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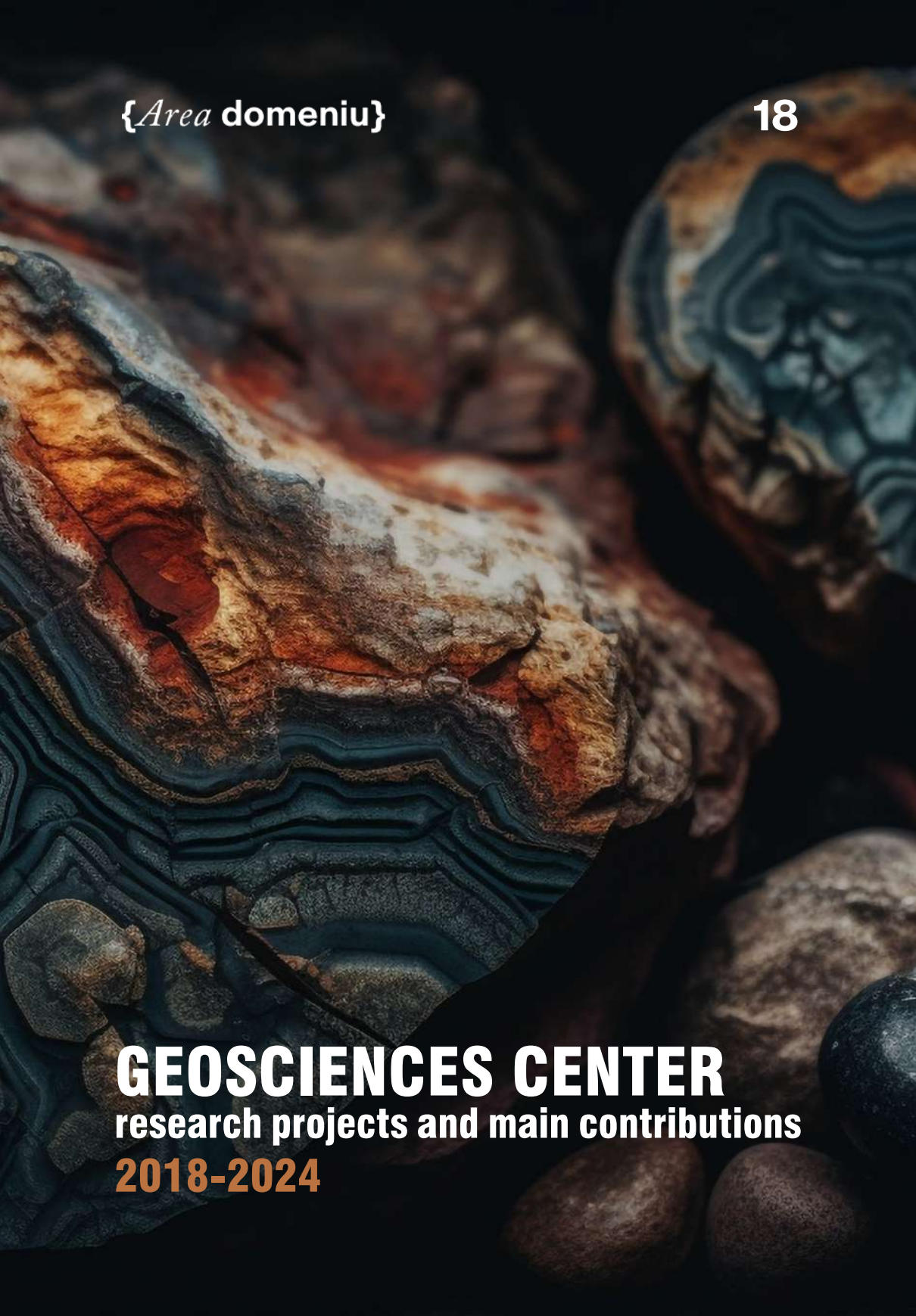

GEOSCIENCES CENTER

research projects and main contributions

2018-2024

Geosciences center

2018-2024 Research Projects and Main Contributions

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Geosciences center

2018-2024 Research Projects and Main Contributions

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Table of contents

Introduction

CGeo (R&D U-73) is a multidisciplinary centre focusing on scientific research and technological innovation, established between 2018 and 2023 as a consortium comprising the University of Coimbra (UC), the Polytechnic Institute of Tomar (IPT), the University of Trás-os-Montes and Alto Douro (UTAD), and the Earth and Memory Institute (ITM). In 2024, UAL also joined as a managing institution. It succeeded the Geosciences Centre at the University of Coimbra, continuing its Geosciences and Humanities framework established in 1975.

Since its inception, CGeo's scope has been to advance from the identification of geo-resources to their innovative utilization and, within a cultural context, to understand societal choices concerning them. This mission justified the initial organization into three main research clusters: Fossil Energy and Sustainable Development, Geotechnology, and Quaternary and Human Adaptations. The 2013-2017 cycle allowed CGeo to consolidate this framework within a sustainability strategy, highlighted by a significant moment of internationalization during the International Year of Global Understanding (2016).

The 2018-2023 cycle further advanced this strategy by integrating analytical and human resources, aligning the drivers of energy, geotechnology, and human adaptations, and enabling CGeo to play an increasingly significant role in international agendas (UNESCO Geoparks, BRIDGES) and scientific organizations (International Union of Geological Sciences, International Union of Prehistoric and Protohistoric Sciences, International Association for Promoting Geoethics, APHELEIA International Landscape Management Association). This period also continued to support the characterization of paleoenvironments, human adaptations, and geotechnical solutions.

The new sustainability paradigm requires overcoming scientific silos, particularly those between the natural and the human sciences, and fostering collaboration to address societal challenges that are both contextual (natural) and cultural (human). This holistic approach to science and culture is embraced by the more than 150 members, over 10% of whom are PhD students and 20% early career researchers (ECR).

In the 2018-2023 cycle, the overall focus was on implementing cross-cutting interdisciplinaryterritory-based projects. These were guided by methodologies from the geosciences and humanities,aligned with Geoethics concerns, and scientific strategies aimed at bridging fundamental and appliedresearch for social transformation. This integrated approach began with the identification of naturalresources, encompassing fundamental research into the planet's biogeological evolution, as well asthe utilization, recycling, and transformation of mineral resources. It then progressed to applyingnovel methodologies for evaluating socio-cultural mechanisms, identifying social needs, and co-designing strategies to address societal dilemmas, including those associated with UNESCOprograms.

CGeo's activities have been aligned with the 17 Sustainable Development Goals (SDGs) and aimed at bolstering cooperation globally,

particularly with countries within the Community of Portuguese-Speaking Countries (CPLP). Noteworthy among the new projects initiated in 2022 but built on earlier initiatives were those focused on research in science education and quality teacher training (SDG 4),studies on gender (SDG 5), access to drinking water and sanitation (SDG 6), the development of sustainable cities and communities (SDG 11), the analysis of earth's and climate evolution (SDG 13),and the investigation and preservation of ancient marine and terrestrial life evidence (SDGs 14 and15).
CGeo includes a larger team of qualified human resources (54 integrated members compared to 39 in the previous cycle), a reinforced analytical platform, a cluster of postgraduate programs, greater internal integration, key responsibilities in relevant international organizations, and a series of ongoing national and international projects, serving an ambitious agenda.

In 2018, CGeo outlined an ambitious strategy focusing on research into sedimentary basins and life evolution, geological resources, and human needs, integrated with assessments of human adaptations. Key contributions include: 1) Discoveries in the field of paleobiodiversity; 2) Advancements in theoretical approaches to geoheritage and geoethics; 3) Development of tailor-made geotechnological solutions; 4) Consolidation of two global networks at the intersection of science and society (UNESCO chairs); and 5) Establishment of a new UNESCO program on sustainability science (BRIDGES).

1) PALEOBIODIVERSITY: Integrated members and postgraduate students conducted high-impact studies in the domain of paleobiodiversity. They developed an interdisciplinary approach that extends beyond traditional systematic studies by interlinking geochronology, paleogeography, and paleoclimatology. Contributions include the descriptions of new genera and species of trilobites,insects, plants, and ichnofossils (Correia et al., 2021; Collantes et al., 2023; Figueiredo et al., 2023), revealing unique behaviors of extinct organisms through new insect-plant interactions (Correia et al., 2020) and dinosaur tracks (Figueiredo et al., 2022). These studies have enhanced our understanding of the biodiversity and ecosystems of earth's past. Attention was given to extreme events and their effects on biotas, including human responses in the Quaternary. A significant contribution was the study of surviving communities after the great Hirnantian (Ordovician) glaciation, through the description of the first assemblages of the Hirnantia Fauna in Portugal (Colmenar et al., 2019) and Belgium (Pereira et al., 2021). These findings revealed a Silurian relict, suggesting that delayed post-glacial effects of rising temperature and sea level in protected settings may have facilitated the establishment of refugia. Additionally, important research was conducted onthe adaptation and modification of floras during the

Carboniferous-Permian transition, influenced by dry conditions and rising oxygen levels (Correia et al., 2021). The group also contributed to paleogeographical reconfigurations of continental masses, a crucial tool for improving historical land reconstructions. For instance, fossil flora provided solid evidence of an Iberian-Appalachian connection in the Late Carboniferous (Correia & Murphy, 2020), and early Cambrian trilobite communities supported strong links between the West Gondwana domain and Avalonia (Collantes et al., 2021), generating key information for international and regional correlations (Collantes et al., 2022).

2) GEOHERITAGE AND GEOETHICS: As fundamental research at CGeo is strongly related to fieldwork and the analysis of fossil remains, our team has developed extensive expertise in heritage-related issues (e.g., Henriques & Reis, 2021), ranging from the coordination of science museums to considerations of Geoethics. CGeo has sought to address conceptual issues related to the theoretical foundations of Geoconservation, such as community involvement (Ferraro et al., 2020), thereby consolidating this field as an emerging geological science at the interface with the Humanities (Freire-Lista, 2021). Members have solidified their roles in leading international organizations, such as the IUGS International Geoscience and Geoparks Programme, actively contributing new knowledge (e.g., Martini et al., 2022). Significant progress has also been made inidentifying, evaluating, conserving, enhancing, and monitoring materials, sites, and territories within dubitable geological (including archaeological) heritage, which has occasionally led to notable ancillary advancements, such as the collective study on lactose (Evershed et al., 2022). Among these, research into the assessment of contamination caused by mining near the Cabo Mondego Natural Monument in Central Portugal, in low-density territories (Henriques et al., 2020, in NE Brazil), as well as studies in African countries (São Tomé and Príncipe), (Neto & Henriques, 2023) andt hose involving evidence of early human settlements (e.g., MSA of Africa, Pereira et al., 2023), are particularly noteworthy. PhD students are involved in projects that have strengthened partnerships with researchers and institutions from all Portuguese-speaking countries, leveraging the cultural affinities they share. These partnerships have also helped reduce inequalities in the production andinternational dissemination of scientific knowledge, aligning with SDGs 4, 11 and 17. Contributions to Geoethics have been made in line with these efforts (Sjursen & Oosterbeek, 2023), and CGeo is also part of the CIPSH Chair in Geoethics, recently approved and affiliated with the International Association for Promoting Geoethics.

3) GEOTECHNOLOGICAL SOLUTIONS: Designing geotechnological solutions has always been a core component of CGeo's activities. Our approach to sustainability emphasizes the importance of framing needs, interacting with local specific contexts, and providing solutions that contribute to the well-being of communities (e.g., Jambon et al., 2023). This involves crafting tailor-made solutions to address geological/geotechnical challenges, such as the stability of slopes in construction areas, and monitoring mining impacts (Antão et al., 2023; Fernandes et al., 2023), as well as capacity-building projects (Jesus & Quinta-Ferreira, 2023). Integrated members and postgraduate students have contributed responsibly for innovative solutions to tangible challenges faced by local communities and institutions, both in Portugal and worldwide (e.g., Guinea-Bissau, Senegal, and East Timor). Key initiatives include the extraction and management of ornamental stone, employingnew tools that have enhanced

quarry operations through field mapping, block modeling, and aerial photogrammetric surveys, aimed at maximizing quarry yield and reducing environmental impacts by minimizing waste volume (Bogdanowitsch et al., 2022). Research about the physical and mechanical properties of rocks and their weathering evolution during artificial aging tests (Freire-Lista, 2023; Sousa et al., 2021; Trovão et al., 2020; Valido et al., 2023) have also been crucial. Furthermore, novel insights have led to environmental restoration, remediation, reuse, and recycling of materials, including the development of metal toxicity assessment tools, biomonitoring, and metalphytoremediation technologies (Chaturvedi et al., 2021; Favas et al., 2023), the utilization of stone-cutting waste in new materials (Bruschi et al., 2022), and innovations in separation processes toimprove recycling of plastics and e-waste (Pita & Castilho, 2020).

4) UNESCO CHAIRS: CGeo's research has been significantly enhanced through the establishmentof two major global networks. The UNESCO Chair on Geoparks, Sustainable Development, and Healthy Lifestyles, hosted by UTAD, is a global research and innovation network that has been instrumental in establishing many of the 195 geoparks across all continents (Rosado-González etal., 2021), contributing to the expansion of the concept, refining its quality assurance criteria, and defining its monitoring criteria. The UNESCO Chair in Geoparks annually develops the International Summer University on Geoparks, where students engage in innovative practices and apply theoretical knowledge to real-world scenarios and best practices. CGeo members are integral to the coordination of several relevant projects and publications, establishing geoparks as a global realityand a major tool for sustainability. Concurrently, CGeo's emphasis on the interface between geosciences and humanities forms the basis of another UNESCO Chair on Humanities and Landscape Management (Oosterbeek, 2019), hosted by IPT. This chair involves almost 100 institutions, including universities, research centers, NGOs, local authorities, and private companies,with branches in Brazil and Cabo Verde, closely linked to CPLP networks (Oosterbeek & Gomes, 2022). This strategy, which includes an Erasmus Mundus Master on Cultural Landscapes and a novel online PhD on Heritage, Technology and Territory (Silveira & Oosterbeek, 2023), has a profound impact on sustainability science. This is exemplified by the Lisbon Declaration of the European Humanities Conference, endorsed by UNESCO, FCT, and the Portuguese Ministry of Science and Technology, and supported by over 100 global organizations (Oosterbeek et al., 2023).

5) BRIDGES: The most recent contribution from CGeo is the new UNESCO program for sustainability science: BRIDGES (Attala et al., 2023). This program is based on the "Mação Declaration," which was endorsed in 2019 by more than 20 coordinators of international programs and UNESCO, following an invitation from our team. It proposed the creation of a UNESCO programto facilitate the engagement of human communities in co-constructing knowledge about their environments, promoting an understanding of the planet not merely as a system, but as a web of meanings that influence human actions. Research into historical perceptions of the landscape, including its symbolic aspects as demonstrated in rock art (Garcês & Nash, 2023) and other prehistoric remains (Scarre & Oosterbeek, 2020), along with community involvement in landscape mapping (Soares, 2023), has broadened the scope of scientific data available through participatory science strategies. BRIDGES develops best practices and protocols for operating, co-designing, and co-implementing science-based sustainable landscape

management practices. Established by UNESCO, the program includes a CGeo coordination team member on its Governing Council. During its preparatory phase, nearly 50 site-based projects were initiated, with the CGeo team involved in approximately 50% of them, notably through students' applied projects across Europe, Africa, South America, and Asia. The program currently aims to recognize 100 contexts within one year.

Stepping forward, CGeo is committed to delivering projects and research outputs through transversal integrated approaches with a special emphasis on benefiting society, capacity-building, and the advancement and sharing of knowledge, emphasizing N-S and S-S cooperation. The Activity Plan for 2025-2029 addresses fundamental questions embedded in a geoethical approach: the Earth's evolution and its geosystems; the characterization, transformation, and responsible use of geological resources; and the understanding of human adaptive strategies with a focus on heritage and land management.Research is now organized into three Greater Thematics, ranging from fundamental Geosciences questions, to concrete applied Geosciences topics and to societal applications and human activities, briefly described below:

GT1 - Geosystems and Earth Evolution focuses on fundamental geosciences and aims to deepen our understanding of the complex interactions among Earth's various geosystems and their role in shaping the planet's evolution, particularly the continental crust and life. It integrates two major topics: 1A. Plate Tectonics, Continental Crust, and Paleogeography; and 1B. Paleoclimate, Paleoenvironments, and Species Adaptation. An ERC starting grant will promote research under topic 1A over the next five years.

GT2 - Geo-resources, Geomaterials, and Environment focuses on solutions for the responsible use of geological resources, linking socioeconomic and environmental perspectives throughout the lifecycle of resources, from prospecting of raw materials to recycling. It is strongly aligned with the EU and UNESCO goals through four programs: 2A. Water; 2B. Mineral Resources and Circular Economy; 2C. Energy Transition and Geo-resources; and 2D. Engineering Geology and Geomaterials. The research will be strongly anchored in existing and new partnerships with the private and public sectors (e.g., Portuguese Environmental Agency), seeking funding support such as the Water4All Horizon Europe programme (ongoing application).

GT3 - Heritage and Land Management operates as a transversal group that bridges science and society (social innovation and creative economy), through interactions with GT1 and GT2 and three programs: 3A. Geoarchaeology and Prehistory; 3B. Territories and Integrated Landscape Management; and 3C. Geoheritage and Geoparks. Two UNESCO chairs and a CIPSH chair provide prominent international networking for all these avenues, with a very strong societal impact, which was already characteristic of the previous funding cycle.

GEOSCIENCES CENTER

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&T1 geosystems and earth evolution

The group has a long record in the dimension of knowledge regarding traditional disciplines including Paleontology, Micropaleontology, Biostratigraphy, Sedimentology, Sedimentary Petrology, Seismic Stratigraphy, Basin Analysis and Hydrocarbon Exploration to develop and improve the knowledge on the sedimentary record of Portuguese onshore and offshore basins and characterize natural resources for further application in a sustainable perspective.

In the last cycle, the group has made highly relevant contributions in several areas:

1) A leading area of research for our group is paleobiodiversity, where we have significantly advanced understanding of earth's past biodiversity and ecosystems. This includes describing new genera and species of trilobites, insects, plants, and ichnofossils. Additionally, these studies have unveiled new behaviors of extinct organisms, such as insect-plant interactions and dinosaur tracks. These contributions have laid the foundation for other high-impact studies, also led by members of our group, which explore paleoenvironmental, paleogeographical, and paleobiological implications of the occurrences and disappearances of such groups in constant adaptation to changing earth systems.

2) Our group has also made substantial contributions to the characterization of paleoenvironments and the identification of extreme events in the geological record. One study reported the survival of communities following one of the largest glaciation events during the Ordovician, through the description of the first assemblages of the Hirnantia Fauna in Portugal and Belgium. This research altered our understanding of the temporal distribution of these organisms, as evidenced by a Silurian relic likely linked to delayed post-glacial effects of rising temperatures and sea levels in protected settings. Moreover, significant advances have been made in studying the adaptation and modifications of floras during the Carboniferous-Permian transition. Ongoing work in this area has uncovered strong evidence of a unique record of paleo-wildfires during the Late Carboniferous, at a time when the territory was part of an intracontinental setting on a large dry landmass.

3) Integrated members of GT1 have made relevant contributions using multiple proxies as indicators of the evolution of landmasses over time, including the paleogeographical configuration of continental masses and their lithospheric evolution. We highlight three publications: i) paleobotanical work providing firm evidence of an Iberian-Appalachian connection in the Late Carboniferous during the formation of Pangea; ii) studies of Early Cambrian trilobite assemblages that support strong links between the West Gondwana domain and Avalonia, generating key information for international and regional correlation of this period; and iii) the application of multi-mineral, multi-technique approaches to the detrital mineral record to unravel the tectonic settings that have shaped the evolution of sedimentary environments and the continental crust, and the development of new proxies to track crustal and tectonic processes through time.

The Greater Thematic 1 (GT1) research group contributes to a better understanding of the interactions between the different geosystems in an integrated view of the Earth's evolution. There is a strong focus on the interactions between different Earth systems, particularly those that led to the evolution of the continental crust and life. Members contribute to two main programmes: 1A. Plate tectonics, continental crust and palaeogeography and 1B Palaeoclimate, palaeoenvironments and species adaptations.

1A. PLATE TECTONICS, CONTINENTAL CRUST AND PALAEOGEOGRAPHY

The 1A. programme seeks to unravel the geological processes that have shaped the lithosphere over time. Through multidisciplinary approaches and multiscale observations, it helps to interpret:

i. Secular evolution of tectonic plates;

ii. Palaeogeography and the cycles of the palaeocontinents;

iii. Formation and evolution of mountain ranges;

1.B. PALAEOCLIMATE, PALAEOENVIRONMENTS AND SPECIES ADAPTATIONS

Programme 1B. looks at the intricate evolution of terrestrial ecosystems and how life forms, from individual species to entire ecosystems, have responded to changes in climate and geodynamic forces.

It also carries out exhaustive surveys of sedimentary basins to assess palaeoenvironmental conditions and tectonic histories and explores the prospectivity of resources. Areas include:

i. Palaeoclimate evolution and change

ii. Analysing sedimentary basins

iii. Palaeobiology and taphonomy

iv. Great species extinctions

In line with the aims of CGeo, the group promotes scientific, educational and social development by developing new approaches to scientific challenges and promoting knowledge transfer. This integrated understanding of Earth systems supports education for sustainability, a key CGeo objective. The group specialises in the dynamics of marine paleocommunities and analyses paleobiodiversity (SDG 14), and works to protect and sustainably use ancient terrestrial ecosystems (SDG 15). In addition, it contributes to societal development by characterising geological resources for reuse in tourism and hospitality.

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T2 | geo-resources, geomaterials and environment

GT2 | geo-resources, geomaterials and environment

The activities of GT2 are based on a strong link between geoscientific research and the transfer of knowledge to engineering and society. The main areas of interest are the development of knowledge and competences to find, characterise, process and (re)use geological materials (soil, rock, raw materials and water), to promote the protection and rehabilitation of the environment and to enhance the conservation of the stone heritage. These areas are fundamental to the development and success of societies and are certainly one of our most important challenges for the future.

In the last cycle the main contributions of GT2 were:

1) New forms of environmental rehabilitation and the valorisation of exploration by-products that help to reduce the need for new resource extraction and move towards the goals of zero waste and zero pollution. Key outcomes of GT2 include the development and application of metal toxicity assessment tools, biomonitoring and metal phytoremediation technologies. This includes the identification of endemic plants that hyperaccumulate heavy metals and metalloids for use in bioremediation of contaminated sites and phytomining. Other advances include optimising stone block sizes and assessing the physico-mechanical properties of rocks to increase quarry yield and reduce waste; using or incorporating exploration waste in the production of new materials; designing and implementing environmental monitoring plans for water and indoor radon; contributing to land management and restoration through geomorphic restoration of lands degraded by human activities; and applying separation processes used in mining to the beneficiation of ores and recycling of industrial and urban wastes, including plastics and metals.

2) Working with national and international stakeholders to provide tailored solutions and generate new data. Notable examples include Working with the Government of East Timor to establish cooperation protocols and develop geoscience projects that have led to improved characterisation of regional bedrock geology; working with the Portuguese Environment Agency to investigate the chemical composition of fresh surface and groundwater in central Portugal and to produce the national radon risk map; optimising extraction processes in partnership with the National Association of Mining and Processing Industries and ornamental stone companies; assisting local and regional authorities with geotechnical studies for the construction of new roads and new engineering structures; characterising the deterioration of geological materials used in historic buildings, monuments and sacred art; and designating Ançã Limestone as a World Heritage Stone Resource under UNESCO IGCP Project 637.

3) Capacity building and international cooperation in the field of sustainable use of mineral resources was also a focus of GT2 members, who participated in capacity building projects funded by Erasmus+ (SUGERE and GEODES) and within the framework of the Strategic Cooperation Programmes of Instituto Camões (SURGE CPLP).

Greater Thematic 2 (GT2) aims to investigate and develop solutions that promote the sustainability of geological resources, linking socio-economic and environmental perspectives throughout the life cycle of resources, from extraction to recycling. Members contribute to 4 main programmes: 2A. Water, 2B. Mineral resources and circular economy, 2C. Transition and Energy Resources, 2D. Engineering Geology and Geomaterials.

2A. WATER

Its object of study is water, its temporal and spatial variability and the diversity of the hydrogeological systems in which it occurs. Its research is structured around two themes:

i. Modelling hydrogeological systems

ii. Water, environmental monitoring and climate change

2C. TRANSITION AND ENERGY RESOURCES

Addresses issues related to territorial energy matrices for the responsible and sustainable development of regions and communities. It comprises two themes:

i. Petroleum systems, hydrocarbon exploration and sustainability

ii. Geothermal energy

2B. MINERAL RESOURCES AND THE CIRCULAR ECONOMY

It contributes to a more circular economy by developing research that follows the life cycle of mineral resources, from the prospecting of raw materials to the recycling of waste. This programme is organised around four themes:

i. Prospecting and characterisation of mineral resources

ii. Optimisation of exploration

iii. Remediation and environmental recovery

iv. Mineral valorisation and beneficiation

2D. ENGINEERING GEOLOGY AND GEOMATERIALS

It focuses its research on the border between geology and engineering, studying the behaviour and deterioration of geological materials and their interaction with engineering works. This programme has four themes:

i. Acquisition and management of geospatial data

ii. Geomechanical behaviour of materials

iii. Geotechnical risks and solutions

iv. Deterioration of geomaterials

The CGeo GT2 group brings together geoscience, engineering, and technology experts committed to using geotechnology to provide sustainable solutions to local challenges. Their multidisciplinary approach focuses on improving water quality and minimising environmental impacts (SDGs 6.3-6.6, 15.1), promoting resource availability, energy efficiency and the circular economy (SDGs 12.2, 4, 8), and enhancing the resilience of the built environment in harmony with natural systems (SDGs 11.3, 7).

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T3 | heritage and landscape management

Humans are part of evolution, adapting and, in such process, transforming, their contexts. But such transformative processes are actually unequal, operating at different levels, from moments of fast change to times of near immobility, from phases of growing interaction and intensification to stages of segregation, from sequences of apparent equilibrium to disruptive events. Humans are not different from other living species, or from rocks, in that respect, even if time and space scales might be distinct.

The core of research on human adaptations throughout the quaternary, within CGEO, is to assess human transitions, focusing on the relation between resources, their transformation, the related logistics, the social access to knowledge and products and the cultural understandings of all these processes. Geosciences (geoarchaeology, dating, etc.) seat as the backbone of such a research strategy that builds into paleotechnology, paleoeconomy, paleoecology and paleoethnology, these allowing for then bridging with contemporary concerns on landscape management and sustainability. As a result, our research privileges the integrated study of territories, and, within them, of resources, technologies (on lithics, ceramics, metals, organic materials), their results (from tools to rock art, dwelling or food) and the mechanisms of sociocultural exchange and transformation of knowledge and products. Because we know that human behavior varies beyond the variability of resources and other contextual variables, CGEO engages in comparative assessments in different continents. Ongoing projects are undertaken by our Centre in Europe, Latin America, Africa and Asia.

This allows to identify common structural approaches despite cultural differences: from the assessment of Pleistocene and Holocene macrolithic industries of the Tagus and Uruguay valleys, to the importance of the representation of deers in the art of societies in transition to production economies in southern Europe and northeast Brazil, or to the function of rock art in the landscapes of the Iberian peninsula and the Ebo valley in Angola. From this, we discuss main structural drivers of human transitions, which are of use for contemporary landscape management projects. This is why we have engaged in heritage management and museography, but also into the cooperation with international projects like CIPSH-UNESCO World Humanities Conference, the International Year of Global Understanding or the UNESCO project on Broadening Sustainability Science, Geoconservation and Geoscience Education programmes.

Research will pursue in the years, attempting to improve knowledge on past societies, developing new models of heritage management and education, and pursuing to resume a central role for such a humanities and geosciences integration for landscape sustainable development.

Greater Thematic 3 (GT3) research group operates as a transversal group linking science and society (social innovation and creative economy), through interactions between the GT1 and GT3 theme and its three main programmes: 3A. Geoarchaeology and Prehistory, 3B. Territory and Integrated Landscape Management, 3C. Geopatrimony and Geoparks.

3A. GEOARCHAEOLOGY AND PREHISTORY

The core of Quaternary studies continues, focusing on transitional processes, e.g. climate-environment oscillations and human adaptations, with great attention to transitional processes (e.g. Late Middle Palaeolithic/MSA, Neolithic or contact societies) and rock art archaeology. Research regions: SW Europe, the Atlantic seaboard of sub-Saharan Africa and sub-Amazon South America:

i. Cultural transitions in the late Pleistocene and early and middle Holocene
ii. Rock art archaeology
iii. Coastal archaeology

3B. TERRITORIES AND INTEGRATED LANDSCAPE MANAGEMENT

Focus on the assessment of landscape management in past and contemporary societies, addressing the challenges within the SDG agenda and promoting a geoethical approach to land management. It develops protocols and indicators centred on the factors of slow geological and geomorphological change and human interactions beyond short-term variations, also incorporating applications such as games, storytelling and AI:

i. Landscape identification and management
ii. Geoethics
iii. Cultural landscapes and the multisensory construction of space

3C. GEOLOGICAL HERITAGE AND GEOPARKS

The 3C programme advances geological heritage through three main efforts: developing geopatrimony concepts and models for scientific and transdisciplinary use; supporting the UNESCO Geoparks Network expansion (including a UNESCO Chair at UTAD); and creating geoconservation solutions: i. Geoparks, geological and cultural heritage; ii. Geoconservation; iii. Education and literacy in Geosciences

The CGeo GT3 group brings together a multidisciplinary team of researchers from the fields of geosciences, archaeology, tourism, landscape studies, cultural heritage, conservation and education acts as a bridge between science and society, focussing on social innovation and the creative economy. Operating transversally, GT3 establishes important interactions with the research areas of GT1 and GT2, contributing to solutions that combine scientific knowledge with social impact.


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RESEARCH PROJECTS

Characterization of the Portuguese continental Carboniferous from the paleontological, paleoclimatic and paleoenvironmental point of view

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PROJECT TYPE: Research Project

COORDINATION (OR SUPERVISION): Pedro Correia

TEAM: Pedro Correia, Artur A. Sá, Zélia Pereira, Sofia Pereira, Eugenia Romero Lébron, André Nel, André Jasper, Christopher J. Cleal, and Zbyněk Šimůnek.

INSTITUTIONS INVOLVED: University of Coimbra, Geosciences Center, Department of Earth Sciences (Portugal), Department of Geology, University of Trás-os-Montes e Alto Douro, Vila Real (Portugal), Laboratório Nacional de Energia e Geologia (LNEG), S. Mamede de Infesta (Portugal), Universidad Nacional de Córdoba (Argentina), Muséum National d'Histoire Naturelle, Paris (France), Universidade do Vale do Taquari, Univates, Lajeado (Brazil), School of Earth Science, University of Bristol, Bristol (UK), Czech Geological Survey, Prague (Czech Republic).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 13 and 15.

PROJECT GOALS: There is a broad consensus that modern climate change is resulting in an increasingly warmer and drier climate. Iberia in particular seems to be undergoing aridification as a result of climate change. We may gain insights into the future of plant biodiversity in Iberia by studying a critical interval in geologic time in which a similar rapid climate change occurred. In this project, we intend to conduct detailed studies to quantify the dominance, decline, absence or disappearance in the fossil record of the different plant groups for the wetland and dryland settings (climatic biomes), and to provide detailed reconstructions of the resident flora and fauna, climate and landscapes in the Portuguese continental Carboniferous. The data obtained from these studies will be used to estimate the plant biodiversity before and after late Paleozoic climate change occurred in Iberia as a template for biodiversity and adaptation of plant ecosystems during future change and its implications for the natural heritage conservation and sustainable science.

RESULTS: Our preliminary studies carried out in the Carboniferous of Portugal provide strong evidence of a warm and dry climate with the discovery of dry-climate adapted floras. A high number of drought-tolerant floras has been documented in the Portuguese Carboniferous. These floras are preserved in the fossil record in a Carboniferous-Permian geological transition, which coincided with a climate change to a warming period. These paleobotanical proxies provide valuable insights into the evolution of climate in Iberia during that time interval. In addition, various new floral and faunal fossil-taxa have been identified which demonstrate that the late Paleozoic biodiversity of Iberia is still underestimated or misunderstood.

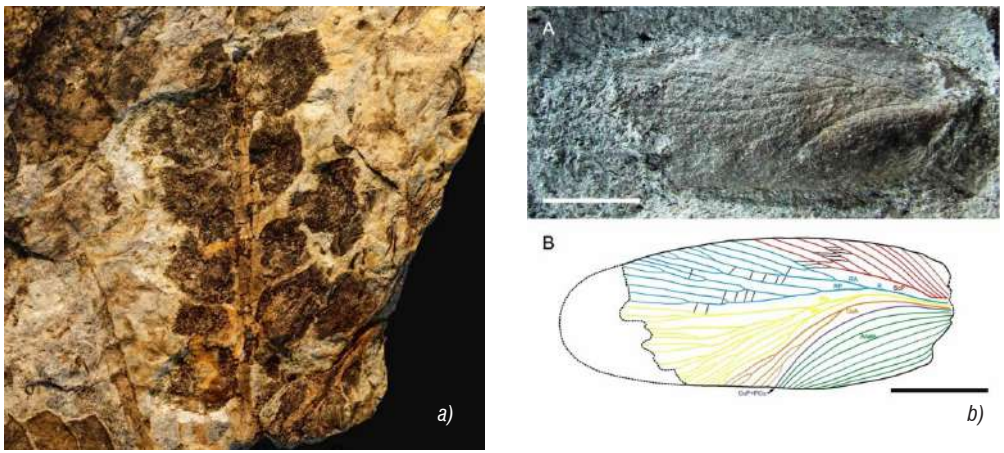

Fig 1. (a) Florinanthus bussacensis sp. nov. (from Correia et al., 2023a) and (b) Poroblattina anadiensis sp. nov. (from Correia et al., 2023b).

OUTPUTS:

Communications:

1. Correia, P., Pereira, S., Šimůnek, Z. & Cleal, C.J. 2023a. Florinanthus bussacensis sp. nov., a new cordaitalean cone from the Upper Pennsylvanian of Portugal. Review of Palaeobotany and Palynology, Vol. 316, 104942. https://doi.org/10.1016/j.revpalbo.2023.104942.

2. Correia, P., Pereira, S., Cavaleiro, M., Correia, M., Sá, A.A. & Nel, A. 2023b. The first poroblattinid roachoid from the uppermost Carboniferous of Portugal. Historical Biology, 35, 242–248. https://doi.org/10.1080/08912963.2022.2032030

Geological Mapping of the Buçaco Syncline

Tim Young[1,2], and Sofia Pereira[1*]

[(1)]Centro de Geociências, Universidade de Coimbra, Coimbra, Portugal

[(2)]GeoArch, Caerphilly, UK

*ardi_eu@hotmail.com

PROJECT TYPE: Research Project

Principal Investigador/ Coordination: Tim Young & Sofia Pereira

TEAM: Tim Young, Sofia Pereira, Jorge Colmenar, Miguel Pires, Ícaro Dias da Silva

INSTITUTIONS INVOLVED: University of Coimbra (Portugal), GeoArch (Wales, UK.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 8, 11 and 15. The use of geological sciences to identify mineral and rock resources, for a variety of uses and using geology and landscapes within tourism, aiding the conservation of geodiversity and building a greater understanding of those communities living and working around geological features.

PROJECT GOALS: this project is undertaking the first modern revision of the geological map of the classic Lower Palaeozoic strata of the Buçaco Syncline. Parts of the syncline were mapped at 1:10,000 scale in the 1980s and 90s by one of us (TY). This project aims to build on the earlier work and to complete the entire map, with updates where exposure has changed with the construction of new roads and other infrastructure. During the mapping process, the stratigraphy is being revised and refined. All the previous data are being converted to digital records. The goal is to publish a revised map of the syncline at a minimum of 1:25,000 scale.

RESULTS: Fieldwork between 2021-2024 has focused on the most structurally complex areas: 1, the western limb between Espinheira and Covelo and 2, the area around Penacova. In both areas high-resolution lithostratigraphy and detailed collection of fauna has produced new understanding of the complex faulting. The detailed mapping is also clarifying the complex lateral relationships between the Upper Ordovician volcanic sequence, the carbonates that are the local expression of the late Katian global warming Boda Event, and the deposits associated with the Hirnantian glaciation.

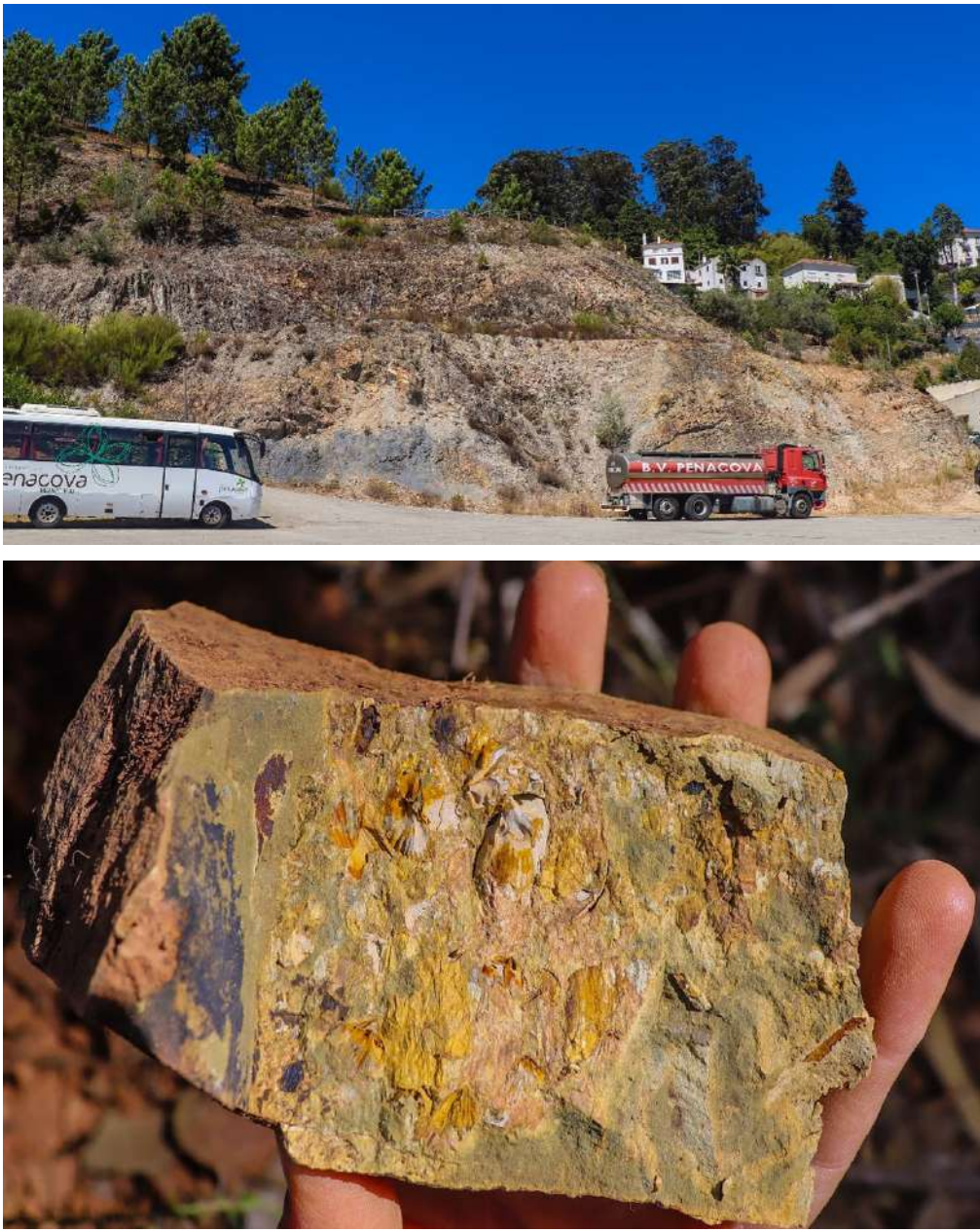

Fig 1. (a) the highly tectonised core of a subsidiary fold in Penacova, with Lower Ordovician quartzites containing lenses of Middle Ordovician mudstones, (b) careful collection of fossil fauna permits a high-resolution stratigraphy, here with an assemblage related to the cold water 'Hirnantia fauna' (Ribeira do Braçal Fm) from immediately below diamictites of the Casal Carvalhal Fm.

Fingerprinting cold subduction and plate tectonics using key minerals (FINGER-PT)

Inês Filipa Pereira[1*]

[(1)] Universidade de Coimbra, Centro de Geociências, Departamento de Ciências da Terra, Coimbra, Portugal

*ines.pereira@dct.uc.pt

PROJECT TYPE: Research Project, GAP101117053 (European Research Commission, Starting Grant 2023)

PRINCIPAL INVESTIGADOR/ COORDINATION: Inês Pereira

TEAM: Patrícia João (still recruiting other team members). Main collaborators also include Pedro Dinis, Kenneth Koga, Emilie Bruand, Eric Thiessen, Matteo Alvaro and Joseph Gonzalez

INSTITUTIONS INVOLVED: Universidade de Coimbra; Universitè d'Orleans (France).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): SDG 4: Quality Education; SDG 17: Partnerships for the Goals.

PROJECT GOALS: The main goals of this project are: i) to apply both the existing and newly developed petrogeochemical and thermobarometric tools to obtain P-T-t conditions from single grains applied to garnet, rutile and titanite; ii) to systematise and provide new constraints on rutile trace element diffusion and behaviour in the presence of aqueous fluids, to optimise trace-element based discrimination tools applied to rutile; iii) to study the survival of eroded LT-HP terranes via multi-proxy mineral analyses in modern sediments; iv) to trace LT-HP metamorphism in the geological record using exceptional (meta) sedimentary rocks of Precambrian age (> 1.0 Ga).

RESULTS: Since the project officially started in May 2024 there are no scientific outcomes yet. However, in October 2022 we were able to run single crystal X-ray diffraction on quartz inclusions in rutile and obtain cell parameters (PI of the session: Joseph Gonzalez). Two field campaigns took place in the Alps to collect rock samples and stream sediments (summer 2023; summer 2024; Fig. 1). These stream sediment samples will be part of the PhD project that is starting in October/November 2024, and the other samples are part of WP1 and WP2 (Fig. 1a). Six samples that were collected in 2023 were already processed by Tiago Simões, a BSc student that worked as my intern between March and June 2023 (Fig. 1b). Preliminary work shows that the sediments in the Arc river are more enriched in heavy minerals than the Isère, and that garnet and titanite are present as heavy minerals, but no rutile was found in the four inspected samples. Additionally, minerals such as kyanite and glaucophane were found (Fig. 1c). Changes in the heavy mineral concentration in both rivers was also observed as a function of distance and fraction, with the 2.5-3Φ fraction being the most enriched.The projects for the installation of three instruments in two labs are also undergoing, one of the labs will work for in-situ isotope geochemistry (Geochronosi), while the second will be dedicated to electron imaging and Raman spectroscopy (i-microscale).

Fig 1. Samples recovered within the project, a) an augen gneiss, b) stream sediments; c) optical image of a heavy mineral fraction showing glaucophane in PPL (center).

OUTPUTS:

Invited speaker at Seminars/conferences/events:

1. Pereira, I. 2023. What does a grain of sand conceal? Inovação@UC, Coimbra, Portugal

2. Pereira, I. 2024. Tiny but timely. The contribution of detrital heavy minerals to unravelling geodynamic processes. SSAGI, Búzios, Brazil

3. Pereira, I. 2024. Tracing subduction zone metamorphism using rutile and titanite. Research seminars of Ruhr-Universität Bochum, Bochum, Germany.

Communication at conference:

Pereira, I., Bruand, E., Koga, K., Nicollet, C., Vitale-Brovarone, A. 2024. Stability and chemistry of rutile and titanite in metamafic rocks. 7th Orogenic Lherzolite Meeting, Oviedo, Spain.

High Resolution Biostratigraphy of the Iberian Jurassic

Maria Helena Henriques[1*] and María Luisa Canales[2]

[(1)]University of Coimbra, Geosciences Center, Department of Earth Sciences, Coimbra, Portugal

[(2)]Department of Geodynamic, Stratigraphy and Paleontology, Faculty of Geological Sciences, University Complutense of Madrid, Madrid, Spain

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PROJECT TYPE: Research Project

COORDINATION: Maria Helena Henriques

TEAM: Maria Helena Henriques; María Luiza Canales; Sílvia Silva

INSTITUTIONS INVOLVED: University of Coimbra (Portugal), Complutense University of Madrid (Spain) and Federal University of Rio de Janeiro (Brazil).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4, 14, and 17.

PROJECT GOALS: to deepen knowledge about the fossil assemblages recorded in the Lower-Middle Jurassic rocks of Iberia; to improve the established zonal scale based on different fossil groups; to characterize the paleoenvironments on which these assemblages were developed during the Early Aalenian–Early Bajocian and Late Bajocian-Early Bathonian; and to compare the results among coeval sections of the Iberian Peninsula.

RESULTS: Detailed biostratigraphic scales well calibrated with the standard ammonite scale based: on the benthic foraminifera for the Upper Toarcian-Lower Bajocian of Iberian basins; on the dinoflagellate record for the Upper Toarcian-Lower Bathonian of the Lusitanian Basin; and on the calcareous nannoplankton for the Upper Bajocian-Lower Bathonian of the Lusitanian Basin.

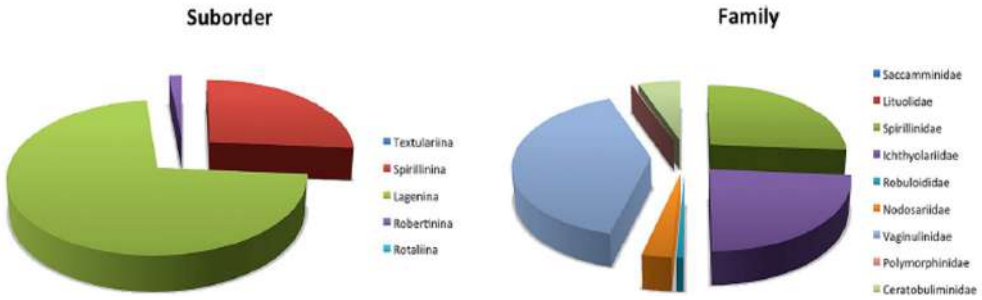

Fig 1. Relative abundance (percentages) of the Suborders and Families recognized in the Discites Zone, stratigraphic interval in the Barranco de Agua Larga section (Betic Cordillera, Southern Spain) (from Silva et al., 2020).

OUTPUTS:

Articles:

1. Hernández, L., Canales, M. L. & Henriques, M. H. (2018). Response of benthic foraminiferal assemblages to contrasting environments during the Aalenian - Bajocian in the Iberia: a case study from the Talveila section (Iberian Range) and Murtinheira section (Lusitanian Basin), Journal of Iberian Geology, 44: 447–478. [DOI: 10.1007/s41513-018-0067-1].

2. Correia, V. F., Riding, J. B., Henriques, M. H., Fernandes, P., Pereira, Z. & Wiggan, N. J. (2019). The Middle Jurassic palynostratigraphy of the northern Lusitanian Basin, Portugal, Newsletters on Stratigraphy, 52(1): 73-96. [DOI: https://doi.org/10.1127/nos/2018/0471].

3. Silva, S. C., Canales, M. L., Henriques, M. H. & Ureta, M. S. (2020). Benthic foraminiferal assemblages across the Aalenian - Bajocian boundary in the Iberian and Basque-Cantabrian basins (North Spain), Palaeobiodiversity and Palaeoenvironments, 100: 51–78. [DOI: 10.1007/s12549-019-00376-5].

Communications

1. López-Otálvaro, G.-E. & Henriques, M. H. (2020). Bioestratigrafía de alta resolución del tránsito jurásico inferior/medio con amonites y nanofósiles calcáreos de la cuenca lusitánica: implicaciones paleobiogeográficas, Primer Congreso Colombiano de Paleontología, Bogotá, 1 p., http://ciencias.bogota.unal.edu.co/eventos/congreso-colombiano-de-paleontologia/.

2. Correia, V., Riding, J., Duarte, L. V., Henriques, M. H., Fernandes, P., Pereira, Z., Fensome, R. A., Williams, G. L. & Macrae, R. A. (2022). Early and Middle Jurassic palynoevents of the Lusitanian Basin (Portugal) in the proto-Atlantic context, Annual Meeting of the Geological Association of Canada, Mineralogical Association of Canada, the International Association of Hydrogeologists – Canadian National Committee, and the Canadian Society of Petroleum Geologists (CSPG), Halifax, Geological Association of Canada-Mineralogical Association of Canada, Geoscience Canada, Vol. 49, pp. 90-91 (https://journals.lib.unb.ca/index.php/GC/article/view/32966/1882528310).

Make Portuguese Paleozoic Paleontology famous again: let's bring back to life the classical collections and arise the lithostratigraphy of forgotten areas while solving trilobite systematics

Sofia Pereira[1*]

[(1)]Centro de Geociências, Universidade de Coimbra, Coimbra, Portugal
[*]ardi_eu@hotmail.com

PROJECT TYPE: Research Project (CEEC Institucional). Fundação para a Ciências e Tecnologia. CEECINST/00152/2018/CP1570/CT0005 https://doi.org/10.54499/CEECINST/00152/2018/CP1570/CT0005

PRINCIPAL INVESTIGADOR/ COORDINATION: Sofia Pereira

TEAM: Sofia Pereira, Jorge Colmenar, Juan Carlos Gutiérrez-Marco, Isabel Rábano, Tim Young, Miguel Pires, David Holloway, Gonçalo Silvério, Artur Abreu Sá, Nuno Vaz, Carlos Neto de Carvalho, Ícaro Dias da Silva

INSTITUTIONS INVOLVED: University of Coimbra (Portugal), Instituto Geológico y Minero de España-CSIC (Spain), Instituto de Geociencias (CSIC-UCM) (Spain), GeoArch (Wales, UK), University of Cardiff (Wales, UK), Universidade Nova de Lisboa (Portugal), Museums Victoria (Australia), Universidade de Trás-os-Montes e Alto Douro (Portugal), Universidade de Évora, Naturtejo Geopark (Portugal), Instituto Dom Luiz (Portugal).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4, 8 and 17.

PROJECT GOALS: 1) to make available a large amount of paleontological material for grade and post-graduate students; 2) to study geologically poorly known Portuguese areas; 3) to solve trilobite systematic problematics through the study of Cambrian, Ordovician and Devonian assemblages and 4) to study the peri-Gondwana Realm Late Ordovician benthic communities, essential to better understand how critical events (eg. BODA Event; Mass extinction) affected the biotas.

RESULTS: Description of several Ordovician fossil assemblages from Portugal, Spain, Morocco and Belgium, including new species, new occurrences and first occurrences of particular faunas (e.g. Hirnantia Fauna) in some regions. Discovery of the first Ordovician fossils from remote areas in Portugal, detailed geological mapping of the Penha Garcia Syncline (Portugal), discovery of the first Portuguese Silurian trilobites and the first Ordovician trilobites in Andorra. Production of educational content related to palaeontology in Portugal and support for a new palaeontological centre (Centro Paleontológico Nery Delgado).

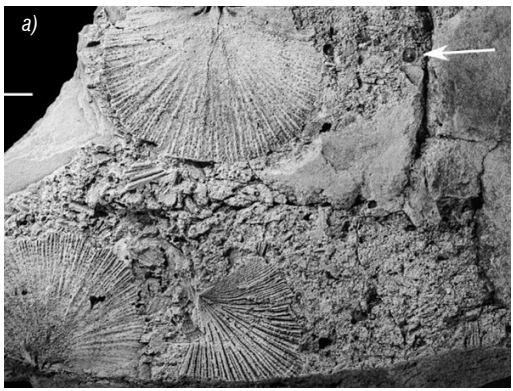

Fig 1. a) Hirnantia Fauna from Belgium and b) Ulugtella? biformis Pereira et al., 2021 from the Ordovician of Morocco (from Pereira et al. 2021 and Pereira et al., 2024).

OUTPUTS:

Articles:

1. Colmenar, J., Pereira, S., Young, T.P., da Silva, C.M. & Sá, A.A. 2019. First report of Hirnantian (Upper Ordovician) high-latitude peri-gondwanan macrofossil assemblages from Portugal. Journal of Paleontology. https://doi.org/10.1017/jpa.2018.88

2. Gutiérrez-Marco, J.C., Pereira, S., García-Bellido, D.C. & Rábano, I. 2019. Ordovician trilobites from the Tafilalt Lagerstätte: new data and reappraisal of the Bou Nemrou assemblage. Geological Society Special Publication, 485. https://doi.org/10.1144/SP485-2018-126

3. Pereira, S., Colmenar, J., Mortier, J., Vanmeirhaeghe, J., Verniers, J., Štorch, P., Harper, D. A. T. & Gutiérrez-Marco, J. C., 2021. Hirnantia Fauna from the Condroz Inlier, Belgium: another case of a relict Ordovician shelly fauna in the Silurian?, Journal of Paleontology, 95(6), pp. 1189-1215. https://doi.org/10.1017/jpa.2021.74.

4. Pereira, S, Rábano, I. & Gutiérrez-Marco, J.-C. (2024). The trilobite assemblage of the "Declivolithus Fauna" (Katian, Ordovician) of Morocco: a review with new data. Journal of Paleontology, Special volume. https://doi.org/10.1017/jpa.2023.77

5. Pereira, S., Colmenar, J., Pires, M., Young, T., Gomes, A., Polechová, M. & Vaz, N. (2021) – Os primeiros fósseis do Ordovícico de Águeda (Aveiro): Implicações lito e bioestratigráficas, Comunicações Geológicas, 108, 135-140 https://doi.org/10.34637/her8-7343

Metamorphism in the Central Iberian Zone

Inês Filipa Pereira[1*], Telmo Bento dos Santos[2,3] and Beatriz Cotrim[2]

[(1)]Universidade de Coimbra, Centro de Geociências, Departamento de Ciências da Terra, Coimbra, Portugal
[(2)]Instituto Dom Luiz, Lisboa, Portugal
[(3)]Universidade de Lisboa, Departamento de Geologia, Lisboa, Portugal
*ines.pereira@dct.uc.pt

PROJECT TYPE: Research Project. No specific funding, although it has benefitted from pluriannual funding from IDL and CGeo and FCT scholarships to B. Cotrim and J. Ferreira

PRINCIPAL INVESTIGADOR/ COORDINATION: Telmo Bento dos Santos

TEAM: Inês Filipa Pereira, Beatriz Cotrim, Vanessa Soares, Joana Ferreira, Pedro Castro

INSTITUTIONS INVOLVED: Inês Filipa Pereira, Beatriz Cotrim, Vanessa Soares, Joana Ferreira, Pedro Castro

SUSTAINABLE DEVELOPMENT GOALS (SDGS): SDG 4: Quality Education; SDG 17: Partnerships for the Goals.

