

GeoResources and Geomaterials

GeoResources and Geomaterials (G3)

Report 2022

Unidade de I&D ICT

Instituto de Ciências da Terra - ICT

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Group Coordinator's Words

The **GeoResources and Geomaterials – Group 3** is included in ICT structure, a multidisciplinary institution, organized into six research groups covering major areas of Earth Sciences and comprising a wide range of scientific expertise. The main objective of **GeoResources and Geomaterials Group** is aligned with the ICT mission which is to develop exceptional-quality research, promote technological development and support public policies in the area of Earth Sciences.

This report presents the main achievements produced by **GeoResources and Geomaterials - Group 3**, including publications, organization of events, outreach activities, and other outcomes.

The composition of the **Group 3 team** can be consulted at:

<https://www.icterra.pt/g3/index.php/team/>

The main goals of the **Group 3 team** can be consulted at:

<https://www.icterra.pt/g3/index.php/about-us/>

I would like to take this opportunity to congratulate all on your efforts in achieving the objectives of our group.

I wish you an excellent
2023!

Best regards!



Helena Sant'Ovaia

*GeoResources and Geomaterials Group Coordinator
Porto, 1st February 2022*

TABLE OF CONTENTS

1. MAIN ACHIEVEMENTS	1
2. PUBLICATIONS	5
A. Books, chapters in books, and article	5
A1. Books and chapters in books	5
A2. Articles in peer-review Journals (ISI and Scopus)	6
A3. Articles in national Journals	11
B. Conference proceedings	12
B1. International conference proceedings	12
B2. National conference proceedings	23
C. Reports	27
D. Others	30
E. Models	31
F. Computational applications	31
3. COMPLETED PHD THESIS	32
4. COMPLETED MSC THESIS	32
5. PHD, RESEARCH, POST-DOC FELLOWSHIPS, AND RESEARCHER CONTRACTS SIGNED IN 2022	33
6. SCIENTIFIC EVENTS PARTICIPATION, FIELD TRIPS PARTICIPATION, CONFERENCES ORGANIZATION	34
7. NACIONAL AND INTERNATIONAL PROJECTS	42
8. SCIENTIFIC DISSEMINATION	54
9. AWARDS AND DISTINCTIONS	61

01 Main Achievements

Within the **GeoResources and Geomaterials Group (G3)** the research focuses on two main areas:

(i) LCT pegmatites and hydrothermal deposits of Critical Raw Materials (CRMs) associated with acid magmatism for the identification of genesis, age and mode of occurrence to improve exploration programs and processing technologies, and to improve and develop methods of evaluation of mining and other industrial wastes to promote recycling;

and,

(ii) Characterization of natural and anthropogenic geomaterials for the promotion of critical metals recovery, and also in the field of geoarchaeological, architectural and civil engineering purposes, and in studies of soils and sediments for forensic applications.

The following are the results obtained throughout 2022 in these two major themes.

(i) LCT pegmatites and deposits of rare elements associated with granites

Demand for the main metals that modern society needs to produce goods has increased significantly over the past few decades, thereby increasing the number of new exploration projects to meet this demand. The development of innovative indirect and non-invasive tools for prospecting new resources of Critical Raw Materials (CRMs) are crucial.

Considering this, the understanding of the Variscan granite's role in the occurrence of high rare metal (W, Sn and Li) anomalies is an urgent need. Geological mapping is one of the most powerful tools to develop and approach this type of studies. Thus, during 2022, magnetic susceptibility and whole rock geochemistry were applied to igneous rocks that outcrop in the area covered by sheet 4 of Portugal geological mapping at the scale 1:200.000.

The recent data on the ages of mineralization of Sn and W combined with petrophysical and geochronological studies of the granites spatially associated with the W-Sn deposits prove the existence of different periods of mineralization related to Variscan magmatism. S type granites, of mesocrustal origin, emplaced at deeper levels, and I type granites, of basic-crustal to infra-crustal origin, emplaced as intrusive massifs at higher crustal levels, are

productive, with the former occurring more associated to Sn mineralization and the latter to W mineralization.