PROJECT GOALS: This is an ongoing project where we have been detailing the metamorphic conditions that have affected the Central Iberian Zone in the Iberian Massif (Fig. 1a). The main goal is to better establish the mechanisms and processes that were responsible for the high-grade metamorphism that took place during the Carboniferous, resulting in the development of several anatectic complexes that are found by tectonic structures, mainly transpressive shear zones. The anatectic events were followed by intense S-type magmatism, which indicates the prevalence of high geothermal gradients. We evaluate the dichotomy between the high volumes of partial melting and the preserved peak metamorphism paragenesis in the anatectic rocks (Fig. 1b).

RESULTS: We have characterized peak metamorphic conditions in two of the five main anatectic complexes, with maximum temperatures reaching 800 ^{o}C and 760 $\pm$ 50 ^{o}C, whilst pressures vary between 8 and 5 kbar. The age of metamorphism and cooling rates are now better constrained, with average cooling rates at 35 ^{o}C.Ma-1 for migmatite ages between 343.7 $\pm$ 2.5 and 314.8 $\pm$ 1.3 Ma. New and compiled petrographic, mineral chemistry and whole-rock geochemistry data combined with phase diagram modelling allowed to evaluate the competing effects of bulk-rock composition and P-T conditions that affected this terrane. Water saturated conditions and a fast isothermal decompression at 750 - 800 ^{o}C are responsible for the high volumes (> 40% melt vol) of anatectic melts, despite the low modal percentages of peritectic garnet or cordierite (0 to 2 vol %).

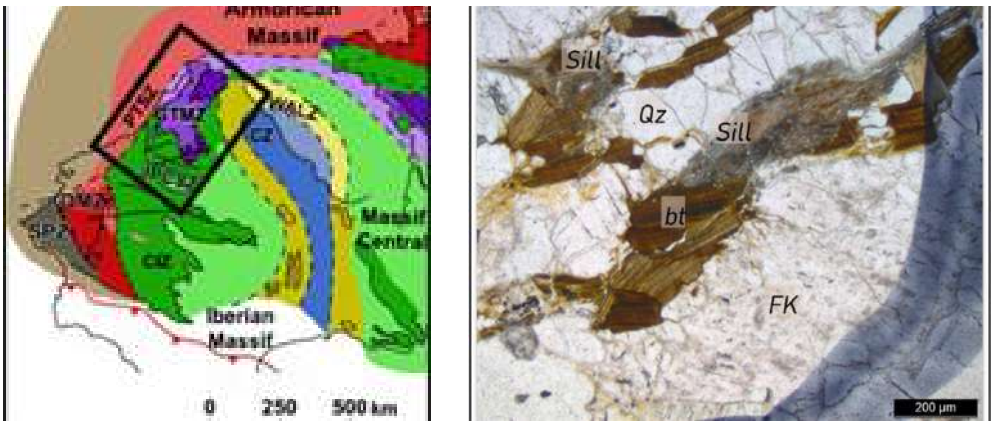

Fig 1. Anatectic complexes in the Central Iberian Zone, a) a simplified structural zone map of the Iberian Massif, b) petrographic image of sillimanite+Fk (PPl).

OUTPUTS:

Article:

1. Pereira, I., Dias, R., Bento dos Santos, T., & Mata, J. (2017). Exhumation of a migmatite complex along a transpressive shear zone: inferences from the Variscan Juzbado–Penalva do Castelo Shear Zone (Central Iberian Zone). Journal of the Geological Society, 174(6), 1004-1018.

2. Bento dos Santos, T., Rodrigues, J. F., Castro, P., Cotrim, B., Pereira, I., Ferreira, J. A., ... & Guimarães, F. (2021). Exhumation of an anatectic complex by channel flow and extrusion tectonics: structural and metamorphic evidence from the Porto–Viseu Metamorphic Belt, Central-Iberian Zone. International Journal of Earth Sciences, 110(6), 2179-2201.

3. Ferreira, J. A., Pereira, I., Bento dos Santos, T., & Mata, J. (2022). U–Pb age constraints on the protolith, cooling and exhumation of a Variscan middle crust migmatite complex from the Central Iberian Zone: insights into the Variscan metamorphic evolution and Ediacaran palaeogeographic implications. Journal of the Geological Society, 179(5), jgs2021-072.

Communication at conference

1. Pereira, I. Bento dos Santos, T., Soares, V., Cotrim, B. Castro, P. 2023. Anatectic granite profusion in the Central Iberian Zone: modelling of melting conditions. XI Congresso Nacional de Geologia, Coimbra (Portugal), pp. 31-32.

2. Cotrim, B., Pereira, I., Bento dos Santos, T., Soares, V., Castro, P. 2024. P-T constraints from pseudosection modelling of the anatectic complexes of the Central Iberian Zone (Portugal). XVI Congresso de Geoquímica dos Países de Língua Portuguesa, Aveiro (Portugal).

Submerged Oasis: Conservation of Coral Reefs (Sergipe) - between Discoveries and Challenges

Priscilla Teixeira Campos[1] and Antônio Jorge Vasconcellos Garcia[2,3,*]

[(1)]Department of Fisheries and Aquaculture Engineering (DEPAQ-UFS), Aracaju, Sergipe, Brazil
[(2)]Federal University of Sergipe (UFS), Progeology Laboratory, Aracaju, Sergipe, Brazil
[(3)]University of Coimbra, Geosciences Center, Department of Earth Sciences, Coimbra, Portugal
*ajvgarcia@academico.ufs.br

PROJECT TYPE: Research Project

COORDINATION: Priscilla Teixeira Campos

TEAM: Priscilla Teixeira Campos, Luana Portz, Jullyana de Souza Siqueira Quintans, Joana Carolina Freire Sandes Santos, Carla Maria Menegola da Silva, Ana Paula Siqueira Dornellas, Edenilce de Fátima Ferreira Martins, Angela Ferreira Schmidt, Cátia Rosana Hansel, Laurent Picot, Raphael Grougnet, Ernesto de Carvalho Domingues, Carlos Augusto França Schettini, Marcelio José Motta, Júlio Cesar Vieira, Antônio Jorge Vasconcellos Garcia, Lucindo José Quintans Júnior and Adriano Antunes de Souza Araújo.

INSTITUTIONS INVOLVED: Federal University of Sergipe (UFS)(Brazil), University of La Rochelle (France), University of Paris Descartes Sorbonne (France), Geosciences Center, University of Coimbra, (Portugal).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 7, 9 and 14.

PROJECT GOALS: Map, monitor and restore newly discovered coral/SE reefs; to assess your health status and pharmacological potential for restoration purposes. We will operate throughout Sergipe, with different strategies, simultaneously, with an interdisciplinary team of scientists, educators and artists, promoting the generation, production and transmission of knowledge to different audiences, from fishing communities to society in general. Therefore, we will seek viable solutions to manage and protect these ecosystems, combined with public policies and international guidelines; creating a simple and replicable socio-environmental model for reef restoration.

RESULTS: Mapping and monitoring the physiographic/geological, biotic, chemical and biochemical aspects of the aquatic environments involved. Oceanographic characterization of reef environments in the State of Sergipe, including analysis of all biota associated with corals. And their respective conservation states. Study of commercial species used to generate income and subsistence and that participate in their life cycle in coral reefs in the State of Sergipe. Training and strengthening of leaders and community groups (young people, women, teachers and traditional communities) to mobilize local actions, articulation in networks and public policies linked to improving the quality of estuaries, beaches and marine and reef environments. Establish appropriate strategies for the restoration and conservation of reef environments in the state of Sergipe.

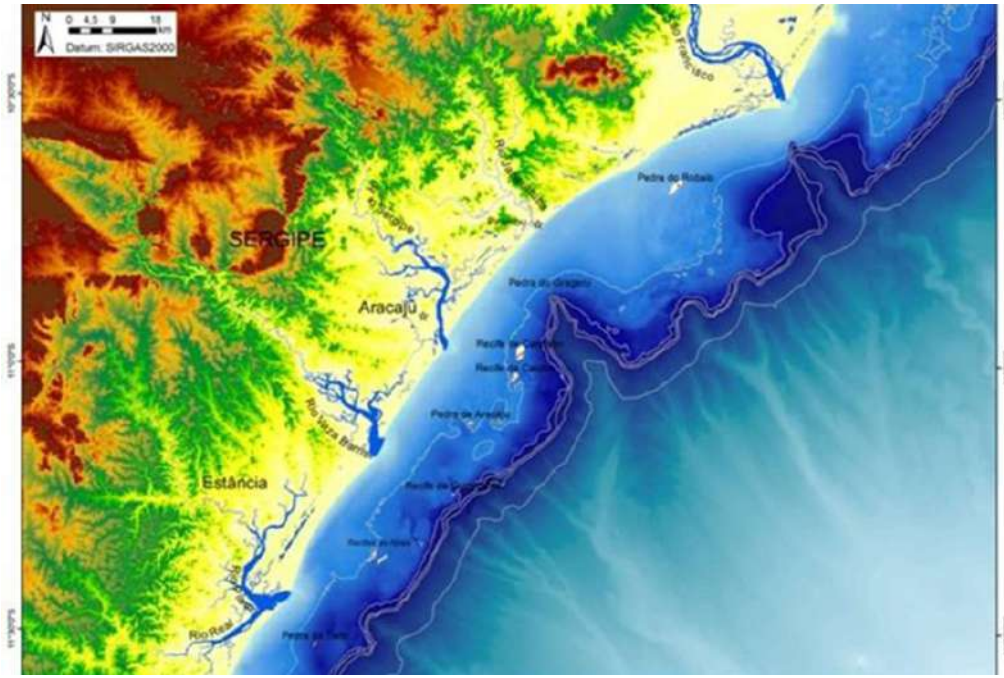

Fig 1. Coral reefs mapped on the coast of Sergipe.

Fonte: <https://www.ufs.br/conteudo/16447-fundo-do-mar-de-sergipe- aprese>

OUTPUTS:

Website

1. Plataforma continental de Sergipe e Alagoas _ Livraria UFS_files https://www.livraria.ufs.br/produto/revista-marseal-edicao-plataforma-continental-seal-volume-1/

Book

1. Carneiro, M.E.R., Arguelho, M.L.P.M. (2018). Plataforma continental de Sergipe e Alagoas. Ciências da Terra e Meio Ambiente, Geologia e Geomorfologia, 445 pp.

ISBN: 978-85-7822-618-3.

The economic geology of the northern Buçaco Syncline / southern Buçaco Basin and its exploitation

Tim Young[1,2,] and Sofia Pereira[1*]

[(1)]Centro de Geociências, Universidade de Coimbra, Coimbra, Portugal
[(2)]GeoArch, Caerphilly, UK
[*]ardi_eu@hotmail.com

PROJECT TYPE: Research Project

PRINCIPAL INVESTIGADOR/ COORDINATION: Tim Young & Sofia Pereira

TEAM: Tim Young, Sofia Pereira

INSTITUTIONS INVOLVED: University of Coimbra (Portugal), GeoArch (Wales, UK)

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 8, 11 and 15. The use of geological sciences to identify mineral and rock resources, for a variety of uses and using geology and landscapes within tourism, aiding the conservation of geodiversity and building a greater understanding of those communities living and working around geological features.

PROJECT GOALS: this is a multi-facetted project to unravel the geological nature of the resources, together with the history and technology of their exploitation. These resources were the objects of some of the earliest mining concessions awarded in Portugal in the 19th century; research aims to shed light on their historical and social context. One strand of the research is identifying the various sources for the iron slags employed in the creation of the embrechados of the Convento de Santa Cruz do Buçaco between the early 17th and 20th centuries.

RESULTS: Research has entailed several distinct strands: (1) examination of the evidence at local and national level for the registration of mineral claims during the late 19th and early 20th century, (2) fieldwork to establish the validity, geology and archaeological evidence for the claimed sites, (3) fieldwork to locate early iron smelting sites, (4) laboratory analytical studies of iron slags and ores to permit provenance studies and (5) trials to obtain radiocarbon dates for the smelting activity from carbonized inclusions. Initial results suggest that the iron ores hosted in the Upper Ordovician volcanic sequence were a regionally significant resource, exploited over a longer period than previously thought.

Fig 1. (a) early 17th century embrechado decoration on the western façade of the Convento de Santa Cruz do Bussaco. The dark component is provided by slag from bloomery iron smelting. (b) detail of embrechado decoration inside the entrance hall of the Convento, showing a block of tapped bloomery iron smelting slag. The chemistry of the slag is compatible with the smelting of iron ore hosted by the Ordovician Porto de Santa Ana Formation, as seen at the ancient smelting sites such as Vinha da Leira Má (Louredo) and 'Pedras Negras' (Vicariça).

OUTPUTS:

Note:

1. Young, T & Pereira, S, in press. The embrechados of the Convento de Santa Cruz do Bussaco, Portugal, The Crucible, Issue 111 (forthcoming).

Vertebrates of the Lower Cretaceous of the Papo-Seco Formation: Diversity and palaeoenvironment context

Silvério Domingues Figueiredo[1*]

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PROJECT TYPE: Research Project. Funding: no Grant, but supported by the Plurianual funding of CGeo and Centro Português de Geo-história e Pré-História.

PRINCIPAL INVESTIGATOR: Silvério Domingues Figueiredo

TEAM: Silvério Domingues Figueiredo; Ismar Souza Carvalho; Pedro Proença Cunha; Xabier Suberbiola; Vanessa Antunes; Patrícia Boto

INSTITUTIONS INVOLVED: Centro de Geociências, Portugal; Centro Português de Geo-História e Pré-História.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4- Provide Quality Education; 13 – Climate Action; 15 – Live on Land.

PROJECT GOALS: Discovery of new fossils of ornithopod dinosaurs in the Papo-Seco Formation; Describe the ornithopod dinosaurs of the Barremian of Portugal and characterize them in the Iberian and European context and make its Paleoenvironmental and paleogeographic implications. Increase the knowledge of the ornithopod dinosaurs of the Lower Cretaceous of Portugal and relate them to the European Lower Cretaceous ornithopods. Frame this fossil record from the paleoenvironmental and paleobiogeographic point of view.

RESULTS: The Ornithopod remains of this project are from the Papo-Seco Formation. This geological formation is attributing to Lower Barremian and the sedimentary record, consisting in limestones, marls, sands and conglomerates, which yielded fossil remains of dinosaurs and other vertebrates. The material is constituted by a set of bones, teeth and footprints. The old material, studied by Lapparent and Zbyzsewski (1957) were restudied (Figueiredo et al., 2022b) and the taxonomy was actualized.

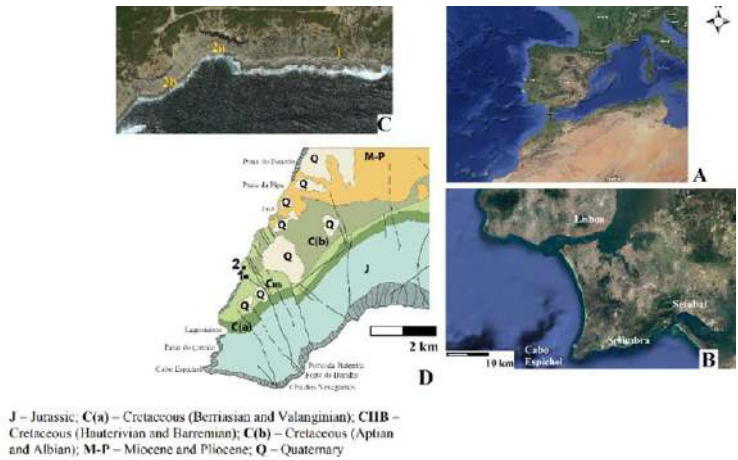

Fig 1. Regional geological map of the Cabo Espichel area with relevant location of the studied site. (from Figueiredo et al., 2023).

OUTPUTS:

Articles:

1. Figueiredo, SD; Rosina, P; Figuti, L. 2015. Dinosaurs and other vertebrates from the Papo-Seco Formation (Lower Cretaceous) of southern Portugal. Journal of Iberian Geology 41(3):301-314 Doi: https://doi.org/10.5209/rev_JIGE.2015.v41.n3.47828

2. Figueiredo, SD; Dinis, P.; Rosina, P.; Belo, J; Strantzali, I. 2017. A new record of a possible ornithopod footprint from the Lower Cretaceous of Cabo Espichel (Sesimbra, Portugal). Bollettino della Società Paleontologica Italiana, 56 (2), 2017, 217-231.

3. Figueiredo, SD, Carvalho, CN, Cunha, PP. And Sousa Carvalho, I. 2021. New Dinosaur Tracks from the Lower Barremian of Portugal (Areia do Mastro Formation, Cape Espichel). Journal of Geoscience and Environment Protection, 9, 84-96. https://doi.org/10.4236/gep.2021.91007

4. Figueiredo, S. D., Carvalho, I. S., Pereda-Suberbiola, X., Cunha, P. P., Antunes, V., Diaz-Martínez, I. 2022a. New ornithopod footprints from the Areia do Mastro Formation (Lower Cretaceous), Espichel Cape (Portugal, Western Iberia) and their context in the Iberian ichnological ornithopod record, Cretaceous Research, 131, p. 105069, https://doi.org/10.1016/j.cretres.2021.105069.

5. Figueiredo, S.D., Souza Carvalho, I., Pereda-Suberbiola, X., Cunha, P.P., Strantzali, I.B., Antunes, V. 2022b. Ornithopod dinosaur remains from the Papo Seco Formation (lower Barremian, Lusitanian Basin, Portugal): a review of old and new finds, Historical Biology. DOI:10.1080/08912963.2022.2138372

3D Urb UNDER | Capacity building of urban underground 3D Modelling to support engineering projects and planning sustainable actions

Luisa Gonçalves[1,2*], Paulo Providência[3,2], Anísio Andrade[3,2], Anabela Veiga[1,4], João Veludo[1], Fransje Hooimeijer[5] and Loreta Von Der Tann[6]

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[(3)]Department of Civil Engineering, University of Coimbra, 3030-074 Coimbra, Portugal
[(4)]University of Coimbra, Geosciences Center, Department of Earth Sciences, Coimbra, Portugal
[(5)]University of Technology Delft, Netherlands
[(6)]LT Research & Consulting, Norway
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PROJECT TYPE: Competitive internal project – INECS. Association for Innovation and Development of FCT. 3D Urb UNDER/ 2023

PRINCIPAL INVESTIGATOR: Luisa Gonçalves

COORDINATION: Luisa Gonçalves and Paulo Providência

TEAM: Luisa Gonçalves, Paulo Providência, Anísio Andrade, Anabela Veiga, João Veludo, Fransje Hooimeijer, Loreta Von Der Tann and João Felipe Azevedo.

INSTITUTIONS INVOLVED: INESC Coimbra, Polytechnic Institute of Leiria, University of Coimbra and University of Technology Delft.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): SDG 11: Sustainable Cities and Communities; SDG 12 - Sustainable Production and Consumption; SDG 15 - Protect Life on Earth.

PROJECT GOALS: develop a theoretical framework: subsurface integration need assessment: city - subsurface interdependencies; thematic instruments subsurface integration in urban development projects. Conduct an analysis of Leiria city: institutional context; urban complexities; historical and geological setting; available data thematic instruments and tools.

RESULTS: 3D Urb UNDER case study outputs use: guide decision making on planning, with fewer impacts on fragile environments; reducing the effect of natural hazards and damage to constructions. International cooperation: develop a comprehensive understanding, support cities and urban projects with different geological conditions and constraints, institutional setups and experience in subsurface integration; cover different experiences and cases for integrating the subsurface into planning and design processes; creating an outlook on how the project findings and developed methodologies can be transferred to other countries and cities.

OUTPUTS:

Communications:

1. Veiga, A., Areia, S. & Veludo, J. (2023). Informação geotécnica de Leiria em SIG - Contributo para o desenvolvimento sustentável. XI Congresso Nacional de Geologia - Geociências e desafios globais, Coimbra.

2. Areia, S., Veiga, A. & Veludo, J. (2023). A integração de informação geotécnica de Leiria num SIG - Contributo para a cartografia geotécnica da cidade. 18º Congresso Nacional de Geotecnia - Geotecnia e Alterações Climáticas, Évora.

Breath IN towards a better and sustainable indoor air quality environment

Cristina Andrade[1], Helena Monteiro[1], José Antunes[1], Rui Gonçalves[1], Francisco Carvalho[1], José C. Pereira[1], Sandra Mourato[2,] Anabela Veiga[2,5], Sónia Pereira[2], Hermano Bernardo[2], João C. Sousa[2], Anastasia Paschalidou[3], Stavros Syayhopoulos[3], Kyriaki Psistaki[3], Edna Yamasaki[4], Iris Charalambidou[4], Kyriakos Georgiou[4], Lucia Protapapa[4], Loizos Papaloizou[4], Ernestos Sarris[4], Christiana Demetriou[4], Souzana Achilleos[4] and Photos Hajigeorgiou[4]

[(1)]Polytechnic Institute of Tomar, Portugal

[(2)]Polytechnic Institute of Leiria, Portugal

[(3)]Democritus University of Thrace, Greece

[(4)]University of Nicosia, Cyprus

[(5)]University of Coimbra, Geosciences Center, Department of Earth Sciences, Coimbra, Portugal

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PROJECT TYPE: Programme Erasmus+. KA220-HED Cooperation partnerships in higher education. It has began on September 1st, 2023. 2023-1-PT01-KA220-HED-000153118

PRINCIPAL INVESTIGATOR: Cristina Andrade

COORDINATION: Cristina Andrade, Sandra Mourato, Anastasia Paschalidou and Edna Yamasaki

TEAM: Cristina Andrade, Helena Monteiro, José Antunes, Rui Gonçalves, Francisco Carvalho, José C. Pereira, Sandra Mourato, Anabela Veiga, Sónia Pereira, Hermano Bernardo, João C. Sousa, Anastasia Paschalidou, Stavros Syayhopoulos, Kyriaki Psistaki, Edna Yamasaki, Iris Charalambidou, Kyriakos Georgiou, Lucia Protapapa, Loizos Papaloizou, Ernestos Sarris, Christiana Demetriou, Souzana Achilleos and Photos Hajigeorgiou.

INSTITUTIONS INVOLVED: Polytechnic Institute of Tomar, Polytechnic Institute of Leiria, Democritus University of Thrace and University of Nicosia.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): SDG 3 (Good health and well-being) one of the main goals of Breath IN is to raise awareness towards the relevance of the indoor quality air and health benefits of a sustainable working environment; SDG 4 (Quality education) with the students and staff engagement in the project's activities; SDG 5 (Gender equality) the Breath IN research team has a higher percentage of females in comparison with the male gender.

PROJECT GOALS: More than 90% of one's lifespan is spent in closed environments therefore indoor air pollution may pose a serious threat to health. The Higher Education Institutions (HEI) sector represents a unique environment, for faculty members, and a learning environment for students. BREATH IN aims at promoting awareness, exchanging best practices, developing skills, creating a Living lab to experience the impact of indoor air quality, introducing eco-friendly and green practices, and proposing a roadmap for a sustainable environment.

RESULTS: The overall Breath IN outcomes aims to tackle different SDGs by 1) improving the good health and well-being of the HEI actors (SDG3-13) 2) promoting engagement as agents of change (SDG4) and raising awareness in the academic community, and key stakeholders by creating Living Labs 3) promoting interdisciplinary and international cooperation by sharing knowledge (SDG10-11) 4) disseminate results as MOOC's 5) promote green and sustainable practices with a financial impact in society (SDG11-13).

OUTPUTS:

Site

1. http://www.breathin.ipt.pt/en/

Conference

1. Breath IN Symposium 2024 – Indoor Air Quality, Health, and Well-being. 15-16 May 2024. University of Nicosia, Cyprus. https://www.unic.ac.cy/event/breath-in-symposium-may-2024/2024-05-15/

Communications

1. Achilleos, S. (2024, April 3). Mitigating the health effects od desert dust storms using exposure-reduction approaches: lessons learned from the LIFE-MEDEA public health intervention study [Conference presentation]. 2nd Breath IN Webinar.

2. Paschalidou, A. (2024, April 3). Thermal stress and public health in Mediterranean environments: current trends and future projections [Conference presentation]. 2nd Breath IN Webinar.

3. Pereira, S. (2024, April 24). Microbial air quality in healthcare settings: an overlooked public health problem? [Conference presentation]. 3rd Breath IN Webinar.

4. Syayhopoulos, S. (2024, April 24). The role of green buildings in promoting sustainable development and human health [Conference presentation]. 4th Breath IN Webinar.

5. Mourato, S. & Bernardo, H. (2024, May 15-16). Monitoring air quality, lighting, and energy consumption methodology [Conference presentation]. Breath IN Symposium, University of Nicosia.

Exploratory revitalization program in a Mature Basin: focus on recognizing the main migration routes in the Sergipe-Alagoas Basin

Antônio Jorge Vasconcellos Garcia[1,2,3*], Gustavo Gonçalves Garcia[2] and Karolline Dewanele Santana Rocha[3]

[(1)]Federal University of Sergipe (UFS), Progeology Laboratory, Aracaju, Sergipe, Brazil
[(2)]Federal University of Sergipe (UFS), GKF Solutions, Aracaju, Sergipe, Brazil
[(3)]University of Coimbra, Geosciences Center, Department of Earth Sciences, Coimbra, Portugal
*ajvgarcia@academico.ufs.br

PROJECT TYPE: Research Project, Teaching and Research Development, Training Project, Research and innovation

COORDINATION: Antônio Jorge Vasconcellos Garcia

TEAM: Antônio Jorge Vasconcellos Garcia, Gustavo Gonçalves Garcia, Karolline Dewanele Santana Rocha, Itson Santos de Souza, Hugo Resende Cavalvante, Carine Maria Xavier e Silva, Isis Carvalho dos Santos, Luana Áfele Santos de Oliveira, Samuel Lucas Monteiro de Farias and Sílvio Luan dos Reis Oliveira.

INSTITUTIONS INVOLVED: Progeologia Laboratory/Nucleus of Competence in Oil, Gas and Biofuels (Brazil), GKF Solutions and Geosciences Center (Portugal).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): SGD9 and SGD12.

PROJECT GOALS: Innovative exploratory models always result in new exploration cycles. New exploratory models require better understanding of the relationships between static and dynamic elements of petroleum systems. The relationships between the distribution of reservoirs and sealing elements need to be better understood, this implies seeking to better understand the migration paths for oil and gas, within the different petroleum systems, better characterizing the Migration Routes. The "Exploratory Revitalization Program in the Sergipe-Alagoas Basin" is directed towards specific objectives, covering observations of targets located in regions of immediate interest in the basin. To achieve this, the different information and databases about the basin are being organized into a Database (BDI), using AI. In its broader context, the objective of this program is to understand the reasons why, in some petroleum systems, reservoirs considered analogous have not resulted in economic discoveries to date (Barbosa, 2023). The multiscale characterization of these elements requires, among other aspects, the understanding of the distribution of the reservoir properties of the analogous litho-stratigraphic units, from the sedimentary basin context to the pore scale, as already pointed out by Garcia et al. (2003) and Garcia et al. (2014, 2015).

RESULTS: Characterization of the presence of static elements in petroleum systems and analysis of favorable or unfavorable conditions in each of them, in each case studied.

Assessment of the evolution of the dynamic elements of petroleum systems and their influences on each target reservoir studied. Cross-check information on static and dynamic elements, and analyze the relationship between them, within the concept of synchronism.

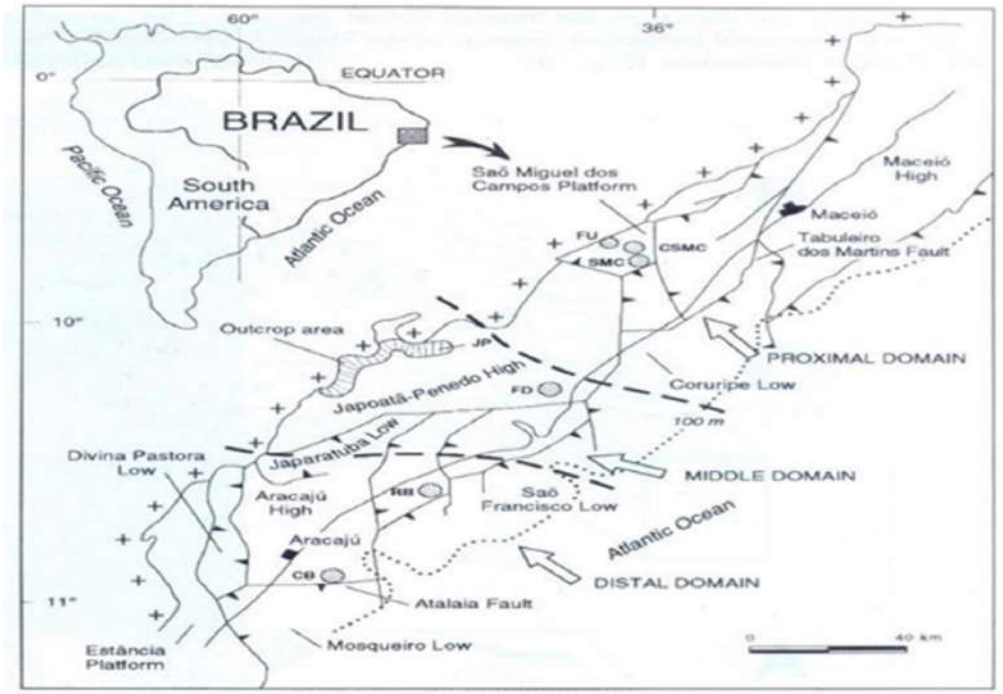

Fig 1. Distribution of diagenetic domains recognized in pre-rift reservoirs. (Modified from Garcia, 1992).

OUTPUTS:

Articles

1. Barbosa, G.S., Pena dos Reis, R., Garcia, A.J.V., Barberes, G.d.A. & Garcia, G.G. (2022). Petroleum Systems Analysis of Turbidite Reservoirs in Rift and Passive Margin Atlantic Basins (Brazil and Portugal). Energies, 15, 8224. https://doi.org/10.3390/en15218224

2. Barbosa, G. S., Garcia, G. G., Reis, R. P., Garcia, A. J. V., & Barberes, G. A. (2023). Analysis of the efficiency of petroleum systems in fluvial environments in the rift context of the South and North Atlantic – Brazil and Portugal. Geosciences, 13(8), 239. https://doi.org/10.3390/geosciences13080239

Investigation of groundwater and surface water bodies in RH4A (Central Portugal)

Ana Maria Castilho[1]

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*amcastil@dct.uc.pt

PROJECT TYPE: Collaborative research and knowledge transfer partnership.

PRINCIPAL INVESTIGATOR: Ana Maria Castilho

TEAM: Ana Maria Castilho, Paula Carvalho, Paula Garcia, Rosa Oliveira, Telma Pedrosa, Bachelor and Master students.

INSTITUTIONS INVOLVED: Geosciences Center (CGeo), Earth Sciences Department of University of Coimbra (DCT-UC), Portuguese Environmental Agency (APA), Marine and Environmental Sciences Centre (MARE).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): SDG 6 - Clean Water and Sanitation; SDG 12 - Ensure sustainable consumption and production patterns; SDG 13 - Take urgent action to combat climate change and its impacts.

PROJECT GOALS: The main goal of this collaborative research project is to analyse and integrate physical, chemical and biological characteristics of surface and groundwater bodies of the RH4A Portuguese hydrological region during the 2021/2023 hydrological years. The intentions are also to use these new data to estimate natural geochemical background (NBL) and threshold (TH) compositions in groundwater and its receptors; quantify the contribution of surface and groundwater flows, evaluate changes in surface water/groundwater interaction as a result of extreme climatic events, evaluate saline intrusion and other changes resulting from the interaction between surface water and groundwater.

RESULTS: This partnership is expected to have a long-term impact, by increasing and sharing open data and knowledge and by bringing together complementary profiles to conduct research and transfer basic and applied knowledge. During the sampling period, that ended in June of 2023, more than 1200 water samples were analysed, and the data are being treated and interpreted by geoscientists and technicians, including BSc and PhD students, in over 2000 hours of training. Data will be publicly available through APA open data platform.

Fig 1. Water sampling field work.

Fig 2. Analytical work.

OUTPUTS:

Report:

1. Agência Portuguesa do Ambiente (APA). (2019). Plano de gestão da região hidrográfica Vouga, Mondego e Lis (RH4A). 3º Ciclo – 2022-2027. Questões significativas da gestão da água (QSiGA) (In Portuguese).

2. Muller, D., Blum, A., Hart, A., Hookey, J., Kunkel, R., Scheidleder, A., Tomlin, C.,& Wendland, F., (2006). Final Proposal for methodology to setup groundwater threshold values in Europe. Deliverable D18, BRIDGE Project. http://www.keriel.org/BIB/Publ_UNESCO/SOG_BRIDGE/Deliverables/WP3/D18.pdf

Separation of plastic mixtures by sink-float combined with froth flotation

Fernando A. G. Pita[1]

[(1)]University of Coimbra, Geosciences Center, Department of Earth Sciences, Coimbra, Portugal
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PROJECT TYPE: Research and innovation

PRINCIPAL INVESTIGATOR: Fernando A. G. Pita

COORDINATION: Fernando Pita

TEAM: Earth Sciences Department of University of Coimbra (DCT-UC), Geosciences Center (CGeo); Bachelor and Master students.

INSTITUTIONS INVOLVED: Polytechnic Institute of Tomar, Polytechnic Institute of Leiria, Democritus University of Thrace and University of Nicosia.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): SDG 11 - Make cities and human settlements inclusive, safe, resilient and sustainable, SDG 12 - Ensure sustainable consumption and production patterns.

PROJECT GOALS: The aim of this research is to separate mixtures of post-consumer plastics (PS, PMMA, PVC-D, PVC-M, PET-D and PET-S) by combination of sink-float separation (density separation) and froth flotation methods. Froth flotation was used when sink-float performance was poor. For the density separation two mediums separation were used: sodium chloride water solution and ammonium nitrate water solution. For the separation of plastic mixtures by froth flotation, sodium lignosulfonate was used as a wetting agent. The effect of the solution density and the effect of particle size and particle hydrophobicity on the density separation performance was analysed.

RESULTS: In sink-float method the recovery of the six plastics decrease with the increase of the medium density and with the increase of particle size. In some mixtures, separation improved with increasing particle size. Separation is better when the floating plastic has a greater contact angle than the sinking plastic. It can be assumed that it is possible to separate the mixture of the six plastics (PS, PMMA, PVC-D, PVC-M, PET-D, PET-S) using density separation combined with froth flotation, obtaining almost clean products of PS, PMMA, PET and PVC.

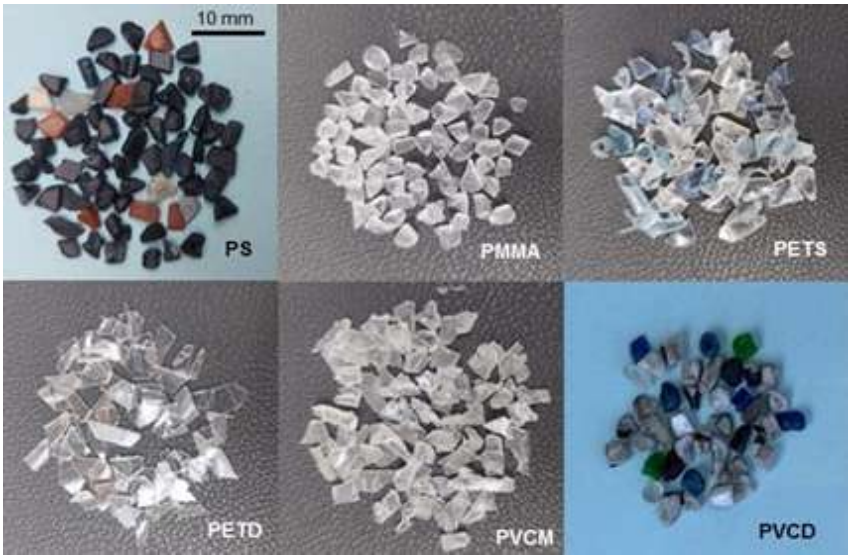

Fig 1. Different types of plastics used in the research.

OUTPUTS:

Articles:

1. Pita, F. (2023). Separation of plastic mixtures by sink-float combined with froth flotation. Polímeros: Ciência e Tecnologia, 33(3), e20230025. https://doi.org/10.1590/0104-1428.20220094

2. Pita, F., & Castilho, A. (2016). Influence of shape and size of the particles on jigging separation of plastics mixture. Waste Management, 48, 89-94. http://dx.doi.org/10.1016/j.wasman.2015.10.034

3. Pita, F., & Castilho, A. (2017). Separation of plastics by froth flotation. The role of size, shape and density of the particles. Waste Management, 60, 91-99. http://dx.doi.org/10.1016/j.wasman.2016.07.041

4. Pita, F., & Castilho, A. (2019). Plastics floatability: effect of saponin and sodium lignosulfonate as wetting agents. Polímeros: Ciência e Tecnologia, 29(3), e2019035. http://dx.doi.org/10.1590/0104-1428.01419

Sustainable Stone by Portugal

Anabela Veiga[1,2]

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*anabela.veiga@ipleiria.pt

PROJECT TYPE: The Sustainable Stone by PORTUGAL agenda, led by the company SOLANCIS, is being developed by a consortium of 52 Members, who together presented an investment of €55 760 917.17

PRINCIPAL INVESTIGATOR: Solancis

TEAM: https://sustainable.stonebyportugal.com/

INSTITUTIONS INVOLVED: The consortium is made up of 31 companies, 21 of which are natural stone and 10 technology companies. Nova School of Science & Technology, INESC INOV, INESC TEC Polytechnic Institute of Leiria, Polytechnic Institute of Santarém, ISEG, IST, LNEG, University of Coimbra, University of Évora.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): SDG 8 - Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all; SDG 9 - Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation; SDG 12 - Ensure sustainable consumption and production patterns.

PROJECT GOALS: The Sustainable Stone by PORTUGAL consortium proposes to develop innovative products and technologies, new systems for the valorization of surpluses and by-products, development of robotic solutions for the entire value chain, develop new more sustainable processes, develop new digitalization processes and also promote the transfer of knowledge, technologies and the training of human resources to and from the Natural Stone Sector.

RESULTS: Competitive digital systems/equipment for industrial logistics; Competitive digital systems/equipment for Factories; New concept based on the use of non-saleable blocks.

Pilot 4.0 lines for the valorization of raw materials “with no commercial value”.

OUTPUTS:

Site

https://sustainable.stonebyportugal.com/

Communications

1. Monteiro, S., Jorge, M., Heleno, M. L., Oliveira, N., Alves, M., Veiga, A., & Silva, A. (2023). Sustainability study of limestone quarry waste. 10º Encontro Nacional de Engenharia e Gestão Industrial. Leiria

2. Monteiro, S., Jorge, M., Oliveira, N., Alves, M., Veiga, A., & Silva, A. (2023). Sustainability study of limestone quarry waste into value-added products: PCC and GCC. VII GLOBAL STONE CONGRESS - Dimension Stone sector. Batalha

3. Monteirio, S., Jorge, M., Oliveira, N., Alves, M., Veiga, A., & Silva, A. (2023). Qualitative analysis of the limestone waste potencial from the Serra de Aire e Candeeiros quarries. VII GLOBAL STONE CONGRESS - Dimension Stone sector. Batalha

Acoustics of caves and prehistoric hypogea in Central Portugal: a contribute to understand early musical behaviour

Fernando Augusto Coimbra[1,2*] and Ari de Carvalho[2]

[(1)]University of Coimbra, Geosciences Center, Coimbra, Portugal
[(2)]Institute Earth and Memory, Mação, Portugal

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PROJECT TYPE: Research Project

PRINCIPAL INVESTIGATOR: Fernando Augusto Coimbra

TEAM: Ari de Carvalho, Fernando Coimbra, Alexandra Águeda de Figueiredo, José Eduardo Mateus, George Harold Nash, Dragos Gheorghiu

INSTITUTIONS INVOLVED: Institute Earth and Memory (Portugal); Polytechnic Institute of Tomar (Portugal); Geosciences Centre (Portugal).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4, 5, 8.

PROJECT GOALS: Analyze the acoustic characteristics of caves with Late Prehistoric burials and hypogea of Central Portugal. Test the sound of replicas of Neolithic ceramic drums, bone flutes and the human voice inside those cavities. Observation of possible acoustic phenomena and their effects in the mind and body. Production of an audiovisual documentary with the several phases of research.

RESULTS: Recording of sounds (drums, handclapping, flute, voice) performed in the prehistoric hypogea of Quinta do Anjo (Palmela) and Carenque (Amadora). Recording of sound and image in the Cave of Moeda (Batalha). Production of two replicas of Late Neolithic clay drums of different characteristics (that were used in tests in the caves and hypogea). Pre-production of an audiovisual documentary. Organization of the session -Archaeoacoustics: a novel interdisciplinary way of studying the past, in the frame of the XX UISPP Conference, Timisoara, Romania.

Fig 1. Hypogeum 1 of Carenque (external view) and replica of Late Prehistoric ceramic drums used in acoustic tests.

OUTPUTS:

Book

1. Coimbra, F. A. 2022. Arqueologia do Som, Música e Metafísica. Leiria: Textiverso, 211p.

Communications

1. Coimbra, F. A. 2023. Acoustic phenomena in late prehistoric architecture: a theoretical approach. XX UISPP Conference, Timisoara, Romania.

2. Nash, G. H. 2023. A strange sound of silence: the audibility ranges inside burial monumentality. XX UISPP Conference, Timisoara, Romania.

3. Carvalho, A.; Coimbra, F. A., 2024. Acoustics of the prehistoric hypogea of Quinta do Anjo and Carenque (Portugal). X Apheleia Seminar. Mação.

4. Gheorghiu, D. 2024. Experimenting a Neolithic archaeoacoustic object. X Apheleia Seminar. Mação.

AMIGO

Manuela Morais[1], Luiz Oosterbeek[2*] and Hugo Gomes[3]

[(1)]Universidade de Évora, Portugal
[(2)]Instituto Politécnico de Tomar, Portugal
[(3)]Institute Earth and Memory, Mação, Portugal
*loost@ipt.pt

PROJECT TYPE: Teaching and Research Development (funding: European Commission)

PRINCIPAL INVESTIGATOR: Manuela Morais

TEAM: Luiz Oosterbeek; José Carlos Ferreira; Myriam Lopes, Cristina Branquinho (institutional coordinators). CGeo team: Hugo Gomes, Luís Santos, Sara Garcês, Rita Anastácio

INSTITUTIONS INVOLVED: Universidade de Évora, Instituto Politécnico de Tomar, Universidade de Aveiro, Universidade de Lisboa and Universidade Nova de Lisboa (Portugal), besides universities from over 20 countries.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 3, 11 and 17.

PROJECT GOALS: The AMIGO Consortium develops pedagogic and training activities integrating sciences and humanities, in the field of environmental studies, in Southern Mediterranean (Algeria, Israel, Lebanon, Morocco, Palestine, Tunisia), Western Balkans (Albania and Montenegro), Americas (Argentina, Brazil, Chile, Colombia, United States of America) and Africa (Angola; Benin; Burkina Faso; Cabo Verde; Rep. Democrática do Congo; Guiné-Bissau; Mali; Moçambique; Namíbia; Nigéria; São Tomé e Príncipe; Senegal; Africa do Sul; Tanzânia; Zâmbia); Pacific (East Timor).

RESULTS: Applied projects and training with all the involved universities. Particularly relevant cooperation of IPT-CGeo with Université Libanaise (preparation of research project on the Kahdisha Valley) and University of Cape Verde (PhD programme).

Fig 1. (from left to right): Anis Chaaya (Université Libanaise), Darina Saliba Abi Chedid (Director of the Unesco International Center for Humanities) and Luiz Oosterbeek, at the world heritage site of Byblos, in Lebanon.

OUTPUTS:

PhD dissertation

1. Carvalho, M.L.S., 2020. Eficácia, Eficiência e Efetividade de Gestão das Áreas Protegidas de Cabo Verde: uma contribuição para a Sustentabilidade da Rede Nacional de Áreas Protegidas. PhD programme on Management of Environmenal Policies. Universidade de Cabo Verde.

Book

1. Oosterbeek, L.; Gomes, H. (eds.) 2023. Ciências da Sustentabilidade em Língua Portuguesa … por mares nunca dantes navegados. Livro de Atas do XXIII Encontro de Estudos Ambientais dos Países de Língua Portuguesa. Mação, Portugal: 408 p.

APHELEIA – Humanities International Association for Cultural Integrated Landscape Management

Luiz Oosterbeek[1*], Nuno Guimarães da Costa[2] and Renaldas Guadauskas[3]

[(1)]Instituto Politécnico de Tomar, Portugal
[(2)]ICN Business School, Paris
[(3)]University of Vilnius, Lithuania
*loost@ipt.pt

PROJECT TYPE: Research and innovation (funding: CGeo)

PRINCIPAL INVESTIGATOR: Luiz Oosterbeek

TEAM: Nuno G. da Costa, Renaldas Gudauskas, Inguelore Scheunemann, Benno Werlen, John Crowley, Judite Nascimento, Nada Elias, et al.

INSTITUTIONS INVOLVED: Instituto Politécnico de Tomar (Portugal), Instituto Terra e Memória (Portugal), ICN Business School (France), University of Jena (Germany), Hagrath (France), University of Cape Verde, Université Libanaise et al.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 3, 11 and 17.

PROJECT GOALS: Apheleia aims at structuring a convergent set of strategies based in the methodology of the Humanities that will foster the need for a properly Integrated (as opposed to dispersed) Cultural (i.e. human and diverse) Landscape Management (rooted in human understandings and leading towards governance through awareness and critical thinking) for Local and Global Sustainability (addressing the great global dilemmas, but also focused on individual anxieties and needs).

RESULTS: Yearly international seminars in Mação (Portugal) since 2015. Publication of 12 books and over 100 papers. Site-based case-studies in four continents. Founding member of the UNESCO programme BRIDGES, on sustainability science. Establishment of a South American chapter in 2023 (see specific file on this).

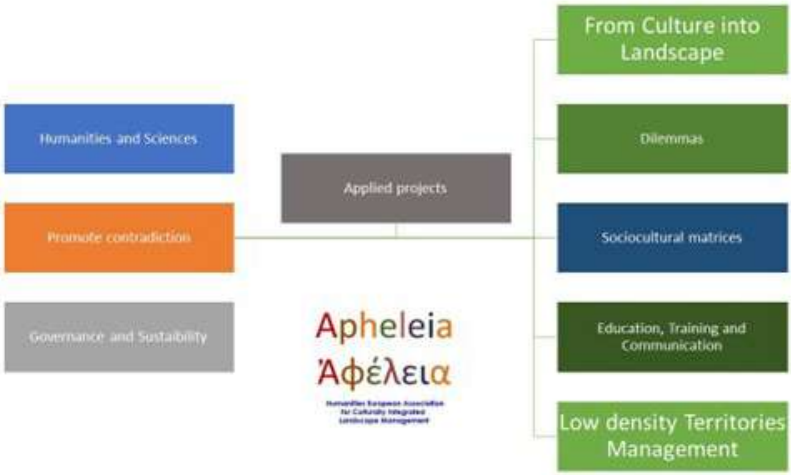

Fig 1. The scope of APHELEIA.

OUTPUTS:

Article:

1. Oosterbeek, L., 2023. Memory and Oblivion: tangible images and utopia. Design/Arts/Culture 3(1): 7-15. http://dx.doi.org/10.12681/dac.33699.

Book chapter:

1. Oosterbeek, L.; Werlen, B.; Gudauskas, R. et al. Apheleia. Building an European strategic partnershipfor Cultural Integrated Landscape Management for sustainable developmentand global understanding.". In Sustainability and Sociocultural Matrices.Transdisciplinary contributions for cultural integrated landscape management. Tomar, Portugal: pp. 25-36.

Archaeological monitoring Contract 1940P – CONSTRUCTION OF THE BENEDITA BUSINESS LOCATION AREA

Cristiana Ferreira[1], Joana Carrondo[2] and Ana Rita Ferreira[3]

[(1)]Earth and Memory Institute, Geosciences Centre, Mação, Portugal
[(2)]PreHistoric Skills, Vila Nova da Barquinha, Portugal
[(3)]Centro Português de Geo-História e Pré-História, Golegã, Portugal
*ferreira.cris.00@gmail.com

PROJECT TYPE: Research project

PRINCIPAL INVESTIGATOR: Cristiana Ferreira, Joana Carrondo, Ana Rita Ferreira

TEAM: Alexandre Paya, Inês Rita, João Belo, Vanessa Antunes, Fernando Coimbra.

INSTITUTIONS INVOLVED: Earth and Memory Institution (Portugal).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 9, 11 and 17.

PROJECT GOALS: The main objective of the project was the integral and continuous monitoring of the construction of the Benedita Business Location Area, near Alcobaça, due to prior identification of relevant archaeological remains.

RESULTS: The archaeological monitoring carried out allowed the recognition of a stratigraphy devoid of archaeological interest, being essentially characterized by a very compact layer of clayey matrix, corresponding to decalcification clays characteristic of karst areas. However, three occurrences of heritage interest were identified and safeguarded by the record for future memory: Quinta da Serra or Retiro, a 18th century housing complex, with housing, an area for prayer, stables, olive presses, barns, among others; an olive oil mill building revealed a number of relevant structural elements, for the characterization of this structure and also of the farm itself; the study of the complex demonstrated a continuity of occupation and transformations of that location for more than 200 years.

Figure 1. General view of the construction area of the Benedita business location area

Figure 2. General view of the archaeological work carried out inside the Quinta da Serra or Retiro olive oil mill.

OUTPUTS:

Reports:

1. Ferreira, C., Carrondo, J. e Ferreira, A.R. 2023. Relatório Final – Acompanhamento Arqueológico de Obra. Empreitada 1940P – Construção da Área de Localização Empresarial da Benedita, Alcobaça – ALEB'21. Instituto Terra e Memória. Documento policopiado entregue na DGPC.

2. Ferreira, C., Carrondo, J. 2022. Relatório Preliminar da Escavação de Sondagens Arqueológicas manuais a Quinta da Serra ou do Retiro. Acompanhamento Arqueológico de Obra. Empreitada 1940P – Construção da Área de Localização Empresarial da Benedita, Alcobaça – ALEB'21. Instituto Terra e Memória. Documento policopiado entregue na DGPC.

3. Ferreira, C., Carrondo, J. 2022. Relatório Anual de Progresso – Acompanhamento Arqueológico de Obra. Empreitada 1940P – Construção da Área de Localização Empresarial da Benedita, Alcobaça – ALEB'21. Instituto Terra e Memória. Documento policopiado entregue na DGPC.

4. Ferreira, C., Carrondo, J. 2021. Relatório/Nota Técnica – Ponto de Situação de Obra. Acompanhamento Arqueológico de Obra. Empreitada 1940P – Construção da Área de Localização Empresarial da Benedita, Alcobaça – ALEB'21. Instituto Terra e Memória. Documento policopiado entregue na DGPC.

5. Ferreira, C., Carrondo, J. 2021. Nota Técnica – Memória Descritiva Preliminar – Quinta da Serra ou do Retiro. Acompanhamento Arqueológico de Obra. Empreitada 1940P – Construção da Área de Localização Empresarial da Benedita, Alcobaça – ALEB'21. Instituto Terra e Memória. Documento policopiado entregue na DGPC.

Archaeological Research in Gruta da Mesa, municipality of Alcinópolis, Mato Grosso do Sul, Brazil

André Luis Ramos Soares[1*], Lia Raquel Toledo Brambilla Gasques[2] and Juliano Bittencourt Campos[3]

[(1)]Instituto Terra e Memória, Geosciences Centre, Portugal; Federal University Santa Maria, Santa Maria, Brazil
[(2)]Federal University, Mato Grosso do Sul, Campo Grande, Brazil
[(3)]Southern University Santa Catarina State, Criciúma, Brazil
*andre.soares@ufsm.br

PROJECT TYPE: Research project, Teaching and Research Development

PRINCIPAL INVESTIGATOR: André Luis Ramos Soares

COORDINATION: Lia Raquel Toledo Brambilla Gasques

TEAM: João Vitor Ferreira Lima, Eduardo de Souza Santos, Bruna Costa Dias, Josiane Lourenço de Araujo, Maria da Gloria Tavares Demamann, Alice Elisa Dal Bem De Paiva, Daniel Requia

INSTITUTIONS INVOLVED: Federal University Santa Maria(Brazil) , Federal University Mato Grosso do Sul, (Brazil), Southern University Santa Catarina State (Brazil)

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 3 and 4.

PROJECT GOALS: To undertake the archaeological research of the Gruta da Mesa Site, located in the Templo dos Pilares Municipal Park, municipality of Alcinópolis, state of Mato Grosso do Sul, Brazil. It intends to develop academic research, considering the occupation of the territory for more than twelve thousand years. It also promotes spaces for learning archeology and local prehistory, as well as disseminating knowledge in schools in the region.

RESULTS: After two field seasons, stratigraphic levels corresponding to the sixth century of the Common Era have been reached. Heritage education actions were developed at the site and also at the municipal school. In addition, booklets about the initial settlement of the region were distributed, also presenting the different indigenous cultures that circulated in the territory. Two seminars were held. bringing together researchers, students and the local community.

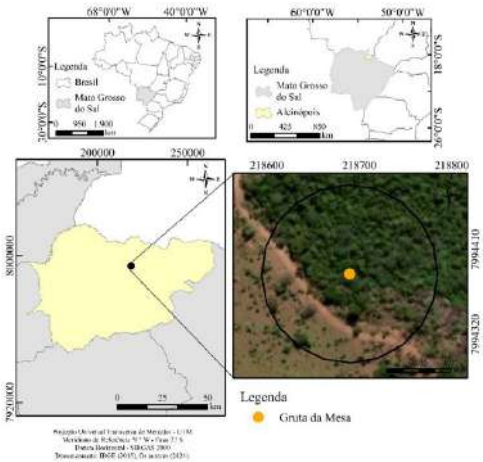

Fig 1. Location of Gruta da Mesa.

Fig 2. Beginning of excavations.

OUTPUTS:

Book:

1. Soares, A.L.R., Gasques, L. R. T. B., Campos, C. E. C., Duarte, L. R. P., Pinto, L. M. 2023. Arqueologia: Manual de boas práticas. Santa Maria: UFSM/UFMS, CTE: 26p .

Book chapters:

Campos, C.E.C, Soares, A. L. R. ; Duarte, L. P. ; Gasques, L. R. T. B. ; Pinto, L. M., 2024. Simulações de escavação arqueológica como ferramenta de formação continuada no Programa Trilha Rupestre: conexões entre ensino, pesquisa, extensão e inovação. In: Actas Completas da Jornada Internacional de Iniciação Científica e Extensão Universitária. Porto, Editora Cravo: pp. 1574-1584.

Archaeological Research in the Roman site of Vale do Junco (Ortiga, Mação, Portugal)

Fernando Augusto Coimbra[1] and Davide Francesco Delfino[1,2]

[(1)]Instituto Terra e Memória, Geosciences Centre, Portugal
[(2)]Ministero della Cultura- DRM Molise, Italy

*coimbra.rockart@yahoo.com

PROJECT TYPE: Research project

PRINCIPAL INVESTIGATOR: Fernando Augusto Coimbra

TEAM: Davide Francesco Delfino, Cristiana Duarte Ferreira, Hugo Filipe Gomes, Sara Liliana Garcês, José Francisco Curate, Anabela Borralheiro Pereira, Silvério Domingues Figueiredo, Rita Ferreira Anastácio

INSTITUTIONS INVOLVED: Institute Earth and Memory (Portugal); Municipality of Mação (Portugal); Geosciences Centre (Portugal).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4, 5 and 8.

PROJECT GOALS: Geoelectric prospection in order to check where there are buried structures; archaeological excavation to unearth new structures and to reveal the rest of the Roman baths, not yet excavated; establish a more precise chronological frame of the contexts of occupation of the site; scientific and cultural disclosure of the results, through publications, participation in scientific meetings, organization of an exhibition with recovered materials and public lectures. Preserve and musealize the site with the collaboration of the municipality of Mação.

RESULTS: Initial geoelectric prospection identified possible buried structures, which existence was confirmed by archaeological excavation in 2023; the continuation of the work in 2024 identified a large Roman wall, with mortar, and a possible Palaeochristian structure (Fig.1). The excavation in 2024 recovered remains of glass production (which is not very frequent in Portugal), raw material such as silica; the excavations also brought to day light evidences of Islamic pottery, which enlarges profoundly the chronology of occupation of the archaeological site.

Fig 1. Possible Early Christian structure found recently at Vale do Junco.

OUTPUTS:

Article:

1. Coimbra, F. A. 2022. Investigação arqueológica no sítio romano de Vale do Junco (Ortiga, Mação). Antrope, 15: 31-52.

2. Encarnação, J. d'; Coimbra, F. A. 2022. Estatueta de bronze de Vale do Junco (Ortiga, Mação). O Ideário Patrimonial. 14: 177-190.

Catalogue:

1. Coimbra, F. A. 2022 (Ed.). Vale do Junco e o passado Romano no Território de Mação. Exhibition catalogue. Câmara Municipal de Mação. 120p.

Archaeology, History and Culture of Indigenous Peoples as a tool for educational processes in the Caminhos dos Canions do Sul UNESCO Global Geopark

Juliano Bitencourt Campos[1*]

[(1)]University of Southern Santa Catarina, Criciúma, Brazil, Earth and Memory Institute, Geosciences Center of University of Coimbra, Portugal.

*jbi@unesc.net

PROJECT TYPE: Research project; University extension project. This project was financed in part by the Diretoria de Extensão, Cultura e Ações Comunitárias da UNESC (PROPIEX), nº. 514/2022.

PRINCIPAL INVESTIGATOR: Juliano Bitencourt Campos

TEAM: Jairo José Zocche; Mikael Miziescki; Gislael Floriano; Lucy Ostetto; José Gustavo Santos da Silva; Carlos Paulo dos Passos Matias; Tarcísio Roldão da Rosa; Diego Dias Pavei; Maria da Gloria Tavares Demamann; Suliano Ferrasso; Fabiano Alves (Kárai); Luciano Miranda; Monica Guglielmi; Carolina Porto Luiz; Estefani Oliveira Serafim; Alex Luciano Tavares Rollano; Breno Ferreira Fontana; Luiz Miguel Ghedin.

INSTITUTIONS INVOLVED: University of Southern Santa Catarina (UNESC) (Brazil), Caminhos dos Canions do Sul UNESCO Global Geopark (Brazil).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): Goal 4 (Quality Education) and Goal 11 (Sustainable cities and communities)

PROJECT GOALS: The purpose of this initiative is to facilitate the acquisition of knowledge essential for the establishment of a fairer, more equal, and inclusive society that recognizes the importance of fostering solidarity, peace, and active citizenship. Over the course of five years, this endeavor has been dedicated to mapping out the archaeological, historical, and cultural legacy of indigenous communities within the CCSUGGp region, engaging local schools in the educational network of the municipalities encompassed by the territory through Heritage Education.

RESULTS: The program was initiated in 2020, with the participation of more than 40 schools, encompassing a student body of over 1200 individuals. The involvement of schools, facilitated by their teachers and students, plays a crucial role in promoting awareness, appreciation, and commitment to the preservation of heritage. Workshops are conducted in various educational settings, both formal and informal, such as municipal and state schools, LAPIS, archaeological sites, and indigenous communities located in Imaruí/SC and Torres/RS municipalities.

Fig 1. Students and educators from an elementary school touring the Pedro Ignacio Shimitz archaeological laboratory (from Campos et al., 2023).

OUTPUTS:

Book Chapter:

1. Campos, J. B et al., 2023. Environmental, economic and social sustainability in the territory of the UNESCO Global Geopark Caminho dos Cânions do Sul: The landscape, archaeology, history and culture of indigenous peoples as tools for education. In L. Attala, L. Steel, L. Oosterbeck, S. Hartman & D. Tsimprikidou (Eds.), BRIDGES: A humanities-led unesco coalition for sustainability (p. 34). UNESCO.

2. Campos, J. B et al., 2022. The Archaeology Of The Original Peoples In The Region Of Geopark South Canyons Paths. In: Leandro Bazotti; Tatiana Bressel. (Org.). Guide to the canyons of Aparados da Serra Geral. 1ed.Viamão: (Eds). from the authors., v. 1, (p. 54-61).

Avecasta - The Time Portal

José Eduardo Mateus[1,2*] and Paula Fernanda Queiroz[1,2]

[(1)]Centro de Geociências, Universidade de Coimbra, Portugal
[(2)]Laboratory of Palaeoecology - Double-u Replay, Torres Vedras, Portugal
*jedumateus@gmail.com

PROJECT TYPE: Research project

PRINCIPAL INVESTIGATOR: José Eduardo Mateus

TEAM: José Eduardo Mateus, Paula Fernanda Queiroz, Teresa Bray, Rui Palhinha, Miguel Geraldes, Artur Mateus, Massimo Beltrame, Ricardo Triães, Ana Manhita, Cristina Dias, Cláudia Relvado, Patrícia Jordão, Carlos Pimenta.

INSTITUTIONS INVOLVED: Laboratory of Palaeoecology - Double-u Replay / CGEO (Portugal), Ferreira do Zêzere Municipality (Portugal); Polytechnical Institute of Tomar (Portugal); Laboratory Hercules - Univ. Évora (Portugal).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4, 13 and 15.

PROJECT GOALS: To investigate the long time-series of dwelling occupation of the Avecasta Cave and immediate surroundings, since the Late Pleistocene till Modern times. We are dealing with extremely well-preserved village structures, apparently centered on the Cave Great Hall, (from the Neolithic to the Middle Bronze Age) and with important artisanal occupations from the Iron Age, Roman Epoch and the Middle Ages. A three-fold goal: Excavation, Museum and School with a special emphasis on micro-archaeology, palaeoecology, and virtualization - the former topic under the a new scenic paradigm, re-created around the concept of Virtual Realistic Replayable Replica.

RESULTS: Four main results: 4 phases of excavation, since 1980; 25 thousand objects from a very long and diverse diachrony and functional realms; an unique and rich series of (archaeo)metallurgical forge-pits covering the whole evolution of metallurgy, where the secrets of smelting techniques are being revealed; a sound and complete picture of the human impact patterns on the landscape through the centuries is being reconstructed (in cross-correlation with the Western Peatmire Palaeovegetation Initiative) revealing the major archaeo-territorial changes and discontinuities.

Fig 1. GRUTA da AVECASTA – The large room entrance (1980).

OUTPUTS:

Articles:

1. Mateus, J.E., 2023. Para uma arqueologia cénica do passado. O Ideário Patrimonial 18. Dezembro de 2023. Instituto Politécnico de Tomar.

2. Abiodun, O., Beltrame, M., Mirão, J., Mateus, J.E., 2022. Archaeometric study of the proto-historic ceramics from the settlement of the Avecasta Cave 2 (Ferreira do Zêzere, Portugal). in Estudos do Quaternário, 22, APEQ, Braga, 2022.

Reports:

1. Mateus, J.E., Queiroz, P.F., 2012. A Gruta-Povoado da Avecasta. Uma introdução ilustrada ao sítio arqueológico e ao seu programa de estudo e valorização. Terra Scenica, Lisboa.

Communications

1. Mateus, J.E., Queiroz, P.F., Bray, T., Palhinha, R., 2024. Avecasta ArqueoReplay: Percursos de um programa piloto de virtualização cénica em arqueologia. III Jornadas da Primavera - Avecasta Portal do Tempo. Ferreira do Zêzere.

2. Mateus, J.E., Queiroz, P.F., 2023. A gruta da Avecasta - as perspectivas e os desafios para o futuro eco-museu. in Avecasta Portal do Tempo - II Jornadas da Primavera - A Velha Arca dos Sentidos. Ferreira do Zêzere.

3. Queiroz, P.F., Silva, D., Mateus, A., Mateus, J.E., 2021. Frutos e Sementes Protohistóricos da Gruta da Avecasta - Primeiros Resultados. Jornadas Internacionais Amanhar a Terra: Arqueologia da Agricultura (do Neolítico ao Período Medieval), Junho 2021, Palmela (poster presentation).

BRIDGES

Luiz Oosterbeek[1*] and Erika Robrahn-González[2]

[(1)]Instituto Politécnico de Tomar, Centro de Geociências, Portugal
[(3)]Instituto Terra e Memória, Centro de Geociências, Portugal
*loost@ipt.pt

PROJECT TYPE: Research project

PRINCIPAL INVESTIGATOR: Luiz Oosterbeek

TEAM: Erika Robrahn-González, Steven Hartman, Luci Attala et al.

INSTITUTIONS INVOLVED: Instituto Politécnico de Tomar, Instituto Terra e Memória (Portugal), Unesco, the University of Walles et al.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 3, 11 and 17.

PROJECT GOALS: BRIDGES' Humanities-driven sustainability science is a novel transdisciplinary method that integrates conventionally undervalued knowledge systems into established approaches to deliver innovative solutions to the most pressing social and environmental challenges tackled by the United Nations' Sustainable Development Goals (SDG 2015). It acknowledges non-academic expertise and champions meaningful co-production that combines the methods and expertise of the humanities and the arts with STEM subjects.

RESULTS: By promoting a renewed and integrated approach to sustainability science, BRIDGES will provide information to the Member States to inform policy, empower populations, and avoid the short-termism that creates new problems. Luiz Oosterbeek and Érika Robrahn-González serve in the board of 12 members of the BRIDGES programme.

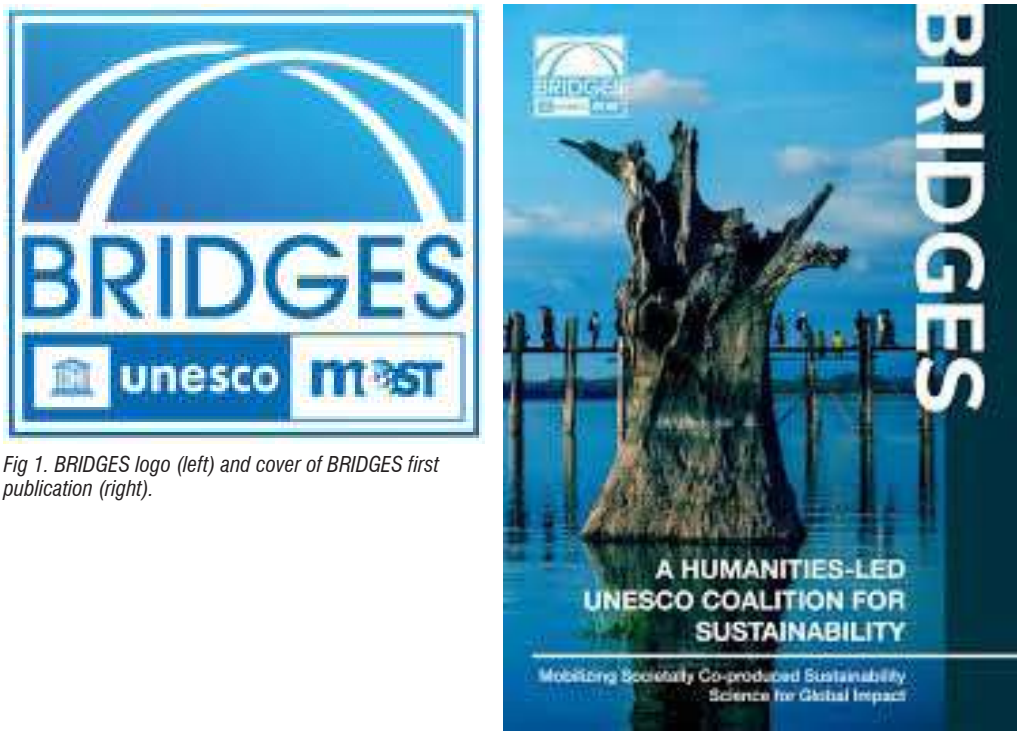

Fig 1. BRIDGES logo (left) and cover of BRIDGES first publication (right).

OUTPUTS:

Article:

1. Oosterbeek, L., 2019. Persona: From Unrest into Adaptation. Plastir 56: pp. 1-14. www.plasticites-sciences-arts.org/PLASTIR/Oosterbeek%20P56.pdf

Book:

1. Attala, L., Steel, Oosterbeek, L., Hartman, S. 2023. BRIDGES: a humanities-led UNESCO coalition for sustainability. University of Walles https://issuu.com/trinitysaintdavid/docs/bridges-humanities-coalition-for-sustaninabillity

CIPSH Chair on Geoethics

Silvia Peppoloni[1], Maria Helena Henriques[2] and Luiz Oosterbeek[3*]

[(1)]Istituto Nazionale di Geofisica e Vulcanologia, Italia
[(2)]Universidade de Coimbra, Centro de Geociências, Portugal
[(3)]Instituto Politécnico de Tomar, Centro de Geociências, Portugal
*loost@ipt.pt

PROJECT TYPE: Academic chair (award: International Council for Philosophy and Human Sciences).

PRINCIPAL INVESTIGATOR: Silvia Peppoloni (chair)

TEAM: Maria Helena Henriques, Luiz Oosterbeek, Harold Sjursen.

INSTITUTIONS INVOLVED: Istituto Nazionale di Geofisica e Vulcanologia, CGeo, International Union of Geological Sciences, International Association for Promoting Geoethics, AGU Ethics and Equity Center – American Geophysical Union, World Philology Union, Stockholm China Center - Institute for Security and Development Policy, Université Cadi Ayyad.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 3, 11 and 17.

PROJECT GOALS: The CIPSH Chair on Geoethics is focused on creating a research network aimed at developing discussions on a global ethics grounded in geoethics, i.e. an ethics of responsibility towards the Earth system, through the lens of different cultural perspectives. Geoethics, initially developed to address the ethical and social implications of geoscience knowledge and practice, needs interdisciplinary approaches to develop its potential as an ethics capable of fostering a planetary ecological humanism. In this perspective, geoethics is the meeting point between geosciences, humanities and social sciences.

RESULTS: The chair is initiating its activities, but several publications are already available.

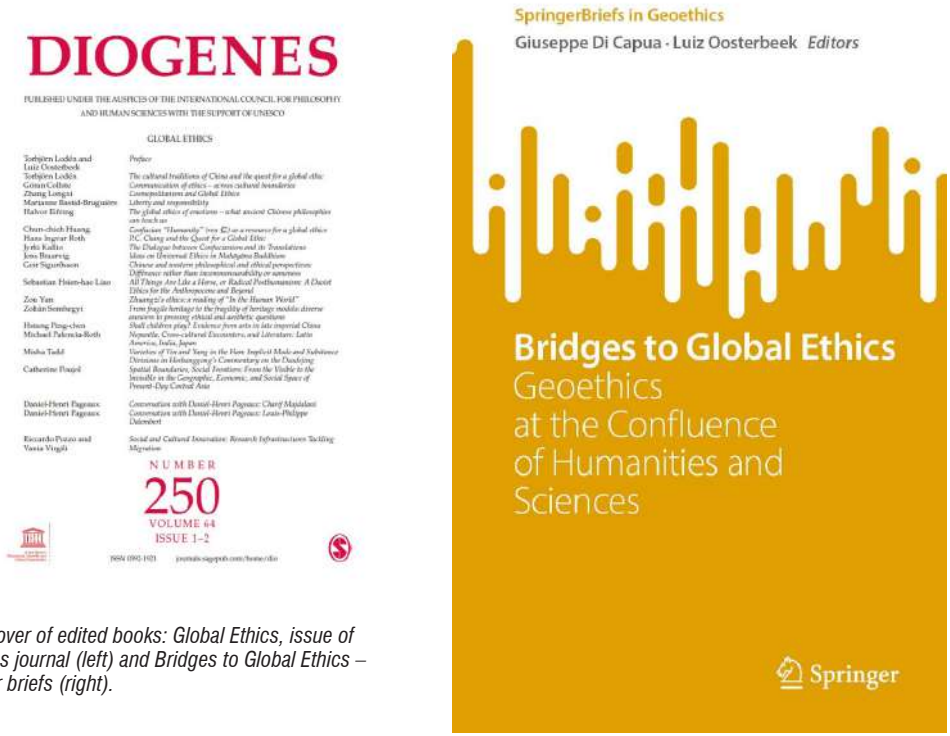

Fig 1. Cover of edited books: Global Ethics, issue of Diogenes journal (left) and Bridges to Global Ethics – Springer briefs (right).

OUTPUTS:

Article:

1. Loden, T., Oosterbeek, L. 2022. Preface. Global Ethics -Diogenes. London: Sage: 3-4 https://journals.sagepub.com/doi/abs/10.1177/03921921211068234

Book:

1. Di Capua, G., Oosterbeek, L., 2023. Bridges to Global Ethics. Springer International Publishing. DOI: 10.1007/978-3-031-22223-8

Collective Approach of Research and Innovation for Sustainable Development in Highlands – HIGHLANDS.3

Luis Filipe Carreira dos Santos[1*] and Fernado Ruiz Peyré[2]

[(1)]Polytechnic Institute of Tomar, Tomar, Portugal
[(2)]Austrian Academy of Sciences, Innsbruck, Austria

*lsantos@ipt.pt

PROJECT TYPE: Research Project. The Highlands.3 project's programme is H2020-EU.1.3. - EXCELLENT SCIENCE - Marie Skłodowska-Curie Actions, under the H2020-EU.1.3.3. - Stimulating innovation by means of cross-fertilization of knowledge Topic, implemented through MSCA-RISE-2019 - Research and Innovation Staff Exchange.

PRINCIPAL INVESTIGATOR: Oliver Bender

COORDINATION: WP1: Fernando Ruiz Peyré (IGF/ÖAW, AT); WP2: Luis Santos (IPT, PT); WP3: Marie Houdart (INRAE, FR); WP4: Jean-François Tourand (TLS, FR); WP5: Emanuel de Castro (AGE, PT).

TEAM: Team involved in all WPs involved 42 Experienced researchers and 26 PhD students who underwent secondments contributing to a cross-fertilisation-wide network of partners and results.

INSTITUTIONS INVOLVED: 18 European Academic Partners, 12 European Non-Academic Partners and 14 Third Country Partners, detailed information is available at https://www.highlands3.eu/

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 1, 4, 5, 11, 13, 15, 16, and 17.

PROJECT GOALS: The HIGHLANDS. 3 goal is to contribute to Inclusive Sustainable Development in Highlands (ISDH) through collective and impact-driven Research & Innovation (R&I), based on capacity building, sharing of local-global knowledge, experience, and tools. Activities are organized in 5 integrated work packages (WP): Coordination & management (WP1); Methodology & capacity building for ISDH (WP2); Analysis, comparison and modelling of ISDH (WP3); Building a multi-actor ISDH Decision-Support Platform (DSP) (WP4); Communication, Dissemination & Exploitation of results (WP5). The work plan will run 8 successive Research & Innovation Sessions (5 in Europe, 3 outside) to promote the exchange among participants as a foundation for innovation. Each R&IS is built upon collective learning principles and a holistic systemic approach, exposing participants to a wide range of world views that will encourage experimentation with practice. Each R&IS will focus on a particular aspect of sustainable highland development and will include collective learning, collaborative research, and capacity building on data collection/analysis, and modelling. To complement the R&IS, long-term secondments will be implemented for researchers and practitioners to deeply train and work together on specific issues the consortium identifies. Collected data on ISDHs will be stored in an online collaborative and interactive decision-support platform that will then be transferred to existing mountain networks.

RESULTS: The Highlands.3 project results are the production of manuals for ISDH, an ISDH

platform with more than 200 initiatives for sustainable development in Highlands, over 400 staff exchange secondments and eight Research and Innovation Sessions in different mountain ranges of the world. Additionally, we increase the visibility of 'good practice' examples and promote exchanges between practitioners. We bolster the academic career of young scientists and promote North-South and Academic-Non-academic dialogue across different areas of knowledge and practice.

Figure 1. The first Research and Innovation session France 2021 (from Highlands.3, 2021).

OUTPUTS:

Article:

1. Manuel Rodríguez & Valerià Paül (2024): "The local population is not aware" of nature conservation: implementing and managing the Natura 2000 network in a mountainous area of Galicia, Spain. eco.mont – Volume 16, Number 2, July 2024, p.38-46; http://epub.oeaw.ac.at/eco.mon

Santos, L.; Silva, J.; Lopes, E. & Simões, J. (2023): Integrated analysis of tourism offer from Golegã and Torres Novas municipalities. Journal of Tourism and Heritage Research, 6 (1): 257-270. http://www.jthr.es/index.php/journal/article/view/450

Rojas, Facundo; Sironi, Osvaldo & Martín, Facundo (2023): Sequías en Mendoza (Argentina): una mirada sociohistórica desde la segunda mitad del siglo XIX. Agua y Territorio, (22): 147-166. https://revistaselectronicas.ujaen.es/index.php/atma/article/view/7134

S. Raniolo, L. Maretto, E. Benedetti del Rio, S. Cournut, M. Cremilleux, B. Nowak, A. Michaud, V. Lind, G. Concheri, P. Stevanato, A. Squartini, M. Ramanzin, E. Sturaro (2023). Soil pH dominance over livestock management in determining bacterial assemblages through a latitudinal gradient of European meadows and pastures. Ecological Indicators, 155. 10.1016/j.ecolind.2023.111063

Rubén Boga, Valerià Paül (2023). 'Because of its size, it's not worth it!': The viability of small-scale geographical indication schemes. Food Policy. 121. 10.1016/j.foodpol.2023.102549

Pachoud, Carine (2021). Territorialization of Public Action and Mountain Pastoral Areas—Case Study of the Territorial Pastoral Plans of the Rhône-Alpes Region, France. Sustainability, 13 (14) :8014. https://doi.org/10.3390/su13148014

Converging pathways for peace: tourism practices, UNESCO World Heritage and SDG16+.

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[(2)]Geosciences Centre, Portugal

[(3)]University of Tehran, faculty of Social Sciences, Dept. Tourism

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PROJECT TYPE: Research Project.

PRINCIPAL INVESTIGATOR: Fabio Carbone and Tiam Naz Khanzadi

TEAM: Fabio Carbone, Tiam Naz Khanzadi and Aidin Salamzadeh

INSTITUTIONS INVOLVED: University of Northampton (UK); University of Tehran (Iran, Islamic Republic Of)

SUSTAINABLE DEVELOPMENT GOALS (SDGS): SDG16 and 16+

PROJECT GOALS: Geociences and Humanities contribute towards expanding the range of heritage places, impacting the perceptions and the performance of human communities, often across major divides, with relevant ethical implications. Our research work aimed to deepen our understanding and extend knowledge of how cultural heritage management and tourism at World Heritage Sites (WHS) may contribute to achieving the SDG16+, which so well resume the SDG pillars: People, Prosperity, Planet, Peace, and Partnership.

RESULTS: Existing knowledge was extended by providing, firstly, a precise and operational definition of PEACE EDUCATION THROUGH TOURISM, proposed to provide a reference for future discussion and to ensure a common understanding of the specific parameters and objectives associated with the integration of peace education principles into the realm of cultural heritage management and tourism, in this respect. Moreover, a theoretical framework for peace education through tourism at WHS was proposed.

OUTPUTS:

Article:

1. Carbone, F. & Khanzadi, T. N., 2024. Unveiling the Nexus: Peace Education, Tourism, and UNESCO Site Management Policies, in RT&D – Journal of Research, Tourism and Development (proceedings of the INVTUR 2024) [to be published].

2. Carbone, F. & Khanzadi, T. N., 2024. Converging pathways for peace: tourism practices, UNESCO World Heritage Convention, and the SDG16(+), Journal of Tourism Management Perspectives, Q1 [Submitted to].

Communication:

1. Carbone, F. & Khanzadi, T. N., 2024. Unveiling the Nexus: Peace Education, Tourism, and UNESCO Site Management Policies, paper presented at the International Conference INVTUR 2024, University of Aveiro, May. 2024

Cultural Environment Community AI Hub

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PROJECT TYPE: Research and Innovation

PRINCIPAL INVESTIGATOR: Erika M. Robrahn-González

TEAM: Erika M. Robrahn-González, Luiz Oosterbek, Nuno Madeira

INSTITUTIONS INVOLVED: ITM (Portugal), IPT (Portugal), DOCUMENTO Ltd (Brazil), UNESCO/MOST/BRIDGES Coalition (France)

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4, 11 and 17.

PROJECT GOALS: This Program aims to create a Community AI Hub with knowledge management in the Cultural Environment, applied in international contexts (Brazil and Portugal, with planned expansions) and strongly enhanced by Artificial Intelligence. It aims to support solutions based on the Sustainable Development Goals (SDGs) of the UN 2030 Agenda and ESG Factors (Environment, Social, Governance).

RESULTS: Data Science of more than 500 projects developed in Brazil. Involvement of hundreds of communities (indigenous, Afro-descendants, local and urban). Development of Digital Humanities tools includes Player, Cultural Territory Simulator, Virtual Museum, Control Room, Distance Learning platform, Public Cultural Heritage Management Platforms, Storytellers, and Deep Maps. Integration of Artificial Intelligence in knowledge management, dialogue between stakeholders, transparency, and collaboration between users.

Fig 1 a. Cultural Territory Simulator (from DOCUMENTO Ltd., 2024). b. Territory of Memory, Cinta Larga indigenous group (from DOCUMENTO Ltd., 2014).

OUTPUTS:

Article:

1. Robrahn-González, E.M., 2024. Cultural Heritage in Landscape Management: overcoming the challenges of Sustainable Development Goals. Bulletin du Musée d'Anthropologie Préhistorique de Monaco, n° 63 :37-54 (in press).

2. Robrahn-González, E. M., 2022. Culture as a vector for Social Innovation and Creative Economy: Co-creative projects in Rio de Janeiro, Brazil. In Ana Campana & Carlos Rodrigues (ed.) International Capital Conference on Multidisciplinary Scientific Research – Proceeding Book. Lisboa, :356-364. ISBN: 978-625-8323-93-1

3. Robrahn-González, E. M., 2021. Expanding the concept of Heritage in a disruptive world: the Open Science model. In: Oosterbeek, Luiz (Ed.) Heritage and Cultural Exchange routes: to debate, preserve and enhance, :19-24. ISBN: 978-989-8840-62-2

4. Robrahn-González, E. M., et al. 2016. Inteligência Coletiva em Meio Ambiente Cultural: modelos preditivos, preservação e valorização da identidade cultural. LEPAARQ vol. 13, n. 26 :248-268. ISSN 2316 8412

5. Robrahn-González, Erika M. 2015. Integrating communities from the perspective of Continuous Archaeology: a case study of Rio de Janeiro, Brazil. Proceedings of the II Internacional Conference on Best Practices in World Heritage: People and Communities. Section 6: Transversal Actions, :1009-1023. ISBN: 978-84-606-9264-5

Discovering Val Maira (Italy): A Community Heritage Project

Gabriele Luigi Francesco Berruti[1,2*], Marta Arzarello[1,2], Sandro Caracausi[1], Maddalena Coccagna[1], Sara Daffara[1], Sara Garcês[1,3], Hugo Gomes[1,3] and Luiz Oosterbeek[1,2,3]

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[(2)]Instituto Politécnico de Tomar, Portugal
[(3)]Centro de Geociências, Portugal
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PROJECT TYPE: Teaching and Research Development

PRINCIPAL INVESTIGATOR: Gabriele Luigi Francesco Berruti

TEAM: Gabriele Luigi Francesco Berruti, Marta Arzarello, Sandro Caracausi, Maddaena Coccagna, Sara Daffara, Sara Garcês, Hugo Gomes, Luiz Oosterbeek

INSTITUTIONS INVOLVED: Archeosmart s.r.l., Instituto Politécnico de Tomar, Instituto Terra e Mémoria, Università degli studi di Ferrara, Associazione Espaci Occitan.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4.

PROJECT GOALS: The main objectives of the project are to engage and educate local communities of the Val Maira area about cultural heritage by involving them in heritage conservation activities. The Application created in Maçao will be adapted to the specific context of Val Maira and distributed throughout the region. This fosters a sense of ownership and connection and enhances public awareness. Collaboration between archaeologists and the public leverages local knowledge, facilitating cultural exchange and thorough documentation of findings. The project aims to build local skills, promote sustainable practices, and ensure inclusivity by involving diverse groups. Increasing public access to research through presentations and publications, supporting heritage tourism, and promoting interdisciplinary approaches are also key goals.

RESULTS: The expected results include the adaptation of the application developed in Maçao to the Val Maira area. The project team will produce the initial content to be uploaded to the app, starting with known historical and archaeological data. Subsequently, the app will be distributed throughout the area of interest, allowing both local residents and occasional visitors to the valley to participate in creating new content using the methods already established for the Maçao territory. The development and implementation of the app will enable Val Maira to increase both scientific knowledge of its cultural heritage and its promotion for tourism and communication purposes.

Fig 1 and 2: Val Maira area.

Earth-Humanity Coalition Sciences for Equitable Wellbeing on a Healthy Planet Enabling the International Decade of Sciences for Sustainable Development 2024-2033 (IDSSD)

Luiz Oosterbeek[1,5*], Maria Helena Henriques[2,5], Inês Pereira[2,5], Ana Castilho[2,5], Nuno Vaz[3,5] and Adolfo Silveira[4,5]

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[(3)]Universidade de Trás-os-Montes e Alto Douro, Portugal
[(4)]Universidade Autónoma de Lisboa, Portugal
[(5)]Centro de Geociências, Portugal
*loost@ipt.pt

PROJECT TYPE: Research and innovation

PRINCIPAL INVESTIGATOR: Luiz Oosterbeek

TEAM: members of CGeo

INSTITUTIONS INVOLVED: International Union of Pure and Applied Physics, Switzerland; Instituto Politécnico de Tomar, Portugal, Universidade de Coimbra, Portugal; Universidade de Trás-os-Montes e Alto Douro; Universidade Autónoma de Lisboa; Club of Rome and others.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 14, 15 and 17

PROJECT GOALS: To implement an ambitious and transformative programme of activities for the International Decade of Sciences for Sustainable Development 2024-2033 (IDSSD). Research explicitly aiming to promote and deliver the SDGs and UN Agenda 2030, the Paris Agreement, the Convention on Biodiversity and all intergovernmental conventions and agreements foregrounding the outcome of sustainable development for people and the planet.

RESULTS: Expected results: the joint mobilization and collaboration of all domains of knowledge, beyond the traditional framing and fragmentation into separated disciplines, including indigenous and local knowledge; a new role for sciences to work together for humanity; a decisive contribution of sciences and humanities to address the gaps and divides within and between worldviews, cultures, communities, values and nations; to address barriers to equity within knowledge creation itself.

Fig 1. Coalition logo and UN Decade announcement.

OUTPUTS:

Articles:

1. Werlen, B., Oosterbeek, L., Henriques, M. H., 2016. International year of global understanding: Building bridges between global thinking and local actions. Episodes 39(4): 604-611. DOI:10.18814/epiiugs/2016/v39i4/103894.

2. Henriques, M. H. & Brilha, J. 2017. UNESCO Global Geoparks: a strategy towards global understanding and sustainability", Episodes 40(4): 349-355. DOI: 10.18814/epiiugs/2017/v40i4/017036.

3. Oosterbeek, L., Henriques, M. H., Rosina, Pierluigi; Figueira, Luís M. 2018. Paving the Road for Sustainability through Global Understanding of Heritage. Proceedings 2, 559: 1-9. http://dx.doi.org/10.3390/iecg_2018-05356.

4. Henriques, M. H., Canales, M. L., García-Frank, A. & Gomez-Heras, M. 2019. Accessible geoparks of Iberia: a challenge to promote geotourism and education for sustainable development. Geoheritage 11: 471-484. DOI: 10.1007/s12371-018-0300-5.

5. Henriques, M. H. & Carvalho, I. S. 2022. Culturally differentiated paths towards the conservation of the paleontological heritage at Araripe (NE Brazil) and Arouca (N Portugal) UNESCO Global Geoparks. Geoheritage 14: 68. https://doi.org/10.1007/s12371-022-00700-0.

EcoPLis
Pleistocene Human Occupation in the Lis River Ecotones

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PROJECT TYPE: Research Project, Training Project; Wenner-Gren Foundation (GR 9296), Fundação para a Ciência e a Tecnologia (IF/01075/2013), City of Leiria (63017-UAL Proj EcoPLis-Mun LeiriaPID), Direção Geral do Património Cultural (AEF-PIPA2021-12), and supported by the City of Leiria, EST, S.A. and União de Freguesias de Santa Eufémia e Boa Vista.

COORDINATION: Telmo Pereira, Vânia Carvalho, Trenton Holliday

TEAM: Telmo Pereira, Patrícia Monteiro, Eduardo Paixão, David Nora, Sandra Assis, Carlos Simões, Cleia Detry, Vânia Carvalho, Trenton Holliday, Alexandre Paya

INSTITUTIONS INVOLVED: Universidade Autónoma de Lisboa, Instituto Politécnico de Tomar, CGeo - Centro de Geociências, UNIARQ - Centro de Arqueologia da Universidade de Lisboa, LARC-Laboratório de Arqueociências, Património Cultural IP, ICArHEB - Interdisciplinary Centre for Archaeology and Evolution of Human Behaviour, TraCEr - Laboratory for Traceology and Controlled Experiments, MONREPOS - Archaeological Research Centre and Museum for Human Behavioural Evolution, The Institute of Archaeology, The Hebrew University of Jerusalem, CRIA - Centro em Rede de Investigação em Antropologia, Museu de Leiria, Tulane University, Centre for the Exploration of the Deep Human Journey, University of the Witwatersrand, Rococo, Cultura com Estilo, Lda.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 13 and 16

PROJECT GOALS: To solve the problem of coarse and dispersed information from westernmost Iberia in order to produce a more detailed understanding about the role of ecotones that linked the coast, the fluvial basin, the karstic canyons and the mountain landscapes and resources, particularly during climatic crises of the Late Pleistocene and Early Holocene.

RESULTS: Excavations. Poço Rock shelter (Middle Solutrean, Upper Solutrean, Epipaleolithic, Early Neolithic), Buraca da Moira Cave (deep sediment infill), Praia do Pedrógão (MIS5b Mousterian), Abrigo da Gruta da Buraca da Moira (Early Gravettian to Upper Solutrean, Epipaleolithic, Middle Neolithic to Late Chalcolithic.

Fig 1. Coalition logo and UN Decade announcement.

OUTPUTS:

Articles:

1. Pereira. T., Paixão, E., Évora, M., Nora, D., Monteiro, P., Assis, S., Detry, C., Simões, C., Carvalho, V., Holliday, T., 2022. Evidence of specialized resource exploitation by Modern Humans in Western Iberia associated to Pleistocene and Holocene extreme environmental conditions, Journal of Archaeological Sciences – Reports. 46, 103696. https.//doi.org/10.1016/j.jasrep.2022.103696.

2. Pereira, T., Paixão, E., Évora, M., Marreiros, J., Nora, D., Monteiro, P., Assis, S., Carvalho, V., Holliday, T., 2021. Raw material procurement at Abrigo do Poço Rockshelter (Central Portugal). In Studies on the Palaeolithic of Western Eurasia. (Lengyel, György, Wilczyński, Jarosław, Sánchez de la Torre, Marta, Mangado, Xavier, Fullola, Josep Maria, Eds.), Archaeopress Archaeology, Oxford, 216-230.

3. Assis, S., Branco, R., Carvalho, V., Dias, R., Duarte, C., Évora, M., Farias, A., Holliday, T., Marreiros, J., Matias, R., Monteiro, P., Nora, D., Paixão, E., Pereira, T., 2018. An unusual coronoid fracture in a fragment of ulna recovered from the Prehistoric site of Buraca da Moira Rock Shelter. (Boa Vista, Leiria), Antropologia Portuguesa, 35, 69-82. doi.org/10.14195/2182-7982_35_4

Encontros Transatlânticos de LabGeopoéticos (1er Symposium Rencontres Transatlantiques de LabGéopoétiques)

Luisa Corral M.O. Ponciano[1], Georgios Dimitriadis[1,2,3*] and Lirandina Gomes [3]

[(1)]NU2GEO/UNIRIO, Rio de Janeiro, Brasil

[(2)]UNESCO Chair on Geoparks, Sustainable Regional Development and Healthy Lifestyles

[(3)]INSTITUTE CAMÕES Chair/UNEB, Salvador, Brasil

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PROJECT TYPE: Teaching and Research Development on Geopeotics jointly with Institute Camões Chair "Fidelino Figueiredo" /UNEB, BR and UNESCO Chair "Geoparks, Regional Sustainable Development and Healthy Life Styles"

TEAM: Luisa Corral M.O. Ponciano, Georgios Dimitriadis and Lirandina Gomes

INSTITUTIONS INVOLVED: UNIRIO (Brasil) UNEB (Brasil) and UTAD (Portugal)

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4, 12, 15

PROJECT GOALS: the present Symposium object and goals are expanding research networks on geopoetics and understanding its multiple approaches. Our transatlantic meetings are based on the search for a greater perception of the sensitive and affective relationships of human beings with the planet earth aiming to contribute to the conservation of nature(s) (biotic and abiotic) and cultures that is associated with the rhythms, flows, dynamics and systems of the Earth.

RESULTS: Share experiences with a focus on geopoetics and find possibilities of establishing new bridges for carrying out research, expanding this call by this invitation.

Fig 1. Logotypes of involved Institutions, 18-19 July 2024.

OUTPUTS:

Special Issue:

1. SPECIAL ISSUE ON GEOPEOTICS - REVIEW ECOTURISMO & CONSERVAÇÃO (HTTPS://WWW.UNIRIO.BR/CCBS/ECOTURISMO/REVISTA), Post-Graduation Program in Ecotourism and Conservation, UNIRIO, Rio de Janeiro, December 2024.

EUROMUSE

Luiz Oosterbeek[1,3,4*], Fernando Coimbra[2,3,4]

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[(2)]Município de Mação
[(3)]Instituto Terra e Memória, Portugal
[(4)]Centro de Geociências, Universidade de Coimbra, Portugal
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PROJECT TYPE: Research and innovation (funding: European Commission)

PRINCIPAL INVESTIGATOR: Aleksandar Marcovic (Portugal: Fernando Coimbra)

TEAM: Ari de Carvalho, Luiz Oosterbeek, Silvia di Benedetto, Mina Mitsomponou, Kostas Moschos

INSTITUTIONS INVOLVED: Earth PR, Serbia; Museo Dei Bambini Societa Cooperativa Sociale, Italy; Kotsanas Museum of Ancient Greek Technology, Greece; Municipio de Mação, Portugal; IEMA-Greek Music Information Centre, Greece.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 3, 4, 17.

PROJECT GOALS: EUROMUSE is an innovative research project that proposes the development of a new sub-genre of applied music for museums, aiming to increase the number of visitors and improve their experience. It is based on a model of participatory music cocreation and testing of composed applied background music for museums' facilities, through an interactive process between young composers, museum professionals, researchers, and active groups of museum visitors.

RESULTS: The project part will provide 6 new music compositions specially composed for permanent exhibitions in 3 museums after 3 residences, 9 workshops, and 4 trainings are finished.

Fig 1. Poster of initiative of the Museum of Mação, in 2023.

OUTPUTS:

Articles:

1. Oosterbeek, L., 2014. Changing the gestures of the eyes to invent newlandscapes. Cultural heritage and local development. Local communities through heritage awareness and global understanding. Ravello, appendix to Territori della Cultura 18: 108-117.

2. Carvalho, A., 2024. Sound and Museology, X Apheleia Seminar, Mação.

European Humanities Conference (2021 Portuguese presidency of the European Council)

Luiz Oosterbeek[1,2,3*]

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[(2)]Instituto Terra e Memória, Portugal
[(3)]Centro de Geociências, Universidade de Coimbra, Portugal
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PROJECT TYPE: Research and advocacy (funding: Fundação para a Ciência e Tecnologia; UNESCO).

PRINCIPAL INVESTIGATOR: Luiz Oosterbeek

TEAM: Maria do Rosário Costa, Rosi Braidotti, Henrique Leitão

INSTITUTIONS INVOLVED: Instituto Terra e Memória, Fundação para a Ciência e Tecnologia, UNESCO, Ministério da Ciência e Tecnologia e Ensino Superior, Conselho Internacional para a Filosofia e as Ciências Humanas.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4, 11, 17.

PROJECT GOALS: The European Humanities Conference was organized during the Portuguese Presidency of the Council of the European Union, aiming at addressing humanities contributions to core societal concerns (health, migrations, digitalization, science and others) and approve recommendations for universities and authorities.

RESULTS: A “Declaration of Lisbon”, engaging the Portuguese government (Ministry of Science and Higher Educatin) and FCT, was approved and is in process of implementation, focusing on open science and the need to include a curricular component of sciences and humanities for all students, every year, until PhD level. A final outcome document and a youth forum statement were also approved, with further recommendations, namely on language diversity in science.

Fig 1. Poster (left) and proceedings cover (right) of the conference.

OUTPUTS:

Book of proceedings:

Oosterbeek, L., Braidotti, R., Leitão, H., Costa, R., 2023. Proceedings of the European Humanities Conference, 5-7 May 2021. Mação, Instituto Terra e Memória. https://drive.google.com/file/d/1Z_GSmSFr5DaAMMz-gLeH_rMXmJwHI2VZ/view?usp=share_link

FIRST-ART PROJECT
Conservation, documentation and management of the first manifestations of rock art

Hipólito Collado[1,2,3,9,11*], Sara Garcês[1,2,3], Hugo Gomes[1,2,3], Virginia Lattao[2,3,12], George Nash[1,2,3,5],Pierluigi Rosina[1,2,3], Qingfeng Shao[4], Carmela Vaccaro[10], Elena Marrocchino[10], Genevieve von Petzinger, Matthias Meyer[8], Alba Bossoms Mesa[8], José Julio García[3,9], Diego Salvador Fernandez[6] and Hugo Mira Perales[7]

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[(2)]Instituto Terra e Memória, Mação, Portugal
[(3)]Centro de Geociências, Portugal
[(4)]Nanjing Normal University, China
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[(6)]Universidad de Cádiz, Spain
[(7)]Instituto de Estudios Campogibraltareños, Sección 2ª: Arqueología, Etnografía, Patrimonio y Arquitectura. España.
[(8)]Max Planck Institute for Evolutionary Anthropology, Germany
[(9)]Universidad de Extremadura, Spain
[(10)]Universidad de Ferrara, Italy
[(11)]Junta de Extremadura, Spain
[(12)]Universidade de Coimbra, Portugal
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PROJECT TYPE: Research Project, (Grant 0497_FIRST ART_4_E)

PRINCIPAL INVESTIGATOR: Hipólito Collado Giraldo

TEAM: Sara Garcês, Hugo Gomes, Virginia Lattao, George Nash, Pierluigi Rosina, Qingfeng Shao, Carmela Vaccaro, Elena Marrocchino, Genevieve von Petzinger, Matthias Meyer, Alba Bossoms Mesa, José Julio García, Diego Salvador Fernandez y Hugo Mira Perales

INSTITUTIONS INVOLVED: Junta de Extremadura, Museo de Altamira (Spain), DRC Alentejo, Municípios de Montemor-o-Novo e Mação, Inst. Terra e Memória (Portugal), Max Planck Institute (Germany), Nanjing Normal Univ. (China); Un. de Ferrara (Italy), Un. de Extremadura (Spain), National Geographic, Lee Berger Foundation (USA), Bradshaw Foundation (England).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4, 5 and 9.

PROJECT GOALS: FIRST ART aims to unravel the origins of cave art by comprehending the symbolic repertoire that humans, irrespective of their species, were capable of depicting on rock surfaces, through complementary processes: to establish a consistent and accurate chronological framework within which the earliest graphic expressions took place; to characterize, based on technical, stylistic and morphological criteria, the graphic elements that dating studies associate with the emergence of art: the identification of the

human groups that played a key role in the genesis of the earliest graphic representations by studying traces of human DNA.

RESULTS: the chronological confirmation of the antiquity of parietal representations about which there were doubts as to their Neanderthal attribution; significant progress in the characterisation and identification of the pigments used in the early phases of rock art; evidence that gives hope for the identification of DNA remains in some Palaeolithic figures.

Figure 1 (left): Fieldwork in Bacon Hole, Wales, UK.
Figure 2 (right): Fieldwork in Cueva de Balmori, Asturias, Spain.

OUTPUTS:

Article:

1. Rosina P., Collado H., Garcês S., Gomes H., Lattao V., Nicoli, Eftekhari N., Vaccaro C., 2023. Pigment spectroscopy analyses in Maltravieso cave, Spain. L'Anthropologie https://doi.org/10.1016/j.anthro.2022.103116.

Book chapters:

1. Rosina, P.; Garcês, S.; Gomes, H.; Lattao V.; Collado Giraldo, Hipolito, 2022. Caracterización de los pigmentos empleados en las figuras pintadas de la Cueva de Maltravieso. In: Collado Giraldo, H. & García Arranz J.J. (Coord.) Arte Rupestre Paleolítico em la Cueva de Maltravieso (Cáceres, España) Volumen I: Estudios; pp. 63-91.

2. Garcês, S., Collado, H., García Arraz, J.J., Oosterbeek, L., Silva, A.C., Rosina, P., Gomes, H. Pereira, A.B., Nash, G., Gomes, E., Almeida, N., Carpetudo, C., 2020. O Projecto First-Art - conservação, documentação e gestão das primeiras manifestações de arte rupestre no Sudoeste da Península Ibérica: as grutas do Escoural e Maltravieso. In Arnaud, J. M.; Neves, C.; Martins, A., Arqueologia em Portugal 2020 - Estado da Questão. Lisboa: pp. 513-521. DOI: https://doi.org/10.21747/978-989-8970-25-1/arqa40

Geocaching as a tourism product for the sustainable development of a territory

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[(2)]University of Coimbra, Geosciences Center, Department of Earth Sciences, Coimbra, Portugal
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PROJECT TYPE: Master in Inland Tourism - Education for Sustainability

RESEARCH STUDENT: Luiza Friedrich Garcia

SUPERVISION: Maria do Rosário Campos Mira and Maria Helena Paiva Henriques

TEAM: Luiza Friedrich Garcia, Gustavo Gonçalves Garcia, Patrícia Margarida Nunes João, Salomé Cruz Marques Custódio and Maria Helena Paiva Henriques.

INSTITUTIONS INVOLVED: Geosciences Center and Coimbra Education School – Polytechnic of Coimbra (Portugal).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 11, 12 and 17.

PROJECT GOALS: This project aims to deepen knowledge about the relationship between geocaching and tourism. Characterization of the model of variables that define the relationship between Geocaching and tourism. Analyzing the application of the model of variables developed in a territory. It also aims to boost the geocaching as a tourism products to the appreciation your heritage, suggesting the implementing caches for a specific territory.

RESULTS: The model of variables designed to describe the relationship between geocaching and tourism was characterized through bibliometric analysis. Using the VOSviewer software, a co-occurrence map was generated with the most relevant keywords from the articles analyzed, which were grouped into four clusters. The co-occurrence map was used to create a variable model that highlights the fundamental dimensions that characterize the relationship between Geocaching and tourism, namely 'Tourism product', 'Ecosystem', 'Consumer profile' and 'Sustainability'. After validating this model, it was necessary to create a cluster, entitled 'Geocacher', to incorporate the information highlighted in the logs that did not fit the parameters previously identified. This model could serve as a basis for analyzing the relationship between geocaching and tourism in other territories, relating to the interaction between the geocachers and the territory. Moreover, with a view to the promotion and pilot study of a territory, seven geocaches were planned as part of a Geotour, which consists of a route of caches with a specific purpose for the town of Ança (Cantanhede). Once they have been set up in the area, the aim is to monitor visits to these caches through the logs on the geocaching.com platform, in order to the geocaching community's interest in the area, as well as carrying out a content analysis of the comments in the caches. This pilot study

will serve as a basis for designing Geotours to promote the natural and cultural heritage of other territories. Future work includes applying this Geotour in an educational context, not only validating the caches, but also making them part of the curriculum of the first cycle of Portuguese basic education.

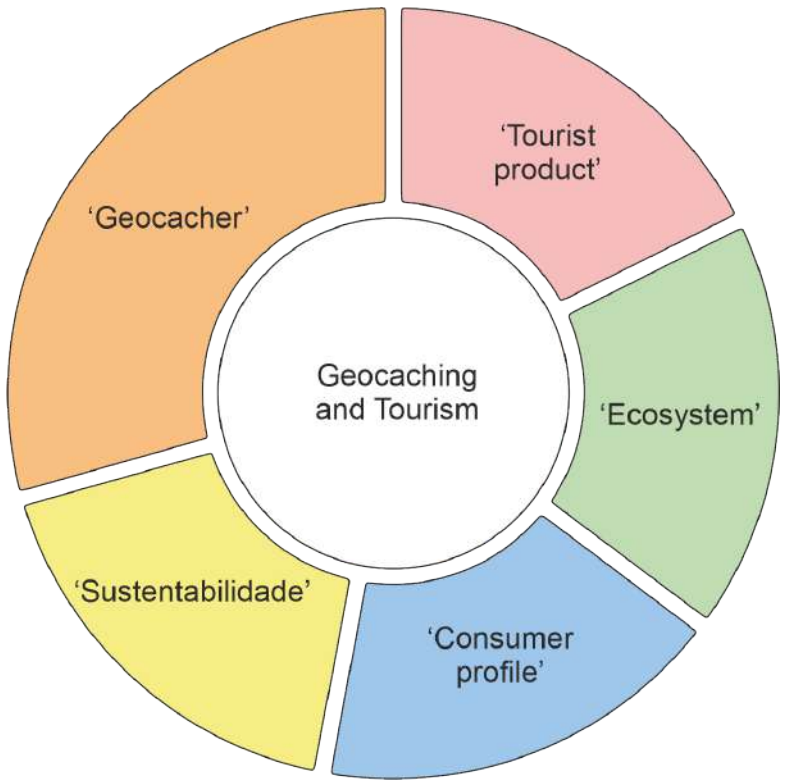

Fig 1. Demonstrative model of Geocaching's relationship with tourism (modified from Garcia 2024).

OUTPUTS:

Communications:

1. Garcia, L.F., Garcia, G.G., Custódio, S.C., Henriques, M.H., João, P. (2023). Earthcaches in the territory of the Atlantic Geopark Project (Portugal). 10th International Conference on Geoparks, 4 to 11 September 2023, in Marrakech and M'Goun Unesco Geopark in Azilal, Abstracts Book, p. 135.

SEDSNET – SCIENCE and Education for Sustainable Development Networks in UNESCO Global Geoparks

Hugo Gomes[1,2*]

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[(2)]Centro de Geociências, Portugal
*hugohugomes@gmail.com

PROJECT TYPE: Research Project (Geopark)

PRINCIPAL INVESTIGATOR: Hugo Gomes

INSTITUTIONS INVOLVED: CGEO - Geosciences Centre, Coimbra University, Portugal; AGE - Associação Geopark Estrela, Portugal; UTAD - Universidade de Trás-os-Montes e Alto Douro: Vila Real; UC - Universidade de Coimbra: Coimbra; Instituto Politécnico da Guarda; Universidade da Beira Interior; Instituto Politénico de Tomar.

USTAINABLE DEVELOPMENT GOALS (SDGS): 3, 4, 5, 6, 8, 10, 13, 15, 16, 17.

PROJECT GOALS: The IGCP 736 - SESDNet - Science and Education for Sustainable Development Networks in UNESCO Global Geoparks (UGGp) project, supported by UNESCO's International Geosciences Programme, has already begun its activities. This initiative, led by Estrela UGGp, with the collaboration of Mixteca-Alta UGGp, from Mexico, and Araripe UGGp, from Brazil, aims to establish the sharing of good practices and joint actions between UNESCO Global Geoparks, including territories aspiring to this classification, in order to develop innovative strategies for research, education and scientific dissemination. The IGCP 736 - SESDNet - Science and Education for Sustainable Development Networks in UNESCO Global Geoparks (UGGp) project is supported by UNESCO's International Geosciences Programme.

RESULTS: Currently, 14 territories in five Ibero-American countries (Portugal, Mexico, Brazil, Chile and Ecuador) are already part of this network, which is open to expansion to more territories in these regions and the CPLP, promoting science as a driver of development.

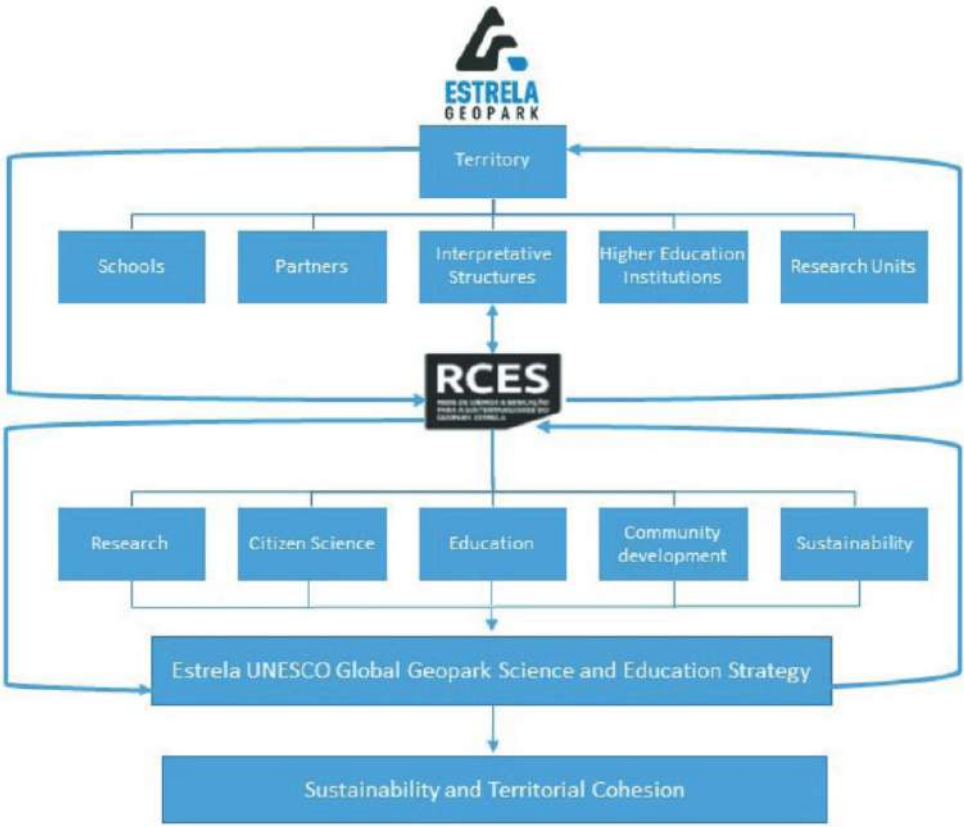

Figure 1: Estrela UNESCO Global Geopark Science and Education Strategy.

OUTPUTS:

Articles:

1. Gomes, H., Loureiro, F., Cezar, L., Castro, E., Vieira, G. (2019). Interpreting Late Pleistocene paleoenvironments through the geosites of the Estrela Geopark (Central Portugal). In: Pena dos Reis, R..; Henriques, M. H.; Oosterbeek, L.; Rosina, P.; Alves, E.I.; Garcia, G.G. e João, P. (2019). International Meeting on Paleoclimate: change and adaptation – book of abstracts. série Area Domeniu, vol. 8, Instituto Terra e Memória – Centro de Geociências da Universidade de Coimbra. pp 57–58.

2. Gomes, H. "THE GEOCONSERVATION STRATEGY IN ESTRELA GEOPARK - portugal". Paper presented in 8th Internacional Conference on UNESCO Global Geoparks, Adamello - Brenta, 2018. 10.1016/j.quageo.2013.11.002

3. Gomes, H. "ULTRA HIGH RESOLUTION GEOMORPHOLOGICAL MAPPING AS A TOOL FOR RESEARCH AND MANAGING GEOSITES". Paper presented in 8th International Conference on UNESCO Global Geoparks, Adamello - Branta, 2018. 10.1016/j.quageo.2013.11.002

4. Gomes H.; Castro E.; Vieira G.; Mora C.; Echeverria S.; Freitas H. "The Estrela UNESCO Global Geopark Science and Education Network for Sustainable Development". 2021. https://doi.org/10.5194/egusphere-egu21-12903. 10.5194/egusphere-egu21-12903

Geoconservation among the Community of Portuguese Speaking Countries

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[(2)]CCMN-Igeo, Universidade Federal do Rio de Janeiro, Av. Athos da Silveira Ramos 274, 21.941-916 Cidade Universitária, Ilha do Fundão, Rio de Janeiro, Brazil

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PROJECT TYPE: Research Project

COORDINATION: Maria Helena Henriques

TEAM: Maria Helena Henriques; Ismar de Sousa Carvalho; Rui Pena dos Reis; Vera Alfama; Keynesménio Neto; Salomé Custódio.

INSTITUTIONS INVOLVED: University of Coimbra (Portugal), Federal University of Rio de Janeiro (Brazil), University of Cabo Verde, and University of São Tomé and Príncipe.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4, 11, and 17.

PROJECT GOALS: To enlarge concepts and ideas about geoconservation; to deepen knowledge about the geodiversity of Portugal, Brazil, Cabo Verde and São Tomé and Príncipe; to characterize its geological heritage; to develop valuation strategies of geoeducation and geotourism to promote local sustainable development.

RESULTS: Development of new concepts and ideas in geoconservation science. Inventory and assessment of the geological heritage outcropping in Fogo Island (Cabo Verde), Príncipe Island (São Tomé and Príncipe) and the "Atlantic Geopark Project" (Portugal). Valuation strategies for the promotion of remote territories displaying geoheritage resources in Brazil (Araripe), West Africa (the Cameroon Volcanic Line) and Cabo Verde (Fogo Natural Park).

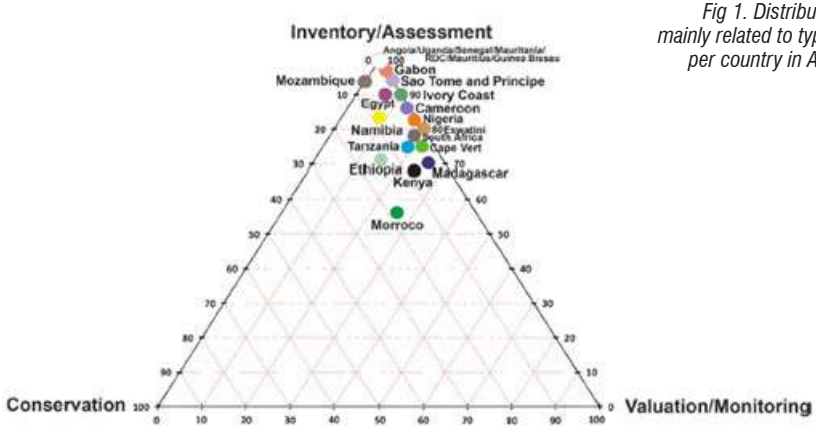

Fig 1. Distribution of documents mainly related to types of geoheritage per country in Africa (from Neto & Henriques, 2022).

OUTPUTS:

Articles:

1. HENRIQUES, M. H., PENA DOS REIS, R., GARCIA, G. G., JOÃO, P., MARQUES, R. M. & CUSTÓDIO, S. (2022). Developing paleogeographic heritage concepts and ideas through the Upper Jurassic record of the Salgado and Consolação geosites (Lusitanian Basin, Portugal), Resources Policy, 76, 102594, pp. 1-11 [https://doi.org/10.1016/j.resourpol.2022.102594].

2. HENRIQUES, M. H. & CARVALHO, I. S. (2022). Culturally differentiated paths towards the conservation of the paleontological heritage at Araripe (NE Brazil) and Arouca (N Portugal) UNESCO Global Geoparks, Geoheritage, 14: 68, 13 p. [https://doi.org/10.1007/s12371-022-00700-0].

3. NETO, K. & HENRIQUES, M. H. (2022). Geoconservation in Africa: state of the art and future challenges, Gondwana Research, 110: 107-113 [doi: https://doi.org/10.1016/j.gr.2022.05.022].

4. HENRIQUES, M. H. (2023). Broadening frontiers in Geoconservation: the concept of intangible geoheritage represented by the 1755 Lisbon earthquake, Geoheritage [DOI: 10.1007/s12371-023-00831-y].

5. NETO, K. & HENRIQUES, M. H. (2023). Geoheritage of the Príncipe Island (West Africa): selected geosites, Geoheritage, 15:118, 13 p. [https://doi.org/10.1007/s12371-023-00887-w].

6. HENRIQUES, M. H. & NETO, K. (2023). A geo-itinerary to foster sustainable tourism in West African islands: storytelling the evolution of the ancient Cameroon Volcanic Line coral reefs, Sustainability, 15, 16863, 15 p. [https://doi.org/10.3390/su152416863].

7. ALFAMA, V., HENRIQUES, M. H. & BARROS, A. (2024). The challenging nature of volcanic heritage: the Fogo Island (Cabo Verde, W Africa), Geoheritage, 16:34, 18 p. [https://doi.org/10.1007/s12371-024-00939-9].

8. CUSTÓDIO, S. C., HENRIQUES, M. H., ROSADO-GONZÁLEZ, E., VAZ, N., SÁ, A. A. (2024). Selected geoheritage resources of "Atlantic Geopark" Project (central Portugal), Geosciences, 14:81, 15 p. [https://doi.org/10.3390/geosciences14030081].

GEODES
Geosciences, Development and Sustainability - Africa and Europe together

Nelson Rodrigues[1*], João Serra Pratas[1] and Ana Maria Castilho[1]

[(1)]University of Coimbra, Geosciences Center, Department of Earth Sciences, Coimbra, Portugal
*nelsonr@ci.uc.pt

PROJECT TYPE: ERASMUS+ Programme - Capacity Building in the field of Higher Education: Strand 1

COORDINATION: Nelson Rodrigues

TEAM: Ana Maria Castilho, João Serra Pratas, Nelson Rodrigues the rest of the team can be consulted at: https://www.uc.pt/en/geodes/team-project/

INSTITUTIONS INVOLVED: University of Coimbra (UC), University of Salamanca (USAL), University of Torino (UNITO), University Agostinho Neto (UAN), University Katiavala Bwila (UKB) University Mandume ya Ndemufayo (UMN), University Eduardo Mondlane (UEM), University of Lúrio (UL), University Pùngué (UP).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4, 10, and 17.

PROJECT GOALS: The idea behind GEODES is the integration of four newcomers to the ERASMUS program from less favored institutions, with an emphasis on the upgrading and implement degrees in Geosciences and to train students and teachers in practical aspects. The project should: (i) promote technical training of teachers and final year students from 6 higher education institutions from Angola (UAN, UKB, UMN) and Mozambique (UEM, UL, UP) in the area of Earth Sciences; (ii) empower trainers from UAN and UEM on training country fellows; (iii) Upgrade and develope BSc and MSc courses in the area of Earth Sciences; (iv) develop professional internships in private companies in Angola and Mozambique; and (v) create applications that can be submitted in competitive research calls for funding.

RESULTS: It is expected longer term impact from GEODES. The exchange among scientists by bringing together complementary profiles should improve standards, methods, and techniques for carrying out research and transferring of fundamental and applied knowledge.

Fig 1. GEODES Logo.

Fig 2. Capacity Building - Infrastructures Improvement at the Polytechnic Institute of Huíla (Angola).

OUTPUTS:

Communications:

1. Dino, G. A., Mancini, S, Pereira, D., Lasagna, M., Gambino, F., Prego, G., Gonçalves, D., Jacinto, A., Jamal, D., José, L., Nganhane, H., Dinis, P., & Rodrigues, N. (2024). Towards sustainable management of georesources: the importance of Cooperation Projects to boost education on responsible and sustainable mining. The example of the SUGERE and GEODES projects. Proceedings of the EGU General Assembly 2024, Session EOS4.4 - Geoethics: The significance of geosciences for society and the environment. https://meetingorganizer.copernicus.org/EGU24/session/49297

2. Mancini, S, Pereira, D., Lasagna, M., Gambino, F., Prego, G., Gonçalves, D., Jacinto, A., Jamal, D., José, L., Nganhane, H., Rodrigues, N., Dinis, P., & Dino, G. A. (2024). Sustainability in geo-resource management through shared competence-building projects. The example of GEODES Interrego Project. Congresso congiunto SGI, SIMP 2024. https://en.geoscienze.org/N260/sessionT73.html

Geodiversity and Urban Paleontology

Carlos Marques da Silva[1] and Sofia Pereira[2]

[(1)]Instituto Dom Luiz, Lisboa, Portugal

[(2)]Centro de Geociências, Universidade de Coimbra, Coimbra, Portugal

*ardi_eu@hotmail.com

PROJECT TYPE: Research Project

COORDINATION: Carlos Marques da Silva & Sofia Pereira

TEAM: Carlos Marques da Silva, Sofia Pereira

INSTITUTIONS INVOLVED: University of Lisbon (Portugal), University of Coimbra (Portugal).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4 and 11. Through its strong connection to the phenomenon of generating local identity, which is fundamental to the cohesion and vitality of human communities, and its strong pedagogical aspect at various levels, contributes to SDG 11) Sustainable Cities and Communities and 4) Quality Education, in close articulation with what is set out in the Pedagogical part of the project. Besides, it also contributes fo SDG 11 by using geology and landscapes within tourism, aiding the conservation of geodiversity and building a greater understanding of those communities living and working around geological features.

PROJECT GOALS: Investigating the pedagogical, cultural and social impact of urban geodiversity. The study of the relationship between geodiversity, culture and society in an urban environment will be deepened, 1) investigating the impact of elements of abiotic nature on local populations, namely in the generation of 'sense of place' and decorative arts, as well as their pedagogical application at secondary and university level and 2) Investigating the pedagogical application of macrofossils in an urban context and their potential as a teaching resource, to construct "A brief guide to urban palaeontology".

RESULTS: Publication of teaching materials for the example of the geological context, rocks and fossils of Terreiro do Paço in Lisbon; Demonstration of the importance of urban geodiversity as an identity element of urban communities, taking Lisbon's emblematic Portuguese pavement and its international impact, e.g. on the Copacabana promenade, as an example; start of the brief guide to urban palaeontology, with the publication of a chapter dedicated to rudist fossils; construction of a glossary of palaeontology terms in Portuguese.

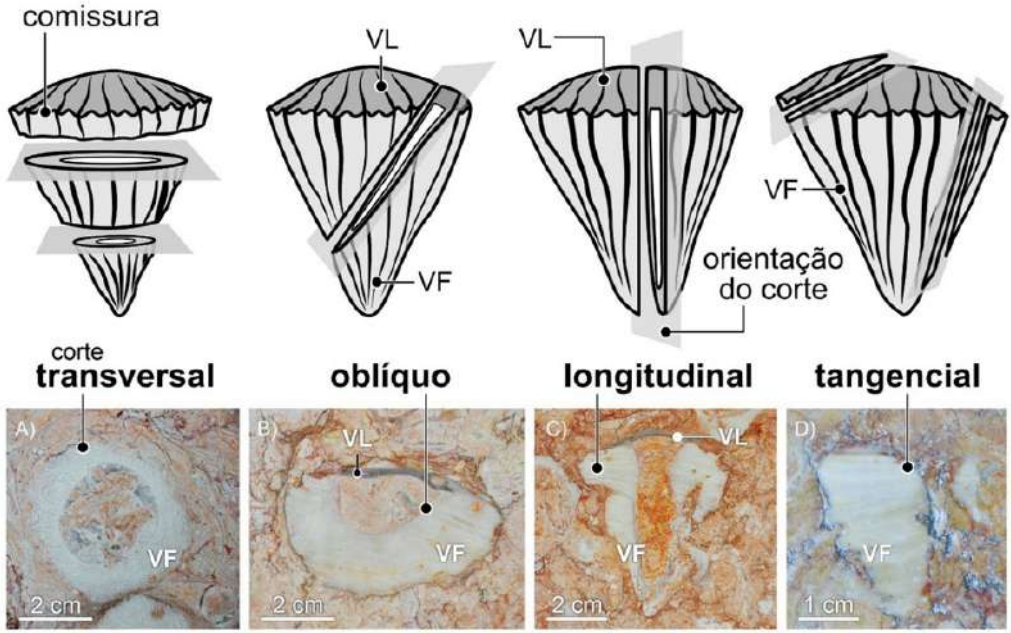

Fig 1. Fossils of the radiolithid rudist Sauvagesia on polished surfaces exposed on walls and pavements in the city and how to interpret and use them in a pedagogical and scientific dissemination context (image by Silva & Pereira, 2023).

OUTPUTS:

Articles:

1. Silva, C.M. da; Pereira, S. (2021) A geodiversidade urbana como recurso educativo. O exemplo do contexto geológico, das rochas e dos fósseis do Terreiro do Paço em Lisboa. Revista de Ciência Elementar, 9(3): 051. http://doi.org/10.24927/rce2021.051

2. Silva, C.M., Pereira, S. (2022). Walking on Geodiversity: the Artistic Stone-Paved Sidewalks of Lisbon (Portugal) and Their Heritage Value. Geoheritage, 14, 98 https://doi.org/10.1007/s12371-022-00733-5

3. Silva, C. & Pereira, S. (2023). "Breve guia de Paleontologia urbana". Revista de Ciência Elementar 11 (4), 043, 20 pp. http://dx.doi.org/10.24927/rce2023.043.

Geopoetics of Terra Brasilis. An archaeo-anthropological hermeneutics approach of the architecture of urban cultural landscapes: Salvador-BA e Amparo-SP, Brazil

Georgios Dimitriadis[1,4*], Haroldo Gallo[2], Camila Gomes Sant'Anna[3] and Andine Gavazzi[4]

[(1)]CGeo/ UNESCO Chair on "Geoparks, Sustainable Regional Development and Healthy Lifestyles"

[(2)]IA&IFCH/UNICAMP, Campinas, Brasil

[(3)]UFBA, Salvador, Brasil

[(4)]UNESCO Chair on "Anthropology of Health. Biosphere and Healing Systems"/UNIGE

*gdimitriadis@autonoma.pt

PROJECT TYPE: Research Project UTAD-UNICAMP-UFBA jointly with UNESCO Chair "Geoparks, Regional Sustainable Development and Healthy Life Styles", PT and UNESCO Chair "Anthropology of Health. Biosphere and Systems of Healing", IT.

PRINCIPAL INVESTIGATOR: Georgios Dimitriadis, Haroldo Gallo, Camila Gomes Sant´Anna and Adine Gavazzi

COORDINATION: Georgios Dimitriadis, Haroldo Gallo, Camila Gomes Sant´Anna and Adine Gavazzi.

TEAM: Georgios Dimitriadis, Artur Sá, Haroldo Gallo, Marco Tognon, Camila Gomes Sant´Anna, Bruna dos Santos Azevedo, Kaique Joaquim Cordeiro Mascarenhas and Adine Gavazzi.

INSTITUTIONS INVOLVED: UNESCO Chair UTAD, Portugal; UNESCO Chair UNIGE, Italy; Faculty of Architecture/UFBA-Federal University of Bahia, Brasil; Institute of Arts/ UNICAMP, University of Campinas, Brazil; Institute of Philosophy and Human Sciences/ UNICAMP, University of Campinas, Brazil; Faculty of Architecture/UFBA- Federal University of Bahia.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4, 11, 15.

PROJECT GOALS: The urban planning of Bahia, derived from the Lisbon model, and Amparo, São Paulo, conceived by Italian planners, represents the application of a Eurocentric thought derived from the Renaissance and subsequently 19th-century evolution of the city projected towards an ideal future. This model, implemented in various South American regions, inevitably clashes with the complexity of the continent's geographies, biotic networks, and neotropical ecosystems. Moreover, the elements that govern pre-colonial territorial planning are more relevant and determinant than the imported theoretical models. This vision highlights the need to recognize the geoclimatic contexts in landscape planning, integrating the memory of Western paradigms towards an eco-centric horizon. A point of reference and operation will be the case study of an action research project of the historic centre of Amparo as exemplary of São Paulo's

listed historical centre jointly with the historic centre of Salvador, Bahia, listed as UNESCO World Heritage and the challenges of geopoetic preservation: methodology for updating, evaluating and forming a base regionally, nationally and internationally integrated data analysis, including of vulnerability.

RESULTS: Landscape currently contributes to an all-encompassing and integrated vision of heritage. Thus, heritage is contextualised as part of a landscape, which helps to make sense of it and explain its purpose.

In parallel, the concepts of heritage and landscape have taken on a more common and plural dimension. The heritage dimension of landscape provides important information for its planning and management, as well as its economic development on a local level. Conscious of these issues, the Observatory of South America Landscape promotes a range of initiatives to strengthen the value of landscape in this regard and orientate the work of authorities, organizations and citizens.

OUTPUTS:

Articles:

1. Berque, A. (Org.), Bartalini, V. (Org.), Sant'Anna, Camila G (Org.) (2023). O pensamento-paisagem. 1. ed. São Paulo: Edusp. 144p.

2. Sant'Anna, Camila G, Mell, Ian, Schenk, L (2022). . Planning with Landscape: Green Infrastructure to Build Climate-Adapted Cities. 1. ed. Gewerbestrasse: Springer International Publishing. v. 35. 258p .

3. Hoyle, Helen, Sant'Anna, Camila Gomes (2020). Rethinking `future nature? through a transatlantic research collaboration: climate-adapted urban green infrastructure for human wellbeing and biodiversity. Landscape Research , v. 45, p. 1-17.

4. Gallo, Haroldo, Viana Souza, Paulo de Tarso Coutinho (2023). DANTE E OS NOVOS INFERNOS - CONTEMPORÂNEA - REVISTA DE ÉTICA E FILOSOFIA POLÍTICA - ISSN 24470961 volume 3Haroldo Gallo: Design Teaching and Learning in Covid-19 Times: An International Experience - Capítulo de livro: Communications in Computer and Information Science - Gallo, H.; Ferreira Paulo; Antunes, F; Tognon, M.;Pereira, Heloisa. ISBN 9783030739874 Springer International Publishing.

5. Gallo, Haroldo (2019). Estudo de caso comparativo do tratamento dado aos Monumentos Escultóricos na América do Sul: Brasil, Argentina e Chile - Cap. de Livro: ATORES, FAZERES E POLÍTICAS CULTURAIS NA AMÉRICA LATINA: COMUNICAÇÃO E CULTURA - PROLAM-USP - ISBN 9788588376038 Volume 5. Gallo, H; Lhobrigat, A.

6. Haroldo Gallo: Lina Bardi's Fábrica Pompéia: The Genius Loci in a Center of Cultural Aggregation - Haroldo Gallo, Cap de Livro: Architettura Eremitica: Sistemi Progettuali e Paesaggi Culturali - Edifir Edizione Firenze, ISBN 9788892800021, vol. 1.

HERIT-AWARE

David Pleurdeau[1], Luiz Oosterbeek[2*] and Hugo Gomes[2]

[(1)]Muséum National d'Histoire Naturelle, France
[(2)]Instituto Politécnico de Tomar, Centro de Geociências, Portugal
*loost@ipt.pt

PROJECT TYPE: Research and innovation (funding: European Commission).

PRINCIPAL INVESTIGATOR: David Pleurdeau (Portugal: Hugo Gomes).

TEAM: Luiz Oosterbeek, Pierluigi Rosina, Sara Garcês, Carlos Lorenzo, Marta Arzarello, Alexandra Anders, Marco Beaumont, Hugo Gomes, Julie Arnaud, Antony Borel, Carlos Lorenzo, Robert Sala, Anne-Marie Semah, David Pleurdau, François Semah.

INSTITUTIONS INVOLVED: Muséum National d'Histoire Naturelle (France), Instituto Politécnico de Tomar (Portugal), University of Tarragona (Spain), University of Ferrara (Italy), Eotvos Lorand Tudomanyegyetem (Hungary), Holy Moka Games (France).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4, 14, 15.

PROJECT GOALS: The specific objective is to create a training module open to a wide geographical and thematic spectrum, delivering transversal skills, by: creating an online game to follow the acquisition of knowledge and skills via a documentary bank; to ensure a broad international outlook; taking into account the cultural and disciplinary diversity of users, actors and content; tutored workshops and intensive schools; and allow every HEI (or group) interested to join a learning community, contributing to the enrichment of the game and the documentary bank.

RESULTS: Herit-Aware is focused on 2 open-access productions:

- An online game by international and multidisciplinary teams of students, building, over 4 weeks, the management plan of a region faced with 2 heritage, natural and cultural issues.
- A documentary bank whose access is required by the game (contexts, constraints, issues, initiatives), an instrument for cross-sectoral learning.

Fig 1. Logo of the HERIT-AWARE project.

OUTPUTS:

Articles:

1. Velho, G., Oosterbeek, L., 2009. Serious Games in Heritage. Challenges at Mação. 15th International Conference on Virtual Systems and Multimedia. Vienna: pp. 217-220.

Human Capital de Cabo Verde Technical assistance for the preparation and validation of the Programmes for the secondary school subjects in Cabo Verde

Anabela Veiga[1,2]

[(1)]University of Coimbra, Geosciences Center, Coimbra, Portugal
[(2)]Polytechnic Institute of Leiria, Portugal
*anabela.veiga@ipleiria.pt

PROJECT TYPE: Credit Nº 70780-CV. Project ID Nº P175828. Contract Nº 071/HCP/UGPE/2023

COORDINATION: Pedro Gil Frade Morouço, Dina dos Santos Tavares, Luís Filipe Tomás Barbeiro, Isabel Sofia Godinho Rebelo, Maria Antónia Barreto and Hugo Alexandre Lopes Menino.

TEAM: A large group of teachers from Portuguese secondary schools, teachers from the University of Cape Verde and teachers from the Polytechnic Institute of Leiria. Exemples: Anabela Veiga, Ana Águas, Edgar lameiras, Vera Alfama and Jailson Mendes.

INSTITUTIONS INVOLVED: Polytechnic Institute of Leiria, University of Cabo Verde.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): SDG 4 – Quality education – ensure inclusive and equitable quality education and promote lifelong learning opportunities for al; SDG 15 – Learn to protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss: SDG 17 - Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development.

PROJECT GOALS: Develop and validate programs for all subjects in secondary education in Cape Verde. My contribution is to validate the 11th grade Biology and Geology programs (already completed), 12th grade Geology and 12th grade Biology (in progress).

RESULTS: The 11th grade Biology and Geology program is already being implemented on the ground in schools in Cape Verde.

OUTPUTS:

Programmes for the 11º and 12º secondary school subjects/Cabo Verde.

Human Rights and Information Society

Luiz Oosterbeek[1*], Celso Antônio Pacheco Fiorillo[2]

[(1)]Instituto Politécnico de Tomar, Centro de Geociências, Portugal
[(2)]Academia de Direitos Humanos, Brasil
*loost@ipt.pt

PROJECT TYPE: Research and innovation (funding: member organizations).

PRINCIPAL INVESTIGATOR: : Luiz Oosterbeek & Celso Fiorillo.

TEAM: Paulo Márcio Cruz, Irene Portela, Raquel Cavalcanti Ramos Machado, Hália Santos, Raquel Botelho, Flávio Ahmed, Paula Almeida, Taciana Cervi, Elda Bussinguer, Ana Mafalda Barbosa, Felipe Pinto Et Al.

INSTITUTIONS INVOLVED: Instituto Politécnico de Tomar (Portugal), Academia de Direitos Humanos (Brasil), Rede de Estudos Ambientais dos Países de Língua Portuguesa.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4, 12 and 16.

PROJECT GOALS: This project structures yearly seminars, each with a specific topic within the global thematics, bringing together experts in Earth, Human and Social Sciences, with a focus on science, society and law interactions. It aims to create spaces for dialogue on the current panorama of research in the field of human rights as well as sustainable economic activities as well as in the management of environmental goods, particularly in the face of cultural goods/ digital goods and their challenges as well as to expand the contribution of sciences to research in Law, anchored on inter and multidisciplinary research, for the benefit of the dignity of the human person.

RESULTS: Ten seminars and several articles and books, besides an impact in policies.

OUTPUTS:

Book

1. Oosterbeek, L., Fiorillo, C.A.P., 2024. Direitos Humanos e Sociedade da Informação: inteligência artificial, comunicação e sustentabilidade. Instituto Terra e Memória: 238 p.

Jacobina Geopark Project: Geopoetics and Culture Landscapes. Regional talks point to build up a dialogue for sustainable development

Georgios Dimitriadis[1,2,3*], Artur Sá[1], Lirandina Gomes[2], Rita Coelho[2] and Luiza Ponziano[3]

[(1)]CGeo/ UNESCO Chair on "Geoparks, Sustainable Regional Development and Healthy Lifestyles"
[(2)]PROET/UNEB, Salvador, Brasil
[(3)]NU2GEO/UNIRIO, Rio de Janeiro, Brasil
*gdimitriadis@autonoma.pt

PROJECT TYPE: Research Project PROET/ UNEB-Nu2Geo/UNIRIO-UTAD jointly with Institute Camões Chair "Fidelino Figueiredo", BR; UNESCO Chair "Geoparks, Regional Sustainable Development and Healthy Life Styles", PT.

PRINCIPAL INVESTIGATOR: Georgios Dimitriadis, Lirandina Gomes and Luiza Ponziano

COORDINATION: Georgios Dimitriadis, Lirandina Gomes and Luiza Ponciano

TEAM: Georgios Dimitriadis, Artur Sá, Lirandina Gomes, Rita Coelho, Agripino Coelho, Muniz Filho, Ivison Iurian Ferreira de Souza, Paula Rosana, Bebe Prado, Manuela Santana Pereira, Luiza Ponziano and Deusana Machado.

INSTITUTIONS INVOLVED: UNESCO Chair UTAD, Portugal; Camões Chair UNEB - University State of Bahia/PROET, Brasil; NU2GEO/UNIRIO-University State of Rio de Janeiro, Brasil.

SUSTAINABLE DEVELOPMENT GOALS (SDGS):

4, 11 and 12.

PROJECT GOALS: Draw up a geoenvironmental and geological heritage diagnosis for the municipality of Jacobina - Bahia - Brazil; evaluate the geological and paleontological potential for creating a Geopark in the municipality of Jacobina and its surroundings; develop geoconservation actions and geopoetic activities.

RESULTS: Geopark Implementation Project in the Municipality of Jacobina, Bahia; Geo-environmental education program; Creation of geotourism and geopoetic routes.

Fig 1. Logotype of Team.

OUTPUTS:

Articles:

1. Couto, P.A.; Sampaio, A.R.; Gil, C. A.A.; Loureiro, H.C.; Arcanjo, J.B.; Fernandes Filho, J.F.; Guimarães, J.T.; Melo, R.C. (1978). Projeto Serra de Jacobina: geologia e prospecção geoquímica. Relatório Final. Salvador, CPRM. 12v. Convênio DNPM/CPRM.

2. Couto, L. F. (1989). Estudo petrológico do complexo máficoultramáfico de Campo Alegre de Lourdes (Ba) e dos óxidos de Fe-Ti-(V) associados. Brasília, 169p. Dissertação de Mestrado, Programa de Pós-graduação em Geociências, Instituto de Geociências, Universidade de Brasília. vSGB/CPRM. Serviço Geológico do Brasil. 2019. GEOSSIT-Sistema de Cadastro e Quantificação de Geossítios e Sítios da Geodiversidade. http://www.cprm.gov.br/geossit/. Acesso em: 12 maio de 2024

3. Pereira, R.G.F.A. (2010). Geoconservação e desenvolvimento sustentável na Chapada

4. Diamantina (Bahia-Brasil). Portugal, 317p. Tese de Doutorado, Escola de Ciências, Universidade do Minho.

5. Peucat, J. J., Mascarenhas, J. D. F., Barbosa, J. S. F., de Souza, S. L., Marinho, M. M., Fanning, C. M., & Leite, C. M. M. (2002). 3.3 Ga SHRIMP U–Pb zircon age of a felsic metavolcanic rock from the Mundo Novo greenstone belt in the São Francisco craton, Bahia (NE Brazil). Journal of South American Earth Sciences, 15(3), 363-373.

6. Reis, C., Menezes, R. C. L., Miranda, D. A. D., Santos, F. P. D., Santos, R. S. V. D., & Meneses, A. R. (2021). Projeto integração geológica e avaliação do potencial metalogenético da Serra de Jacobina e do Greenstone Belt Mundo Novo.

MEDICE II: memories, dynamics and scenarios from prehistory to classical times in Nabão

Alexandra Águeda de Figueiredo[1*], Cláudio Inácio Monteiro[2] and Adolfo Silveira[3]

[(1)]Instituto Politécnico de Tomar, Centro de Geociências, Tomar, Portugal
[(2)]Centro de Ciências Históricas, CAAPortugal, Tomar, Portugal
[(3)]Universidade Autónoma de Lisboa, Centro de Geociências, Lisboa, Portugal
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PROJECT TYPE: Research Project.

PRINCIPAL INVESTIGATOR: Alexandra Águeda Figueiredo

COORDINATION: Cláudio Inácio Monteiro, Adolfo Silveira,

TEAM: Daniel Alves, Augusto Ferreira, Ana Waterman, Katina Lillios, Rui Gonçalves, Sandra Peliano, Anderson Tognoli, Daivisson Santos, Solange, Carlos Esquetim, António Amorim, Frederico Martins, Margarida Augusto, Cláudia Cruz, Liliana Ferreira, Paula Cassiano, Joana Ferreira, Patrícia Santos, Ana Santos.

INSTITUTIONS INVOLVED: Instituto Politécnico de Tomar, Associação CAAPortugal, Universidade Autónoma de Lisboa, Faculdade de Ciência do Porto, Faculdade de Ciências e Tecnologia de Coimbra, University of Iowa, Mount Mercy University, Centro de Geociências, Centro de Investigação de Ciências Históricas, MARE, ARNET, Instituto de Ciências da Terra, Univ. Lisboa, Instituto de Ciências Sociais, Univ. Porto, Instituto Nacional de Medicina Legal e Ciências Forences

Project goals: The MEDICE II project (Memories, Dynamics, and Scenarios from Prehistory to the Classical Era) is a continuation of archaeological research preceded by the TEMPOAR I, TEMPOAR II, ANTROPE, and SIPOSU-MC research projects, accumulating 25 years of research. However, MEDICE II is a renewed project, bringing together seven university institutions, two of which are international, five research centers, and other public and private research entities, coordinated by CICH (Research Center for Historical Sciences of the Autonomous University of Lisbon), the Polytechnic Institute of Tomar, and CAAPortugal (Association for New Technologies Applied to Archaeology). The project aims to characterize the sociocultural context of recent prehistory in the central region through the study of behavioral, ritual, genetic, and material markers present in the karst cavities and megalithic monuments of the territory.

SUSTAINABLE DEVELOPMENT GOALS (SDGS):

4 and 5.

PROJECT GOALS: The project aims to characterize the sociocultural context of recent prehistory in the central region through the study of behavioral, ritual, genetic, and material markers present in the karst cavities and megalithic monuments of the territory.

RESULTS: With the capacity and know-how currently installed in the MEDICE II project, we believe it is possible, over the next four years,

to answer the central research question: Were the communities of the karst cavities culturally divergent or convergent with the communities of the megalithic monuments? Starting from the resolution of this first objective, it is also expected to develop studies characterizing the sociocultural aspects of the prehistoric community in the region and to understand the reasons that led to the coexistence of the megalithic phenomenon within the karst cavities. This will contribute to unlocking the historical gap, allowing us to address new questions and to provide a more accurate overall picture of the modus vivendi of these communities.

Fig 1. MEDICE project logotype.

OUTPUTS:

Articles:

1. Alves, Daniel; Ferreira, Augusto; Figueiredo, Alexandra. 2022. Análise antropológica do material osteológico proveniente do monumento megalítico Anta II de Rego da Murta, Alvaiázere (Leiria): caso de estudo de um indivíduo adulto com patologia traumática e sua relação com o contexto depositado., In revista Antrope. IPT. ISSN 2183-1386, www.cta.ipt.pt

2. Figueiredo, A.; Coimbra, F.; Monteiro, C. 2023. One Cave, Multiple Traces: The rock art of the Archaeological site of Algar da Água, Central Portugal. JagannâtHam, Recent Archaeology and Contemporary approaches. Editors: Brijest Rawat; Suranhi Srivasta; Sachin Kumar Tiwary.Pathak Publisher & Distributors New Delhi (India), p. 184-190. MOB.9466702560

3. Figueiredo, A; Waterman, A.; Alves, D.; Ferreira, A. (2024). Bones and Rituals: a look at the remains of Dolmen I e II of Rego da Murta. Cambridge Scholars Publishing.

4. Monteiro, Cláudio; Figueiredo, Alexandra (2024) Técnica de Diagnóstico (TRP) do Estado de Conservação e Predição do Comportamento de Secagem de Madeiras Arqueológicas Encharcadas. In revista ATLANTICUS, Museu Exea. Brasil

5. Figueiredo, A. (2019) Later prehistoric funerary practices in the Nabão Valley in the Rego da Murta Megalithic Complex, in the Megalithic Tombs in Western Iberia, Excavations at Anta da Lajinha, Edited by Chris Scarre and L. Oosterbeek, Oxbow books, Handcover Edition: ISBN 978-1-78570-980-7; Digital Editions: ISBN 978-1-78570-981-4 (epub).

Monitoring and risk assessment at Sergipe River with emphasis on the breakwater complex in the Coroa do Meio, Aracaju, Sergipe, Brazil

Humberto Lucena Lira[1,2], Antônio Jorge Vasconcellos Garcia[1,2,3,*], Júlio Cesar Vieira[2] and Elírio Ernestino Toldo Jr.[4]

[(1)]Federal University of Sergipe (UFS), Progeology Laboratory, Aracaju, Sergipe, Brazil
[(2)]Fundação de Apoio à Pesquisa e Extensão De Sergipe (FAPESE), Aracaju, Sergipe, Brazil
[(3)]University of Coimbra, Geosciences Center, Department of Earth Sciences, Coimbra, Portugal
[(4)]Institute of Geosciences, Federal University of Rio Grande do Sul, Porto Alegre, Rio Grande do Sul, Brazil
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PROJECT TYPE: Research Project - Geology Applied to Analysis and Prevention of Geological, Environmental and Climate Risks in an urban environment (Sustainable Urbanism - Safe Cities).

COORDINATION: Humberto Lucena Lira

TEAM: Humberto Lucena Lira, Júlio Cesar Vieira Soares, Antônio Jorge Vasconcelos Garcia and Elírio Ernestino Toldo Jr.

INSTITUTIONS INVOLVED: Federal University of Sergipe, Progeology Laboratory (Brazil) and Geosciences Center (Portugal).

SUSTAINABLE DEVELOPMENT GOALS (SDGS):

4, 14 and 15.

PROJECT GOALS: Monitoring and risk assessment at the mouth of the Sergipe River with emphasis on the breakwater complex in Bairro Coroa do Meio. Aracaju is the first planned city in Brazil. The famous “Pyrrhic Board” was an unprecedented urban landmark, at the time, in the design of cities in the country and which, for what it set out to do, achieved relative success. A different thing needs to be said about the Coroa do Meio neighborhood where the public power established at the time, permeated by the absence of environmental legislation and administrative and legal oversight bodies, destroyed, without any environmental planning or future projection, a coastal environment, especially young from a geological point of view and absolutely sensitive from an environmental point of view, for the promotion of an urban project that even during its implementation was showing the first signs of failure. This work plan aims to evaluate, measure and map the geological risk of the coastal zone of the Coroa do Meio neighborhood, extending its look to the areas that are part of its inherent dynamics, such as the Poxim River and the central beaches of Aracaju, correlates them with the human interventions carried out in its surroundings, with a direct impact on the estuarine situation of the Sergipe River. With the results, it is intended to support and guide future interventions and actions in the locality that continue to make its existence viable as a human territory, hence the title of the project. In this way, we seek to fill a gap of more than two decades without any hydrodynamic monitoring activity on the Coroa do Meio breakwater.

RESULTS: 1– Construction of 15 control points (with high XYZ precision) of the Coroa do Meio breakwater line; 2 – Aerial photogrammetric survey of the Coroa do Meio breakwater, with sectorization of identified geological risks and hazards; 3 – Photographic survey with the construction of panoramic photographs aimed at building a monitoring database with a temporal resolution of 3 months; 4 – Acquisition of four major GPR lines (north-south direction and south-north direction), from the Coroa do Meio breakwater, with a view to identifying all areas of unconformities present in the region, 2); 5 – Calculation of the speed and direction of ebb and flood tide currents at the mouth of the Sergipe River with oceanographic buoys; 6 – Bathymetric monitoring throughout the region at the mouth of the Sergipe River and part of the Poxim River, with bimonthly resolution; 7 – Sedimentological monitoring with semi-annual resolution of the entire mouth of the Sergipe River, on both banks, including sampling points for control points on the southernmost beaches of Aracaju; 8 – Monitoring with an endoscopic camera of underground features found in the Coroa do Meio breakwater; 9 – Update of the delimitation of the estuarine zone of the Sergipe River, based on the prospecting of its surface and sub-surface salinity, in the dry and rainy season, 10 – Creation of a guide for monitoring and coastal management of the coast of Aracaju, to be operationalized by the Civil Defense of Aracaju and other competent bodies.

OUTPUTS:

Articles:

1. Garcia, M.G., Garcia, A.J.V., Garcia, G.G. (2024). Sustainable Urbanism in the Coastal Environment: a project applied to the expanding urbanized area of the city of Aracaju, Sergipe, Brazil. (under editing).

OCREZART
The first artistic manifestations in the centre-west of the Iberian Peninsula: THE OCREZA VALLEY

Sara Garcês[1,2] and Telmo Pereira[2,3,4]

[(1)]Instituto Terra e Memória, Portugal
[(2)]Centro de Geociências, Universidade de Coimbra, Portugal
[(3)]Universidade Autónoma de Lisboa
[(4)]UNIARQ
* saragarces@ipt.pt

PROJECT TYPE: Research project.

PRINCIPAL INVESTIGATOR: Sara Garcês and Telmo Pereira.

TEAM: Luiz Oosterbeek, Hipólito Collado Giraldo, Pierluigi Rosina, Hugo Gomes, Anabela Pereira, Patrícia Monteiro, Opeyemi Lateef Adewumi, Fernando Coimbra, João Caninas, Francisco Henriques, George Nash, Virginia Lattao, Dionysios Danelatos.

INSTITUTIONS INVOLVED: Earth and Memory Institute; Geosciences Centre; Municipality of Mação; Autonomous University of Lisbon.

SUSTAINABLE DEVELOPMENT GOALS (SDGS):

4, 5 and 9.

PROJECT GOALS: To identify, characterize, and date Palaeolithic rock art in the Ocreza valley and adjacent areas, associating it with other archaeological remains and landscape evolution. Objectives: Relocate engravings identified two decades ago using modern geographical location technologies; to update the recording and decal collection of Ocreza rocks using 3D photogrammetry; to refine knowledge of the archaeological context; to conduct a geological study of sediments and engravings covered by alluvial deposits to indicate a chronology; to analyze potential archaeological levels in the stratigraphy of terrace and slope deposits overlooking the river; to open manual boreholes at strategic points along the last 800m stretch of the River Ocreza to verify the potential for more rock art panels under the sediment.

RESULTS: The discovery of several panels with Palaeolithic rock art in both excavation and prospecting contexts.

Fig 1. Rock with paleolithic animal engraved in Ocreza valley. Photo: Hipólito Collado, 2023.

OUTPUTS:

Articles:

1. Telmo Pereira, Sara Garcês, Dionysios Danelatos et al. New Upper Palaeolithic rock art complex in the Tejo Valley, Central Portugal, 26 June 2024, PREPRINT (Version 1) available at Research Square [https://doi.org/10.21203/rs.3.rs-4542408/v1]

Paleo-spaces in Burkina Faso: the case of the Nakambé watershed

Lassané Toubga[1,2*], Hantissié Hervé Farma[1] and Sawadogo Benjamin[3,4]

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[(2)]Instituto Terra e Memoria, Mação, Portugal
[(3)]Département des Sciences de la Terre, Université Joseph Ki-Zerbo, Burkina Faso
[(4)]IRD, Ouagadougou, Burkina Faso
*lassanetoubga@hotmail.fr

PROJECT TYPE: Research Project

PRINCIPAL INVESTIGATOR: Lassané Toubga

TEAM: Lassané Toubga, Hantissié Hervé Farma, Benjamin Sawadogo, Abdoulaye Daboné, Nonsoba Roger Bicaba, Donatien Ouédraogo.

INSTITUTIONS INVOLVED: Joseph Ki-Zerbo University (Burkina Faso); Instituto Terra e Memoria, Portugal; Centro de Geociências, Universidade de Coimbra, Portugal.

SUSTAINABLE DEVELOPMENT GOALS (SDGS):

4, 11 and 15.

PROJECT GOALS: The objectives are firstly to determine the human and environmental dynamics in the Nakambé basin from prehistory to the 15th century, the period corresponding to the arrival of the Moaga aristocracy in the area. Secondly, it aims to understand the role played by this transitional area during periods of high and low water in the Sahara. Finally, it is part of a logic of salvage of the archaeological heritage in this area, where the weakness of the legislative framework does not allow preventive archaeology to be taken into account in land development work.

RESULTS: Archaeological surveys currently focused on the Massili basin, the main tributary of the Nakambé, have so far identified around a thousand archaeological sites. These sites include lithic industry, ancient iron metallurgy, habitat, necropolises, etc. Lithic industry sites are surface sites precisely located on granite outcrops. Preliminary analysis of the surface material shows Early, Middle and Late Stone Age characteristics. Initial excavations focused on three sites, uncovering various archaeological remains, including human bones that the radiocarbon dating places them between 1500 BC and the 13th century AD.

Fig 1. Partial view of a debitage site on a granite outcrop (from Toubga et al.2024).

OUTPUTS:

Articles:

1. Simporé, L., Farma, H.H., Toubga, L., Daboné, A., 2022, Du projet de valorisation du patrimoine culturel de Bigtogo à la prospection archéologique du Palais de Naaba Zombré (Moogo Naaba du royaume de Ouagadougou 1681 à 1744). Soc. Hist. Archaeol. Newsl. 53.

2. Farma, H. H., Toubga, L. et Daboné, A., 2023, Résilience scientifique : une « archéologie déplacée Interne » en zones urbaine et péri-urbaine de Ouagadougou (région du Centre, Burkina Faso). Nyame Akuma (99), pp.12-20.

PaleoTejo: A network for research and heritage related to Neanderthals and pre-Neanderthals

Telmo Pereira[1*]

[(1)]Universidade Autónoma de Lisboa, Instituto Politécnico de Tomar, CGeo-Centro de Geociências, Uniarq – Centro de Arqueologia da Universidade de Lisboa.

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PROJECT TYPE: Research Project, Teaching and Research Development.

COORDINATION: Telmo Pereira, Luís Raposo, Silvério Figueiredo.

TEAM: Telmo Pereira, Luís Raposo, Silvério Figueiredo, Pedro Proença e Cunha, João Caninas, Francisco Henriques, Luiz Oosterbeek, Pierluigi Rosina, João Pedro Cunha-Ribeiro, Cristiana Ferreira, Nelson J. Almeida, António Martins Margarida Salvador, Fernanda Sousa, Carlos Ferreira, Vânia Pirata, Sara Garcês, Hugo Gomes.

INSTITUTIONS INVOLVED: Universidade Autónoma de Lisboa, Instituto Politécnico de Tomar, CGeo-Centro de Geociências, Uniarq – Centro de Arqueologia da Universidade de Lisboa, Museu Nacional de Arqueologia, Centro Português de Pré-história e Geo-história, MARE – Centro de Ciências do Mar e do Ambiente da Universidade de Coimbra. EMERITA, Lda. Associação de Estudos do Alto Tejo, Departamento de História da Universidade de Évora, Universidade de Évora, ICT – Instituto de Ciências da Terra.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 13 and 16.

PROJECT GOALS: Study of the collections, geoarchaeological study and dating of the sites, the systematic publication of the results.

RESULTS: Analysis of the archaeological sites of Foz do Enxarrique, Vale do Forno 1, Vale do Forno 3, Cabeço da Mina.

Fig 1. Levallois flake from Foz do enxarrique.

OUTPUTS:

Books:

Pereira, T., Paya, A., 2023. Cobrinhos e os primeiros Neandertais em Portugal. Universidade Autónoma de Lisboa.

Pereira, T., Paya, A., 2021. Cobrinhos e os primeiros Neandertais em Portugal. Câmara Municipal de Vila Velha de Ródão.

Article:

1. Pereira, T., Raposo, L., Figueiredo, Cunha, P., Caninas, J., Henriques, F., Oosterbeek., L., Rosina., P., Cunha-Ribeiro, J. P., Ferreira, C., Almeida, N., Martins., A., Salvador, M., Sousa, F., Ferreira, C., Pirata, V., Garcês, S., Gomes, H., 2023. PaleoTejo – Uma rede de trabalho para a investigação e para o património relacionado com os Neandertais e pré-Neandertais, Atas do IV Congresso dos Arqueólogos Portugueses, Arqueologia em Portugal – Estado da Questão, 33-44.

2. Pirata. V., Pereira, T., Pereira, J., 2023. A indústria lítica de malhadinhas e o seu enquadramento no património acheulense do vale do Tejo, Atas do IV Congresso dos Arqueólogos Portugueses, Arqueologia em Portugal – Estado da Questão, 45-60.

Prehistoric settlements of the Upper Uruguay River, Southern Brazil -POPARU

Marcos César Pereira Santos[1,4], Mirian Carbonera[2] and Antoine Lourdeau[3]

[(1)]Programa de Pós-graduação e Antropologia da Universidade Federal de Pelotas, RS, Brasil.
[(2)]Community University of the Chapecó Region, Brazil
[(3)]Muséum National d'Histoire Naturelle, Paris, France (MNHN)
[(4)]Centro de Geociências
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PROJECT TYPE: Research Project.

COORDINATION: Antoine Lourdeau, Mirian Carbonera, Marcos César Pereira Santos.

TEAM: Giulia Marciani, Sirlei Elaine Hoeltz, Jade Paiva, Amélie Da Costa, Daniel Loponte, Vitor Hugo Rosa Biffi, François Gendron, Ana Lúcia Herberts, Adriana Jussara Schuster, Aline Bertoncello, Julio César Paisani, William Zanete Bertolini, Vanessa Barrios Quintana, Sergio Francisco Monteiro da Silva, Stefano Benazzi, Christine Hatté, Michel Fontugne, Christelle Lahaye, Diego Dias Pavei, Ximena Suarez Villagran, Gisele Leite Lima.

INSTITUTIONS INVOLVED: Muséum National d'Histoire Naturelle, Paris (MNHN); Community University of the Chapecó Region, Brazil (UNOCHAPECO); Federal University of Pelotas (UFPEL); CEA-CNRS: Commissariat à l'Energie Atomique – Centre National de la Recherche Scientifique, France; Univ. Est. Do Oeste do Paraná (UNIOESTE); Univ. Estadual de Maringá (UEM); University of São Paulo-USP; Università di Bologna, Italy (UNIBO); CONICET: Cons. Nac. de Inv. Cientificas y Técnicas (Argentine); UNICEN: Univ. Nac. del Centro de la Prov. de Buenos Aires (Argentine).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 3, 11 and 15.

PROJECT GOALS: The initial settlement of the upper Uruguay River valley and the lifestyles and identities of human groups during the Pleistocene-Holocene transition and the early Holocene; Cultural characterisation of Middle Holocene occupations; Defining the time, space and behaviour of the very last pre-colonial populations of Foz do Chapecó.

RESULTS: The POPARU project began in 2013 and is still ongoing. The results are promising and change how we understand the archaeological sequence in southern Brazil. Excavations at three sites have pushed the regional timeline back 3,000 years to between 12,200 and 100 cal BP. At least seven archaeological levels have been identified. There are many different ways of making stone tools, which is more complex than the idea that people in the region used two-sided tools. Large Guarani villages were found with burials outside and inside ceramic urns. The archaeological sites were formed by sediments from the hillsides, which shaped the local valley bottoms and buried the different archaeological levels.

OUTPUTS:

Articles:

1. Pereira Santos, M. C.; Rosina, P.; Carbonera, M.; Hatté, Christine ; Lourdeau, A. 2024, Geoarchaeology of open-air sites of the Foz do Chapecó area in the upper Uruguay river, southern Brazil. Quaternary Science Review, v. 325, p. 108489.

2. Pereira Santos, M. C.; Marciani, G.; Biffi, V.H.R.; Campos, J.B.; Paisani, J.C. 2024. First Assessment of a Pebble Tool Industry in the Pesqueiro River Valley, Upper Uruguay River Basin, Southern Brazil. Latin American Antiquity, v. 1, p. 1-18.

3. Loponte, D.; Carbonera, M.; Santos De Almeida, T.; Maestri, R.; Lourdeau, A.; Santos Pereira, M.; Silvestre, R.; Bertoncello, A. 2023. A review of the curved lithic cleavers from the rainforest of southeastern South America. Journal of Archaeological Science: reports, v. 47, p. 103714, 2023.

4. Paisani, J.C.; Manica, R.; Santos Pereira, M.; Rodrigues, R.A.R. 2023. Modern soil aggregates-colluvium generated by overland flow - stratigraphy and physical experiments. Sedimentology, v. 1, p. 1-25.

5. Paisani, J.C.; Santos Pereira, M.; Vinicius De Sordi, M. 2023. Structures and fabric sedimentary of overland flow generated in laboratory experiments - fluids composed of low concentrations ($\approx$ 3 vol %) of soil aggregates. Revista Brasileira de Geomorfologia, v. 24, p. 1-20.

6. Pavei, D.D.; Santos, M.C.P.; Ferrasso, S.; Borges, C. 2023. A caça de porcos-do-mato (Tayassuidae: Artiodactyla) durante o Holoceno no atual território brasileiro: estudo de caso a partir do enfoque zooarqueológico e tafonômico no sambaqui Lagoa dos Freitas/SC. Revista de Arqueologia, v. 36, p. 200-220.

7. Biffi, V. B.; Santos, M.C.P.; Gasparetto, N. V. L. 2023. Caracterização Petrográfica E Estrutural Dos Derrames Vulcânicos Da Volta Grande Do Alto Rio Uruguai, Sul Do Brasil. Geoingá: Revista Do Programa De Pós-Graduação Em Geografia, V. 15, P. 157-185.

8. Santos, M.C.P. 2023. Les premières occupations humaines dans le Sud du Brésil : une vision géoarchéologique intégrée. Anthropologie, v. 128, p. 103136-32.

RA3I – Rock Art Analysis with Artificial Intelligence

Carlos Mora[1], Sandra Jardim[1], Luiz Oosterbeek[1,2*] and Sara Garcês[2]

[(1)]Instituto Politécnico de Tomar, Portugal
[(2)]Instituto Terra e Memória, Portugal
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PROJECT TYPE: Research and innovation (funding: Portugal 2030).

COORDINATION: Sandra Jardim and Carlos Mora

TEAM: Artur Almeida, João Miguel, Jorge Valente, João Fernandes, Ana Neves, Sérgio Rodrigues, Douglas Cardoso, Luiz Oosterbeek, Sara Garcês.

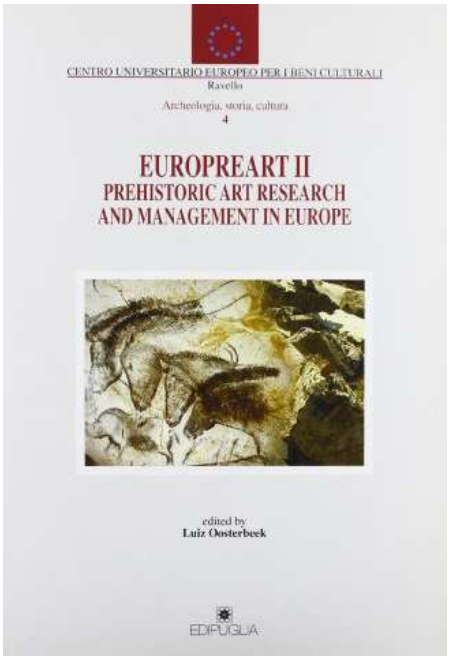
INSTITUTIONS INVOLVED: Techframe, Sistemas de Informação, Instituto Politécnico de Tomar, Instituto Terra e Memória (Portugal).

SUSTAINABLE DEVELOPMENT GOALS (SDGS):

4, 5, 8, 11.

PROJECT GOALS: The project aims at the treatment and conversion of the original supports of rock art images into standardized formats, the subsequent classification and cataloguing of the unique pictograms that compose them, supported by the most recent models of Machine Learning (ML) and Deep Learning (DL), and finally the availability of Data Mining (DM) algorithms to, using the volume of data created, enable interpretive insights, impossible to realize today.

RESULTS: Automatically convert existing images into drawings without human intervention, ignoring/excluding characteristics of the medium (fissures, cracks, natural spots, etc.); individually identify and semantically classify the singular pictograms that make up the engraving; use advanced Data Mining (DM) methods to explore the information collected, with a view to identifying recurring patterns.




Journal of Imaging

MDPI

Article

Graphical Image Region Extraction with K-Means Clustering and Watershed

Sandra Jardim, João António and Carlos Mora

Abstract: With a wide range of applications, image segmentation is a complex and difficult preprocessing step that plays an important role in automatic visual systems, which accessory impacts, not only on segmentation results, but directly affects the effectiveness of the follow-up tasks. Despite the many advances achieved in the last decades, image segmentation remains a challenging problem, particularly, the segmenting of color images due to the diverse inhomogeneities of color, textures and shapes present in the descriptive features of the images. In trademark graphic images segmentation, beyond these difficulties, we must also take into account the high noise and low resolution, which are often present. Trademark graphic images can also be very heterogeneous with regard to the elements that make them up, which can be overlapping and with varying lighting conditions. Due to the immense variation encountered in corporate logos and trademark graphic images, it is often difficult to select a single method for extracting relevant image regions in a way that produces satisfactory results. Many of the hybrid approaches that integrate the Watershed and K-Means algorithms involve processing very high quality and visually similar images, such as medical images, meaning that either approach can be tweaked to work on images that follow a certain pattern. Trademark images are totally different from each other and are usually fully colored. Our system solves this difficulty given it is a generalized implementation designed to work in most scenarios, through the use of customizable parameters and completely unbiased for an image type. In this paper, we propose a hybrid approach to Image Region Extraction that focuses on automated region proposal and segmentation techniques. In particular, we analyze popular techniques such as K-Means Clustering and Watersheddding and their effectiveness when deployed in a hybrid environment to be applied to a highly variable dataset. The proposed system consists of a multi-stage algorithm that takes as input an RGB image and produces multiple outputs, corresponding to the extracted regions. After preprocessing steps, a K-Means function with random initial centroids and a user-defined value for k is executed over the RGB image, generating a gray-scale segmented image, to which a threshold method is applied to generate a binary mask, containing the necessary information to generate a distance map. Then, the Watershed function is performed over the distance map, using the markers defined by the Connected Component Analysis function that labels regions on 8-way pixel connectivity, ensuring that all regions are correctly found. Finally, individual objects are labelled for extraction through a contour method, based on border following. The achieved results show adequate region extraction capabilities when processing graphical images from different datasets, where the system correctly distinguishes the most relevant visual elements of images with minimal tweaking.

Keywords: K-Means; clustering; region extraction; image segmentation; connected component analysis; watershed

1. Introduction

To the human visual system, an image is not just an arbitrary set of pixels, but rather a meaningful arrangement of regions and objects. Perceiving the interesting parts of a scene is a preliminary step for recognizing, understanding and interpreting an image.

Fig 1. Covers of reference publications.

OUTPUTS:

Articles:

1. Jardim, S., António, J., Mora, C., 2022. Graphical Image Region Extraction with K-Means Clustering and Watershed. J. Imaging, 8: 163. doi.org/10.3390/jimaging8060163

Book:

1. Oosterbeek, L., 2006. Europreart II. Prehistoric Art Research and Management inEurope. Edipuglia, Centro Universitario Europeo per I BeniCulturali: 104 p.

Rock Art Trail: innovations and social technologies in the bioeconomy of the municipalities of the northern region of Mato Grosso do Sul

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PROJECT TYPE: Research project.

COORDINATION: André Luis Ramos Soares

TEAM: André Luis Ramos Soares; Lia Raquel Toledo Brambilla Gasques; Ivo Leite Filho; Carlos Eduardo Costa Campos; Priscila Lini; Juliano Bitencourt Campos; Rafael Suarez; Daniel Requia; Sara Garcês; Luiz Oosterbeek.

INSTITUTIONS INVOLVED: Universidade Federal do Mato Grosso do Sul (Brasil), Universidade Federal de Santa Maria (Brasil), Universidade do Extremo Sul Catarinense (Brasil), Universidad de La República (Uruguai), Instituto Politécnico de Tomar (Portugal), Instituto Terra e Memória (Portugal).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 3 and 4.

PROJECT GOALS: The creation of a rock trail between the municipalities of Mato Grosso do Sul, promoting archaeological research in a sustainable way. To boost the local economy by providing products that will be generated through studies and academic support. To promote dialogue between generations, between school and university, between school, university and community.

RESULTS: Creation of 8 axes for the implementation of the program within the Bioeconomy: Archaeological, Ceramic, Chemical-Pharmaceutical, Botanical, Food, Tourism, Geo-Paleontological and Communication. Conducting training in Education Heritage and Environment, with the school and the local community. Archaeological excavation at the Gruta da Mesa Site, Alcinópolis, MS. Raising awareness of the community and local businesses to support tourists. Production of catalogs, websites, folders, and local materials to disseminate potential locations.

Fig 1. Covers of reference publications.

OUTPUTS:

Book:

1. Soares, A.L.R., Gasques, L. R. T. B., Campos, C. E. C., Duarte, L. R. P., Pinto, L. M. 2023. Arqueologia: Manual de boas práticas. Santa Maria: UFSM/UFMS, CTE: 26p .

Book chapters:

1. Soares, A.L.R., 2023. Cátedra UNESCO Fronteiras e Migrações: primeiro balanço quadrienal (2019-2022). In: ANAIS : V reunião do grupo de pesquisa CNPq/ UFSM história platina: história, poder e instituições. III Encontro Internacional de História: fronteira, patrimônio e sociedade. Cátedra UNESCO UFSM: fronteiras e migrações. Itapiranga, SC, Schreiben: pp. 292-303.

2. Campos, C.E.C, Soares, A. L. R. ; Duarte, L. P. ; Gasques, L. R. T. B. ; Pinto, L. M., 2024. Simulações de escavação arqueológica como ferramenta de formação continuada no Programa Trilha Rupestre: conexões entre ensino, pesquisa, extensão e inovação. In: Actas Completas da Jornada Internacional de Iniciação Científica e Extensão Universitária. Porto, Editora Cravo: pp. 1574-1584.

Geological heritage routes (Rock and Water) in the Bairrada, Mondego and Atlantic territories (Rural and Coastal)

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[(2)]UNESCO Chair on "Geoparks, Sustainable Regional Development and Healthy Lifestyles"

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PROJECT TYPE: Research and Development Project: CENTRO-05-5141-FEDER-000940 e CENTRO-05-5141-FEDER-000941; Funding entity: Associação de Desenvolvimento Local da Bairrada e Mondego (AD ELO); Total budget: 74 400.00 € (2021-2023).

COORDINATION: Nuno Monteiro Vaz

TEAM: Nuno Monteiro Vaz, Emmaline Rosado-González, José Martinho Lourenço, Salomé Custódio, Artur A. Sá.

INSTITUTIONS INVOLVED: University of Trás-os-Montes and Alto Douro, Vila Real, Portugal; UNESCO Chair on "Geoparks, Sustainable Regional Development and Healthy Lifestyles"; Geosciences Center, Coimbra, Portugal.

SUSTAINABLE DEVELOPMENT GOALS (SDGS):

11, 14, 17.

PROJECT GOALS: Specialized study that serves as a basis for the tourist valorization of the territory focused on its geological heritage, nature, history and culture. Two projects were carried out: "Geological heritage routes (Rock and Water) in the territory of Bairrada, Mondego and Atlantic (Rural and Coastal Aspects)". The territory included in these projects presents a large and relevant geodiversity that allows us to contemplate the most complete geological record of Portugal over the last 600 million years. This geodiversity documents the main events in the evolution of the Portuguese continental territory, including the evolution of the North Atlantic and the development of rural and coastal landscapes in a continuous interaction between human beings, the rest of biodiversity, rocks and water.

RESULTS: https://rotasdopatrimonio.adelo.pt/ Book and map of the two routes.

OUTPUTS:

Chapters in books:

1. Vaz, N., Rosado-González, E., Lourenço, J., Correia, P., Custódio, S., Henriques, M. H. & Sá, A.A. (2023) - "Projeto Geoparque Atlântico – um compêndio com mais de 600 milhões de anos de geodiversidade". In: Font, E., Dinis, P. A. & Lopes, F. C. (Cords.), "Livro de Roteiros das Excursões do 11º Congresso Nacional de Geologia "Geociências e Desafios Globais"", Departamento de Ciências da Terra da Universidade de Coimbra, 114-131 (ISBN: 978-989-98914-9-4).

Communications

1. Custódio, S.C., Henriques, M.H., Rosado-González, E.M., Vaz, N.M. & Sá, A.A. (2023). Recursos geopatrimoniais de referência do Projeto Geoparque Atlântico (Centro de Portugal). In F. C. Lopes, P. A. Dinis, L. V. Duarte, P. P. Cunha (Coords.). XI Congresso Nacional de Geologia: Geociências e Desafios Globais. Livro de Resumos. Coimbra, Departamento de Ciências da Terra da Universidade de Coimbra (eds.), 629-630.

2. Custódio, S.C., Henriques, M.H., Rosado-González, E.M., Vaz, N.M. & Sá, A.A. (2023). "Atlantic Geopark" Project (Portugal). Abstracts Book of the 10th International Conference on UNESCO Global Geoparks. M'Goun UNESCO Global Geopark, Marrakech, 84.

3. Rosado-González, E.M., Custódio, S., Vaz, N.M., Martinho-Lourenço, J.M, Henriques, M.H. & Sá, A.A. (2022). The use of mobile applications and online gis platforms for heritage identification and characterization in the Atlantic Geopark Project. Abstracts of the 16th European Geoparks Conference, Geoparco UNESCO Sesia-Val Grande, Verbania, Itália, ID 116.

4. Sá, A.A., Zouros, N., Silva, E., Bentana K., Martinho-Lourenço, J., Vaz, N., & Rosado-González, E. (2022). The international observatory of UNESCO global geoparks as key platform for networking towards sustainable development. Abstracts of the 16th European Geoparks Conference, Geoparco UNESCO Sesia-Val Grande, Verbania, Itália, ID 146.

5. Vaz, N. M., Rosado-González, E. M, Custódio, S., Martinho-Lourenço, J. M., Santos, A., Fidalgo, J. M., Henriques, M. H. & Sá, A. A. (2023). Georoutes of the Atlantic Geopark Project: promoting the local heritage for the territorial development in Central Portugal. Abstracts Book of the 10th International Conference on UNESCO Global Geoparks. M'Goun UNESCO Global Geopark, Marrakech, 427.

Site:

https://rotasdopatrimonio.adelo.pt/

RupScience: Review of operational chains, Archaeometry and Chronology of rock art paintings. A technological approach to material in contexts of Portugal and Spain

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PROJECT TYPE: Research and innovation.

COORDINATION: Pierluigi Rosina

TEAM: Pierluigi Rosina, Hugo Gomes, Hipólito Collado, Carmela Vaccaro, Sara Garcês, George Nash.

INSTITUTIONS INVOLVED: Geosciences Centre, Earth and Memory Institute, Portugal, ACINEP- Prehistoric Studies Institute, Spain, Department of Archaeology & Anthropology, University of Bristol, England, Physics and Earth Sciences Department of Ferrara University, Italy.

SUSTAINABLE DEVELOPMENT GOALS (SDGS):

4,5,9.

PROJECT GOALS: This project investigates the processes involved in the production of prehistoric paintings using organic and inorganic pigments. The focus of the discussion is on several rock shelter sites containing rock art in the western part of the Iberian Peninsula, with reference to the sites containing schematic rock art. It is not possible to date rock art made with inorganic pigments directly. However, sampling and subsequent analysis have clearly shown that pigments were made according to well-established recipes, sometimes using organic binders. This project examines the chemical and mineralogical properties of pigments sampled from a selected number of sites in Spain and Portugal and suggests that pigmentation was more than just the application of paint to rock.

RESULTS: Better understanding of the processes involved in the production of prehistoric paintings using organic and inorganic pigments.

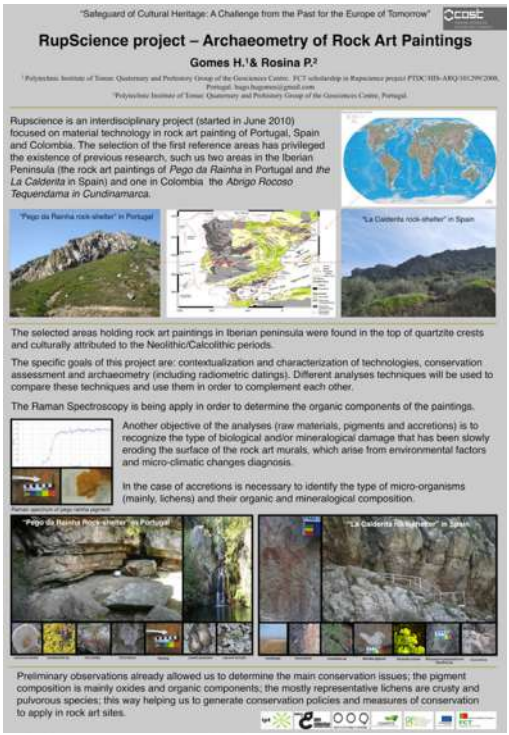

Fig 1. Poster presentation of Rupscience project.

OUTPUTS:

Articles:

1. Gomes, H.; Collado, H.;Garcês, S.; Lattao, V.; Nicoli, M.;Eftekhari, N.; Marrocchino, E.;Rosina, P. (2024). Archeometrical Characterization of Rock Art Pigments from Puerto Roque Open-Air Rock Art Shelter (Valencia De Alcantara, Extremadura, Spain).Heritage 2024, 7, 1123–1139. https://doi.org/10.3390/heritage7030053

2. Garcês, S.; Collado, H.; Rosina, P.; Gomes, H.; Nash, G.; Nicoli, M.; Vaccaro, C. (2022). Identification of organic material in Los Buitres 1 rock art shelter, Badajoz, Spain. Complutum,33 (2): 347-361. https://www.researchgate.net/publication/366273588_Identification_of_organic_material_in_Los_Buitres_1_rock_art_shelter_Badajoz_Spain

3. Nicoli M., Eftekhari N., Vaccaro C., Collado Giraldo H., Garcês S., Gomes H., Lattao V., Rosina P. (2022). A multi analytical evaluation of the depositional pattern on open-air rock art panels at "Abrigo del Lince" (Badajoz, Spain). Environmental Science and Pollution Research. DOI: https://doi.org/10.1007/s11356-022-23589-2

4. Rosina, P.; Collado, H.; Garcês, S.; Gomes, H.; Eftekhari, N.; Nicoli, M.; Vaccaro, C. (2019). Benquerencia (La Serena - Spain) rock art: an integrated spectroscopy analysis with FTIR and Raman. Helyon 5 (10). https://www.researchgate.net/publication/336266462_Benquerencia_La_Serena_-_Spain_rock_art_An_integrated_spectroscopy_analysis_with_FTIR_and_Raman

RupTejo: Rock Art Archaeology of the Tagus Basin

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[(2)]Instituto Terra e Memória, Portugal
[(3)]Centro de Geociências, Universidade de Coimbra, Portugal
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PROJECT TYPE: Research and innovation.

COORDINATION: Luiz Oosterbeek

TEAM: Luiz Oosterbeek, Hipólito Collado, Sara Garcês, Fernando Coimbra, Davide Delfino.

INSTITUTIONS INVOLVED: Geosciences Centre, Earth and Memory Institute, Portugal, ACINEP- Prehistoric Studies Institute, Spain, Department of Archaeology & Anthropology, University of Bristol, England.

SUSTAINABLE DEVELOPMENT GOALS (SDGS):

4,5,9.

PROJECT GOALS: The Ruptejo project was presented as a proposal to answer a long gap identified in the framework of the Tagus River Valley archaeology: the necessity to understand the true extent and specificity of this rock art complex, going beyond the Tagus river strictly understood, and contribute to an inventory of the rock art of the river basin, not necessarily in its supranational context, even though this work programme is part of a more complex program already underway, which extends beyond the border. The combination of both is guaranteed by the research team and by the second applicant of this project.

RESULTS: Complete catalogue of the collection of rock engravings from the Tagus Valley Rock Complex (7000 engravings); Documentation of rock art from Serra de Figueiredo (municipality of Sertã); Excavation of the Zimbreira settlement.

Fig 1. Photography of Tagus latex molds (Flávio Nuno Joaquim) and drawings.

OUTPUTS:

Articles:

1. Coimbra, F. & Garcês, S. (2013) Arte Rupestre Incisa entre o Tejo e o Zêzere: contributo para o seu inventário, tipologia e datação. IN: CRUZ, Ana Rosa; GRAÇA, A.; OOSTERBEEK L.; ROSINA, P. (coord.) Arkeos, 1º Congresso de Arqueologia do Alto Ribatejo – Homenagem a José da Silva Gomes 34: 243-253. CEIPHAR, Tomar.

2. Garcês S. (2019) Cervídeos e Sociedade nos Primórdios da Agricultura no Vale do Tejo. AAP Monografias 10. 68p.

3. Garcês, S. (2018). Corpus do Complexo de Arte Rupestre do Vale do Tejo. Serie Area Domeniu, suplemento especial, Mação: Instituto Terra e Memória. 466p.

4. Garcês, S. (2017-2018). A figura do cervídeo na Arte Rupestre do Vale do Tejo: símbolos de transição. Mação: Instituto Terra e Memória, série Arkeos, vol. 46. 132p.

5. Oosterbeek, L.; Cura, P.; Graça, A.; Cura, S.; Nobre, L.; Pais, S. (2005). Estudo de Impacte Ambiental do Gerador Eólico de Castelo Velho (Zimbreira, Mação), Vila Nova de Barquinha: Centro Europeu de Investigação da Pré-História do Alto Ribatejo.

6. Oosterbeek, L.; Cura, S. (2005). O Património Arqueológico do Concelho de Mação. Breve panorâmica, Zahara, 3: 6, pp.17-32.

7. Oosterbeek, L.; Collado-Giraldo, H.; Garcês, S.; Coimbra, F.; Delfino, D.; Cura, P. (2012) Arqueologia Rupestre da Bacia do Tejo: RUPTEJO. IN: OOSTERBEEK L.; CEREZER, J.; CAMPOS, J.; ZOCCHE, J. (coord.) Arkeos, Arqueologia Ibero-Americana e Arte Rupestre 32:133-172. CEIPHAR, Tomar.

South American Observatory of Heritage, Places, Humanities and Arts – OPLHAr

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[(2)]Secretário da Associação das Universidades do Grupo Montevidéo- AUGM, Montevidéu, Uruguai
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PROJECT TYPE: Teaching and Research Development Project (funding: Association of Universities Group Montevideo).

PRINCIPAL INVESTIGATOR: André Luis Ramos Soares

COORDINATION: Juan Manoel Sotello, Luiz Oosterbeek, Paulo Bayard.

TEAM: Maria Medianeira Padoin, Marta Borin, Jorge Soares da Cruz, Anselmo Alves Neetzow, Marlon Borges Pestana, Rafael Suárez.

INSTITUTIONS INVOLVED: Federal University of Santa Maria (Brazil), Group Montevidéu Universities Association (Uruguai), Tomar Politechnic Institution (Portugal), Rio Grande Federal Foundation (Brazil), Republic University (Uruguay).

SUSTAINABLE DEVELOPMENT GOALS (SDGS):

3, 11 and 13.

PROJECT GOALS: To observe and monitor projects in which the Humanities contribute to the Integrated Management of the Cultural Landscape (GIPC), in the Universities of the Montevideo Group and beyond, in the areas of teaching, research and extension. To create a database on GIPC projects, in the domains of undergraduate and graduate courses, as well as research and extension projects on GIPC. To integrate with national and international networks, through agreements, in order to contribute to quantifiable and qualifiable evaluations of the Humanities and the Arts in territorial development.

RESULTS: The project is in the final phase of approval by the council of rectors of the universities involved in the project. We believe that after the approval we will be able to have a staff of professors and researchers involved in the Observatory, which will serve as a framework for the execution and sharing of good practices in the areas mentioned.

Fig 1. Session of the 1st Apheleia South American Seminar, where the proposal to create the Observatory was presented first. (photo: Luiz Oosterbeek, 2023).

SUGERE
Sustainable Sustainability and Wise Use of Geological Resources

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PROJECT TYPE: ERASMUS+ Programme - Capacity Building in higher education

598477-EPP-1-2018-1-PT-EPPKA2-CBHE-JP SUGERE – Sustainable Sustainability and Wise Use of Geological Resources.

COORDINATION: Nelson Rodrigues.

TEAM: Nelson Rodrigues, João Pratas, Pedro Santarém Andrade, Ana Castilho the rest of the team can be consulted at: https://sugere.org/project-team/

INSTITUTIONS INVOLVED: University of Coimbra (UC), Agostinho Neto University (UAN), Tundavala Higher Polytechnic Institute (ISPT), University of Cape Verde (UnivCV), University of Santiago (US), University of Torino (UNITO), Eduardo Mondlane University (UEM), Higher Institute of Science and Technology of Mozambique (ISCTEM), Centre for Social Studies (CES) and University of Salamanca (USAL).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): AU Agenda 2063 and the UN-SDGoals: (1), (4) and (17).

PROJECT GOALS: To implement five Mining/Geology degrees with a focus on Local Economic Development. Scientific objectives: (i) Increase the understanding of the geoscientific factors affecting the global environment in order to improve human living conditions; (ii) Develop more effective methods to find and sustainably exploit natural resources of minerals, energy and groundwater (ii) Increase the understanding of geological processes and concepts of global importance, including an emphasis on socially relevant issues, (iii) Improve standards, methods and techniques of carrying out geological research.

RESULTS: Three BSc courses (Geology, Geological Engineering and Mining Engineering), one MSc (Geology) and one PhD (Geology) involving the training of at least 40 teachers and 250 students in two years of ongoing courses. Bibliographic materials were prepared, and several online courses supplied. The courses were aligned with the Bologna recommendations.

Fig 1. SUGERE Logo and website - https://sugere.org/.

OUTPUTS:

Article:

1. Dino, G.A., Mancini, S., Lasagna, M., Bonetto, S.M.R., De Luca, D.A., Pereira, M.D., Baptista, E.H., de Ferro Miranda Miguel, I.L., Nuvunga, F., Victória, S.S. & Rodrigues, N. (2022). Cooperative Projects to Share Good Practices towards More Effective Sustainable Mining—SUGERE: A Case Study. Sustainability 2022, 14, 3162. https://doi.org/10.3390/su14063162

Communication:

1. Lasagna, M., Dino, G.A., Mancini, S., & De Luca, D.A. (2021). Sustainability in georesources management: the importance of an updated school system to face the new challenges connected to mining activities. EGU General Assembly 2021. EGU21-12038 https://doi.org/10.5194/egusphere-egu21-12038

Report:

1. Pinto, H.; Vieira, G. C.; Nogueira, C.; Tavares, A. (org.) (2022). Insights from Africa-Europe Cooperation in Higher Education Institutions, Sustaining a Wise Use of Geological Resources, ERASMUS+ SUGERE WP9 report. https://sugere.org/2022/11/16/sugere-project-wp9-report/

SURGE CPLP: Sustainability of Geological Resources at CPLP

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PROJECT TYPE: Instituto Camões Cooperation Project - "SURGE CPLP" project - Sustainability of Geological Resources in the CPLP.

COORDINATION: Nelson Rodrigues.

TEAM: Nelson Rodrigues, João António Mendes Serra Pratas; Pedro Gomes Cabral Santarém Andrade and other researchers from partner institutions.

INSTITUTIONS INVOLVED: University of Coimbra, University of Cape Verde, University of Santiago, Agostinho Neto University, Polytechnic Institute of Tundavala (Lubango), Eduardo Mondlane University, Higher Institute of Science and Technology of Mozambique, National University of East Timor, University of Lúrio and Katyavala Bwila University.

SUSTAINABLE DEVELOPMENT GOALS (SDGS):

Quality Education (4), Reduce inequality within and among countries (10) and strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development (17).

PROJECT GOALS: "SURGE CPLP" project - Sustainability of Geological Resources in the CPLP - was approved as part of cross-cutting projects of Instituto Camões. "SURGE CPLP" project intended to promote collaborative work networks, defining/adapting degree study plans, training actions for teachers and training actions for laboratory/field technicians, contribute to the definition/adaptation of undergraduate curricula and to increase the academic qualifications of teachers.

RESULTS: This project was aligned with the "Group of Geoscience Schools" consortium "José Bonifácio d'Andrade e Silva", which in the context of the Erasmus+ Capacity Building project "SUGERE - Sustainable Sustainability and Wise Use of Geological Resources" shared experiences regarding the capacity building of institutions in the development of curricular plans and the harmonization of these plans with course quality accreditation requirements.

Fig 1. Training actions in Africa.

Fig 2. Field Work.

Territorial Management in the State of Sergipe, Brazil

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PROJECT TYPE: Research Project - Geology Applied to Analysis and Prevention of Geological, Environmental and Climate Risks.

COORDINATION: Antônio Jorge Vasconcellos Garcia.

TEAM: Antônio Jorge Vasconcellos Garcia, Julio Cesar Vieira Soares and Luciano Santos Queiroz.

INSTITUTIONS INVOLVED: Municipal Secretariat for the Environment of Aracaju (Sema), Civil Defense Sergipe, Secretariat for Urban Development and Sustainability (SEDURBS), State Superintendency of Civil Protection (SUPDEC), Federal University of Sergipe (Brazil) and Geosciences Center (Portugal).

SUSTAINABLE DEVELOPMENT GOALS (SDGS):

11, 14, 17.

PROJECT GOALS: Strategic Objectives: Axis 1: Installation of physical space: Disaster Study and Research Room at the Federal University of Sergipe; Axis 2: Creation of a permanent geological risk monitoring and assessment network; Axis 3: Research and development in groundwater assessment for human supply purposes; Axis 4: Research and assessment of coastal risks, especially in estuarine areas; Axis 5: Research and evaluation of surface water resources for flood prevention purposes; Axis 6: Preparation and training of protection and Civil Defense agents in dealing with disasters; Axis 7: Development of technologies aimed at Civil Defense.: Disaster Management Application.

RESULTS: Preparation of vulnerability and environmental risk maps of mapped units in the context of geodiversity recorded in the municipalities involved, including analysis of slope instability with possibilities of landslides; knowledge and characterization of relevant locations, in view of potential uses by local communities for their sustainable development (characterization of soil types for agriculture, for example, as well as locations with aquifer potential); training of local agents and raising awareness among students regarding risk areas and places for sustainable development; implementation of the proposal to create a “reading room” where actions will be developed to encourage and train the reading of themes related to the project’s objectives, with the challenge of strengthening students’ ability to understand the contents of the didactic texts prepared by the project teams.

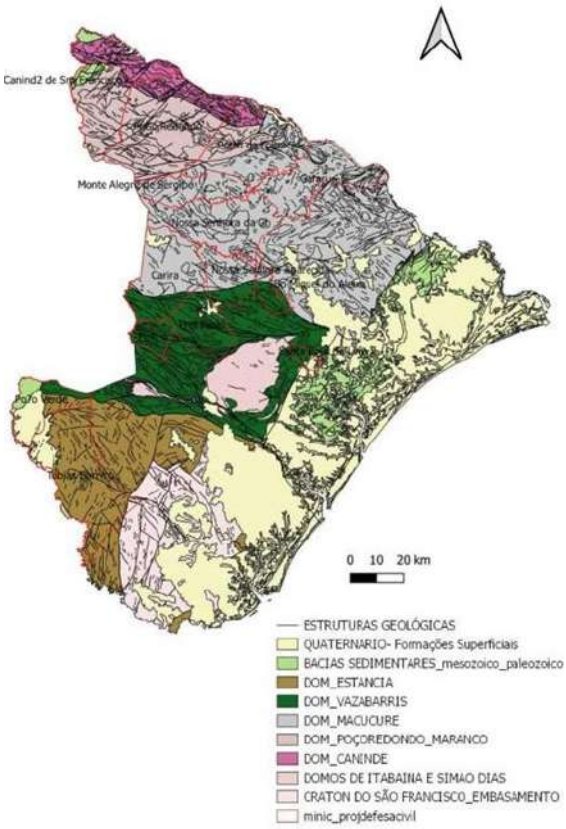

Fig 1. Geological Domains in the State of Sergipe - Geodiversity.

OUTPUTS:

Communications:

1. Teles, G.S., Rocha, L.M., Garcia, A.J.V. (2009). O conhecimento geologico como ferramenta do monitoramento costeiro e apoio ao uso e ocupação do litoral: estudo de caso no litoral de Sergipe, Brasil. IV Congresso Argentino do Cuaternário y Geomorfologia, XII Congresso da Associação Brasileira de Estudos do Quaternário II Reunión sobre el Cuaternário de América del Sur.

2. Begalli, L.R., Carvalho, L.C., Aragão, P.R.L., Mota, L.F., Filho, J.A.S., Santos, J., Machado, A., Garcia, A.J.V., Santos, J.P.L., Galvão, H.L.C. (2024). Desvendando a Geodiversidade Sergipana: Integração Acadêmica e Social através da Paleontologia e Análise de Risco Geológico. 51ºCongresso Brasileiro de Geologia, Belo Horizonte.

Thesis:

1. Silva, A.E. (2016). Análise da vulnerabilidade e risco como subsídio ao planejamento urbano: Município de Pirambu (SE). Master Thesis, PGAB, UFS, Brasil.

The Penafirme Ancient Coventry and its Territory

José Eduardo Mateus[1,2*] and Paula Fernanda Queiroz[1,2]

[(1)]Laboratory of Palaeoecology - Double-u Replay, Torres Vedras, Portugal
[(2)]University of Coimbra, Geosciences Center, Portugal
* jedumateus@gmail.com

PROJECT TYPE: Research Project

PRINCIPAL INVESTIGATOR: José Eduardo Mateus

TEAM: José Eduardo Mateus, Paula Fernanda Queiroz, Teresa Bray, Ricardo Triães.

INSTITUTIONS INVOLVED: Laboratory of Palaeoecology - Double-u Replay / CGEO (Portugal), Torres Vedras Municipality (Portugal); Polytechnical Institute of Tomar (Portugal).

SUSTAINABLE DEVELOPMENT GOALS (SDGS):

4 and 15.

PROJECT GOALS: To reconstruct the ancient coventry of Penafirme (an eremitic augustinian coastal settlement, close to the palaeoestuary of the Alcabrichel River / Torres Vedras). We aim the analysis of its emergent ruins (engulfed by the dunes, after the 1755 Lisbon Earthquake) and confined excavation. First, we are dealing with the reconstruction of a detailed 3D replica of the ruin; secondly, we aim a series of interpretative possible solutions as suitable reconstructions of the original structures, in two distinct epochs (XVI and XVII centuries). In addition to geomatics, excavation and historical document analysis of the monument itself, we want to investigate through palaeoecology (palynology and macro-palaeobotany) the nearby ancient palaeo-estuary of the Alcabrichel - Sorraia System.

RESULTS: Aiming a Virtual Museography approach (following a new concept of Scenic Archaeology), we have been using photogrammetry and LiDAR surveys at different scales of proximity, to register the emergent ruin and its surrounding landscape. The 3D replica components (integrated and re-edited in BLENDER) are being imported to the UNREAL 5 game-engine from EPIC, where the architectural structure and its characteristic material culture will be explored virtually using multi-thematic NPC (non-player characters).

Fig 1. The Ruins of the Penafirme Coventry - Torres Vedras.

OUTPUTS:

Articles:

1. Mateus, J.E. (2023) Para uma arqueologia cénica do passado. O Ideário Patrimonial 18. Dezembro de 2023. Instituto Politécnico de Tomar.

Reports:

1. Mateus, J.M; QUEIROZ, P.F (2022) O Convento Velho de Penafirme - Descrição preliminar da sua partição edificativa com base no levantamento fotogramétrico - relatório DOUBLE-U REPLAY

2. Triães, R.P. (2022) Avaliação global do estado de conservação da ruína do Convento Velho de Penafirme: Proposta de contenção de circulação e minimização do impacto para a realização de sondagens arqueológicas. Relatório do LCR.IPT

Videogame:

1. Mateus, J.M; Queiroz, P.F; Mateus, A,; Pacheco, R; Dias, M. (2016) "Twelve Stones" PC Adventure and Exploration Videogame. Direction: Oldtown Gametales; Production: Instituto Luso Ilírio para o Desenvolvimento Humano. Youtube(EN), Youtube(PT)

Towards a Common Heritage

Luiz Oosterbeek[1*], Leonor Veiga-Ponsar[2] and Fernando António Baptista Pereira[2]

[(1)]Instituto Politécnico de Tomar, Centro de Geociências, Portugal
[(2)]Faculdade de Belas Artes da Universidade de Lisboa, Portuga
* loost@ipt.pt

PROJECT TYPE: Research Project (funding: Chiang Ching-kuo Foundation for International Scholarly Exchange, Taipei).

PRINCIPAL INVESTIGATOR: Luiz Oosterbeek

TEAM: Leonor Veiga-Ponsar, Fernando António Baptista Pereira, Hsiung Ping-chen, René Lommez Gomes, Gustavo Portocarrero, Kuiyi Shen, Juan Luís Conde, Anna Grasskamp, Yu-Chi Lai, Zoltán Somhegyi, Laia Manonelles Moner et al.

INSTITUTIONS INVOLVED: Instituto Politécnico de Tomar, International Council for Philosophy and Human Sciences, Universidade de Lisboa, Universidade Federal de Minas Gerais, Chinese University of Hong-Kong, Universidad Complutense, University of St. Andrews, Academia Sinica, Károli Gáspár University of the Reformed Church in Hungary, Universidad de Barcelona.

SUSTAINABLE DEVELOPMENT GOALS (SDGS):

4 and 17.

PROJECT GOALS: This project focused on emphasizing how artistic images shaped the global understanding of the world in the seabords of Eurasia since the 1650s. It looked at processes that gained momentum since the dawn of Modern Age to the present, in order to evaluate the global acceleration of material culture and the arts. Simultaneous with increasingly global exchange routes, contradictory cultural processes were equally triggered, especially those pertaining to the rise and identity of modern nations. Yet, common ground was equally founded, gradually leading to the construction of world images signifying its interconnected system.

RESULTS: A book, issuing from the project, is being prepared, to be published by Springer, in its geographical series.

Fig 1.Cover of the book of abstracts and partners in the project.

OUTPUTS:

Books:

1. Pereira, F.A.B.; Veiga, L., Oosterbeek, L., 2022. Program of the The Third CIPSH International Academy on Chinese Cultures and Global Humanities Seminar – Towards a Common Heritage: How artistic images shaped the global understanding of the world in the seabords of Eurasia since the 1650s. Lisbon: Faculdade de Belas Artes da Universidade de Lisboa – Instituto Terra e Memória: 30 p.

2. Oosterbeek, L., Veiga-Ponsar, L., (in preparation). Images of the global: Southeast Asia and European interplays of artists and art, as drivers of Modernity. Springer.

TRANSFORMATIVE TERRITORIES: PERFORMING TRANSITION THROUGH THE ARTS
A new European cooperation program led by COAL with five European partners focusing on Transformative Artistic Practices

Hugo Gomes[1,2*], Luiz Oosterbeek[1,2,3]

[(1)]Instituto Terra e Memória, Portugal
[(2)]Centro de Geociências, Universidade de Coimbra, Portugal
[(3)]Instituto Politécnico de Tomar
* hugohugomes@gmail.com

PROJECT TYPE: 607416-CREA-1-2019-1-FR-CULT-COOP1.

PRINCIPAL INVESTIGATOR: Lauranne Germond, COAL, Luiz Oosterbeek (ITM).

TEAM: Hugo Gomes, Sara Garcês, Kenia de Aguiar Ribeiro, Ari de Carvalho.

INSTITUTIONS INVOLVED: INLAND-Campo Adentro (Spain), is a project connecting art and rurality with base in Madrid, Mallorca and the mountains of Northern Spain, with a Shepherds School, publishing house and other actions.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4, 5 and 9.

PROJECT GOALS: Transformative Territories: performing transition through the arts program to explore the role of the arts and transformative artistic practices on a territorial scale. The six cultural players brought together in the Transformative Territories cooperation program have long been working towards an alliance between art and sustainability. They have set themselves the goal of contributing to the development of a culture of sustainability, to bring about and embody other artistic, scientific and political narratives of ecological transformation and solidarity in our societies.

RESULTS: These six partners are exploring and experimenting with collective processes for making Peace with the Earth, through their atypical and pioneering cultural venues and practices. As new places of learning and transmission on a regional scale, they contribute every day to inventing new cultural models that are resilient and inclusive.

Figure 1 (left): Fieldwork in Deia - Maiorca Island.

Figure 2 (right): Coal TT Kick-off meeting in Palma de Maiorca.

TURARQ
Tourism, Archaeology and Landscape

Luiz Oosterbeek[1,2,3] and Sara Garcês[2,3]

[(1)]Instituto Politécnico de Tomar, Portugal
[(2)]Instituto Terra e Memória, Portugal
[(3)]Centro de Geociências, Universidade de Coimbra, Portugal
* loost@ipt.pt

PROJECT TYPE: Research and innovation.

PRINCIPAL INVESTIGATOR: Luiz Oosterbeek

TEAM: Sara Garcês; Hugo Gomes; Eduardo Ferraz; Anícia Trindade; Douglas Cardoso; Marco Martins.

INSTITUTIONS INVOLVED: Instituto Politécnico de Tomar (IPT); CIMT – Comunidade Intermunicipal do Médio Tejo; DGPC – Direção Geral do Património Cultural; e Turismo Centro), com o setor empresarial (NERSANT – Associação Empresarial da Região de Santarém; e PME – Pequenas e Médias Empresas) e com a UNESCO - Organização das Nações Unidas para a Educação, a Ciência e a Cultura.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4,5,8, 9, 11.

PROJECT GOALS: The promotion of heritage tourism especially benefits low-density regions, generating wealth and new jobs, both directly and indirectly. Simultaneously implementing the 'digital tour' and the 'in-person tour' is a business procedure accelerated by the health crisis and current tourist demand: a crucial finding for this holistic and predictive heritage valorisation proposal.

RESULTS: In the context of management, strategies were implemented to efficiently coordinate all the stages of the project; under the inventory axis, we carried out a meticulous cataloguing of all the archaeological and cultural resources within the previously established area of action, compiling detailed information on these sites; sharing knowledge in the academic and scientific arena; in the field of training, we introduced educational programmes with the aim of empowering local communities; developing various tourist routes highlighting points of archaeological interest; registering the TURARQ brand.

Fig 1. Poster presentation of Turarq Heritage Tourism training.

OUTPUTS:

Articles:

1. Marco Martins, Sara Garcês, Hugo Gomes, Anícia Trindade, Douglas Oliveira Cardoso, Eduardo Ferraz, Luiz Oosterbeek (2024). Cocreation of tourist experiences in archaeological landscapes - the prehistory and traditional knowledge festival of mação. In Proceedings of the International Tourism Congress 23 - The Image and Sustainability of Tourism Destinations (pp. 91-96). Sciendo. https://doi.org/10.2478/9788367405287-011

2. Gomes, H., Garcês, S., Oosterbeek, L., Cura, P., Borralheiro A., Santos, R., Alexandre, S. 2023. Parque Arqueosocial do Andakatu em Mação. Boas práticas para a sustentabilidade e disseminação do conhecimento científico. In: Morais Arnaud J., Neves C. e Martins A. Arqueologia em Portugal, 2023 - Estado de Questão. Actas do IV Congresso da Associação dos Arqueólogos Portugueses: 1931-1941.

3. Gomes, H., Garcês, S., Martins, M., Trindade, A., Cardoso, D., Ferraz, E., Oosterbeek., L. 2023. O Projeto TURARQ – Turismo Arqueológico para a compreensão da cultura e das interações ambientais. In: Morais Arnaud J., Neves C. e Martins A. Arqueologia em Portugal, 2023 - Estado de Questão. Actas do IV Congresso da Associação dos Arqueólogos Portugueses: 2301-2306.

4. Oosterbeek, L.; Cura, P; Pereira, A.; Garcês, S.; Gomes, H., Santos, R., Trindade, A.; Cardoso, D.; Ferraz, E. (2022) A sense of place: building knowledge and social cohesion in the Prehistory Park of Mação. HAS MAGAZINE 05.

Western Peatlands of Portugal Palaeoecology and archaeoterritories

Paula Fernanda Queiroz[1*] and José Eduardo Mateus[1]

[(1)]Laboratory of Palaeoecology - Double-u Replay, Torres Vedras, Portugal

* paulafernandaqueiroz@gmail.com

PROJECT TYPE: Research Project.

PRINCIPAL INVESTIGATOR: Paula Fernanda Queiroz

TEAM: Paula Fernanda Queiroz, José Eduardo Mateus, Miguel Geraldes

INSTITUTIONS INVOLVED: Laboratory of Palaeoecology - Double-u Replay / CGEO (Portugal), Torres Vedras Municipality (Portugal).

SUSTAINABLE DEVELOPMENT GOALS (SDGS):

4, 13, 15.

PROJECT GOALS: To survey, identify, sample and study the Late Pleistocene and Holocene peat and mud microstratified deposits of Western-Central Portugal. Pollen, spores, other micro-fossils and plant macro-remais (such as seeds and wood) are investigated in long time-series to provide a sound reconstruction of palaeo-vegetation development and change due to coastal change, climate and human impact and territorial land-use establishment. Apart from palaeoecology, peatmire characterization involves present-day flora, habitat and vegetation description, mapping and virtual (3D) landscape modeling.

RESULTS: Around 40 years of research have been focused on the peatmires between Figueira da Foz and Sines, giving place to an overall view of palaeovegetation and landscape development, history and evolution, driven by the sea, climate and man, concerning the last 15 k years. Complementing the investigation of long time-series, the program has been concerned with surface pollen studies, aeropalynology and wet-vegetation mapping in order to calibrate the palaeo-data. Very high-detailed palynological investigation dealing with sub-millimetric peat sampling focused on a yearly-basis landscape recent reconstruction has been also considered.

Fig 1. Peatmire of Lagoa Seca (Fernão Ferro - Sesimbra).

OUTPUTS:

Articles:

1. Mateus, J.E.; Queiroz, P.F. 2024. The First Agrarian Territories in SW Portugal - The Regional Palaeoecology Approach. In "Transitions? Continuity and Discontinuity of Cultural Developments from the Mesolithic/Epipalaeolithic to the Neolithic Period". DAI Research Cluster series. "Menschen-Kulturen-Traditionen/people-cultures-traditions"

2. Mateus, J.E.; Queiroz, P.F.; Joosten, H. 2017. Portugal. In: Mires and peatlands of Europe. Status, distribution and conservation. Schweizerbart Science Publishers, p: 572-579

3. Queiroz, P.F.; Mateus, J.E. 2004. Paleoecologia Litoral entre Lisboa e Sines. Do Tardiglaciário aos tempos de hoje. In Evolução Geohistórica do Litoral Português e Fenómenos Correlativos. Geologia, História, Arqueologia e Climatologia, Actas. Lisboa: Universidade Aberta, p. 257-304.

Thesis:

1. Queiroz, P.F. 1999. Ecologia Histórica da Paisagem do Noroeste Alentejano. PhD Thesis, Lisbon University, 300 p.

2. Mateus, J.E. 1992. Holocene and present-day ecosystems of the Carvalhal Region, Southwest Portugal. PhD Thesis, Utrecht University. 184 pp.

UNESCO Chair Humanities and Cultural Integrated Landscape Management

Luiz Oosterbeek[1*]

[(3)]Instituto Politécnico de Tomar, Centro de Geociências, Portugal

* loost@ipt.pt

PROJECT TYPE: Academic chair (award: UNESCO).

PRINCIPAL INVESTIGATOR: Luiz Oosterbeek

TEAM: Luiz Oosterbeek, Inguelore Scheunemann, Alexandra Figueiredo, Cristiana Ferreira, Davide Delfino, Fernando Coimbra, George Nash, Hipólito Collado, Hugo Gomes, Laurent Caron, Luís Mota Figueira, Luís Santos, Pierluigi Rosina, Rita Ferreira Anastácio, Rosa Nico, Sara Garcês, Silvério Figueiredo, et al.

INSTITUTIONS INVOLVED: Instituto Politécnico de Tomar, Instituto Terra e Memória, University of Cape Verde, Federal University of Pelotas (Brazil) et al.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 3, 4 and 17.

PROJECT GOALS: The chair is framed as a transdisciplinary programme, rooted in the Human Sciences and focused on Cultural Landscape Management and Sustainability. In this sense, the chair fosters the integration also with natural and social sciences, following the scope of the European project Apheleia and its results. In strategic terms, the project intervenes in the global debate on sustainability, amidst a crisis that stresses the pressure on social and economic aspects, rather than on the environmental dimension.

RESULTS: Education (seminars, master and PhD programmes), site-based research projects in Europe, Africa and Latin America.

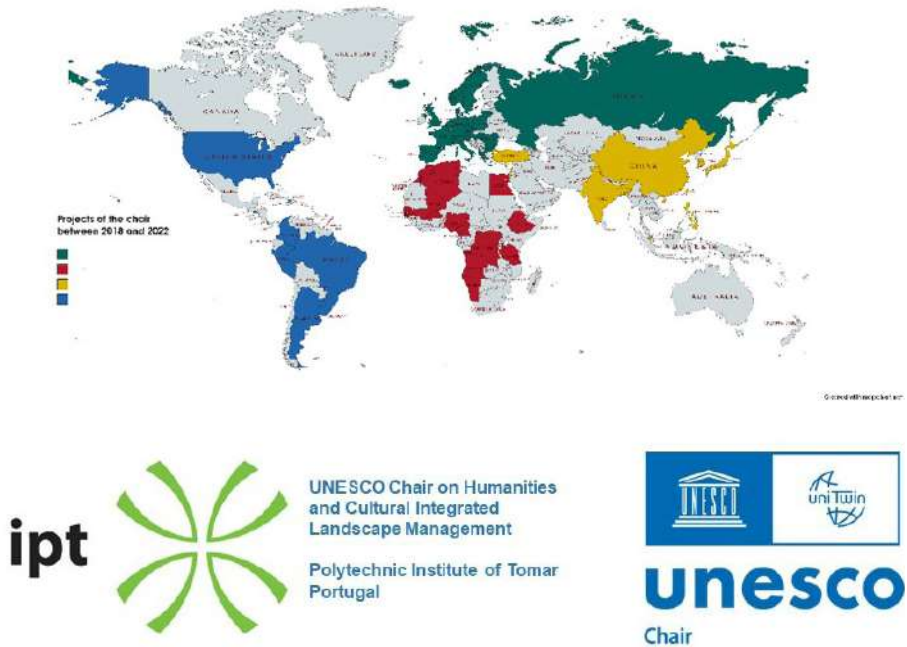

Fig 1. Countries with activities of the chair.

OUTPUTS:

Article:

1. Oosterbeek, L., 2022. Vers le Patrimoine du 3ème Millénaire: archéologie et transdisciplinarité. Territori della Cultura 49: pp. 18-25. https://www.qaeditoria.it/Documenti/TdC_49/territoridellacultura49.html#p=24.

Book:

1. Oosterbeek, L., Scheunemann, I., Michelon, F.F., Nunes, J.F.I., 2022. Gestão Integrada do Patrimônio Cultural –Humanidades, Sociedade, Saúde e Ambiente. Mação, Instituto Terra e Memória: 217 p. https://drive.google.com/file/d/1I-GYSv6OZ5V2J-sUUQTwqa27ZNZqLQ9T/view

World Humanities Report. European chapter

Rosi Braidotti[1], Hiltraud Casper-Hehne[2] and Luiz Oosterbeek[3*]

[(1)]University of Utrecht, The Netherlands
[(2)]University of Göttingen, Germany
[(3)]Instituto Politécnico de Tomar, Centro de Geociências, Portugal
* loost@ipt.pt

PROJECT TYPE: Research Project (funding: Volkswagen Foundation).

PRINCIPAL INVESTIGATOR: Rosi Braidotti

TEAM: Luiz Oosterbeek, Hiltraud casper Hehne, Marjan Ivkovic, Daan Oostveen, et al.

INSTITUTIONS INVOLVED: International Council for Philosophy and Human Sciences, University of Utrecht, University of Göttingen, Instituto Politécnico de Tomar et al.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4 and 17.

PROJECT GOALS: The project of the World Humanities Report served both the purpose of preparing a reference overview on a number of relevant variables of the „state of the art" of the Humanities, including their interface with geosciences, and of promoting concrete platforms to enhance international and regional mulidisciplinary research cooperation, engaging CIPSH and key research universities. The project covered the following themes: topics and methods; relevance for democracy and civic responsibility; intercultural perspectives; public, digital and environmental studies; sciences policy.

RESULTS: Besides a large number of seminars and debates, as well as a wide consultation with scholarly organizations in Europe, a book with the project's results has been published.

OUTPUTS:

Book chapter:

1. Oosterbeek, L., 2024. European archaeological research in the dawn of the third millennium. The Edinburgh Companion to the New European Humanities. Edinburgh University Press: 255-267.

The Flow of Civilizations Various Foreign Cultures gathering for a Sustainable Culture Development in China and Europe

Georgios Dimitriadis[1,2*], Artur Sá[1,2] and Zhang Tongbiao[3*]

[(1)]UNESCO Chair on "Geoparks, Sustainable Regional Development and Healthy Lifestyles"

[(2)]Geosciences Center, Pólo UTAD

[(3)]Jiangnan Academy of Fine Arts, Jiangsu University, Zhenjiang, China

*gdimitriadis@autonoma.pt and 522242101@qq.com

PROJECT TYPE: Research Project

PRINCIPAL INVESTIGATOR: Georgios Dimitriadis.

COORDINATION: Georgios Dimitriadis name Zhang Tonbião.

TEAM: Georgios Dimitriadis, Artur Sá and Zhang Tonbião.

INSTITUTIONS INVOLVED: UNESCO Chair/ UTAD (Portugal) and Jiangnan Academy of Fine Arts/JIANGSU UNIVERSITY (China).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4, 11, 15.

PROJECT GOALS: The Dunhuang Grottoes in western China are known worldwide for their Buddhist art and handwritten documents. In the ancient world, there were only four cultures that formed a system of their own: China, India, Greece and Islam. These four cultural systems converged in Dunhuang, where many cultural elements from the East and West mixed. The Dunhuang Grottoes themselves were Buddhist grottoes and were located on the vital communication line of the Eurasian Silk Road, so Buddhist culture was extremely prosperous here and the basic elements of other cultural systems linked to Buddhist culture were also established here. Among them, the visible part of Buddhist art was particularly obvious, and the origins of foreign cultures can still be clearly distinguished until now.

RESULTS: Promote the North-East Cooperation; Documentation of the European Culture Influence in Buddhism culture and especially Candhara Art. Documentate geoconservation status of budhism art. Development geopeotics projects in Europe and China in order to discover how humans culturally perceive their environment.

OUTPUTS:

Article:

The Dunhuang Grottoes, Beijing, Cultural Relics Press, 2011 Dunhuang Academy: Dunhuang Textual Research Institute, https://dhyssjk.dha.ac.cn/dhh_p/zh_CN/index.aspx

PhD and Postdoc PROJECTS


Chierles
Sllaks
Biuter

Coquina classification based on evolutionary taphonomy and development of theoretical evolutionary models of coquinas (genetic models and theoretical facies distribution models)

Gustavo Gonçalves Garcia[1*]

[(1)]University of Coimbra, Geosciences Center, Department of Earth Sciences, Coimbra, Portugal

* gustavogarcia@dct.uc.pt

PROJECT TYPE: PhD in Geology

RESEARCH STUDENT: Gustavo Gonçalves Garcia

SUPERVISION: Maria Helena Paiva Henriques, Rui Paulo Bento Pena dos Reis and Antônio Jorge Vasconcellos Garcia

TEAM: Gustavo Gonçalves Garcia, Maria Helena Paiva Henriques, Rui Paulo Bento Pena dos Reis, Antônio Jorge Vasconcellos Garcia and Márcio Vinícius Santana Dantas.

INSTITUTIONS INVOLVED: Geosciences Center (Portugal), Progeologia Laboratory/ Nucleus of Competence in Oil, Gas and Biofuels (Brazil) and Petrobras (Brazil).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 9 and 12.

PROJECT GOALS: Definition of the taphonomic processes/mechanisms that give rise to the taphofacies/petrofacies recognised in coquina deposits. Identification and characterisation of the influence of the action of different energy fronts that remobilise the skeletal remains and terrigenous constituents that make up coquina deposits.

RESULTS: The methodologies conceived and applied in this study made it possible to understand and map the distribution of coquina facies in two different palaeogeographic contexts, through the taphonomic analysis of the fossil constituents present in each facies - and which resulted from the action of different physical agents (waves and river currents) - as well as through the application of the CAMURES Methodology - which makes it possible to extend the use of ideal models, built from outcrops and boreholes (Fig. 1). Development of depositional models, theoretical models and 3D models of the stratigraphic evolution of coquina depositional systems over time. Palaeogeographic reconstructions of coquina depositional environments in two Atlantic basins. The resulting geological models, relating to the Morro do Chaves (Sergipe-Alagoas Basin, NE Brazil) and Amaral (Lusitanian Basin, Portugal) formations, supported the construction of theoretical models of coquina deposits on a bench and platform that allow us to predict the spatial distribution of facies in other similar reservoirs of hydrocarbons in Brazil's pre-salt coquinas. However, the use of these theoretical models in other coke deposits requires

an adequate adjustment to the structural, stratigraphic and petrographic-petrophysical aspects of the analogue; only in this way can they have the robustness and reliability required for simulation procedures with a lower degree of uncertainty.

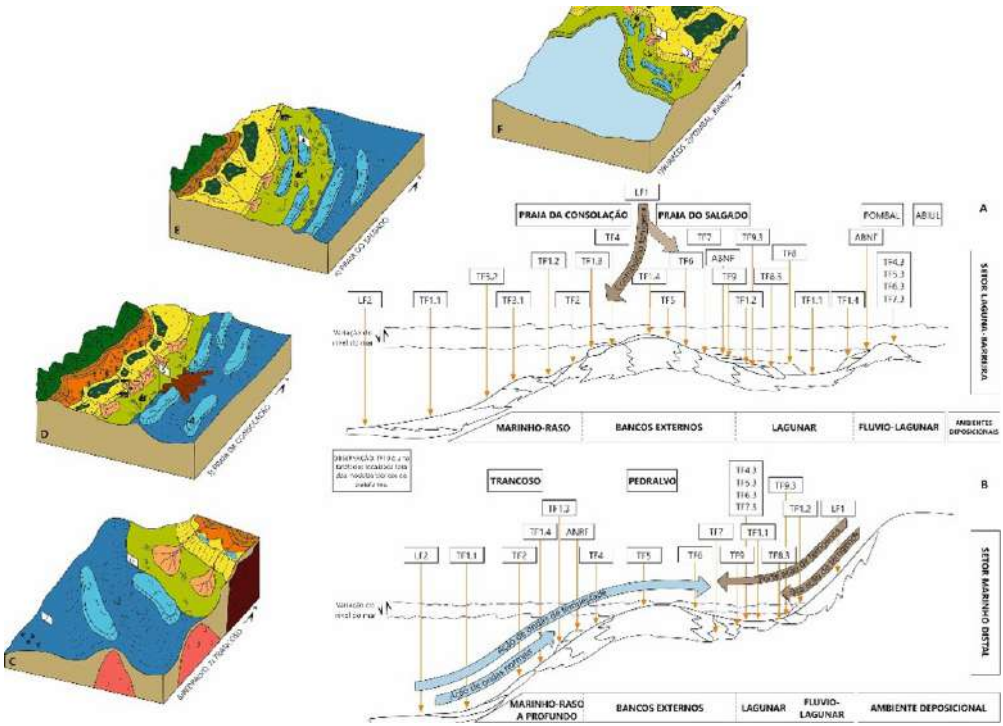

Fig 1. Theoretical 2D models of tafofacies distribution for the coquina deposits of the Amaral Formation in a heterogeneous platform context, namely of two types: A) continuous platform (e.g. Pombal platform to the SW and Berlengas platform to the E-SE); B) isolated platform (e.g. Ota platform). 3D models of the depositional systems for the sectors studied and based on the distribution of the tafofacies in the different sectors of the platform, namely: C) Depositional model of the marine-distal sector; D and E) Depositional models of the lagoon-barrier sector; F) Depositional model of the lagoon sector.

OUTPUTS:

Articles:

1. Garcia, G. G., Henriques, M. H., Garcia, A. J. V., & Dantas, M. V. S. (2020). Petrofacies and taphofacies analyses of coquinas as a tool for the establishment of a stratigraphic evolution model of the Morro do Chaves Formation (Sergipe-Alagoas Basin, NE Brazil). Facies, 67, 4. https://doi.org/10.1007/s10347-020-00614-9

Devonian Trilobites of Portugal

Sofia Pereira[1*]

[(1)]Centro de Geociências, Universidade de Coimbra, Coimbra, Portugal
[*]ardi_eu@hotmail.com

PROJECT TYPE: PhD Grant. Fundação para a Ciências e Tecnologia. Synthesys Grant DOI: 10.54499/2020.04528.BD Synthesys nº 823827

RESEARCH STUDENT: Catarina Carvalho Caprichoso

SUPERVISOR: Sofia Pereira

TEAM: Catarina Caprichoso, David John Holloway (co-supervisor), Sofia Pereira

INSTITUTIONS INVOLVED: University of Coimbra (Portugal), Laboratório Nacional de Energia e Geologia (LNEG; Portugal); Museums Victoria (Australia).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4, 8 and 17. Using the geological record to understand past changes to the climate and using geology and landscapes within tourism, aiding the conservation of geodiversity and building a greater understanding and appreciation of the geological sciences by overall public and those communities living and working around geological features.

PROJECT GOALS: Comprehensive study of Portuguese Devonian trilobite assemblages from the Central Iberian Zone, Ossa Morena Zone and South Portuguese Terrane, reviewing the classic collections, looking for new occurrences and analysing the palaeoecology, palaeobiogeography and biostratigraphy of these materials. It will provide a basis for adding new systematic and phylogenetic data, improving the chronostratigraphy of the Portuguese Devonian sequences and establishing correlations and affinities with other Rheic regions. The subordinate tasks are: 1) Determine the palaeobiodiversity of the Portuguese Devonian trilobite assemblages; 2) Frame, from a biostratigraphic point of view, the lithostratigraphic trilobite-bearing units of the Devonian of Portugal; 3) Investigate the palaeoecology of the trilobite fauna and determine the associated paleoenvironments; 4) Determine the palaeobiogeographic affinities of the trilobite associations.

RESULTS: First report of the trilobite Belenopyge from the Devonian of Portugal and a complete inventory of the Devonian trilobite collections housed in the Geological Museum of Lisbon (Portugal) and housed in the Museum National d'Histoire Naturelle (France), through a Synthesys Grant.

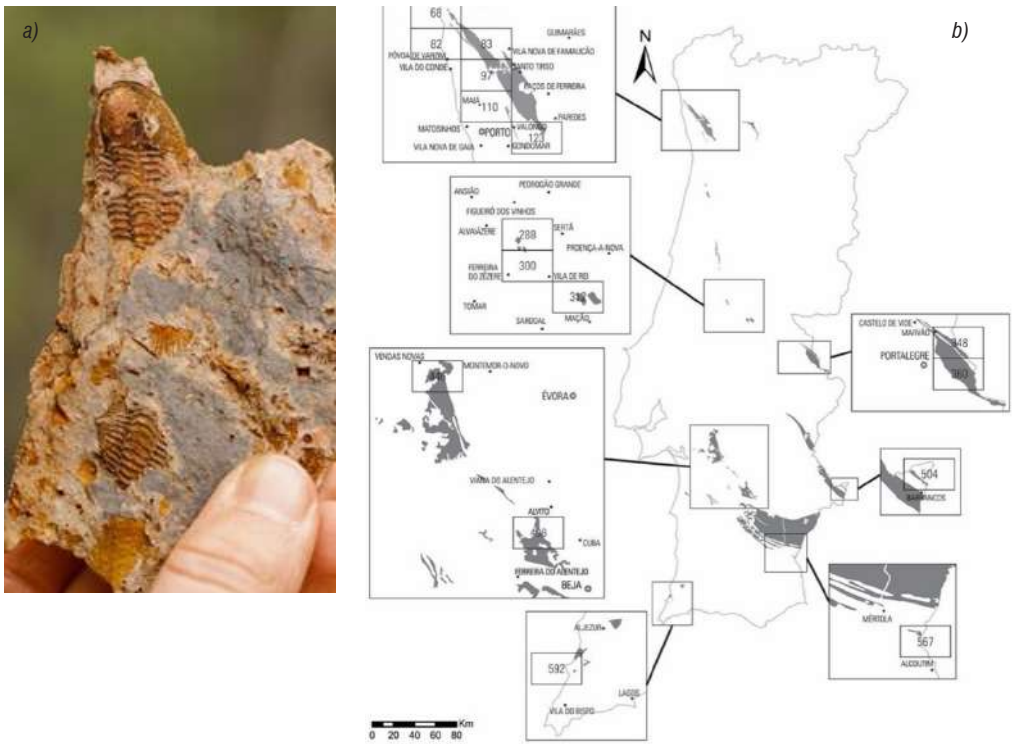

Fig 1. a) Devonian trilobites from the Portalegre Syncline (Portugal); b) Geological scheme of the Devonian outcrops in the Central-Iberian Zone and the Devonian-Carboniferous of the South Portuguese Terrain, with the framework of the study sectors referring to the sheets of the Military Chart of Portugal at a scale of 1:25.000 (IGeoE).

OUTPUTS:

Communications:

1. Caprichoso, C., Pereira, S., Holloway, D., 2021. First report on the occurrence of Belenopyge (Trilobita: Lichida) from the Devonian of Portugal. In: de Celis, A., Guerrero, A., Mocho, P., Páramo, A., Beccari, V., Caprichoso, C., Colmenar, J., Garcia, G. G., Jacinto, A., João, P., Malafaia, E., Pais, V., Pereira, S. & Silvério, G. (Eds.). Abstract book XIX EJIP, Coimbra, 36-37. (ISBN: 9781006988660).

2. Caprichoso, C., Pereira, S. & Holloway, D. 2021. First report on the occurrence of Belenopyge (Trilobita: Lichida) from the Devonian of Portugal. Encontro Ciência '21,Lisbon, https://www.encontrociencia.pt/2021/?accao=posters

3. Caprichoso, C. (2023). As trilobites do Devónico de Portugal. II PaleoPT, Lourinhã, Portugal.

4. Caprichoso, C., Pereira, S. & Holloway, D. 2024. Two countries, one seafloor: comparing the Devonian trilobites of France and Portugal. XXXIX Jornadas de la Sociedad Española de Paleontología.

Trilobites and biostratigraphy of the Marianian Stage (Cambrian Series 2) of the Ossa-Morena Zone, SW Iberia

Sofia Pereira[1*]

[(1)]Centro de Geociências, Universidade de Coimbra, Coimbra, Portugal

[*]ardi_eu@hotmail.com

PROJECT TYPE: PhD Grant. Fundação para a Ciências e Tecnologia.

UI/BD/151298/2021 SYNTHESYS + grant

DE-TAF-TA4-043

RESEARCH STUDENT: Luis Collantes Ruiz

SUPERVISOR: Sofia Pereira

TEAM: Luis Collantes Ruiz, Eduardo Mayoral (co-supervisor), Sofia Pereira.

INSTITUTIONS INVOLVED: University of Coimbra (Portugal), Universidad de Huelva (Spain).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4, 8 and 17. Using the geological record to understand past changes to the climate and using geology and landscapes within tourism, aiding the conservation of geodiversity and building a greater understanding and appreciation of the geological sciences by overall public and those communities living and working around geological features.

PROJECT GOALS: The main goals of this thesis were to study the Iberian Marianian trilobite assemblages in order to correlate the Marianian Stage across the OMZ and other Iberian Cambrian domains, and to evaluate its potential for international correlation and subdivision within the global context of the Cambrian Series 2.

RESULTS: The classical fossil sites were located and sampled and new fossil sites were discovered, with a total of 1299 trilobite fossils. In addition, 585 specimens of the most relevant trilobite collections of the Marianian from the OMZ were reviewed. A total of 23 trilobite species were identified in the Marianian of the Ossa Morena Zone. Among these species, six have been studied in detail, which results have been published in five indexed papers. A new species was erected and the systematic position of the studied taxa was reassessed. Serrodiscus revealed potential for global correlation and the new data improved and refined intra- and inter-regional correlation between the Central Iberian Zone and the Iberian Chains and strengthened the correlation with other Cambrian Series 2 sequences worldwide. Project/PhD successfully finished in March 2024.

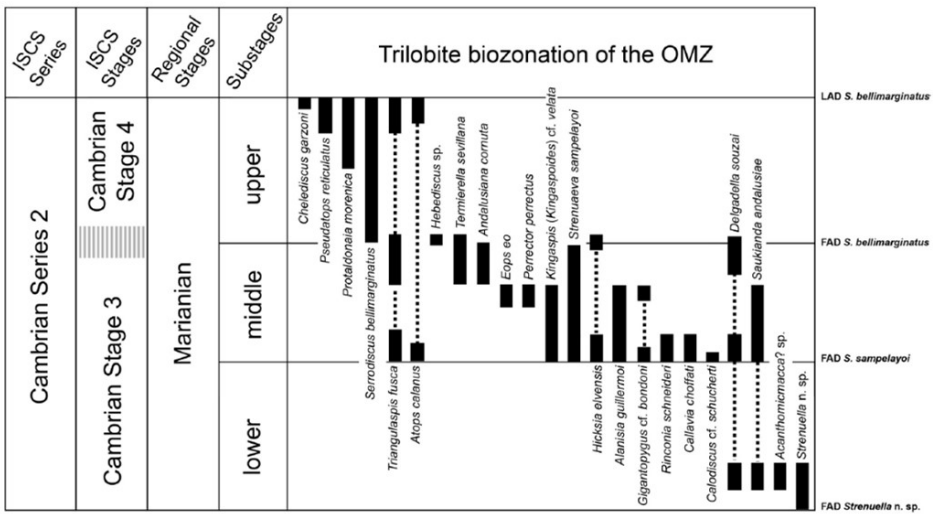

Fig 1. a) Stratigraphical distribution of Marianian trilobites of the Ossa-Morena Zone.

OUTPUTS:

Articles:

1. Collantes L, Mayoral E, Liñán E, Gozalo R., 2021. Atopidae (Trilobita) in the upper Marianian (Cambrian Series 2, Stage 4) of Iberia. Journal of Paleontology, 95(1):123-132. doi:10.1017/jpa.2020.71

2. Collantes, L., Pereira, S., Mayoral, E., Liñán, E. & Gozalo, R., 2021. On Callavia (Trilobita) from the Cambrian Series 2 of Iberia with systematic status of the genus, Journal of Paleontology, 95(6), pp. 1226-1240. https://doi.org/10.1017/jpa.2021.46.

3. Collantes, L., Mayoral, E., Liñán, E., Gozalo, R. & Pereira, S., 2022. The trilobite Serrodiscus Richter & Richter from Iberia, with systematic review of the genus and its international correlation through the Cambrian Series 2. Bulletin of Geosciences, 97(3): 289-317. https://doi.org/10.3140/bull.geosci.1852

4. Collantes, L., Pereira, S., Mayoral, E & Gozalo, R., 2022. First report of Chelediscus Rushton, 1966 (Trilobita) from Western Gondwana, with description of a new species from the Cambrian Series 2 of Spain. Historical Biology, https://doi.org/10.1080/08912963.2022.2109966

5. Collantes, L., Pereira, S., Mayoral, E., Liñán, E., Sepúlveda, A. & Gozalo, R., 2024. Taxonomy, biostratigraphy and paleobiogeography of Strenuaeva (Trilobita) from the Marianian (Cambrian Series 2) of Iberia, Geobios. https://doi.org/10.1016/j.geobios.2023.09.002.

The introduction of salt into Portuguese diets before writing

Luís de Almeida e Jesus[1*]

[(1)]Universidade Autónoma de Lisboa, Instituto Politécnico de Tomar, Centro de Geociências, Portugal

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PROJECT TYPE: PhD in Património, Tecnologia e Território.

RESEARCH STUDENT: Luís de Almeida e Jesus

SUPERVISION: Telmo Pereira and Ana Abrunhosa

INSTITUTIONS INVOLVED: Universidade Autónoma de Lisboa (Portugal) and Instituto Politécnico de Tomar (Portugal).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 3, 12 and 14.

PROJECT GOALS: Sayings such as "He is not worth his salt" or "salarium argentum" show that salt has been a fundamental resource since the invention of writing. Therefore, it is possible to assume that it was already vital before that. Despite being a fundamental resource for millennia, the evolution of Archaeology made the investigation about salt during Pre- and Protohistoric times to be neglected for decades with very few studies of this kind in Portugal. The project seeks to understand how salt was introduced, exploited, used, and transported into the diet, economy, and life of Proto- and Prehistoric populations from western Iberia. In this regard, ceramic fragments from various archaeological sites, dated chronologically between the Early Neolithic and the Iron Age, will be used. This study will encompass three main components: experimental archaeology with ceramics, geochemical analysis of both prehistoric and experimental ceramics, and geochemical analysis of the deposits from which these ceramics originate. Ultimately, it aims to find possible continuities and ruptures that characterized the food patterns of these communities, contributing to the knowledge about eating habits and taste that guided food choices over time.

Fig 1. Chalcolithic salt moulds accumulation in Solnitsata, Provadija, Bulgaria (Weller, O., 2015).

Approaches, Methods and Techniques for the Preservation of Vernacular Earthen Built Heritage in Mediterranean Cultures

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[(1)]Autonomous University of Lisbon, Lisbon, Portugal & Polytechnic Institute of Tomar, Tomar, Portugal

*30014115@students.ual.pt

PROJECT TYPE: PhD Heritage, Technology and Territory.

RESEARCH STUDENT: Rim Menia

SUPERVISION: Graça Almeida Borges

INSTITUTIONS INVOLVED: Autonomous University of Lisbon (Portugal) and Polytechnic Institute of Tomar (Portugal).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 11 and 12.

Assessment of ecosystem services an integrated management approach for the Aspiring Geopark Oeste, Portugal

Inês da Silva Marques[1,2,*], Edna Cabecinha[1,2,3,4], Ferdinando Villa[5] and Artur A. Sá[1,2,3]

[(1)]University of Trás-os-Montes and Alto Douro, Vila Real, Portugal

[(2)]UNESCO Chair on "Geoparks, Sustainable Regional Development and Healthy Lifestyles"

[(3)]Geosciences Center, Coimbra, Portugal

[(4)]CITAB - Centre for the Research and Technology of Agro-Environmental and Biological Sciences, Vila Real, Portugal

[(5)]Basque Centre for Climate Change (BC3)

*ines98marques@gmail.com

PROJECT TYPE: PhD in Environmental Sciences; BI/UTAD/14/2024-C.GEOC.-UID00073/2020 – FP.

RESEARCH STUDENT: Inês da Silva Marques

SUPERVISION: Edna Cabecinha, Ferdinando Villa and Artur A. Sá

INSTITUTIONS INVOLVED: University of Trás-os-Montes e Alto Douro (Portugal); UNESCO Chair on "Geoparks, Sustainable Regional Development and Healthy Lifestyles"; Geosciences Center, Coimbra, Portugal; CITAB - Centre for the Research and Technology of Agro-Environmental and Biological Sciences, Portugal; Basque Centre for Climate Change (BC3).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 13, 14, 15

PROJECT GOALS: There has been a considerable increase in biodiversity loss in the most recent decades. This loss has been even more notorious in marine and coastal ecosystems, which are particularly threatened by human pressures and climate change impacts. UNESCO Global Geoparks (UGG) are territories with unique geological features of international interest. Because of their commitment to the sustainable development of their territories, UGGs can contribute to the protection of ecosystem services (ES). This research proposal aims to identify the added value of the ES of the Aspiring Geopark Oeste, as well as to establish a balance between the ES of the different ecosystems categorized.

RESULTS: The results from this research proposal could be used as a base for the local co-design of adaptive management by recognizing the importance of cultural ES and their contribution to all the other Goods and Benefits that people derive from ecosystems. By recognizing their importance and the risk to their provision, we can better manage the ecosystems by incorporating local stakeholders' knowledge. This research proposal can be helpful to support local policy within the communities to promote cohesion in decision-making by stakeholders and concomitantly contribute to the implementation, at a national level, of the Coastal Zone Management Plans, European Directives such as MSFD undertaking the Agenda 2030.

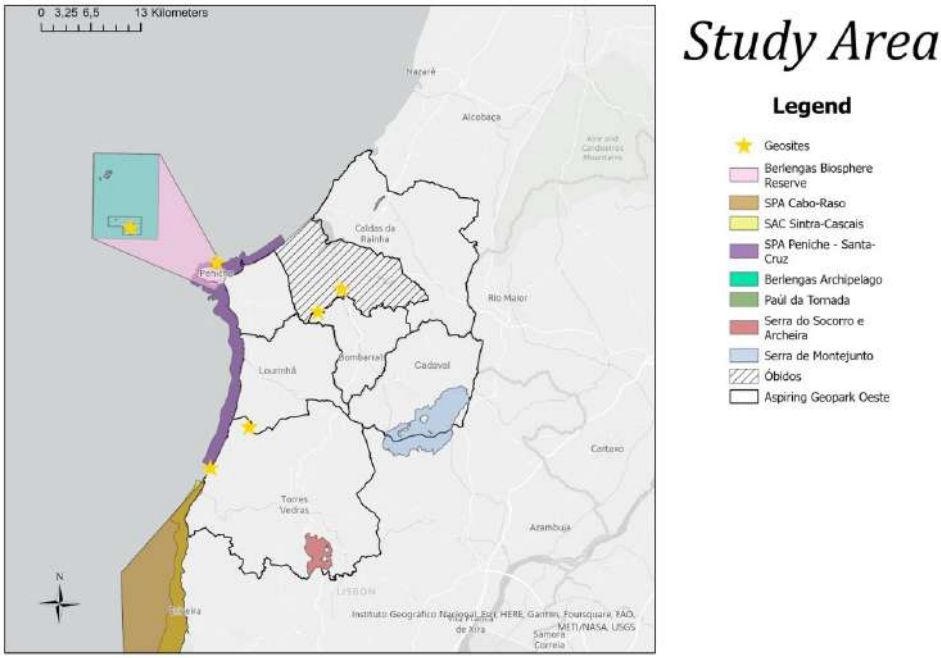

Fig 1. Proposed study area with natural relevance sites.

OUTPUTS:

Communications:

1. Da Silva Marques, I., Villa, F., Sá, A., Cabecinha, E. (2024). "Assessment of ecosystem services - an integrated management approach for the Aspiring Geopark Oeste, Portugal" in Livro de Resumos do 2º Congresso Nacional sobre Alterações Climáticas (CNAC), Mónica Pinto, Ondina Ribeiro, Edna cabecinha e João Santos (Eds.), ISBN: 978-989-704-568-4

Assessment of tsunami risk perception in students from schools located in flood risk areas in the commune of Talcahuano, Chile – A contribution to resilience to natural disasters

María Jesús Bravo Pérez[1,2,*], Artur A. Sá [1,2,3] and Manuel Schilling[4]

[(1)]University of Trás-os-Montes and Alto Douro, Vila Real, Portugal
[(2)]UNESCO Chair on "Geoparks, Sustainable Regional Development and Healthy Lifestyles"
[(3)]Geosciences Center, Coimbra, Portugal
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PROJECT TYPE: PhD in Geology

RESEARCH STUDENT: María Jesús Bravo Pérez

SUPERVISION: Artur A. Sá and Manuel Schilling

INSTITUTIONS INVOLVED: University of Trás-os-Montes e Alto Douro (Portugal); UNESCO Chair on "Geoparks, Sustainable Regional Development and Healthy Lifestyles"; Geosciences Center (Portugal).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 1, 3, 4, 9, 11.

PROJECT GOALS: Chile's tectonic context, which is associated with a convergent margin that forms part of the Pacific Ring of Fire, makes it a very vulnerable territory to the threats of earthquakes and tsunamis, especially considering that several cities with high populations are located near the coast. Many of these cities have a high percentage of their population settled in risk zones, specifically in tsunami flood zones The general objective of this project is to evaluate the perception of tsunami risk of students from schools in the commune of Talcahuano that are located in the tsunami flood zone, to link this perception with the generation of appropriate educational strategies for disaster risk reduction.

RESULTS: The main work will involve out field work in the schools of the region to survey the tsunami risk perception index among students, trying to understand and identify the main weaknesses, so that correcting them can contribute to a more protected and resilient community, in the face of a reality that, unfortunately, is recurrent in this region of the Bíobio aspiring UNESCO Global Geopark.

OUTPUTS:

Communications:

1. Bravo Pérez, María Jesús & Sá, Artur (2024). "Evaluación de la percepción de riesgo de tsunami en la comuna de Talcahuano, proyecto de Geoparque Minero Litoral del Biobío, Chile", 8th International Summer University on Geoparks, Sustainable Regional Development and Healthy Lifestyles, Panel 8 – PROSPERITY.

Contribution to the study of the aesthetics of pre-Hispanic societies: notes on the rock art of the equatorial and high Andean tropics.

Carlos Augusto Rodríguez Martínez[1, 2*]

[(1)]Universidade Autónoma de Lisboa e Instituto Politécnico de Tomar, Instituto Terra e Memória, Centro de Geociências,Portugal

[(2)]GIPRI, UPN, Bogotá, Colombia

*carlosrupestre@gmail.com

PROJECT TYPE: PhD Heritage, Technology and Territory.

RESEARCH STUDENT: Carlos Augusto Rodríguez Martínez

SUPERVISION: Rita Anastácio

INSTITUTIONS INVOLVED: Instituto Politécnico de Tomar (Portugal), Universidade Autónoma de Lisboa (Portugal), GIPRI (Colombia).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4, 11.

PROJECT GOALS: To develop categories to think about and understand the rock art of the equatorial tropics and High Andes. What characterizes and determines the production of this art? How are the particular human and environmental conditions expressed? Is it possible to elaborate categories that serve to explain the rock art phenomenon? This research will allow to discuss other "geographies" understanding that the possibility of thinking about differences passes through the study of these, as the differences are reflected in the material and aesthetic elaborations.

RESULTS: A cartographic and geographical model to show the complexity of the high Andean world of the central highlands of Colombia. To construct specific categories and concepts to think about the rock art present in Colombia. To demonstrate that a general theory does not explain the particularities of the engravings and paintings in a study area. Construction of a database and a GIS tto gather rock art data in different places of Colombia.

Fig 1. Landscape (left) and engraved rock (right) of the study region.

Analysis of the efficiency of petroleum systems in rift and passive margin Atlantic Basins (Brazil and Portugal)

Gustavo Gonçalves Garcia[1*] and Gustavo Santana Barbosa[1,2]

[(1)]University of Coimbra, Geosciences Center, Department of Earth Sciences, Coimbra, Portugal
[(2)]The Brazilian National Agency of Petroleum, Natural Gas and Biofuels (ANP), Rio de Janeiro, Portugal
* gustavogarcia@dct.uc.pt

PROJECT TYPE: PhD in Geology

RESEARCH STUDENT: Gustavo Santana Barbosa

SUPERVISION: Rui Paulo Bento Pena dos Reis, Antônio Jorge Vasconcellos Garcia and Gabriel de Alemar Barberes.

TEAM: Gustavo Santana Barbosa, Gustavo Gonçalves Garcia, Rui Paulo Bento Pena dos Reis, Antônio Jorge Vasconcellos Garcia and Gabriel de Alemar Barberes.

INSTITUTIONS INVOLVED: The Brazilian National Agency of Petroleum, Natural Gas and Biofuels (ANP - Brazil), Progeologia Laboratory/Nucleus of Competence in Oil, Gas and Biofuels (Brazil) and Geosciences Center (Portugal).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): SDG12.

PROJECT GOALS: Multiscale characterization of the elements of the petroleum system, based on the analysis of multivariable data, with the aim of confirming the presence of an active petroleum system, or not in different depositional systems. From the comparison of various characteristics of the static and dynamic elements of petroleum systems, as well as the synchronism element and economic aspects (calculation of the probability of geological success - Pg), the integrated analysis sought to answer what led to reservoirs in the same depositional environments to have generated commercial accumulations of hydrocarbons in one basin, while not in another.

RESULTS: The analysis, based on the multiscale characterization of the elements of the petroleum systems, aimed to confirm the presence of an active petroleum system in the six cases analyzed, which was confirmed. This characterization attested to the occurrence of static elements (generator rocks, reservoir and sealant and trap), as well as dynamic elements (tectonism, sedimentary column, geothermal gradient, generation-migration, main migration routes, diagenesis, accumulation, synchronism, probability of geological success and commerciality of accumulation), based on analysis of geological, geophysical, geochemical and petrographic data. Joint analysis of factors (tectonism, overburden, sedimentary column, geothermal gradient, gravity, faults, presence of diapirs, trap generation, migration routes, diagenesis, porosity, permeability, trap characteristics, economy of accumulation) and acting processes.

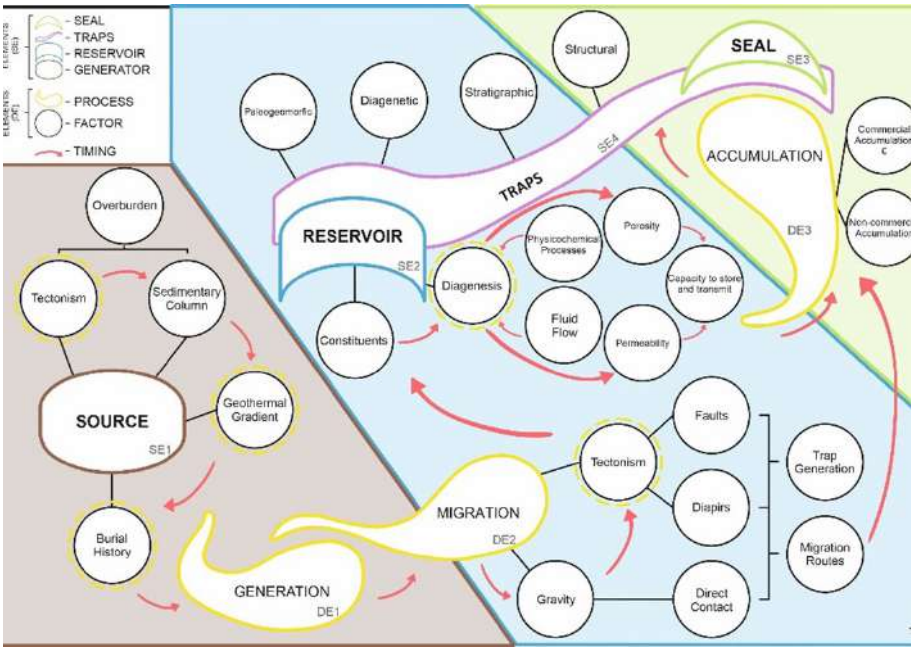

Fig 1. Illustrative diagram of the factors and processes (dynamic elements) that affect the static elements of a petroleum system. The graphic arrangement of these elements was performed according to their moment of contribution within the petroleum system (timing) (from Barbosa et al., 2022).

OUTPUTS:

Article:

1. Barbosa, G.S., Pena dos Reis, R., Garcia, A.J.V., Barberes, G.d.A. & Garcia, G.G. (2022). Petroleum Systems Analysis of Turbidite Reservoirs in Rift and Passive Margin Atlantic Basins (Brazil and Portugal). Energies, 15, 8224. https://doi.org/10.3390/en15218224

2. Barbosa, G.S., Garcia, G.G., Reis, R.P., Garcia, A.J.V. & Barberes, G.A. (2023). Analysis of the Efficiency of Petroleum Systems in Fluvial Environments in the Rift Context of the South and North Atlantic – Brazil and Portugal, Geosciences, 13(8): 239. https://doi.org/10.3390/geosciences13080239

Characterisation of ignimbrites from the island of Tenerife for use as building stone

Luís Sousa[1,2*], José Valido[3] and José Cáceres[3]

[(1)]University of Coimbra, Geosciences Center, Department of Earth Sciences, Coimbra, Portugal

[(2)]Department of Geology, University of Trás-os-Montes e Alto Douro, Portugal

[(3)]Department of Industrial Engineering, Escuela Superior de Ingeniería y Tecnología, University of La Laguna, Spain

*lsousa@utad.pt

PROJECT TYPE: PhD in Ingeniería Industrial, Informática y Medioambiental, Universidade de La Laguna, Tenerife, Espanha

RESEARCH STUDENT: José Antonio Valido García.

SUPERVISION: Luís Sousa; José Cáceres

INSTITUTIONS INVOLVED: University of La Laguna (Spain), University of Trás-os-Montes e Alto Douro (Portugal) and Guama-Arico S.L (Spain).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): SDG8, Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all; SDG9, Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation SDG12, Ensure sustainable consumption and production patterns.

PROJECT GOALS: One of the aims of this study is to characterise different types of ignimbrites that are widely used as building stone in the Canary Islands (Spain). Particular attention will be paid to the anisotropy planes. Another aim is to analyse the relationship between physical and mechanical properties. The use of hydrophobic agents will be evaluated to improve the use of low porosity varieties in coastal environments. Another objective is the identification of historic quarries.

RESULTS: To maximise the yield of the quarries; to find relationships between the textural, physical and mechanical properties; to define the best varieties to be exploited; to improve the weather resistance of the ignimbrites so that they can be used under the influence of the coastal environment; to develop awareness of the geoheritage linked to the historic quarries.

Fig 1. Example of fracture pattern in an ignimbrite quarry (a); historic quarry in tuff outcrops (b).

OUTPUTS:

Articles:

1. Valido, J.A., Cáceres, J.M., & Sousa, L. (2023). A characterisation study of ignimbrites of Tenerife Island employed as building stone. Environmental Earth Sciences 82:280. https://doi.org/10.1007/s12665-023-10957-5

2. Valido, J.A., Cáceres, J.M., & Sousa, L. (2024). Mechanical properties of ignimbrites of Tenerife Island employed as building stone and their correlation with some physical properties. Journal of Building Engineering 82:108222. https://doi.org/10.1016/j.jobe.2023.108222

Contribution of Geology to Sustainable Rehabilitations Based on Natural Engineering and Engineering Geology

Mónica Pratas Silva[1*]

[(1)]University of Coimbra, Geosciences Center, Department of Earth Sciences, Coimbra, Portugal
*mpsilva@student.dct.uc.pt

PROJECT TYPE: PhD Scholarship in Geology. UI/BD/150842/2021

RESEARCH STUDENT: Mónica Pratas Silva

SUPERVISION: Mário de Oliveira Quinta Ferreira and Pedro Gomes Cabral Santarém

INSTITUTIONS INVOLVED: Geosciences Center (CGEO) and Department of Earth Sciences - University of Coimbra.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): Sustainable Cities and Communities (11) Combating Climate Change (13), Terrestrial Ecosystems and Biodiversity (15).

PROJECT GOALS: The main objective is to carry out a detailed study to assess the dangers related to the geomechanical behavior of the geological materials at the sites under study. The ultimate goal is to come up with solutions that promote a natural stabilization of the site, minimizing the need for regular long-term maintenance. These solutions should emphasize the contribution of the local geology to promoting a balanced relationship between efficiency, economic profitability and sustainability.

RESULTS: It is hoped to be able to rehabilitate and recover sites that have been the target of geo-resource exploitation and unstable slopes based on environmentally friendly methodologies, in order to promote landscape integration, as well as the development of the fauna and flora that had existed on these sites, always respecting the conditions of each site, as their individuality must be preserved.

Fig 1. (a) Visit to the LifeRibermine project in Spain during my internship at UCM (b) Limestone sample with calcite minerals at Cabo Mondego.

OUTPUTS:

Book chapter

1. Pratas-Silva, M., Quinta-Ferreira, M. (2020). Caracterização superficial de Geologia de Engenharia da margem direita do rio Mondego, na Av. Cidade Aeminium, em Coimbra. In I. Abrantes, P.M. Callapez, G. P. Correia, E. Gomes, B. Lopes, F. C. Lopes, E. Pires, A. Rola (Eds.), Uma visão holística da Terra e do Espaço nas suas vertentes naturais e humanas. Homenagem à Professora Celeste Romualdo Gomes (Vol. II, pp. 133-146). CITEUC. http://doi.org/10.5281/zenodo.4409368

Communications

1. Pratas-Silva, M., Quinta-Ferreira, M., & Andrade, P.S. (2023). Utilização das Classificações Geomecânicas como base para a reabilitação de escavações em rocha. In Isabel Duarte, João Marcelino, António Pinho, Paula Faria, Luís Lopes; Pedro Pereira (Eds.), Atas do 18º Congresso Nacional de Geotecnia (18CNG), Geotecnia e Alterações Climáticas, Évora,14 a 17 de Maio de 2023, Universidade de Évora, Sociedade Portuguesa de Geotecnia (SPG), 1005-1014. ISBN: 978-989-54038-9-9

Poster

1. Pratas-Silva, M., Quinta-Ferreira, M. & Andrade, P.S. (2023). The Use of Green Geology for the Stabilization and Rehabilitation of Rock Masses. In Tugce Baser, Arvin Farid, Xunchang Fei and Dimitrios Zekkos (Eds.), Proceedings of the 9th International Congress on Environmental Geotechnics (9ICEG), 25-28 June, 2023, Chania, Greece, Volume 2, 577-578. ARGO-E GROUP. https://doi.org/10.53243/ICEG2023-337

Hydrocarbon Sub-Basalt Basin Potential in West India and Offshore Pakistan

Yasir Shahzad[1*], Inês Filipa Pereira[1,2], Ricardo Pereira[3,4] and Rui Pena dos Reis[1]

[(1)]University of Coimbra, Geosciences Center, Coimbra, Portugal
[(2)]University of Coimbra, Geosciences Center, Department of Earth Sciences, Coimbra, Portugal
[(3)]GeoBioTec, DCT FCT-NOV, Lisboa, Portugal
[(4)]Instituto Dom Luiz, Lisboa, Portugal
*yasishzd@gmail.com

PROJECT TYPE: Ph.D. in Geology focusing on "Hydrocarbon Sub-Basalt Basin Potential in West India and Offshore Pakistan," funded by FCT under scholarship reference UI/BD/150822/2021.

RESEARCH STUDENT: Yasir Shahzad

SUPERVISION: Professor Doutor Rui Pena dos Reis, Doutora Inês Filipa Pereira, Doutor Ricardo Pereira

INSTITUTIONS INVOLVED: Centro de Geociências, Coimbra, Portugal.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): SDG 7: Affordable and Clean Energy; SDG 9: Industry, Innovation, and Infrastructure; SDG 12: Responsible Consumption and Production.

PROJECT GOALS: The primary goal is to assess the hydrocarbon potential of the sub-basalt sequences in the offshore Indus Basin and West India, particularly focusing on the Cretaceous-aged units. This involves utilizing seismic profiles to delineate structural and stratigraphic features indicative of hydrocarbon reservoirs. Additionally, the project aims to develop a comprehensive petroleum system model that incorporates source rock, reservoir, seal, and trap elements. Furthermore, integrating the findings with geological and geophysical data from the Onshore Indus Basin and the Kutch Basin will provide a regional perspective. Lastly, the project seeks to implement and test cutting-edge seismic and geophysical techniques to improve sub-basalt interpretation and hydrocarbon exploration.

RESULTS: Seismic profiles oriented NE-SW across the continental shelf reveal structural highs like the Saurashtra High and Somnath Ridge. The K-Pg boundary features distinct seismic reflections, with high-amplitude reflections distinguishing the Cretaceous from the Paleogene. The Cretaceous stratigraphic layer thickens significantly towards the northwest, indicating increased subsidence or sedimentation. Well data from Dabbo Creek-1 and Sher-1 show lateral variation in depositional sequences, with a NE to SW fining trend and varying thicknesses across the Deccan volcanic units. The Lower Cretaceous Sembar Fm., primarily shales, and the Goru Fm., with alternating sandstone and shales, are present in the shallow offshore Indus Basin and also seemingly in the deep offshore (requires confirmation from well data), being the most suitable candidates for unconventional resources in the deep offshore Indus Basin.

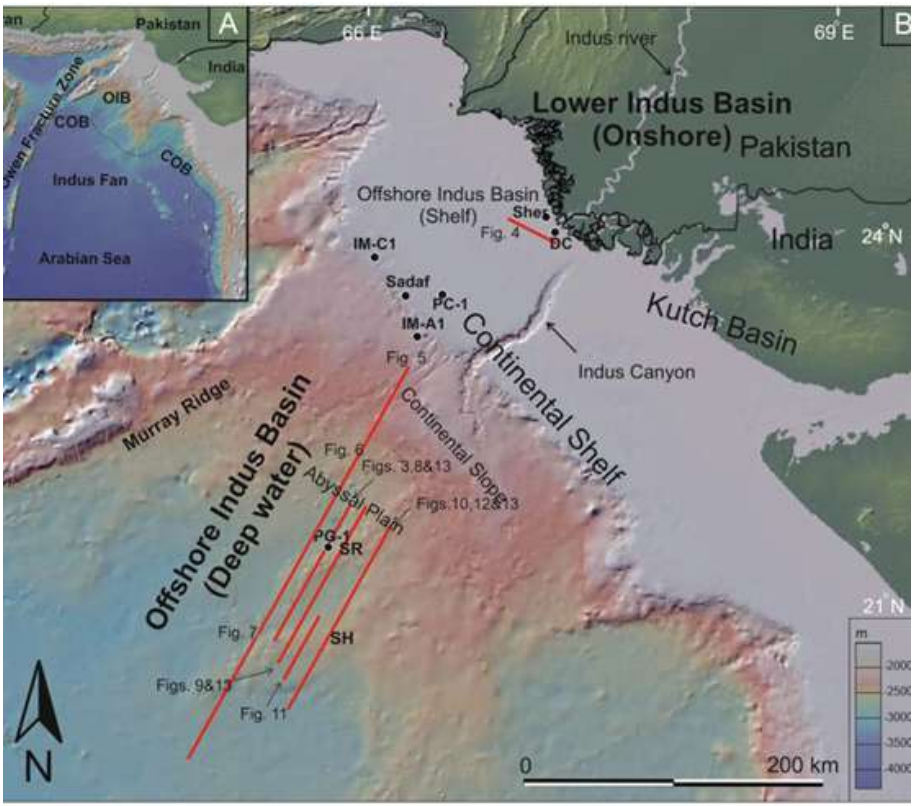

Fig 1. Bathymetric map of the offshore Indus Basin (Pakistan), showing seismic lines and well locations.

OUTPUTS:

Conference presentations:

1. Shahzad, Y. 2021. Environmental Effects of Large Igneous Provinces. Poster presented at Encontro Ciência 2021.

2. Shahzad, Y., Pereira, I., Pereira, R., Pena dos Reis, R. 2023. Play-Based Exploration of Unconventional Gas in the Pre-Deccan Cretaceous Sequence of the Offshore Indus Basin, Pakistan. XI-CNG Congresso Nacional de Geologia, July 2023.

3. Shahzad, Y., Pereira, I., Pereira, R., Pena dos Reis, R. 2024. Pioneering Depths: Unravelling Exploration for the Unconventional Resources in the Cretaceous Reservoirs in the Deep Offshore Indus Basin. 8th Conjugate Margins Conference, Lisbon, May 2024.

Cultural Heritage and Territory Management: analytical matrix and performance indicators

Maurizio Quagliuolo[1,2*]

[(1)]Universidade autónoma de Lisboa, Instituto Politécnico de Tomar, Centro de Geociências, Portugal
[(2)]HERITY, Rome, Italy
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PROJECT TYPE: PhD dissertation in Heritage, Technology and Territory.

RESEARCH STUDENT: Maurizio Quagliuolo

SUPERVISION: Luiz Oosterbeek

INSTITUTIONS INVOLVED: Instituto Politécnico de Tomar, Universidade Autónoma de Lisboa (Portugal), Enotria European Foundation (Italy, and local entities from, at present, 26 villages in 12 Countries.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4, 8, and 11.

PROJECT GOALS: to investigate the processes that lead to choices based on the perception and representation of the territory, whose information can be improved in at least 5 areas. Subsequently, to design indexes on the base of transdisciplinary indicators for personal or collective decision making.

RESULTS: Review and analysis of material and immaterial aspects and their strict connection; review and analysis of the reasoning approaches to dilemmas; review and analysis of the concepts and perception of Territory and Landscape; review and analysis of the choice mechanisms in the fields of assigning Value, Preserve it, Communicate it and, afterwords, to create services and jobs.

Design of a quantitative and qualitative methodology to collect and analyze the data, including new tools to build a model to extract: a justified matrix of the indicators, five thematic indexes, a global index and a vocation guide.

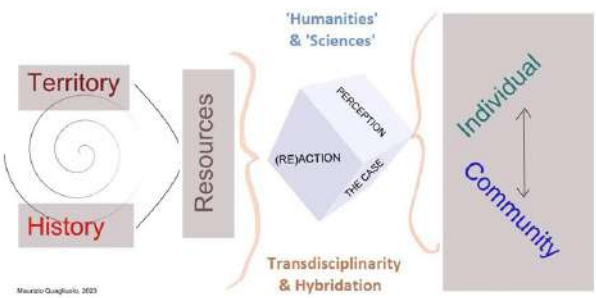

Fig 1. Conceptual model.

Diversity and inclusion Portugal: a reading from the municipal museums' perspective

Joaquim Santos Jorge[1*]

[(1)]Universidade Autónoma de Lisboa, Instituto Politécnico de Tomar, Centro de Geociências, Portugal
*joaquim.santos.jorge@gmail.com

PROJECT TYPE: PhD project in Heritage, Territory and Technology at the Autonomous University and Polytechnic Institute of Tomar, specialising in Heritage, Technologies and Cultural Landscapes.

RESEARCH STUDENT: Joaquim Santos Jorge

SUPERVISION: Graça Almeida Borges

INSTITUTIONS INVOLVED: UAL/IPT, Portugal

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 10, 11 and 17.

PROJECT GOALS: Analysing diversity and inclusion from the research and exhibition practices of municipal museums in Portugal, understand how they have responded to the social changes imposed by intercultural diversity; seeking to identify championing practices, how they overcome obstacles and crafted solutions to make intercultural dialogue possible and support the process of inclusion. To this end, we will study how municipal museums which belong to the Portuguese Network of Museums have included intercultural diversity in their strategic mission, in their programming and daily interpretation practices, in their collections, and in their research and exhibition ethos. We will also examine the relationship between these museums and the minority communities they worked with and collect their perceptions, in order to fully understand other dimensions of the impact of the museum initiatives.

RESULTS: A cartographic and geographical model to show the complexity of the high Andean world of the central highlands of Colombia. To construct specific categories and concepts to think about the rock art present in Colombia. Demonstrate that a general theory does not explain the particularities of the engravings and paintings in a study area. To begin the construction of a database and a GIS that gradually gathers the rock art data in the different places of the national geography.

Geological Heritage of São Tomé e Príncipe

Keynesménio Afonso Neto[1,2] and Maria Helena Henriques[1]

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[(2)]Higher Institute of Education and Communication, University of São Tomé and Príncipe

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PROJECT TYPE: PhD

RESEARCH STUDENT: Keynesménio Afonso Neto

SUPERVISION: Maria Helena Henriques

INSTITUTIONS INVOLVED: University of Coimbra (Portugal) and University of São Tomé and Príncipe (São Tomé and Príncipe).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4, 11, and 17.

PROJECT GOALS: to deepen knowledge about the geodiversity of São Tomé and Príncipe; to characterize its geological heritage; to develop valuation strategies of geoeducation and geotourism to promote local sustainable development. The main objective of this work is to present the complete inventory of the geological heritage of São Tomé and Príncipe, based on detailed field analysis of its different stratigraphic units, and using an evaluation methodology that considers the specificities of oceanic islands in a low to middle income social context.

RESULTS: Development of new concepts and ideas in geoconservation science. Inventory and assessment of the geological heritage outcropping in São Tomé and Príncipe Island (São Tomé and Príncipe). Proposals of valuation strategies for the promotion of remote territories displaying geoheritage resources in West Africa (the Cameroon Volcanic Line).

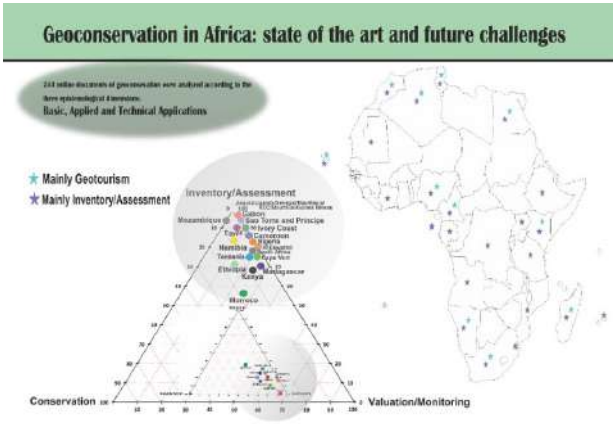

Fig. 1. Distribution of documents mainly related to types of geoheritage per country in Africa (Neto & Henriques, 2022).

OUTPUTS:

Article:

1. Neto, K. & Henriques, M. H. (2022). Geoconservation in Africa: state of the art and future challenges. Gondwana Research, 110: 107-113. [https://doi.org/10.1016/j.gr.2022.05.022].

2. Neto, K. & Henriques, M. H. (2023). Geoheritage of the Príncipe UNESCO World Biosphere Reserve (West Africa): Selected Geosites. Geoheritage, 15(4), 1–13. [https://doi.org/10.1007/S12371-023-00887-W/TABLES/1].

3. HENRIQUES, M. H. & NETO, K. (2023). A Geo-Itinerary to Foster Sustainable Tourism in West African Islands: Storytelling the Evolution of the Ancient Cameroon Volcanic Line Coral Reefs. Sustainability, 15(24), 16863. [https://doi.org/10.3390/su152416863].

Communications:

1. Neto, K. & Henriques, M. H. (2022). À descoberta da geodiversidade de São Tomé. In: Oosterbeek, L. & Gomes, H. (Eds.), Ciências da Sustentabilidade em Língua Portuguesa... Por mares nunca dantes navegados, Livro de Resumos do XXIII Encontro de Estudos Ambientais dos Países de Língua Portuguesa, Tomar, Area domeniu, 15, Instituto Terra e Memória, Mação, pp. 321-326 [ISSN: 1645-6947; ISBN: 978-989-53070-6-7].

2. Neto, K. & Henriques, M. H. (2023). Os geo-itinerários como meio de divulgação do património geológico de São Tomé e Príncipe. In: Lopes, F. C., Dinis, P. A., Duarte, L. V. e Cunha, P. P. (Coords.). XI Congresso Nacional de Geologia: Geociências e Desafios Globais. Livro de Resumos. Coimbra, 16-20 julho de 2023, Departamento de Ciências da Terra da Universidade de Coimbra (Eds.), pp. 649-650 (ISBN: 978-989-98914-8-7).

3. Neto, K. & Henriques, M. H. (2023). Geodiversity and geoheritage of the Príncipe Island (West Africa). 10th International Conference on Geoparks, 4 to 11 September 2023, in Marrakech and M'Goun Unesco Geopark in Azilal, Abstracts Book, p. 297.

Geological heritage of the Atlantic Geopark Project for sustainable development – an integrated approach of the natural and cultural values of the territory

Salomé C. Custódio[1*]

[(1)]Geosciences Center, Department of Earth Sciences, University of Coimbra, Rua Sílvio Lima s/n, 3030-070 Coimbra, Portugal;

*scmcustodio@student.uc.pt

PROJECT TYPE: PhD in Geology

RESEARCH STUDENT: Salomé C. Custódio

SUPERVISION: Maria Helena Henriques (UC); Emmaline M. Rosado-González (UTAD); Artur A. Sá (UTAD)

INSTITUTIONS INVOLVED: University of Trás-os-Montes e Alto Douro; UNESCO Chair on Geoparks, Sustainable Regional Development and Healthy Lifestyles; University of Coimbra.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 11, 13, 17

PROJECT GOALS: The main goal of this project is to justify a proposal for establishing an UNESCO Global Geopark in the study area (Cantanhede, Mira, Mealhada, Montemor-o-Velho, Figueira da Foz and Penacova) integrating the natural and cultural values of the territory and to contribute to the production of scientific knowledge capable of promoting societies to be more sustainable at the environmental, political and economic levels.

RESULTS: The first inventorying of the geological sites in the territory has been accomplished, totalizing 50 geological sites. Six of them were selected for the Oceans Route (figure 1; Custódio et al., 2024), to be one of the Heritage Routes recently launched at the territory (https://rotasdopatrimonio.adelo.pt/wp-content/uploads/2024/01/Mapa-rotas-patrimonio-adelo-2023.pdf).

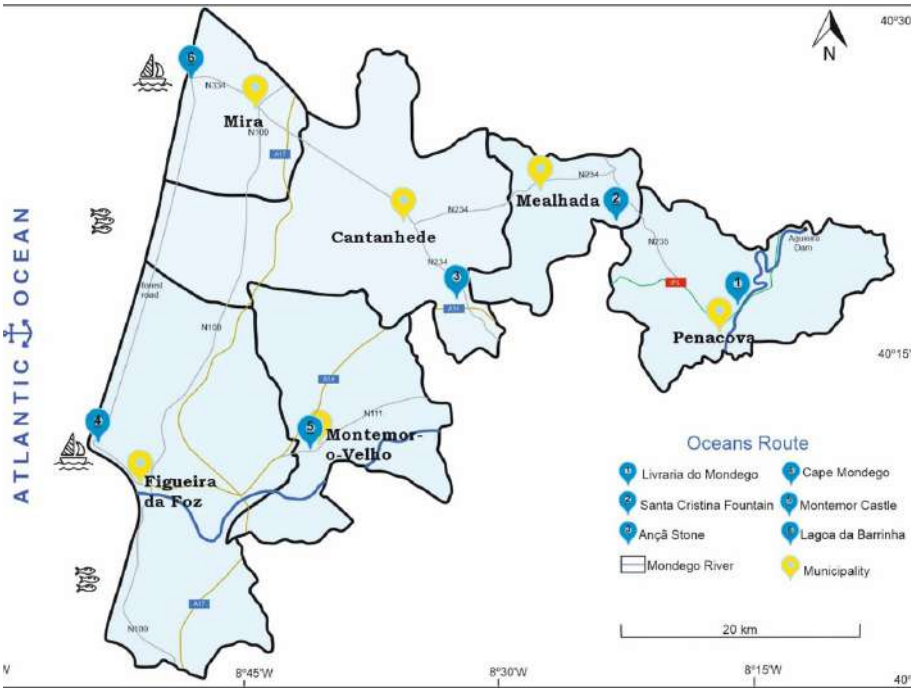

Fig. 1. Distribution of documents mainly related to types of geoheritage per country in Africa (Neto & Henriques, 2022).

OUTPUTS:

Articles:

1. Custódio, S.C., Henriques, M.H., Rosado-González, E.M., Vaz, N.M. & Sá, A.A. (2024) Selected Geoheritage Resources of "Atlantic Geopark" Project (Central Portugal). Geosciences, 14(3), 81. https://doi.org/10.3390/geosciences14030081

Communications:

1. Custódio, S. C., Henriques, M.H., Rosado-González, E., Vaz, N.M. & Sá A. A. (2023). Recursos geopatrimoniais de referência do Projeto Geoparque Atlântico (Centro de Portugal). In: Lopes, F.C., Dinis, P.A., Duarte, L.V. & Cunha, P.P (Coords.). "Livro de Resumos Do 11º Congresso Nacional De Geologia "Geociências E Desafios Globais"". Departamento de Ciências da Terra da Universidade de Coimbra, 16-20 julho, pp. 629-630. (ISBN: 978-989-98914-8-7)

2. Custódio, S. C., Henriques, M.H., Rosado-González, E., Vaz, N.M. & Sá, A. A. (2023). The "Atlantic Geopark" Project (Central Portugal). 10th International Conference on UNESCO Global Geoparks 2023, 4-19 September, Marrakech, Morocco.

Geotourism development in UNESCO Global Geoparks through Geopark Partnership and Local Community Engagement - a case Study from Iranian aspiring geoparks

Soma Sayedyounesi[1,2,*], Artur A. Sá[1,2,3] and Alireza Amrikazemi[1,2]

[(1)]University of Trás-os-Montes and Alto Douro, Vila Real, Portugal
[(2)]UNESCO Chair on "Geoparks, Sustainable Regional Development and Healthy Lifestyles"
[(3)]Geosciences Center, Coimbra, Portugal
*stm_soma@yahoo.com

PROJECT TYPE: PhD in Geology

RESEARCH STUDENT: Soma Sayedyounesi

SUPERVISION: Artur A. Sá and Alireza Amrikazemi

INSTITUTIONS INVOLVED: University of Trás-os-Montes e Alto Douro (Portugal); UNESCO Chair on "Geoparks, Sustainable Regional Development and Healthy Lifestyles"; Geosciences Center (Portugal).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 1, 2, 4, 5, 8, 11, 12, 17.

PROJECT GOALS: The development of geotourism within the framework of UNESCO Global Geoparks plays an important role in advancing geoconservation and promoting local economic development. Through citizen involvement, local communities can establish successful sustainable tourism development and support for territorial development. This reality emphasize the importance of community empowerment in fostering sustainable tourism development, aligning with Agenda 2030 and promoting regions for local empowerment. The general objective of this project is to identify the importance of geotourism for the territorial sustainable development in UNESCO aspiring Geoparks, promoting the establishment of intra- and inter-territory partnerships, encouraging different communities to share expertise, knowledge and best practices, and increase mutual understanding.

RESULTS: This Project will be developed together with local communities, involving monitoring and studies of small business owners in restaurants, accommodation and women's cooperatives and school communities. It is expected that by sharing experiences, between territories of the same country, speaking the same language, dynamics and expertise will develop that facilitate subsequent sharing with other territories of the Global Geoparks Network.

OUTPUTS:

Communications:

1. Sayedyounesi, S. & Amrikazemi, A. (2023). The Role of Promotional and Educational Events in Advancement of Knowledge and Experience Exchange in UNESCO Global Geoparks, Aras UGGp Case" Abstracts of the 10th International Conference on UNESCO Global Geoparks, M'Goun Uggp, Marrakech, Kingdom of Morocco, September 2023.

2. Sayedyounesi, S. & Amrikazemi, A. (2022). Promotion and development of GEOfood IGCP project in Iran. Abstracts of the16th European Geoparks Conference, Sesia Val Grande UNESCO Global Geopark, Verbania, Italy, September 2022.

3. Sayedyonesi, S., Amrikazemi, A., Rezaee, M., Abbasi, M., Sheibani, V.Y. & Ajayebi, K.S. (2018). Geoproducts Improvement, Consolidating Locals Economy and Promoting Geoparks. Abstracts of the 8th International Conference on UNESCO Global Geoparks, Adamello Brenta Geopark, Trentino, Italy, September 2018.

4. Sayedyounesi, S. & Amrikazemi, A. (2016). Geoproduct strategies in Qeshm Island Geopark. Abstracts of the 7th International Conference on UNESCO Global Geoparks, English Riviera UNESCO Global Geopark, Torbay, England, September 2016

5. Amrikazemi, A., Mohsenpur, H. & Sayedyounesi, S. (2016). How a geopark revives? Qeshm Island Geopark- a different experience Oral. Abstracts of the 7th International Conference on UNESCO Global Geoparks, English Riviera UNESCO Global Geopark, Torbay, England, September 2016.

Heritage: History, Narratives and Communities

Celeste Maria Ferreirinho Afonso[1*]

[(1)]Polytechnic Institute of Tomar, Autonomous University of Lisbon, Centro de Geociências, Portugal

*celesteafonso@gmail.com

PROJECT TYPE: PhD in Heritage, Technology and Territory, specialization in Heritage, Technologies and Cultural Landscape.

RESEARCH STUDENT: Celeste Maria Ferreirinho Afonso

SUPERVISION: Luiz Oosterbeek

INSTITUTIONS INVOLVED: Polytechnic Institute of Tomar, Tomar, Portugal; Autonomous University of Lisbon , Lisbon, Portugal; UNESCO Chair in Humanities and Integrated Cultural Management of the Territory, Tomar, Portugal; Geosciences Center of the University of Coimbra, Coimbra, Portugal.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 10, 15 and 16.

PROJECT GOALS: Identify and analyze the milestones and historical events that have played a fundamental role in transforming the concept of Cultural Heritage. Evaluate how these milestones have influenced the perception and approach to Cultural Heritage. Explore the contemporary theories and approaches that have shaped the understanding of Heritage. Define Communities in the context of Cultural Heritage. Understand the dynamics between Cultural Heritage, Narratives and Communities in different processes of patrimonialization and integrated cultural management of the territory.

RESULTS: We intend to contribute to a conceptual construction of community that brings us closer to a functional definition.

OUTPUTS:

Communications at conferences:

1. “Cultural Landscapes and Intangible Cultural Heritage: Community Participation in Heritage Processes” in International Congress “Safeguarding The Intangible Heritage: Policies and Practices for the next Decades”, University of Évora (Portugal), November 3rd, 2003

2. “What is a Community? How to Build Sustainability from Communities?” in International Congress on Cultural Heritage and Sustainability – CIPCS: a Happy Museum for a Better Future, Federal University of Pelotas and Catholic University of Pelotas, Brazil, July 5rd, 2024

3. “Creative revitalization of the Caramulo Mountain: integrating culture and sustainability” in Conference “Horizons of Sustainability: The power of creative innovation for transformation of rural and non-urban futures” in Šibenik, Croatia, 25-27 September 2024

Monuments to the Dead of the Great War in Portugal: Sites of Memory in the Public Space (1914-2014)

Lígia Salgueiro Coutinho Mateus[1,2*]

[(1)]Universidade Autónoma de Lisboa, Instituto Politécnico de Tomar, Centro de Geociências, Portugal
[(2)]Collaborating researcher at TECHN&ART, Polytechnic University of Tomar, Portugal
*ligia.mateus@ipt.pt

PROJECT TYPE: PhD in Heritage, Technology and Territory

RESEARCH STUDENT: Lígia Mateus

SUPERVISION: Graça Almeida Borges, Luiz Oosterbeek and Hermínia Sol

INSTITUTIONS INVOLVED: Polytechnic University of Tomar (Portugal) and Autonomous University of Lisbon (Portugal)

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4, 11 and 16.

PROJECT GOALS: This project aims to analyze the monuments to the dead of the IWW in Portugal to explore the relationship between their visibility in public space and their impact on Portuguese collective memory. It aims to observe how the creation of these monuments has evolved between 1914 and 2014, in dialogue with the construction of memory and cultural landscapes. The focus will be on the monuments built in Portugal, but the analysis will be extended to other spaces that will allow a more complete understanding of the Portuguese case (France and Romania).

Fig 1. Memorial to the soldiers of the Great War, Mação – Portugal (Source: Lígia Mateus, 2024).

OUTPUTS:

Conference communication

1. Mateus, L., 2024. The memory of the Great War in Portugal (1914-2014): a historiographical essay. 1st Annual International KreativEU Conference “Heritage, Science and Technology for a Sustainable Preservation”, 16th-17th May 2024, Targoviste – Romania.

Holocene Slope Deposits and Microstratigraphy in the Middle Tagus Basin, Portugal

Opeyemi Lateef Adewumi[1,2,3,4,5*], Luiz Miguel Oosterbeek[1,3,4], Josep Vallverdú[4,5] and Mário Quinta- Ferreira[1,2]

[(1)]Geosciences Centre (CGEO), Portugal

[(2)]University of Coimbra (Polo II), Faculty of Science and Technology, Department of Earth Sciences and Geosciences Centre, Coimbra, Portugal

[(3)]Polytechnic Institute of Tomar, Portugal

[(4)]Earth and Memory Institute, Mação, Portugal

[(5)]IPHES- The Catalan Institute of Human Paleoecology and Social Evolution, Tarragona, Spain

[(6)]Área de Prehistoria, Universitat Rovira i Virgili (URV), Tarragona, Spain.

*adewumiopeyemi.aomail.com

PROJECT TYPE: PhD in Geology

RESEARCH STUDENT: Opeyemi Lateef Adewumi

SUPERVISION: Professor Luiz Miguel Oosterbeek, Professor Josep Vallverdú, Professor Mario Quinta-Ferreira

INSTITUTIONS INVOLVED: University of Coimbra (Portugal); CGEO-Geosciences Centre (Portugal); Polytechnic Institute of Tomar (Portugal); Earth and Memory Institute (Portugal); IPHES- The Catalan Institute of Human Paleoecology and Social Evolution (Spain).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4, 17.

PROJECT GOALS: To comprehensively analyze the Holocene deposits at three key sites in the middle Tagus basin in Portugal: Amoreira (Abrantes), Cadaval (Tomar), and Vale da Laje (Tomar). This involves characterizing the microstratigraphic units of both the late Pleistocene and Holocene periods, determining the site formation processes, and integrating these archaeological sites within the framework of the catena slope concept.

RESULTS: Development of a general/ comprehensive first assessment of soil formation in the Middle Tagus area. Assessment of the geomorphological processes influencing sediment deposition, soil formation, and archaeological site formation across different slope positions. Classification and categorisation of the archaeological sites into up-slope, mid-slope, and foot-slope deposits. Classification of the soils of each site.

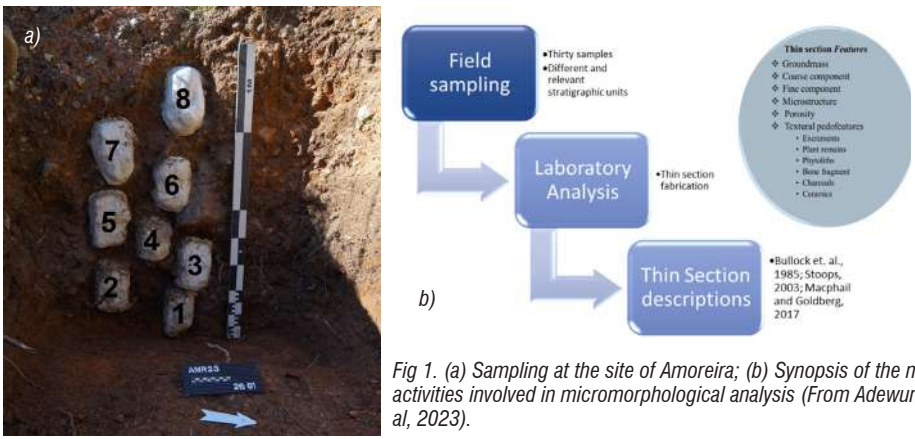

Fig 1. (a) Sampling at the site of Amoreira; (b) Synopsis of the major activities involved in micromorphological analysis (From Adewumi et al, 2023).

OUTPUTS:

Article:

1. Oosterbeek, L., Adewumi, O. L., Rosina, P., Gomes, H., Cura, P., Garcês, S. 2022. Revisiting education and training programs: Geoarchaeology as a driver of interdisciplinary reasoning. Front. Earth Sci. 10:914307. https://doi.org/10.3389/feart.2022.914307

Communications:

1. Adewumi, O. L., Oosterbeek, L., Quinta-Ferreira, M., Vallverdú, J., Almeida, N. J. 2021. Sequencing deposits and human occupations at the Early Neolithic site of Salvador (Abrantes, Portugal): Preliminary micromorphological assessment. 9th Developing International Geoarchaeology Conference, University of Algarve, Faro, 17th - 21st May 2021, Page 51.

2. Adewumi, O. L., Oosterbeek, L., Quinta-Ferreira, M., Vallverdú, J. 2022. Microstratigraphy of Holocene Deposits Associated with Human Occupations at the Dawn of Agropastoralism in the Middle Tagus Basin, Portugal. Geosciences Centre 2022 Conference Raw Materials and Sustainability, Portugal 20-21 June, 2022

3. Adewumi, O. L., Oosterbeek, L., Vallverdú, J., Almeida, N. J., Quinta-Ferreira, M. 2022. Contributions of Micromorphology to the Understanding of Archaeological Records: Anta 1 de Vale da Laje (Tomar, Portugal) as a Case Study. In the 28th European Association of Archaeologists Annual Meeting, Budapest, Hungary, 31st August -3rd September, 2022, P 199.

4. Adewumi, O. L., Oosterbeek, L., Vallverdú, J., Quinta-Ferreira, M., Rosina, P., Pereira, P., Garcês, S. 2022. Micromorphological Insight into the Cave Sediments of Cadaval Cave, Tomar, Portugal. In the 10th IAG International Conference on Geomorphology, Geomorphology and Global Change, Coimbra, Portugal, 12-16 September, 2022. http://dx.doi.org/10.5194/icg2022-262

5. Adewumi, O. L., Oosterbeek, L., Vallverdú, J., Quinta-Ferreira, M., Hugo, G. 2023. Beyond the Naked eye: Micromorphological Assessment of Soils from Amoreira Archaeological Site. Encontro com a Ciência e Tecnologia em Portugal 5 a 7 Julho 2023. http://dx.doi.org/10.13140/RG.2.2.11573.45280

Human ability to adapt to environmental changes during the Quaternary in the Iberian Peninsula through a geoarchaeological analysis

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[(1)]Faculty of Sciences and Technology, Department of Earth Sciences and Geosciences Centre, Coimbra (Portugal)

[(2)]Instituto Politécnico de Tomar (Portugal)

[(3)]Earth and Memory Institute, Mação (Portugal)

* virginia.lattao@gmail.com

PROJECT TYPE: PhD in Geology (Research Grant for the project (UI/BD/150848/2021) FCT - Foundation for Science and Technology, via Instituto Politécnico de Tomar)

RESEARCH STUDENT: Virginia Lattao

SUPERVISION: Pierluigi Rosina, Maria Helena Paiva Henriques

INSTITUTIONS INVOLVED: University of Coimbra, Polytechnic Institute of Tomar, Earth and Memory Institute, Mação (Portugal); University of Ferrara (Italy).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 11, 13 and 17.

PROJECT GOALS: This study contributes to the application of the methodological technique of stable δ13C isotope analysis in continental sediments, to obtain an overview and identify the limitations or strengths of this analytical approach. Obtaining data on vegetation cover variations in different areas of the Iberian Peninsula, during human occupation during the Quaternary, identify if there are parallels between these variations and the different human occupations of the sites. To see if, throughout the history of human occupation, a more marked variation or contrast is visible or discernible.

RESULTS: The results obtained show that human occupation up to the end of the Pleistocene follows natural fluctuations, while the Holocene shows a real and significant impact on the environment by more incisive human activity. The data obtained show that variations in vegetation cover in the Iberian Peninsula during the Pleistocene follow climatic oscillations and appear to be influenced by anthropogenic activities during the Holocene.

Fig 1. a) Sampling (from 2. Lattao V., et al., 2023. Arqueologia em Portugal, 2023-Estado de Questão); b) Preparation and analysis of the sediments' samples (from the communication made in XI Congresso Nacional de Geologia: Geociências e Desafios Globais, Coimbra,16 – 20 of July, 2023).

OUTPUTS:

Article:

1. Lattao V., Collado H., Garcês S., Gomes H., Rosina P., Nash H. G., Garcia Arranz J. J., Mira Perales H. A., 2023. O projeto FIRST-ART: documentação, conservação e gestão das primeiras manifestações da arte rupestre no sudoeste da Península Ibérica: As Grutas de Escoural e Maltravieso. Boletim do Centro Português de Geo-História e Pré-História 5 (2). https://www.cpgp.pt/boletim.php.

Conference proceedings:

1. Lattao V., Garcês, S., Gomes H., Henriques, M. H., Marrocchino, E., Rosina, P., Vaccaro, C., 2023. Análise isotópica estável (δ13C) em sedimentos de sítios arqueológicos. In Arqueologia em Portugal, 2023-Estado de Questão. Actas IV Congresso da Associação dos Arqueólogos Portugueses.

Methodological Proposal for Integrating Debris Flow Hazard Index with Environmental Sensitivity index in Pipelines

Vinicius Queiroz Veloso[1*], Fabio Augusto Gomes Vieira Reis[1], Victor Carvalho Cabral[1] and Artur A. Sá[2,3,4]

[(1)]São Paulo State University, Brazil
[(2)]University of Trás-os-Montes e Alto Douro, Vila Real, Portugal
[(3)]UNESCO Chair on Geoparks, Sustainable Regional Development and Healthy Lifestyles
[(4)]Geosciences Center of University of Coimbra
*vinicius.veloso@unesp.br

PROJECT TYPE: PHD in geosciences and environment. This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brazil (CAPES) - visiting PhD Scholarship (CAPES-PrInt - Institutional Program for Internationalization, process number: 88887.899926/2023-00), with the UTAD, Vila Real, Portugal and the UNESCO Chair on Geoparks, Sustainable Regional Development and Healthy Lifestyles.

RESEARCH STUDENT: Vinicius Queiroz Veloso

SUPERVISION: Fabio Augusto Gomes Vieira Reis, São Paulo State University (UNESP) and Artur A. Sá (UTAD).

INSTITUTIONS INVOLVED: UNESP and UTAD.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 3, 10, 11, 13, 15, 17

PROJECT GOALS: This work addresses the development of complementary methodologies in natural disaster management incorporated into the Oil Spill Environmental Sensitivity Index (ESI) for sections of drainage crossings traversed by pipelines. Although many mapping approaches focus on coastal and marine areas, this study highlights the need to enhance methodologies applied to continental sections, which have a high potential for natural disasters associated with geodynamic events. From this, it suggests approaches for advancing the development of oil spill hazard mapping in continental areas, focusing on risk management and the prevention of technological disasters triggered by natural hazards (Natechs).

RESULTS: The results presented reinforce that the state-of-the-art methods and techniques applied to the management of natural and environmental disasters can offer more suitable responses than those observed and recently adopted by managers and policymakers. From an academic and technical standpoint, there exists a solid foundation built over decades, continuously evolving, capable of addressing needs and providing solutions to the challenges at hand. Public governance acceptance is crucial for the success of any policy related to disaster prevention and management, through its role in policy implementation and resource allocation. It is crucial to recognize that investment in prevention is a strategic policy that needs to be incorporated into both public and private agendas worldwide, aiming to protect populations, the environment, and the economy. Preventive measures not only save lives and reduce costs but also promote sustainable and resilient development, preparing nations to face future challenges more effectively.

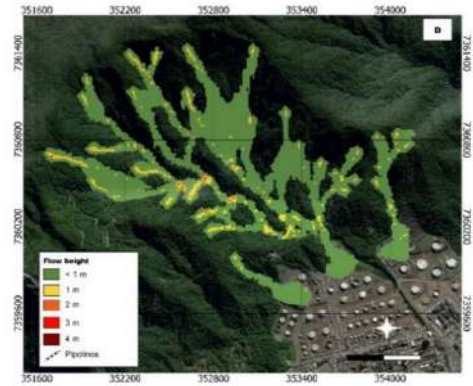

Figure 1 - RAMMS modeling results showing maximum flow height (Cubatão catchment).

Figure 2 - Documentation of erosion caused in the main drainage by the debris flow. A) Record of metric blocks and deposits in the main drainage. B) Documentation of imbrication of large woods and metric blocks deposited in the main drainage after the passage of the debris flow. C) Aerial view of the section crossing the Petrobras pipelines where the construction managed to protect the infrastructures after the passage of the debris flow. To watch the video of the debris flow passing through this section, please access the following link: [https://www.youtube.com/watch?v=w2EuEz2mEeo]

OUTPUTS:

Articles:

1. Veloso, V. Q., Reis, F. A. G. V., Cabral, V. C., do Carmo Giordano, L., Dos Santos, C. V. C., & Kuhn, C. E. S. (2023). Challenges and perspectives in applying the environmental sensitivity index to pipelines: a review on the prevention and management of oil spills disasters. Environmental Monitoring and Assessment, 195(12), 1449. https://doi.org/10.1007/s10661-023-12034-7

2. Veloso, V.Q., Reis, F. A. G. V., Cabral, V. C., Sá, A., Gramani, M., Ribeiro, T.C., Ogura, A. T., Santos, C. V., Mascarenhas, P. V. S., Russo, W., Sanchez, J.P., Kuhn, C. S. Giordano, L. C. (2024) Application of the Debris-flow Hazard Index for pipelines in the context of the hydrogeological disaster of February 2023 in São Sebastião, Serra do Mar, Brazil. Landslides. https://doi.org/10.1007/s10346-024-02319-4

Optimization of archaeological mapping for environmental impact studies using remote sensing in Portugal

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PROJECT TYPE: PhD project.

RESEARCH STUDENT: Vanessa Antunes

SUPERVISION: Telmo Pereira and João Fonte

INSTITUTIONS INVOLVED: Universidade Autónoma de Lisboa (Portugal), Instituto Politécnico de Tomar (Portugal), ERA Arqueologia (Portugal) and Património Cultural I.P. (Portugal).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4 and 9.

PROJECT GOALS: Our research focuses on the limitations of Environmental Impact Assessments (EIAs) in order to present a solution for significantly improving the methods of prior archaeological detection. The objectives are to improve the application of these methodologies to national realities and to generate a good practice guide that adequately integrates remote sensing into EIA contexts, and helps to massify its use in academic and business environments.

RESULTS: The project is in its early stages, but it is hoped to come up with concrete solutions that will effectively contribute to the evolution of archaeological heritage management. It is also hoped that the results of the project will have an effective impact in the short and medium term in an academic environment, both in their practical application and in training programs to obtain degrees or complementary degrees.

Educational programmes and geotourism at the service of the Sustainable Development of the UNESCO World Geopark of Arouca

Alexandra Paz[1,2,*], Artur A. Sá[2,3,4], Daniela Rocha[1,2,4]

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[(2)]UNESCO Chair on "Geoparks, Sustainable Regional Development and Healthy Lifestyles"
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[(4)]Geosciences Center, Coimbra, Portugal
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PROJECT TYPE: PhD in Geology

RESEARCH STUDENT: Alexandra Paz

SUPERVISION: Artur A. Sá and Daniela Rocha

INSTITUTIONS INVOLVED: University of Trás-os-Montes e Alto Douro (Portugal); UNESCO Chair on "Geoparks, Sustainable Regional Development and Healthy Lifestyles"; Geosciences Center (Portugal); Arouca Geopark Association (Portugal).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 1, 4, 5, 8, 11, 12, 17.

PROJECT GOALS: The Arouca UNESCO Global Geopark's non-formal and informal educational programs have become a key supplement to primary and secondary education in Portugal. The growth of tourist infrastructure and visits to Geological Heritage Sites in the area has further enhanced this appeal. This project aims to assess the educational and socio-economic impact of these activities over the past 15 years and evaluate their contribution to the Sustainable Development Goals (SDGs).

RESULTS: This project will be developed involving the local and visiting school community and the entire value chain directly associated with tourism in the territory, seeking to obtain indicators and values that allow showing the real socio-economic impact of geo-educational and geotouristic activities.

OUTPUTS:

Communications:

1. Paz, A., Bastos, S. Rocha, D., Caseiro, J., Duarte, A., Belém, M. & Sá, A.A. (2023). "Diary of Nature" – Protection and popularization of Freita Mountain in Arouca UNESCO Global Geopark (Portugal). Abstracts Book of the 10th International Conference on UNESCO Global Geoparks. M'Goun UNESCO Global Geopark, Marrakech, 322.

2. Paz, A., Rocha, D., Bastos, S., Oliveira, D., Bernardo, V., Belém, M. & Sá, A.A. (2023). "Paiva Walkways" and "516 Arouca" Bridge – equipments for the environmental education in the Arouca UNESCO Global Geopark (Portugal). Abstracts Book of the 10th International Conference on UNESCO Global Geoparks. M'Goun UNESCO Global Geopark, Marrakech, 321.

Pindorama: the processes of reparation, preservation and integration of indigenous cultural heritage resulting from illicit trade

Carla Mabel Santos Paula[1*]

[(1)]Universidade Autónoma de Lisboa, Instituto Politécnico de Tomar, Centro de Geociências, Portugal

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PROJECT TYPE: PhD in Heritage, Technology and Territory (DPTT).

RESEARCH STUDENT: Carla Mabel Santos Paula

SUPERVISION: Luiz Oosterbeek

INSTITUTIONS INVOLVED: Autonomous University of Lisbon and the Polytechnic Institute of Tomar.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 11 and 16.

PROJECT GOALS: To study the specificities of an ethnographic and archaeological collection resulting from illicit trade and trafficking, from its seizure to its final destination; to analyze the regulatory gaps that hinder their return to society, the processes of safekeeping and forwarding these collections after they are seized, proposing guidelines that optimize their destination in favor of the preservation and dissemination of indigenous cultural heritage; to analyze the museological strategies to treat a decontextualized collection, proposing a new format for indigenous culture museums, valuing its scientific and the humanistic dimensions.

RESULTS: This research is expected to return to the public sphere a collection that had its origins and context damaged by the actions of third parties and to prevent other cultural assets from being "forgotten" in some deposit. It will expand research on materials produced by Brazilian indigenous people, strengthening the need to bring to light part of an indigenous past that is still little known by society. It will propose a global framework to address similar contexts.

Fig 1. Part of the collection seized by the Brazilian Federal Police in 2004, donated to the Memorial of Indigenous Peoples in Brasília, in 2021.

OUTPUTS:

Conference proceedings:

1. Paula, C.M.S, Oosterbeek, L., 2024. Pindorama: a constituição de acervos a partir de artefatos frutos do tráfico ilícito. Atas do Congresso Internacional de Patrimônio Cultural e Sustentabilidade, Pelotas, Brazil (in press).

Researching the spread of the earliest depictions of Palaeolithic Rock Art in the Southwest of the Iberian Peninsula

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PROJECT TYPE: PhD in Archaeology, Material Culture and Human Behaviour.

RESEARCH STUDENT: Dionysios Danelatos

SUPERVISION: Sara Garcês and Hipólito Collado Giraldo.

INSTITUTIONS INVOLVED: Departamento de História, Artes e Humanidades, Universidade Autónoma de Lisboa, Instituto Politécnico de Tomar, Centro de Geociências, Universidade de Coimbra, Instituto Terra e Memória, Portugal.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4, 8 and 11.

PROJECT GOALS: (i) investigate the chronological development of Palaeolithic rock art traditions in the southwestern Iberian Peninsula between Tagus and Guadiana and assessing relationships and connections with other major rock art peninsular clusters; (ii) provide up-to-date 2D and 3D rock art documentation; (iii) comprehensive review of the Palaeolithic rock art in the southwest of Iberian Peninsula; (iv) examine rock art sites in terms of site use, thematic elements, techniques employed and chronological considerations; (v) analyze spatial distribution.

RESULTS: The current research stills at its initial stage including bibliographic revision, digital documentation and fieldwork. In 2024, another panel with a pecked zoomorphic figure was uncovered through systematic excavation of colluvial deposits at the Ocreza river, increasing the number of Palaeolithic panels at the sites to four while highlighting the importance of the site for SW Iberia and the role of Tagus.

OUTPUTS:

Articles:

1. Pereira, T., Garcês, S., Danelatos, D., Giraldo Collado, H., Nash, G. H., Adewumi, O., Gomes, H., Monteiro, P., and Oosterbeek, L. . (Submitted) “New Upper Palaeolithic rock art complex in the Tejo Valley, Central Portugal.” Power, Robert C., and Frank L’Engle Williams. “Evidence of increasing intensity of food processing during the Upper Paleolithic of Western Eurasia.” Journal of Paleolithic Archaeology https://doi.org/10.21203/rs.3.rs-4542408/v1

Taphonomic Variability in Faunal Remains at the Sítio Acampamento Rua do Papagaio– SARP

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[(1)]University of Southern Santa Catarina - UNESC, Criciúma, Brazil

[(2)]University of Southern Santa Catarina, Criciúma, Brazil, Earth and Memory Institute, Geosciences Center of University of Coimbra, Portugal.

[(3)]Federal University of Sergipe – UFS, Brazil.

[(4)]Earth and Memory Institute, Polytechnic Institute of Tomar, Geosciences Center of University of Coimbra, Portugal

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PROJECT TYPE: PhD in Environmental Sciences

RESEARCH STUDENT: Diego Dias Pavei

SUPERVISION: Juliano Bitencourt Campos (UNESC) and Alberico N. de Queiroz (UFS)

INSTITUTIONS INVOLVED: University of Southern Santa Catarina (UNESC) (Brazil) and, Earth and Memory Institute, Polytechnic Institute of Tomar – IPT (Portugal).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 10, 15, 16.

PROJECT GOALS: to analyze and describe the taphonomic processes in the faunal remains at the Acampamento Rua do Papagaio Site – SARP, in order to provide new interpretative foundations on cultural aspects and their depositional process.

RESULTS: This research is expected to return to the public sphere a collection that had its origins and context damaged by the actions of third parties and to prevent other cultural assets from being “forgotten” in some deposit. It will expand research on materials produced by Brazilian indigenous people, strengthening the need to bring to light part of an indigenous past that is still little known by society. It will propose a global framework to address similar contexts.

Fig. 1: Microtrace Analysis in a Zooarchaeological Sample.

Fig. 2: Sample distributed on the bench for zooarchaeological and taphonomic studies.

Theories of shamanism and heritage: an interdisciplinary comparative approach with Mongolian ethnography

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[(2)]Universidad de Extremadura, Cáceres, Spain
*rmalim01@gmail.com

PROJECT TYPE: PhD in (Cultural) Heritage

RESEARCH STUDENT: Rufus Malim

SUPERVISION: Luiz Oosterbeek and George Nash

INSTITUTIONS INVOLVED: University of Extremadura with the Universities of Cordoba, Huelva and Jaen. ITM Instituto Terra e Memória, Mação , Portugal. IPT Polytechnic Institute of Tomar, Tomar, Portugal.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4, 11 and 17.

PROJECT GOALS: To make a process of comparative analysis between ethnography and archaeological findings to identify shamanism. Clarify the meaning of the terms shaman and shamanism. To better clarify how and why shamanism is a global phenomenon as well as one of the oldest human practices. With these goals achieved the discipline of archaeology can improve the context and data of certain sites rather than simply referring to them as ritual.

RESULTS: The research managed to produce two scientific models and a scientific metamodel detailing the process to identify shamanism in archaeological contexts anywhere in the world. The research clarified the meaning behind the terms shaman and shamanism via a dialectical process. I also elucidated the global spread of shamanism and presented three theories based on cross disciplinary evidence for this.

Fig 1. Images from my Research in Mongolia for my PhD.

OUTPUTS: Paper | Book chaper | Book | Book review

1. Malim, R., 2023. A Shamanic and Totemic analysis on a 12000-Year-Old Shaman Burial from the Southern Levant (Israel). Antrope (16): pp 51-61.
2. Malim, R., Forthcoming. The Jaw Harp, Auditory driving, European folklore and Mongolian Shamanism.
3. Malim, R., 2024. Is there Shamanism occurring within the ritual of neolithic monuments? A Welsh perspective. Antrope monographs, No. 4.
4. Malim, R., Forthcoming. Book review for Mongolian Shamanism (Sixth Edition) (Volume 1 & 2).

Teaching sciences throughout basic education: sustainable development and practical activities about soils

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[(1)]Geosciences Center, Department of Earth Sciences, University of Coimbra, Coimbra, Portugal

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PROJECT TYPE: PhD in education. FCT - SFRH/BD/132272/2017.

RESEARCH STUDENT: Patrícia João

SUPERVISION: Ana V. Rodrigues, & Maria Helena Henriques (CGeo- UC)

INSTITUTIONS INVOLVED: University of Aveiro (Portugal), University of Coimbra (Portugal), Group of schools Marquês de Marialva (Portugal), FCT.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 10, 15, 16.

PROJECT GOALS: The present investigation is focused on "soils" as a geosciences issue that provides close links with the 2030 Agenda. Through it, it was intended to create the conditions for the co-construction of an integrated set of activities and respective didactic resources with a progressive, systematic, and sequential vision on the theme "soils", to be implemented in the disciplines of Environmental Studies and Natural Sciences of Basic Education.

RESULTS: In this investigation, the problem was contextualized, research questions were defined, and tasks were organized according to the Educational Design Research approach. A proposal to reorganize Essential Learning documents for Portuguese Basic Education emerged after analyzing: 1) the concept of Sustainable Development (SD) in curricular and reference documents from the 1st to 3rd cycles, focusing on the theme of "soils"; 2) teachers' perceptions of these documents and their practices. The proposal includes didactic resources on "soils" aligned with SD concerns, developed and validated through a workshop to support experimental science teaching for all nine years of schooling.

OUTPUTS:

Article/ Book chapter:

1. João, P.; Henriques, M.H.; Rodrigues, A.V.; Sá, P. (2023). In-Service Teacher Education Program through an Educational Design Research Approach in the Framework of the 2030 Agenda. Education Sciences, 13, 584. https://doi.org/10.3390/educsci 13060584

2. João, P., Henriques, M. H., & Rodrigues, A. V. (2022). Sustainable Development and Soils in the Portuguese Education System: Open Problems and Further Challenges. Education Sciences, 12 (10), 672. https://doi.org/10.3390/educsci12100672

3. João, P., Sá, P., Henriques, M.H., & Rodrigues, A. V. (2022). Sustainable Development in Basic Education Sciences in Portugal— Perspective of Official Curriculum Documents. Sustainability, 14 (9), 5651. http://dx.doi.org/10.3390/su14095651

4. João, P., Rodrigues, A. V., & Henriques, M. (2021). Ensino de Geociências e desenvolvimento sustentável: concepção e validação de questionários. Práxis Educacional, 17 (48). https://doi.org/10.22481/praxisedu.v17i48.8810

5. Sá, P., João, P., & Rodrigues, A. V. (2020). Sustainable Development in Primary Education – A Perspective from Official Portuguese Guiding Documents. In Costa et al. (Eds.), Advances in Intelligent Systems and Computing, 262-273. Suisse: Springer International Publishing.

Communications:

1. João, P., Henriques, M. H., & Rodrigues, A. V. (Out 2022). Objetivos de Desenvolvimento Sustentável e Solos no Sistema Educativo Português: dificuldades, desafios e propostas. XXIII Encontro da REALP. Instituto Politécnico de Tomar (Tomar, Portugal).

2. João, P., Rodrigues, A. V., & Henriques, M. H. (Set 2021). Desenvolvimento Sustentável e Solos: Um Programa de Formação Contínua para Professores do Ensino Básico. XI Congreso Internacional sobre Investigación en la Didáctica de las Ciencias. Universidade de Lisboa (Lisboa/Online, Portugal).

3. João, P., Sá, P., Rodrigues, A. V., & Henriques, M. H. (Nov 2020). Desenvolvimento Sustentável nos 2o e 3o CEB – perspetiva dos documentos educativos oficiais portugueses. VII Seminario Iberoamericano CTS (VII SIACTS) (Valencia/Online, Espanha).

4. Sá, P., João, P., & Rodrigues, A. V. (Jul 2019). Desenvolvimento Sustentável no 1.º CEB – perspetiva dos documentos educativos oficiais portugueses. 8.º Congresso Ibero-Americano em Investigação Qualitativa. Escola Superior de Enfermagem de Lisboa (Lisboa, Portugal).

5. João, P., Rodrigues, A. V., & Henriques, M. H. (Jun 2019). Ensinar Ciências ao longo do Ensino Básico: Desenvolvimento Sustentável e Atividades Práticas sobre Solos. Jornadas do LEDUC. CIDTFF - Universidade de Aveiro (Aveiro, Portugal).

Territory(s) and settlements in Last Glacial Maximum in Ocidental coastal Iberian Peninsula: a tecno-functional approach of lithic industry

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[(2)]Instituto Politécnico de Tomar e Instituto Terra e Memória, Mação, Portugal
[(3)]Centro de Geociências
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PROJECT TYPE: Research Project, PhD in Património, Tecnologias e Território.

RESEARCH STUDENT: Pedro Peça

SUPERVISION: Telmo Pereira, Marina Igreja

INSTITUTIONS INVOLVED: Instituto Politécnico de Tomar, Universidade Autónoma de Lisboa, Laboratório de Arqueociências (Portugal)

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4.

PROJECT GOALS: Lithic tools are the main archaeological trace of human artefact production during the Palaeolithic period and, under ideal conditions of conservation, they represent the most reliable testimony of the gestures and activities of that period. Trace analysis is a method that, through macro and microscopic observation of the marks left on the edges of stone tools as a result of contact with different materials, approaches their functionality and use. In this research project, we intend to apply the method of traceology to Last Glacial Maximum flint assemblages from the central coast of Portugal in order to reconstruct the range of activities developed by hunter-gatherer communities, and from this to infer resource management strategies and occupation dynamics.

UNESCO Global Geoparks development in the Middle East

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[(2)]UNESCO Chair on "Geoparks, Sustainable Regional Development and Healthy Lifestyles"
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[(4)]Department of Geography, University of the Aegean, Greece
[(5)]UNESCO Chair on "Geoparks and the Sustainable Development of Insular and Coastal Areas"
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PROJECT TYPE: PhD in Geology

RESEARCH STUDENT: Alireza Amrikazemi

SUPERVISION: Artur A. Sá and Nickolas Zouros

INSTITUTIONS INVOLVED: University of Trás-os-Montes e Alto Douro (Portugal); UNESCO Chair on "Geoparks, Sustainable Regional Development and Healthy Lifestyles"; Geosciences Center (Portugal); University of the Aegean (Greece); UNESCO Chair on "Geoparks and the Sustainable Development of Insular and Coastal Areas".

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 13, 14, 15

PROJECT GOALS: Since the establishment of the Global Geoparks Network in 2004, this initiative has rapidly gained popularity, particularly in Europe and Eastern Asia. Despite the high geodiversity, rich culture, and considerable biodiversity in the Middle East, the development of geoparks in this region has been insignificant. This PhD research will analyze the current situation in the region as a whole to discuss the main factors contributing to the lack of geoparks. It will then focus on selected countries as case studies to conduct practical investigations and examine the strategies that can be implemented in the development of geoparks. The research will also study the obstacles and challenges along this path and attempt to offer some potential solutions.

RESULTS: The main work will involve analyzing existing documents and evidence, as well as conducting interviews with key individuals in each selected country. The outcomes of this phase will inform the subsequent stages of the research, which aim to explore the potentials and possibilities for further action.

OUTPUTS:

Communications

1. Torabi Farsani, Neda & Coelho, Celeste & Costa, Carlos & Amrikazemi, Alireza. (2014). Geo-knowledge Management and Geoconservation via Geoparks and Geotourism. Geoheritage. 6. 10.1007/s12371-014-0099-7

2. Sheibani, Vesal & Zamanian, Ehsan & Amrikazemi, Alireza. (2018). Introducing the potentials of Tabas Aspiring Geopark.

The contribution of trace elements in the etiopathological study of cribral alterations in human bone remains in Portugal

Ricardo A. Melo Pessoa Gomes[1*], Ana Luísa Santos[1] and Lídia Catarino[2]

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[(2)]University of Coimbra, Geosciences Center, Department of Earth Sciences, Coimbra, Portugal

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PROJECT TYPE: PhD in Anthropology, area of specialization Biological Anthropology, FCT SFRH/BD/145343/2019

RESEARCH STUDENT: Ricardo Filipe Afonso de Melo Pessoa Gomes

SUPERVISION: Ana Luísa Santos and Lídia Catarino

INSTITUTIONS INVOLVED: FCT Portugal; University of Coimbra (Portugal)

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 3 and 4.

PROJECT GOALS: Physiological stress indicators in bone tissue, such as cribra orbitalia, can arise from harmful factors to human life. This investigation aims to evaluate trace elements in human remains using X-ray fluorescence (pXRF) to study the etiology of porosity. The study includes individuals with known sex, age, and cause of death from the Identified Skeletal Collections at the University of Coimbra, the Luís Lopes Collection, and archaeological skeletons from Convento de S. Domingo in Lisbon.

RESULTS: Bone elemental composition as a proxy for the study of diseases in the past demonstrated to have great potential and can effectively help to deepen the knowledge on the physiological mechanisms behind conditions such as anemia and cribra cranii.

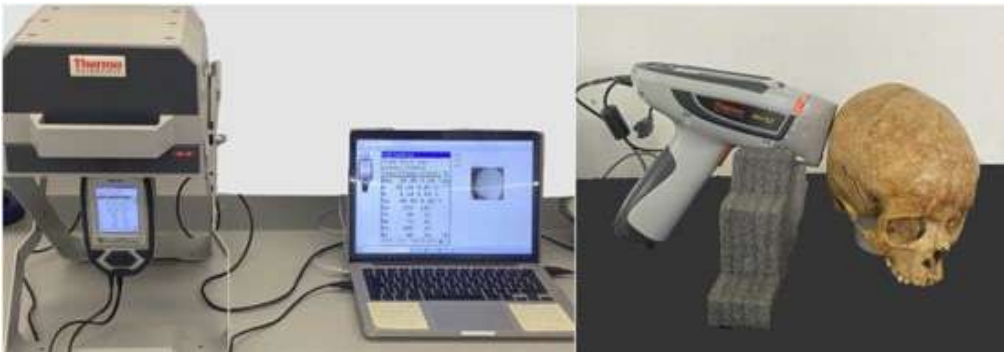

Fig. 1. Portable X-ray fluorescence device (pXRF) in the fixed support with a protective box (left) and a human cranium being measured with the help of a foam object (right) (In Gomes et al., 2024).

OUTPUTS:

Articles:

1. Gomes, R.A.M.P, Santos, A.L., & Catarino, L. (2024). Elemental analysis using portable X-ray fluorescence: Guidelines for the study of dry human bone. International Journal of Paleopathology, 44: 85-89. https://doi.org/10.1016/j.ijpp.2023.12.004

2. Gomes, R.A.M.P, Santos, A.L., & Catarino, L. (2024). Using portable X-ray fluorescence elemental analysis to explore porous skeletal lesions: Interplay of sex, age at death, and cause of death. Am J Biol Anthropol. e24954. https://doi.org/10.1002/ajpa.24954

The development of regional tourism by local stakeholders: UNESCO Global Geopark Caminhos dos Cânions do Sul

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[(1)]University of Southern Santa Catarina, Criciúma, Brazil

[(2)]Federal University of Delta do Parnaíba, Parnaíba, Piauí, Brazil

[(3)]University of Trás-os-Montes e Alto Douro, Vila Real, Portugal and UNESCO Chair on Geoparks, Sustainable Regional Development and Healthy Lifestyles, Department of Geology, Geosciences Center of University of Coimbra

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PROJECT TYPE: PhD in Environmental Sciences. This study was financed in part by the Fundação de Amparo à Pesquisa e Inovação do Estado de Santa Catarina (FAPESC) for the PhD Scholarship in Brazil (CP48/2021). Also, this study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brazil (CAPES) - Finance Code 001, through a visiting PhD Scholarship (PDSE - Programa de Doutorado Sanduíche no Exterior, process number: 88881.933852/2024-01), with the University of Trás-os-Montes e Alto Douro, Vila Real, Portugal and the UNESCO Chair on Geoparks, Sustainable Regional Development and Healthy Lifestyles.

RESEARCH STUDENT: José Gustavo Santos da Silva.

SUPERVISION: Álvaro José Back (UNESC), Ricardo Fonseca Filho (UFDpar) and Artur A. Sá (UTAD).

INSTITUTIONS INVOLVED: University of Southern Santa Catarina (UNESC) (Brazil) and University of Trás-os-Montes e Alto Douro (Portugal).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 8, 11.

PROJECT GOALS: New tourist destinations and regions are emerging in Brazil as a result of the designation and consolidation of UNESCO Global Geoparks (UGGp). These territories hold significant value for the expansion of regional tourism routes. The aim of this project is to analyze the regional tourism development within the territory of the UNESCO Global Geopark Caminhos dos Cânions do Sul (CCSUGGp), located between the states of Santa Catarina and Rio Grande do Sul, focusing specifically on local visitors, particularly the group of tourists/visitors.

RESULTS: The findings suggest that the majority of tourists originate from the states of Santa Catarina and Rio Grande do Sul (96.21%). Additionally, 73.58% of the surveyed individuals opted to stay in the municipality of Praia Grande, with a clear inclination towards an average stay of 2 nights. The type of lodging preferred by the respondents was predominantly Inns (30.18%) and chalets (22.64%). The age group that showed the highest demand for the area was 30-49 years old (60.40%), with a majority of female visitors (60.37%).

Fig 1. Conducting interviews with tourists/visitors. a) Geosite Canyons Malacara, b) Geosite Rio do Boi. (from Silva et al., 2024).

OUTPUTS:

Articles:

1. Silva, J. G. S., Fonseca Filho, R. E., Nascimento, M. A. L., Campos, J. B., Ladwig, N. I., & Back, Á. J. (2024). Geoparques Mundiais da UNESCO no Brasil: Novas Formas De Gestão Integrada dos Territórios. Caminhos De Geografia, 25 (100), https://doi.org/10.14393/RCG2510070678.

The Ornithopods of the Lower Cretaceous of Portugal: Localities, Diversity and its Iberian and European context

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PROJECT TYPE: Postdoc Research Project

PRINCIPAL INVESTIGATOR: Silvério Domingues Figueiredo

SUPERVISION: Ismar Souza Carvalho and Pedro Proença Cunha

TEAM: Silvério Domingues Figueiredo; Ismar Souza Carvalho; Pedro Proença Cunha

INSTITUTIONS INVOLVED: Centro de Geociências, Portugal; Instituto Politécnico de Tomar; Centro Português de Geo-História e Pré-História.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4- Provide Quality Education; 13 – Climate Action; 15 – Live on Land.

PROJECT GOALS: Ornithopod remains from Papo Seco Formation are identified since the XIX century. Three teeth, three vertebrae and a fragment of femur, were attributed to Iguanodon mantelli by Lapparent and Zbyszewski (1957) and later assigned to *Iguanodon cf. atherfieldensis* by Crespo (2001) and to Iguanodon sp. by Antunes and Mateus (2003). These authors also mentioned one tooth and one deformed vertebral centrum kept in the collection of M.T. Antunes, which they attributed to *Iguanodon sp.*.

RESULTS: The Ornithopod remains of this project are from the Papo-Seco Formation. This geological formation is attributing to Lower Barremian and the sedimentary record, consisting in limestones, marls, sands and conglomerates, which yielded fossil remains of dinosaurs and other vertebrates. The material is constituted by a set of bones, teeth and footprints. The old material, studied by Lapparent and Zbyzsewski (1957) were restudied (Figueiredo et al., 2022b) and the taxonomy was actualized.

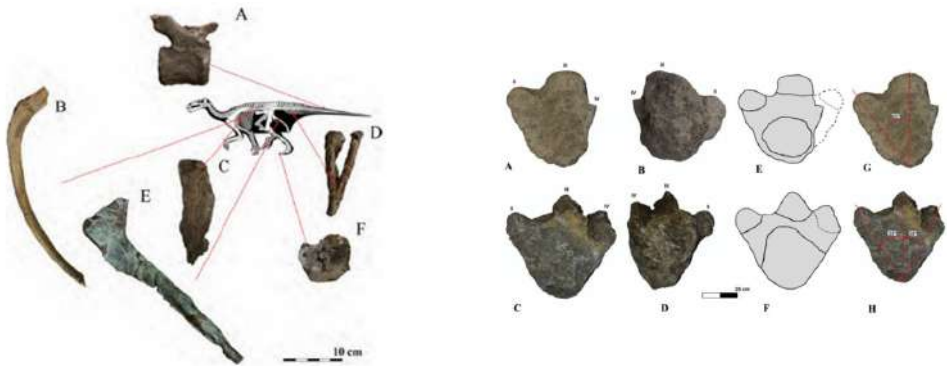

Fig 1. Partial skeleton CPGP.02.07.1 provisionally referred to Ornithopoda indet. Representation of some of the material already restored. (from Figueiredo et al., 2022b). Fig. 2 - Photographs of natural casts of Ornithopod tracks: CPGP.1.19.6 (A and B) and CPGP.1.19.14 (C and D): A and C, top view; B and D, base view. Scale: 20 cm.

OUTPUTS:

Articles:

1. Figueiredo, SD; Rosina, P; Figuti, L. 2015. Dinosaurs and other vertebrates from the Papo-Seco Formation (Lower Cretaceous) of southern Portugal. Journal of Iberian Geology 41(3):301-314 Doi: https://doi.org/10.5209/rev_JIGE.2015.v41.n3.47828

2. Figueiredo, SD; Dinis, P.; Rosina, P.; Belo, J; Strantzali, I. 2017. A new record of a possible ornithopod footprint from the Lower Cretaceous of Cabo Espichel (Sesimbra, Portugal). Bollettino della Società Paleontologica Italiana, 56 (2), 2017, 217-231.

3. Figueiredo, SD, Carvalho, CN, Cunha, PP. And Sousa Carvalho, I. 2021. New Dinosaur Tracks from the Lower Barremian of Portugal (Areia do Mastro Formation, Cape Espichel). Journal of Geoscience and Environment Protection, 9, 84-96. https://doi.org/10.4236/gep.2021.91007

4. Figueiredo, S. D., Carvalho, I. S., Pereda-Suberbiola, X., Cunha, P. P., Antunes, V., Diaz-Martínez, I. 2022a. New ornithopod footprints from the Areia do Mastro Formation (Lower Cretaceous), Espichel Cape (Portugal, Western Iberia) and their context in the Iberian ichnological ornithopod record, Cretaceous Research, 131, p. 105069, https://doi.org/10.1016/j.cretres.2021.105069.

5. Figueiredo, S.D., Souza Carvalho, I., Pereda-Suberbiola, X., Cunha, P.P., Strantzali, I.B., Antunes, V. 2022b. Ornithopod dinosaur remains from the Papo Seco Formation (lower Barremian, Lusitanian Basin, Portugal): a review of old and new finds, Historical Biology. DOI:10.1080/08912963.2022.2138372

Research in Geoscience Education and the promotion of the Sustainable Development Goals of the 2030 Agenda in initial teacher education

Patrícia João[1*]

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*pat.joao@uc.pt

PROJECT TYPE: Pos-Doc in Geoeducation. UC - IT137-23-155.

RESEARCH STUDENT: Patrícia João

SUPERVISION: Maria Helena Henriques (CGeo- UC).

INSTITUTIONS INVOLVED: University of Coimbra (Portugal), FCT.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4 and 17.

PROJECT GOALS: Research in Geoscience Education to assess whether initial teacher education is geared towards promoting the Sustainable Development Goals of the 2030 Agenda. Promotion of synergies between research and education in geosciences, both in formal and non-formal and informal education contexts, from the perspective of education for Sustainable Development, through the establishment of networks.

RESULTS: A study was carried out with the aim of identifying and characterising the Curricular Units (CU) directly related to sustainable development in the teacher training courses offered by Portuguese Public Universities in the Master's Degree in Biology and Geology Teaching for the 3rd cycle of Basic Education and Secondary Education (MDBTG3S). The results show that only one CU was identified with the term 'sustainability'. On the other hand, seven CUs include references to sustainability or sustainable development in their programmes. Thus, this study has shown that in Portugal, at the level of initial teacher training in MDBGT3S, the links present in the CUs and their programmes between sustainable development and the specific content of the subject, in this case Biology and Geology, are still very limited. Several communications were presented at scientific events and science communication actions regarding other complementary issues.

OUTPUTS:

Article:

1. João, P.; Henriques, M. H.; Sá, P. (Set, 2023). "Educação em Geociências e Agenda 2030", Boletim da AIA-CTS/Boletín de la AIA-CTS, nº 19, pp. 34-39. ISSN: 2183-5098. https://aia-cts.web.ua.pt/wp-content/uploads/2023/09/Boletim_AIA_CTS_n19.pdf

Communications:

1. João, P., Sá, P. & Costa, A. P. (Jul, 2024). Educação para Sustentabilidade nos Seminários CTS: mapeamento bibliográfico. IX Seminário Ibero-Americano CTS | XIII Seminário CTS. Universidade de Aveiro (Aveiro, Portugal).

2. João, P., Sá, P. & Henriques, M. H. (Jan, 2024). Education for Sustainability in Portuguese Master's Degree in Teaching Biology and Geology. 8th World Conference on Qualitative Research. University of Açores (S. Miguel, Açores, Portugal).

3. João, P; Henriques, M. H. & Custódio, S. C. (Set, 2023). Educational Resources within the Atlantic Geopark Project (Portugal). In 10th International Conference on UNESCO Global Geoparks 2023 (Marrakech, Morocco).

4. Garcia, L. F., João, P., Custódio, S. C., Garcia, G. G. & Henriques, M. H. (Set, 2023). Geocaching as a geotourism tool to promote Ançã village (Atlantic Geopark Project, Portugal). In 10th International Conference on UNESCO Global Geoparks 2023 (Marrakech, Morocco).

5. Garcia, L. F., Garcia, G. G., Custódio, S. C., Henriques, M. H. & João, P. (Set, 2023). Earthcaches in the territory of the Atlantic Geopark Project (Portugal). In 10th International Conference on UNESCO Global Geoparks 2023 (Marrakech, Morocco).

6. Garcia, L. F., João, P., Custódio, S. C., Garcia, G. G. & Henriques, M. H. (Jul, 2023). Valorização do património através do Geocaching: o caso de Ançã. In XI Congresso Nacional de Geologia: Geociências e Desafios Globais. Departamento de Ciências da Terra da Universidade de Coimbra (Coimbra, Portugal).

7. João, P., Henriques, M. H. & Rodrigues, A. V. (Jul, 2023). Ensinar geociências numa perspetiva de Desenvolvimento Sustentável ao longo do Ensino Básico. In XI Congresso Nacional de Geologia: Geociências e Desafios Globais. Departamento de Ciências da Terra da Universidade de Coimbra (Coimbra, Portugal).

Theory 5. G-A: A Systemic Approach to UNESCO World Geoparks

Georgios Dimitriadis, Ph.D[1,2,3*]

[(1)]CGeo/UTAD, Vila Real, Portugal

[(2)]UNESCO Chair on "Geoparks, Sustainable Regional Development and Healthy Lifestyles"

[(3)]UNESCO Chair on "Anthropology of Health. Biosphere and Healing Systems"/UNIGE

*gdimitriadis@autonoma.pt

PROJECT TYPE: Post Doctoral Research Project

RESEARCH STUDENT: Georgios Dimitriadis

SUPERVISION: Prof. dr. Artur Sá/UTAD, PT and Prof. dr. Antonio Guerci/UNIGE, IT

INSTITUTIONS INVOLVED: Department of Geology/UNESCO Chair-UTAD (Portugal) and Department of UNESCO Chair-UNIGE (Italy).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4.

PROJECT GOALS: This enquiry aims to align some segments of scientific research in a theoretical framework along the following lines: archaeology-agriculture-anthropology-architecture-astronomy, with the intention of systematising, expanding and revitalising the Unesco-UGGp world geopark concept by adding the aesthetic dimension [Homo aestheticus], in other words, geopoetics.

RESULTS: This interdisciplinary approach contributes to a comprehensive understanding of the complex interactions between human beings, health and the environment, enabling the formulation of innovative and sustainable approaches.

OUTPUTS:

Communications

1. Ajayebi, Kimiya & Amrikazemi, Alireza. (2023). Geotourism in Iran. 10.1007/978-3-031-24170-3_6

Torabi Farsani, Neda & Coelho, Celeste & Costa, Carlos & Amrikazemi, Alireza. (2014). Geo-knowledge Management and Geoconservation via Geoparks and Geotourism. Geoheritage. 6. 10.1007/s12371-014-0099-7

2. Sheibani, Vesal & Zamanian, Ehsan & Amrikazemi, Alireza. (2018). Introducing the potentials of Tabas Aspiring Geopark.

The Cross-Border Connections Between Galicia and Portugal During the Recent Prehistory Through the Lithic Industry

Diego Herrero-Alonso[1,2]

[(1)]Departamento de Historia, Arte e Xeografía. Universidade de Vigo. Campus Universitario As Lagoas s/n. 32004, Ourense (Spain). Grupo de Estudos de Arqueoloxía, Antigüidade e Territorio (GEAAT).

[(2)]Departamento de Geologia. Centro de Geociências. Universidade de Trás-os-Montes e Alto Douro. Quinta de Prados. 5000-801, Vila Real (Portugal)

*diego.herrero.alonso@uvigo.es

PROJECT TYPE: PostDoc Research Project (ED481B-2023-022).

RESEARCH STUDENT: Diego Herrero-Alonso

SUPERVISION: Beatriz Comendador-Rey

INSTITUTIONS INVOLVED: Universidade de Vigo (Spain) and Universidade de Trás-os-Montes e Alto Douro (Portugal)

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4 and 5.

PROJECT GOALS: The main objective of the project is to study the commercial and exchange connections between Galicia and Portugal during recent prehistory through the lithic industry. This includes bibliographic review, geological characterization of raw materials, and analysis of archaeological materials to understand the economic and social relationships of prehistoric groups.

RESULTS: It is a project that began in January 2024, so the results are still partial. However, through the study of some archaeological materials held in the museums of Ourense and Chaves, it seems that the mobility of human groups exceeded the local range, with raw materials coming from long distances. Additionally, a particular use of certain raw materials has been identified, which may respond to both cultural and technical factors.

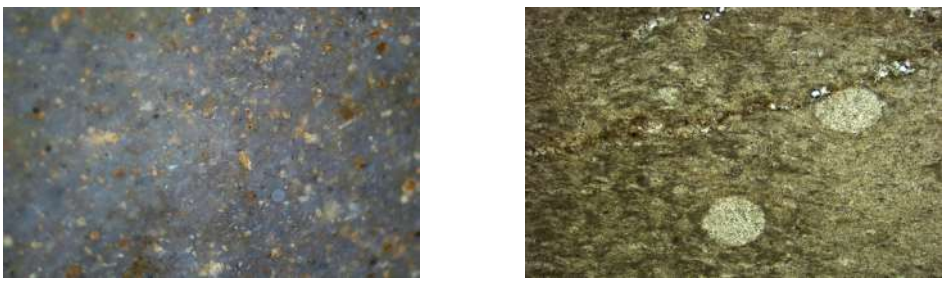
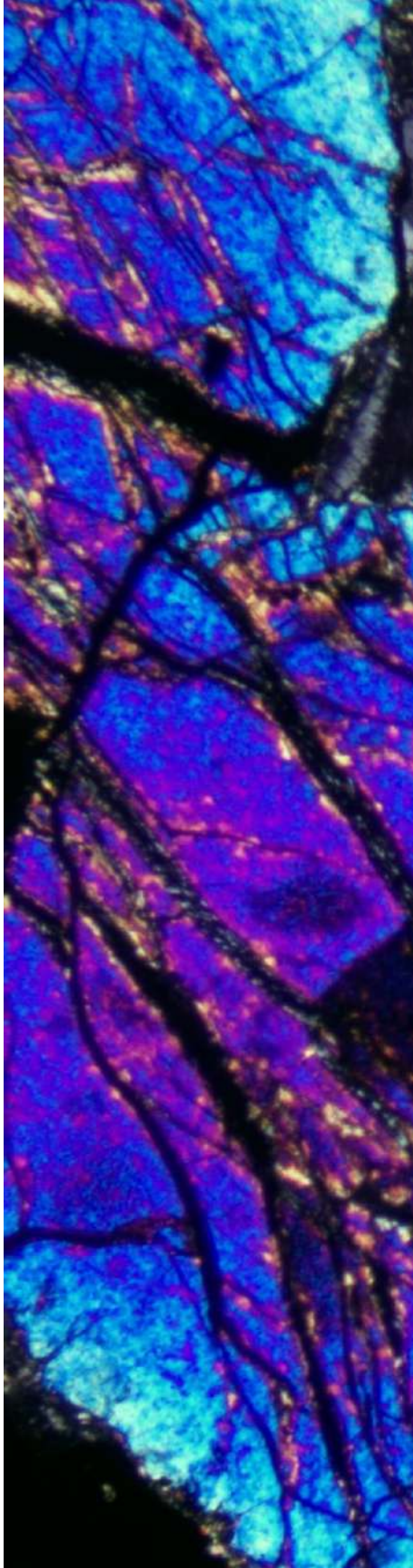


Fig 1. Left: Flint from Pastoria in a stereomicroscope photography. Right: Two radiolarian ghost in thin section (ppl).

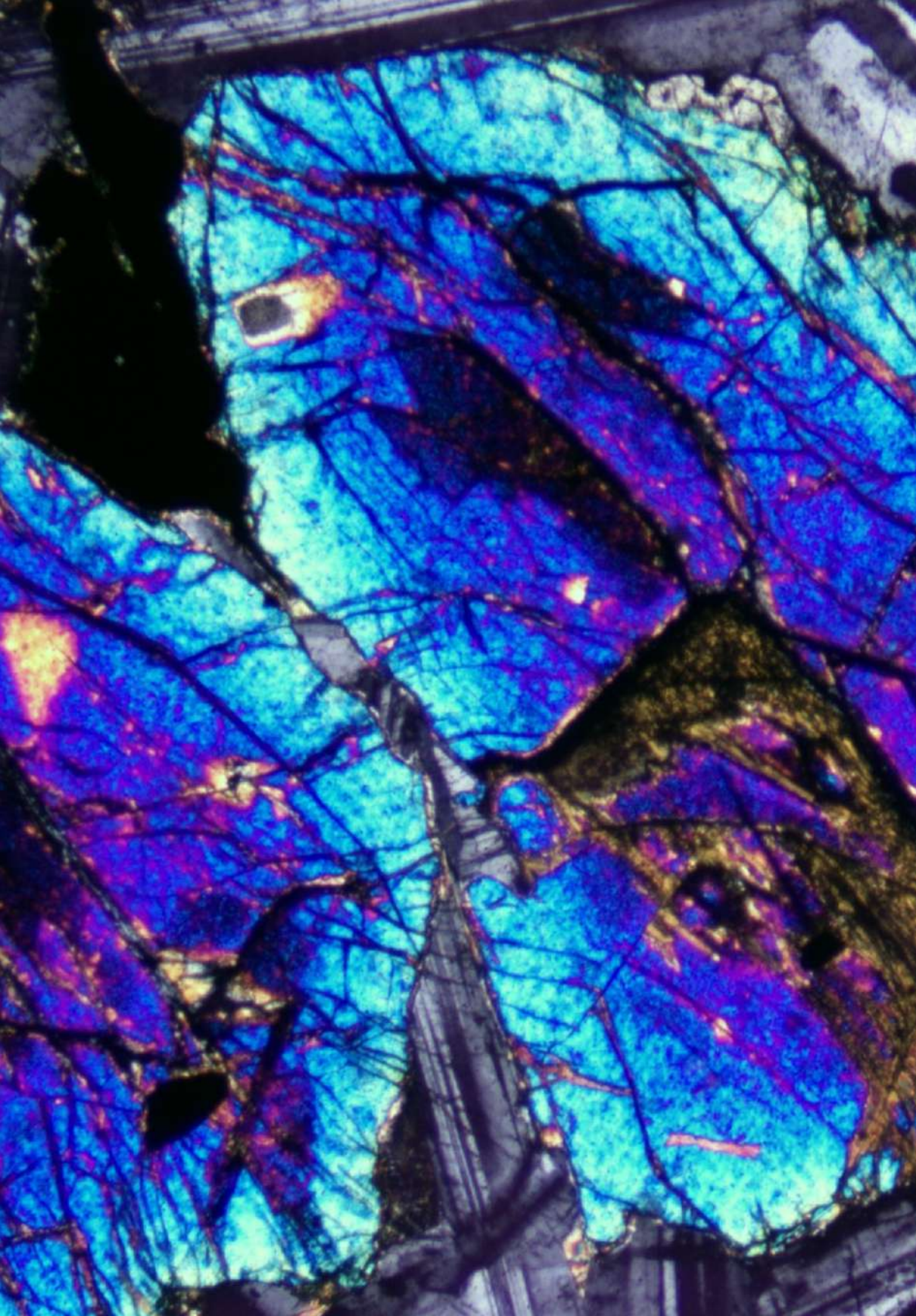
OUTPUTS:

Communications:

Lucía Rodríguez-Álvarez, Diego Herrero-Alonso, Beatriz P. Comendador-Rey. Trazando rutas, abriendo caminos: Áreas de aprovisionamiento y uso de rocas silíceas en la Prehistoria reciente del valle del Támega. VII Congreso de Neolítico Peninsular. Sept-2024. Alcalá de Henares, Madrid.



Specialized services
Outreach projects
Academic events
Master programmes
PhD programme



Palynological analyses and processing

Gustavo Gonçalves Garcia[1,2,*], Inês Sofia Morais Ruas[1,2],
Daniela de Vasconcelos Martins Manso Bento[1,2] and Luísa Rocha Begalli [3]

[(1)]University of Coimbra, Geosciences Center, Department of Earth Sciences, Coimbra, Portugal

[(2)]University of Coimbra, Laboratory of Sedimentary Geology and Fossil Record, Department of Earth Sciences, Coimbra, Portugal

[(3)]Federal University of Sergipe (UFS), Progeology Laboratory, Aracaju, Sergipe, Brazil

* gustavogarcia@dct.uc.pt

PROJECT TYPE: Specialised services

PRINCIPAL INVESTIGATOR: Gustavo Gonçalves Garcia

TEAM: Gustavo Gonçalves Garcia, Inês Sofia Morais Ruas, Daniela de Vasconcelos Martins Manso Bento and Luísa Rocha Begalli

INSTITUTIONS INVOLVED: University of Coimbra, Geosciences Center (Portugal), Federal University of Sergipe (UFS), Progeology Laboratory (Brazil) and other national and foreign universities and institutions (confidential).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 8, 9 and 12.

PROJECT GOALS: Recovering and recognizing palynological contents, organic wall microfossils, in sedimentary deposits, with the aim of contributing to the expansion of micropalaeontological databases and aiming to refining biostratigraphic, palaeoenvironmental and palaeogeographic approaches to the related to its origin. To have national and international recognition for the laboratory and its team.

RESULTS: The Sedimentary Geology and Fossil Record Laboratory began processing rock samples for palynology in 2021. To date, it has carried out research, completed a master's thesis, supervised two internships and provided numerous services to national and international universities and companies (Portugal, Spain and Brazil) with samples from different parts of the world. In the last year, the laboratory has increased its preparation and production capacity and has perfected its processing techniques with specific training programmes.

Fig 1. Processing samples for palynology.

OUTPUTS:

Articles:

1. Garcia, G.G, Garcia, A.J.V, Henriques, M.H.P. (2018). Palynology of the Morro do Chaves Formation (Lower Cretaceous), Sergipe Alagoas Basin, NE Brazil: paleoenvironmental implications for the early history of the South Atlantic. Cretac Res 90:7-20. https ://doi.org/10.1016/j.cretr es.2018.03.029

Thesis:

1. Marques, R.M. (2024). Palinostratigrafia do Jurássico Superior do Perfil da Cumieira (Pombal). Master Thesis, Universidade de Coimbra, Portugal, 80 pp.

International Minerals, Gems and Fossils Fair

Gustavo Gonçalves Garcia[1,*] and David Costa Ascenso Silva[2]

[(1)]University of Coimbra, Geosciences Center, Department of Earth Sciences, Coimbra, Portugal

[(2)]University of Coimbra, Center for Earth and Space Research of the University of Coimbra, Geophysical and Astronomical Observatory, Coimbra, Portugal

*gustavogarcia@dct.uc.pt

PROJECT TYPE: Outreach projects.

COORDINATION: Gustavo Gonçalves Garcia and David Costa Ascenso Silva.

TEAM: Gustavo Gonçalves Garcia, David Costa Ascenso Silva, Luiza Friedrich Garcia, Patrícia Margarida Nunes João, Salomé Cruz Marques custódio and Anna Paula Lima Costa.

INSTITUTIONS INVOLVED: Geosciences Center, Center for Earth and Space Research of the University of Coimbra, Department of Earth Sciences and Science Museum of the University of Coimbra (Portugal).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4 and 17.

PROJECT GOALS: The University of Coimbra's Minerals, Gems and Fossils Fair aims to promote and publicise earth sciences through the beauty and appreciation of minerals, gems and fossils. Moreover, this event brings attention not only to specimens and pieces of unrivalled value, but also to scientific and social themes of education and sustainability.

RESULTS: The International Minerals, Gems and Fossils Fair represents the opportunity for any individual, through collecting, acquiring an object, or simply visiting, to be able to join this natural universe and glimpse the geological diversity that is presented. In addition to presenting a series of national and foreign exhibitors of collectible minerals, precious stones, fossils, teaching materials and manufactured goldsmithing objects, it also has several events, namely: meeting of collectors; book launch; educational activities aimed at younger audiences; speeches; visit the José Bonifácio d'Andrada e Silva Mineral Gallery at the Science Museums of the University of Coimbra; among others. The wide variety of pieces can become from countries such as Afghanistan, Brazil, China, Mexico, Namibia and Portugal. Among gems and crystals of rare aesthetic beauty, there will also be a huge variety of fossils that record different ages and environments in the history of the Earth, through which the evolution of organisms passed. The diversity ranges from dinosaurs, petrified fish, trilobites, ammonites, giant ferns and even insects preserved in amber.

Fig 1. The XXIX edition of the International Minerals, Gems and Fossils Fair of the University of Coimbra (2023).

OUTPUTS:

Report:

1. Garcia, G.G., Silva, D.C.A. (2023). XXIX Feira Internacional de Minerais, Gemas e Fósseis de Coimbra - Relatório da Edição de 2023, 7 pp.

2. Garcia, G.G., Silva, D.C.A. (2022). XXVIII Feira Internacional de Minerais, Gemas e Fósseis de Coimbra - Relatório da Edição de 2022, 10 pp.

3. Garcia, G.G., Silva, D.C.A., Azevedo, J.M.M. (2021). XXVII Feira Internacional de Minerais, Gemas e Fósseis de Coimbra - Relatório da Edição de 2021, 7 pp.

Public Understanding of Geosciences

Maria Helena Henriques[1*] and Patrícia João[1]

[(1)]Geosciences Center, Department of Earth Sciences, University of Coimbra, Coimbra, Portugal
*hhenriq@dct.uc.pt

PROJECT TYPE: Outreach project.

COORDINATION: Maria Helena Henriques

TEAM: Ana Castilho, António Trota, Daniela Bento, Fernando Michels, Gustavo G. Garcia, Inês Pereira, Inês Ruas, João Duarte, Keynes Sousa, Maria Helena Henriques, Mónica Silva, Patrícia João, Pedro Santarém Andrade, Pedro Correia, Salomé Custódio, Sofia Pereira, Telma Pedrosa, Vera Alfama, Yasir Shahzad.

INSTITUTIONS INVOLVED: University of Coimbra (Portugal)

SUSTAINABLE DEVELOPMENT GOALS (SDGS):

4 and 17.

PROJECT GOALS: Bridging the gap between earth sciences and society through unformal, non-formal, and formal initiatives of local to global impact; to disclose key aspects of geology which demonstrate that geologists have a role in achieving all 17 of the Sustainable Development Goals.

RESULTS: Participation in 2022 and 2023 editions and preparation of the 2024 edition of the European Researchers Night of the University of Coimbra, a science communication event that takes place annually in several European cities, with the aim of promoting awareness and the population's involvement in science, bringing researchers and civil society closer together (Fig. 1A-E); several activities of CGeo goes to school/The school goes to CGeo, initiatives that prioritize contact between researchers and the school public (Fig. 1F-H).

Fig 1. Geosciences Center initiatives of public understanding of geosciences. A-E: the 2022 and 2023 of the European Researchers Night of the University of Coimbra; F-H: CGeo goes to school/ The school goes to CGeo held at the Geosciences Center in 2022 and 2023.

PRAT-CARP
Prehistoric Rock Art Trails - Caminos de Arte Rupestre Prehistórico

Sara Garcês[1,2] and Luiz Oosterbeek[1,2,3]

[(1)]Instituto Terra e Memória, Portugal
[(2)]Centro de Geociências, Universidade de Coimbra, Portugal
[(3)]Instituto Politécnico de Tomar
* saragarces@ipt.pt

PROJECT TYPE: Cultural Itinerary of Council of Europe.

PRINCIPAL INVESTIGATOR: Sara Garcês (connected with PRAT-CARP).

TEAM: Sara Garcês; Luiz Oosterbeek, Hipólito Collado.

INSTITUTIONS INVOLVED: PRAT-CARP is integrated by 44 partners and 21 collaborator entities belonging to 8 different countries: Spain, Portugal, France, Italy, Norway, Finland, Georgia and Azerbaijan. The Municipality of Mação, through the Museum of Prehistoric Art, is one of the itinerary's founding partners.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4, 5, 8, 16

PROJECT GOALS: Prehistoric Rock Art Trails is the largest European network of cultural and tourism destinations showing the public the European Rock Art. This network has been able to build a strong alliance between the institutions that manage the sites technically and administratively, especially since its designation as a European Cultural Route in 2010.

RESULTS: The Association "PRAT-CARP" is the legal body of this network. Now, the Association is integrated by 44 partners and 21 collaborator entities belonging to 8 different countries: Spain, Portugal, France, Italy, Norway, Finland, Georgia and Azerbaijan. The entities partners are diverse, including national, regional or local Culture administrations, universities, research units, networks for rural development or museums. They have responsibilities in all or in part of the management of the rock art destinations that are open to the public in these countries. Many of them are small sites (a cave, a rock shelter, a small museum …), but there are locations with significant tourist equipment where it is possible to see large archaeological sites. In fact, the cultural and tourism interest of the first art of the Prehistory of Europe has been noted by UNESCO recognizing as World Heritage 9 sites that are included in our Cultural Route.

Figure 1: Promotion chart of PRAT-CARP 2020.

OUTPUTS:

Livros:

1. Good Practice Handbook for the Cultural Route of the Council of Europe “Prehistoric Rock Art Trails”. Link: https://www.prehistour.eu/docs/Good_Practice_Handbook_PRAT_EN.pdf

I International Seminar APHELEIA South America: The World In transformation

Juliano Bitencourt Campos[1*], Luiz Oosterbeek[2,3,4] André Luis Ramos Soares[2,3,5] Lia Raquel T. Brambilla Gasques[6] Jairo José Zocche[1] and José Gustavo Santos da Silva[1]

[(1)]University of Southern Santa Catarina, Criciúma, Brazil,
[(2)]Earth and Memory Institute
[(3)]Geosciences Center of University of Coimbra, Portugal.
[(4)]Polytechnic Institute of Tomar
[(5)]Federal University of Santa Maria, Brazil
[(6)]Federal University of Mato Grosso do Sul, Brazil
*jbi@unesc.net

PROJECT TYPE: Academic event. This event was financed in part by the Fundação de Amparo à Pesquisa e Inovação do Estado de Santa Catarina (FAPESC). Public Call Nº. 23/2022 - Proeventos 2023 - Phase II. Apheleia International Seminar: South America. Term of Grant Nº: 2023TR000402.

PRINCIPAL INVESTIGATOR: Juliano Bitencourt Campos.

SUPERVISION: Luiz Oosterbeek, André Luis Ramos Soares.

TEAM: Alex Sander da Silva, Daniel Ribeiro Preve, Michele Gonçalves Cardoso, Geraldo Milioli, Carlos Paulo dos Passos Matias; Tarcísio Roldão da Rosa; Diego Dias Pavei; Maria da Gloria Tavares Demamann; Luciano Miranda; Monica Guglielmi; Estefani Oliveira Serafim; Bruno Carola; Alex Luciano Tavares Rollano; Breno Ferreira Fontana; Luiz Miguel Ghedin.

INSTITUTIONS INVOLVED: University of Southern Santa Catarina (UNESC) (Brazil), Earth and Memory Institute, Polytechnic Institute of Tomar (Portugal). UNESCO Chair in Borders and Migrations – Federal University of Santa Maria (Brazil), Federal University of Mato Grosso do Sul (Brazil).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): Goal 4 (Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all) and Goal 11 (Make cities and human settlements inclusive, safe, resilient and sustainable).

PROJECT GOALS: The 1st International Seminar APHELEIA: South America aimed to bring together researchers, teachers and civil society for discussions on how human societies perceive territories, seeing different and sometimes conflicting ways of relating to landscapes. The event featured presentations of theoretical and contextual case studies and was aimed at scientific activities related to the humanities.

RESULTS: The conference took place at UNESC in Criciúma, Santa Catarina, Brazil. A total of 14 projects were showcased, spanning 10 different thematic categories. The event spanned four days, featuring round table discussions each day, as well as an excursion to the UNESCO Global Geopark Caminhos dos Cânions do Sul. The conference boasted a lineup of 36 speakers, including 8 international speakers from Latin American countries and Europe, as well as 28 domestic speakers representing 4 regions of Brazil.

Fig 1. I International Seminar APHELEIA South America.

Fig 2. Excursion to the Caminhos dos Cânions do Sul UNESCO Global Geopark. (from Campos et al., 2023).

OUTPUTS:

Article:

1. Campos, J. B.; Oosterbeek, L.; Soares, A. L. R.; Brambilla, L. R. T.; Zocche, J. J.; Silva, J. G. S., 2024. I Seminário Internacional Apheleia América do Sul: O Mundo em Transformação. Arkeos Perspectivas em Diálogo, v. 58.

II International Seminar APHELEIA South America: The Worldwide Rock Art in one place

André Luis Ramos Soares[1,3,5], Lia Raquel T. Brambilla Gasques[6], Juliano Bitencourt Campos[3,4,6], Luiz Oosterbeek[3,4,5] and Sara Garcês[3,4]

[(1)]Federal University of Santa Maria, Brazil

[(2)]Federal University of Mato Grosso do Sul, Brazil

[(3)]Earth and Memory Institute

[(4)]Geosciences Center of University of Coimbra, Portugal.

[(5)]Polytechnic Institute of Tomar

[(6)]University of Southern Santa Catarina, Criciúma, Brazil.

*andre.soares@ufsm.br

PROJECT TYPE: Academic event. (partial funding: Fundação de Desenvolvimento Científico e Tecnológico – FUNDECT, Estado de Mato Grosso do Sul).

PRINCIPAL INVESTIGATOR: André Luis Ramos Soares.

SUPERVISION: Lia Brambilla Gasques and Juliano Bitencourt Campos

TEAM: Lia Raquel T. Brambilla Gasques, Carlos Eduardo da Costa Campos, Priscila Lini, Ivo Leite Filho, Sara Garcês, Luiz Oosterbeek.

INSTITUTIONS INVOLVED: Federal University of Santa Maria (UFSM, Brasil), Federal University Mato Grosso do Sul (UFMS-Brasil) , Earth and Memory Institute, Polytechnic Institute of Tomar (Portugal). University of Southern Santa Catarina State (UNESC, Brazil).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4 and 11.

PROJECT GOALS: The 2nd International Seminar APHELEIA: South America will bring together researchers, teachers and civil society to discuss the scientific, cultural, economic, social and educational potential of Rock Art and Rock Archaeology. The event will be attended by national and foreign researchers, as well as civil society and the school public.

RESULTS: The conference will take place at UFMS in Campo Grande, Mato Grosso do Sul state, Brazil. We intend share the academic place with researchers, teatchers, graduate and post graduate students, besides the local comunity who living around the cities where the rock art stays. More than this, this meeting will joint the politic class and comunity to debate the paths of rock art sustantability.

OUTPUTS:

Article:

1. Campos, J. B.; Oosterbeek, L.; Soares, A. L. R.; Brambilla, L. R. T.; Zocche, J. J.; Silva, J. G. S., 2024. I Seminário Internacional Apheleia América do Sul: O Mundo em Transformação. Arkeos Perspectivas em Diálogo, v. 58.

DYCLAM+

Robert Belot[1], Pierluigi Rosina[2], Luiz Oosterbeek[2*], Adrian Corpádean[3] and Marina Fumo[4]

[(1)]Université Jean Monet, France
[(2)]Instituto Politécnico de Tomar, Centro de Geociências, Portugal
[(3)]University Babes-Bolyai, Roumania
[(4)]University of Naples Federico II, Italy
*loost@ipt.pt

PROJECT TYPE: Master in Dynamics of Cultural Landscapes, Heritage, Memory and Conflictualities (funding: European Commission)

PRINCIPAL INVESTIGATOR: Robert Belot

TEAM: Pierluigi Rosina, Luiz Oosterbeek, Adrian Corpádean, Marina Fumo, Ferrucio Ferrigni, Luís Santos, Rita Anastácio, Luís Mota Figueira et al.

INSTITUTIONS INVOLVED: Instituto Politécnico de Tomar, Université Jean Monet, Universitá di Napoli Federico II, University Babes-Bolyai, Município de Mação.

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 4, 11 and 17

PROJECT GOALS: A priority in the international framework of UNESCO and Europe, the question of cultural heritage and landscapes is at the heart of complex issues of geopolitical, environmental, social and economic dynamics of territories. Responding to these issues requires knowledge and skills in several scientific and applied fields (urban planning, architecture, archaeology, geography, environment, economy, ethnology, communication, geopolitics...), global understanding of which is often difficult, if not impossible, in the academic environment and the professional one, which is often very specialized. DYCLAM+ is a unique training and skills development program involving disciplinary fields (environment, engineering sciences, humanities, law, digital sciences); academic world and professional reality; culture and technology; international and national institutions; geographical areas.

RESULTS: Over 100 Master dissertations and site-based projects in over 40 countries.

Fig 1. DYCLAM+logo (left) and poster of public presentations of student's applied research projects (right).

OUTPUTS:

Article:

1. Alves, E. M. C., Oosterbeek, L., 2019. Paisagens culturais industriais:uma abordagem sobre a gestão integrada e sustentável do patrimônioindustrial. Pós. Revista do Programa de Pós-Graduação em Arquitetura eUrbanismo da FAUUSP 26 49 (2019): e125056-e125056. https://doi.org/10.11606/issn.2317-2762.posfau.2019.125056.

Book:

1. Oosterbeek, L., 2021. Covid 19, guerres et désastres naturels: peur et résilience auxorigines de la transformation des paysages culturels. Mação:Instituto Terra e Memória: 529p. www.pacadnetwork.com/itm/images/sampledata/Domeniu/AreaDomeniu11_final_2022.pdf.pdf.

International Master in Quaternary and Prehistory (IMQP)

Marta Arzarello[1], Luiz Oosterbeek[2*], François Sémah[3] and Robert Sala[4]

[(1)]Universitá degli Studi di Ferrara, Italy
[(2)]Instituto Politécnico de Tomar, Portugal
[(3)]Muséum National d'Histoire Naturelle, France
[(4)]Universitat Rovira I Virgili, Spain
*loost@ipt.pt

PROJECT TYPE: Master in Dynamics of Cultural Landscapes, Heritage, Memory and Conflictualities (funding: European Commission).

PRINCIPAL INVESTIGATOR: Marta Arzarello

TEAM: Luiz Oosterbeek, Pierluigi Rosina, Silvério Figueiredo, Laurent Caron, Luís Santos, Alexandra Figueiredo, George Nash, Sara Garcês, Telmo Pereira, Hugo Gomes, Rita Anastácio, Hipólito Collado, François Sémah, David Pleurdeau, Robert Sala, Carlos Lorenzo Merino, et al.

INSTITUTIONS INVOLVED: Instituto Politécnico de Tomar, Universitá di Ferrara, Muséum national d'Histoire Naturelle, Universitat Rovira i Virgili, University of the Phillipines Diliman.

SUSTAINABLE DEVELOPMENT GOALS (SDGS):

4, 15 and 17.

PROJECT GOALS: IMQP aims at offering a solid education to students for their future professional placement: a valuable preparation to the knowledge and use of scientific methods for a cultural and naturalistic approach to the reconstruction of human history; good skills to coordinate multidisciplinary interventions; an up-to-date, in-depth and interdisciplinary knowledge of research in Prehistory and Quaternary geology through interaction with the most important European institutions involved in research and formation in these fields of study.

RESULTS: Over 200 Master dissertations and site-based projects in over 50 countries.

Fig 1. Final session of dissertations presentation and discussion, in Mação.

Fig 2. The 2023-2024 class of IMQP in Isernia, Italy.

OUTPUTS:

Article:

1. Oosterbeek, L., Adewumi, O., Rosina, P., Gomes, H. et al. 2022. Revisiting education and training programs: Geoarchaeology as a driver of interdisciplinary reasoning". Frontiers in Earth Science 10. http://dx.doi.org/10.3389/feart.2022.914307.

2. Oosterbeek, L., 2019. Higher education in prehistory andarchaeology. Revista Arqueologia Pública 13 2: pp. 23-40. http://dx.doi.org/10.20396/rap.v13i2.8658295

PhD Heritage, Technology and Territory

Luiz Oosterbeek[1,3*] and Adolfo Silveira[2,3]

[(1)]Instituto Politécnico de Tomar, Portugal
[(2)]Universidade Autónoma de Lisboa, Portugal
[(3)]Centro de Geociências
* loost@ipt.pt

PROJECT TYPE: PhD in Heritage.

COORDINATION: Luiz Oosterbeek and Adolfo Silveira.

TEAM: Graça Almeida Borges, Telmo Pereira, Pierluigi Rosina, Hermínia Sol, Alexandra Figueiredo, Luís Mota Figueira, Silvério Figueiredo, Sara Garcês, Hugo Gomes, Fernando Coimbra.

INSTITUTIONS INVOLVED: Instituto Politécnico de Tomar, Universidade Autónoma de Lisboa, Centro de Geociências, Tech&Art (Portugal).

SUSTAINABLE DEVELOPMENT GOALS (SDGS): 3, 11 and 15.

PROJECT GOALS: Bringing together geosciences and humanities, the focus of the program is the study of heritage materiality's and their relevance for the dynamics, resilience, and sustainability of human societies, understanding in this process two main dimensions: technology (human materials) and territory and the construction of cultural landscapes around the heritability of the products of ancient technologies (heritage, technologies, and cultural landscapes.

RESULTS: The PhD aims to train highly qualified professionals with advanced critical skills based on conducting research projects applied to specific territories and contribute to the development of those territories.

OUTPUTS:

Livros:

1. Silveira, A., Oosterbeek, L., 2023. Doutoramento em Património, Tecnologia e Território. Lisboa, Universidade Autónoma de Lisboa. https://repositorio.ual.pt/bitstream/11144/6597/1/DPTT_Final.pdf

PHD IN

HERITAGE, TECHNOLOGY AND TERRITORY

- DISTANCE EDUCATION PHD
- INTERNATIONAL RESEARCH NETWORK
- TOPICS ON CULTURAL LANDSCAPES AND ARCHAEOLOGY
- FOCUS ON THE STUDY OF HERITAGE MATERIALITIES
- FOCUS ON THE RELATIONSHIP TECHNOLOGY / LANDSCAPES / SUSTAINABILITY
- HERITAGE AND CULTURAL PRODUCTS

PHD IN

HERITAGE, TECHNOLOGY AND TERRITORY

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museums and interpretation centres

Associação Centro de Interpretação do Alto Ribatejo ACIAAR

PROJECT TYPE: Interpretation Centre; Heritage conservation, Archaeology.

DIRECTOR: Rui Constantino

TEAM: Rui Martins, Ana Rita Inácio, Antónia Coelho, Pierluigi Rosina, Cristiana Ferreira, Mónica Gomes.

INSTITUTIONS INVOLVED: Municipality of V.N. Barquinha, Instituto Politécnico de Tomar, Instituto Terra e Memória.

PROJECT GOALS: CIAAR was created to carry out activities to inventory, study, preserve and enhance archaeological heritage through the transfer of knowledge and the use of technologies applied to archaeology and collateral areas; the organization of seminars, conferences and training activities.

RESULTS: Over time CIAAR has established itself as a national and international benchmark in terms of research, particularly due to the work carried out on the Ribeira da Atalaia Palaeolithic site. At the same time, it has developed various projects to share knowledge, including exhibitions, activities with schools and the publication of the newspaper “Novo Almourol”.

Articles:

1. Oosterbeek, L., Lino, J.T., 2020. Archaeological heritage management of the Prehistoric Art Museum of Mação, Portugal. Revista de Arqueologia: doi. org/10.24885/sab.v33i3.836.
2. Oosterbeek, L., Figueira, L.M. et al. 2021. Co-construção e socialização do conhecimento para a coesão social territorial. Nova Augusta 32: pp. 316-328.

Museu de Arte Pré-Histórica e do Sagrado do Vale do Tejo

PROJECT TYPE: Museum; Heritage conservation, Archaeology.

DIRECTOR: Luiz Oosterbeek

TEAM: Anabela Pereira, Fernando Coimbra, Sandra Alexandre, Isabel Afonso, Margarida Pacheco, Pierluigi Rosina, Sara Garcês, Hugo Gomes.

INSTITUTIONS INVOLVED: Municipality of Mação, Instituto Politécnico de Tomar, Instituto Terra e Memória.

PROJECT GOALS: The project aims to create and test new educational tools that bridge science and society through multisensory experiences, emphasizing hands-on experimentation and scientific reasoning. It enhances the teaching of archaeology within geosciences while promoting critical thinking through the integration of training, education, and communication.

RESULTS: The project started over two decades ago and was able to become a reference for articulating science and society in low density territories. Besides its local impact, it has been involved in collaborations to set similar approaches in several other communities, in various countries.

Articles:

1. Oosterbeek, L., Lino, J.T., 2020. Archaeological heritage managementof the Prehistoric Art Museum of Mação, Portugal. Revista de Arqueologia: doi. org/10.24885/sab.v33i3.836.

2. Oosterbeek, L., Figueira, L.M. et al. 2021. Co-construção esocialização do conhecimento para a coesão social territorial. Nova Augusta 32: pp. 316-328.

Núcleo Museológico da Ortiga, Mação

PROJECT TYPE: Interpretation Centre; Heritage conservation, Archaeology, Ethnography; History;

DIRECTOR: Luiz Oosterbeek

TEAM: Anabela Pereira, Fernando Coimbra, Sandra Alexandre, Isabel Afonso, Margarida Pacheco, Virginia Lattao, Sara Garcês, Hugo Gomes.

INSTITUTIONS INVOLVED: Municipality of Mação, Instituto Politécnico de Tomar, Instituto Terra e Memória.

PROJECT GOALS: The mission of the Ortiga Museum Centre is to make known the history of Ortiga and the Tagus basin region in which it is located, managing the historical and cultural heritage, both tangible and intangible, of the Ortiga community and the territory, including the identification, collection and incorporation, inventorying, conservation and restoration of the museum collection, the appropriate interpretation and consequent exhibition for study, education and leisure, thus promoting the socio-cultural development of communities and visitors.

RESULTS: The Ortiga Museum Centre incorporates cultural assets - tangible and intangible - that exist in the Ortiga area, enhancing them through work related to identification, collection, research, inventory, exhibition, interpretation and conservation.

Articles:

1. Município de Mação & Museu de Arte Pré-Histórica e do Sagrado do Vale do Tejo (2020). Catálogo da Exposição do Núcleo Museológico da Ortiga, 27p.

Museu Agrícola de Riachos

PROJECT TYPE: Community Museum: Association for the Defence of the Historical and Natural Heritage of the Riachos Region - APDPHNRR

DIRECTOR: Luís Mota Figueira

INSTITUTIONS INVOLVED: IPT, CGEO, ITM, Agrupamentos de Escolas, CIMT, ADIRN, NERSANT, TAGUS, ICNF, Turismo de Portugal, Entidade Regional de Turismo do Centro; Municipality of Torres Novas.

PROJECT GOALS: MAR - Museu Agrícola de Riachos was founded in 1989 with the main aim of safeguarding the rurality of the Riachos region, which is part of the Ribatejo territory and is administratively associated with the Médio Tejo sub-region of the Centre Region of Portugal and is part of the Médio Tejo Intermunicipal Community at local government level, as it is a town in the municipality of Torres Novas. This space of memory and active life has a local and global reach, establishing itself as a Community Museum. Founded under the mutualist ideals and legacy of the Cingeleiros Society, it is anchored in this root and in the sacred and profane manifestation of the Cattle Blessing Festival that gave rise to it. The museum is run with an inclusive vision and, in its cultural commitment, links tradition and contemporaneity. It takes on the challenge of harmonising Cultural Animation with Applied Scientific Research.

Articles:

1. Mota Figueira, L. (2022). Museu Agrícola de Riachos: Práticas e Teorias num Museu de Comunidade. Cadernos De Sociomuseologia, 63(19), 73-89. https://doi.org/10.36572/csm.2022.vol.63.06

Museu Ibérico de Arqueologia e Arte - MIAA (Archaeological collections)

PROJECT TYPE: Research project (funding: Municipality of Abrantes).

PRINCIPAL INVESTIGATOR FOR ARCHAEOLOGICAL COLLECTION: Luiz Oosterbeek

TEAM: Davide Delfino, Gustavo Portocarrero, Jayshree Mughur-Medhi.

INSTITUTIONS INVOLVED: Instituto Politécnico de Tomar, Instituto Terra e Memória, Município de Abrantes.

PROJECT GOALS: The MIAA includes two relevant collections of archaeological objects: the local municipality's collection, predominantly resulting from scientific excavations, and a private collection organized by a collector, João Estrada, predominantly resulting from purchase in auctions. The purpose of the project has been to: 1) characterize the private collection in full, also identifying the authenticity or not of its components; 2) to integrate the two collections within a same interpretative discourse; 3) to organize an exhibition for society at large.

RESULTS: Over ten books and a large number of papers resulted from the systematic study of the collections. This made it possible to organize a unique exhibition that presents an overview of human from prehistory to classical times all across Eurasia. The exhibition explains on one hand the cycles of autarchical intensification of resources exploitation, vs cycles of greater exchange and interaction, also evidencing dynamics of center and periphery in cultural dynamics.

Website: https://www.museusdeabrantes.pt/miaa/miaa.html

Núcleo Museológico do Centro Português de Geo-História e Pré-História: NMCPGP

PROJECT TYPE: Research and Scientific dissemination Project. Funding: Centro Português de Geo-história e Pré-História and Municipality of Golegã.

DIRECTOR Silvério Domingues Figueiredo

TEAM: Vanessa Antunes; Patrícia Boto; Fernando Coimbra; Mário Antas.

INSTITUTIONS INVOLVED: Centro Português de Geo-História e Pré-História, Municipality of Golegã.

PROJECT GOALS: NMCPGP, resulted from a protocol signed between CPGP and the Municipality of Golegã. It consists of a Natural History exhibition and a library specializing in Palaeontology, Prehistory and Archaeology. The exhibition was thought to present, in a didactic and accessible way to the general public, the following themes: Evolution, Palaeontology, Prehistory and Rock Art. It is based in textual elements, interactive media devices and the collections of Palaeontology and Prehistoric Archaeology of the CPGP.

RESULTS: The activities developed have attracted people from various origins, becoming a pole of development and animation of the village.

Articles:

1. Figueiredo, SD., Coimbra, F., Antas, M., Silvério, S. & Sousa, F. 2018. The Museum of the Portuguese Centre of Geo-History and Prehistory. Earth Heritage, 50, 41-43.

2. Figueiredo, SD., Coimbra, F., Antas, M., Carrança, A., Sousa, F. 2020. The Museum of the Portuguese Centre of Geo-History and Prehistory: a project for the dissemination of palaeontological and prehistoric heritage. Boletim do Centro Português de Geo-História e Pré-História 2 (2) 2020: 37-43.

Museu de Geologia "Fernando Real" UTAD

PROJECT TYPE: Research and Scientific dissemination Project.

DIRECTOR: Maria Elisa Preto Gomes

INSTITUTIONS INVOLVED: Universidade de Trás-os-Montes e Alto Douro

PROJECT GOALS: The Fernando Real Geology Museum's main objective is to be a living space where UTAD students and visitors, particularly students and teachers from all levels of education, can find answers to the many questions related to Earth Sciences and the incentive to carry out research and 'investigation' work and projects in the various fields of Geology. It also aims to promote the dissemination and communication of science and geological resources, contributing to the scientific literacy of the general public. At present, the Museum has embraced a new project, still in its infancy, which is opening its doors to the outside world through the creation of the 'Geological Garden of Trás-os-Montes and Alto Douro', which will make a series of geological stations available at the EcoCampus, allowing visitors to observe and understand geological aspects of the region.

RESULTS: Valuable collection of samples from all over the world, including marvellous specimens of minerals and ores from the main Portuguese mines.

Articles:

1. Coke, C.; Favas, Paulo J. C.; Gomes, M. Elisa P. "Museu de Geologia da UTAD: 25 anos ao serviço da cultura científica". In Comemorações dos 25 anos do Museu de Geologia da UTAD, 11-21. Utad Vila Real, Portugal: UTAD, 2011.

Museu da Ciência Universidade de Coimbra

PROJECT TYPE: Research and Scientific dissemination Project.

DIRECTOR: Paulo Trincão

TEAM: Ana Cristina Rufino, Ana Cristina Tavares, Ana Maria Dias, António Pedro, Carla Alves, Carmina Silva, Dayane Farias, Germana Torres, Gilberto Pereira, Graça Antunes, Gustavo Gonçalves Garcia, Rosa Oliveira.

INSTITUTIONS INVOLVED: Ministério da Cultura Fundação Calouste Gulbenkian, Fundação para a Ciência e a Tecnologia, Universidade de Coimbra;

PROJECT GOALS: The MCUC's mission is to inspire and motivate citizens towards science through research, production, transmission and dissemination of scientific knowledge and the history of the University of Coimbra, based on its collections The MCUC's mission with regard to natural history collections is in line with the Buffon Declaration agreed in Paris in 2007 by 93 natural history institutions from around the world.

RESULTS: The MCUC is an inclusive reference centre for the dissemination of scientific and technological culture and a modern, up-to-date museum capable of responding to the demands of contemporary society, assuming itself as an interface for the activity of the University of Coimbra.

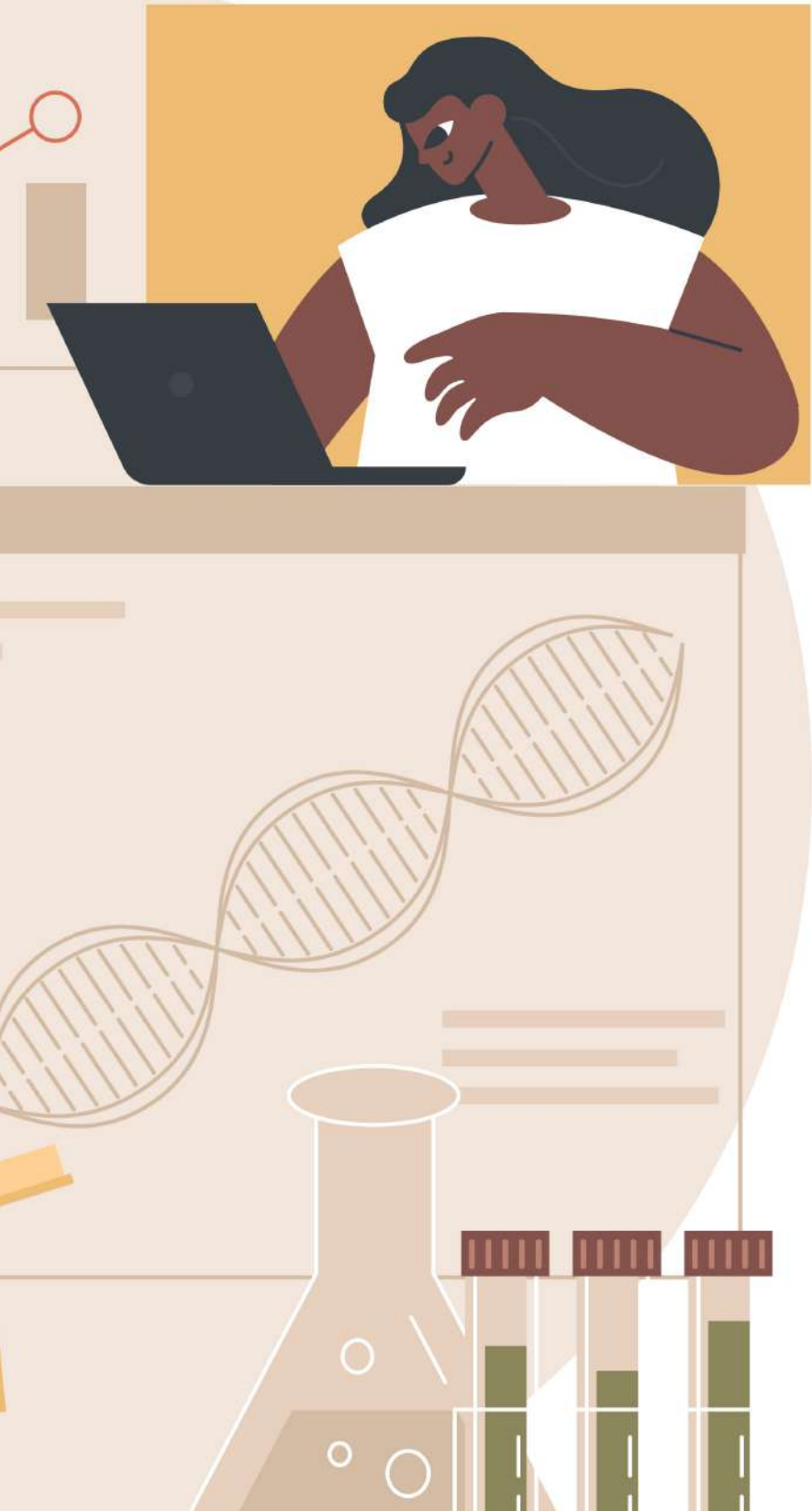
Articles:

1. Exposição Permanente – Guião. Museu da Ciência – Universidade de Coimbra; Sector de Educação; 2011.

Website:

http://www.museudaciencia.org/index.php

CGEO Analytical Platform Laboratories



Hugo Gomes
Coordinator
hugo.hugomes@gmail.com

CGEO Analytical Platform

The scale of the CGEO's laboratory work has led to an understanding of the complementarity of laboratory resources between its member institutions and the advantage of making this more explicit and profitable. To this end, from the 2024 cycle onwards, the CGEO will structure a networked laboratory platform, supported by a consortium of five institutions: University of Coimbra, Polytechnic Institute of Tomar, Institute of Earth and Memory, University of Trás-os-Montes and Alto Douro and the Autonomous University of Lisbon.
The aim of the platform is to support and promote research in the geosciences applied to the territory, with an integrated network of laboratories linked to the CGEO through the higher education institutions that are part of it. The platform supports different areas of scientific research, including natural sciences, exact sciences, social sciences and humanities.

OBJECTIVES

- Promote complementarity between the laboratory resources involved.
- To accelerate the analytical aspect of research within the CGEO.
- Promote multi/interdisciplinary research and scientific knowledge.
- Promote science and education as drivers of territorial development.
- Involve different partners and institutions, both academic and non-academic.
- Attract national and international researchers to the CGEO, promoting science and knowledge.
- Promote scientific exchanges between different laboratory units.
- Involve structures involved in the dissemination of scientific knowledge, such as museums, interpretation centres and associations.
- Promote scientific and technological research projects with a significant impact on regional development, using integrated, holistic and innovative approaches.
- Encouraging interdisciplinarity through collaboration between researchers and laboratories and other development and research units, both national and international.
- To disseminate scientific knowledge through the organisation of technical and scientific events,
- Developing training and dissemination activities in the laboratory field
- Provide services to the community.
- Stimulating lines of action by attracting financial resources from public or private organisations.
- Bringing science closer to the citizens.
- Promote research applied to local realities and the needs of the population.

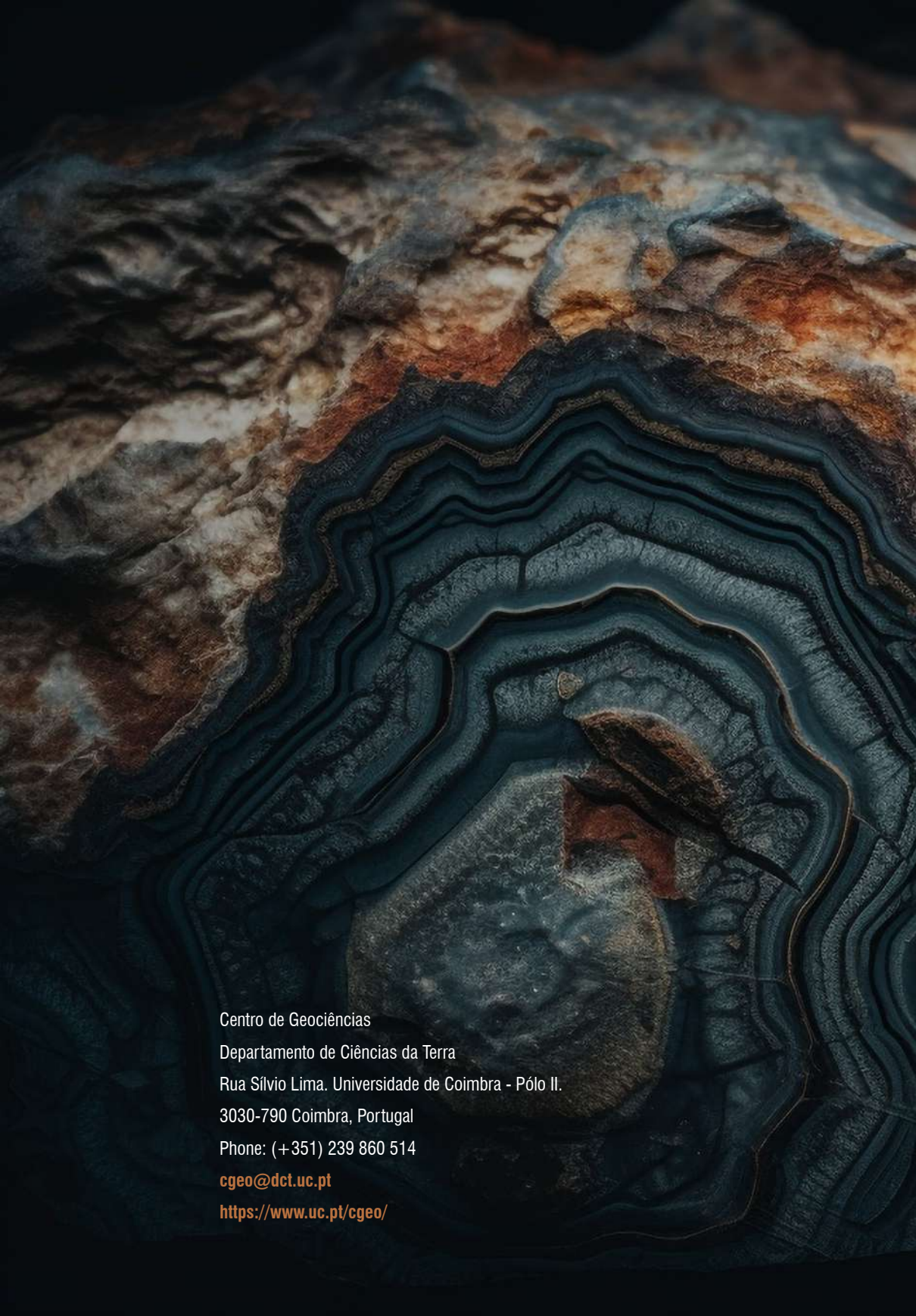
Laboratories

The Laboratories assigned to the Department of Earth Sciences (DCT - UC) are:
EOLab - Earth Observation Laboratory
Sedimentary Geology and Fossil Record Laboratory
Geochemical and X-ray Laboratory
Santander Laboratory: Geophysics, Geotechnics and Ore Treatment Laboratory
Geochronos i Laboratory (Coimbra)
i Micro Scale Laboratory (Coimbra)
Hydrogeology Laboratory
Sedimentology Laboratory
Petrography Laboratory
Palaeomagnetism Laboratory
Computational Geosciences Laboratory

The Laboratories assigned to the University of Trás-os-Montes e Alto Douro are:
Museu e Laboratório de Geologia da UTAD

The Laboratories assigned to the Polytechnic University of Tomar are:
Lab.Ipt - Central Laboratory Unit (Tomar)
LABFOTO - Photography Laboratory
LABPA - Audiovisual Production Laboratory
LABVIDEO - Video and Documentary Film Laboratory
LACPS - Laboratory for the Archaeology and Conservation of Underwater Heritage
LCC - Civil Construction Laboratory
LCR - Conservation and Restoration Laboratory
LE - Electrotechnics Laboratory
LEM - Mechanical Engineering Laboratory
LFÍSICA - Physics Laboratory
LISI - Computer Science and Intelligent Systems Laboratory
LTAG - Graphic Arts and Technology Laboratory
LTQA - Chemical and Environmental Technology Laboratory
CGRDBA - Centre for the Management and Reservation of Archaeological Data and Assets
CA2PT - Centre for Archaeology, Archaeosciences and Palaeontology
LPEco - Palaeoecology Laboratory
LPT - Palaeontology Laboratory
Lab.TUR - Tourism Laboratory

The Laboratories assigned to the Earth and Memory Institute are:
Quaternary and Territory Laboratory (Mação)
Laboratory of Rock Art Archaeology (Mação)
Experimental Archaeology Laboratory and Park (Mação)
Alto Ribatejo Archaeology and History Library



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