Mineralogical and fluid inclusion studies have allowed to better estimate the P-T conditions for the formation of W-(Au) and Sn (Li) mineralizations. The geochemical characterization, namely of the most evolved granitic facies of each of the types of magmatism, has allowed to distinguish the differentiating processes involved, namely greisenization and muscovitization.

Also the study of low-, medium- and high-grade metamorphic rocks in different sectors of the Variscan orogenic belt, with emphasis on the petrogenetic and structural relationship of the metamorphism with the associated mineralizations (lithium, antimony tin and tungsten) was carried out.

Also important was the texture and petrography characterization of the serpentinized ultrabasic rocks from the Bragança region (NE Portugal) and the multidisciplinary studies performed on late variscan felsic and mafic veins.

An important goal of G3 is the construction of spectral libraries concerning different pegmatite types (LCT and NYF) for satellite exploration. Having this in mind, spectral libraries were built both at a national and European scales. Distinct satellite products were evaluated for lineament extraction to find faults and shear zones related with pegmatite emplacement. Also, a large emphasis was given to geochemical exploration tools namely, stream sediment campaigns, whole rock and mineral chemistry for pegmatite exploration.

Particular attention was given to the marine mineral resources. A particular focus was given to polymetallic nodules and their occurrence as mineral deposits in the Clarion Clipperton Zone in the Pacific Ocean basin. As part of the project for the extension of the continental shelf in the Madeira offshore, the study and characterization of the Madeira drift system were also achieved to address the extent of the influence of the Madeira lower slope.

(ii) Characterization of natural and anthropogenic geomaterials

Multidisciplinary research activities focused the investigation of soils mainly associate with coal mining and near industrial facilities using combustion of fossil fuels in the past (thermal power plant, cement industry), aiming the identification of contamination problems. Some activities were carried out on the application of organic petrology techniques in studies related to mineral deposits, effects of forest fires, speleothems, and archaeology.

The CoalMine project was closed during 2022 with the presentation of all results in the 2nd workshop as well as the preparation and submission of the last manuscripts, being the most recent accepted in Minerals just at the end of this year. The SHS project (started in 2021) is in progress. Most of the results were already obtained and their processing is under development as well as the preparation of manuscripts to be submitted to international journals. The Special Issue “Geochemistry, Environmental Impact and Remediation of Mining Areas”, in Minerals, was organized within this project, being the Guest Editors D. Flores and P. Santos.

Research in G3 remained motivated on sustainability aspects of materials namely the characterization of spent lithium batteries components and concentration of the graphite; the characterization of coal fly ash, concentration of char and ferrospheres, testing applications in oxygen reduction reactions and photoreactions, respectively; the characterization of phosphorus-rich ashes and testing concentration processes; and the characterization of cork powder fly ash, concentration of titanspheres and biochar, testing water depollution processes, metals stabilization and soils correction.

Still bearing in mind sustainability concerns, petrographic, petrophysical and geomechanical characterization and evaluation of geological formations where the CO₂ can be stored, were carried out.

Advanced remote sensing led to the generation mechanism for oceanic interfacial waves that propagate within the strongly stratified cold water tongue that seasonally develops at the equator in the Pacific Ocean. The interfacial waves' time and horizontal scales are revealed in satellite images and are characterized for the first time.

Also important was the development of GIS applications in open source software and the development of webGIS using several programming languages. In 2022, 3 applications were developed: a GIS Application to Detect Invasive Species in Aquatic Ecosystems; another application to detect the vegetation phenology from Sentinel 2 data and a A GIS Plugin for Susceptibility Modeling: Case Study of Wildfires in Vila Nova de Foz Côa. An Interactive WebGIS Integrating Environmental Susceptibility Mapping in a Self-Burning Waste Pile Using a Multi-Criteria Decision Analysis Approach, was also developed. Furthermore, other studies, in collaboration with students, were carried out using the GIS software, such as the evaluation of Spatial Thinking Ability Based on Exposure to GIS Concepts in the Context of Higher Education and a comparative analysis of four QGIS plugins for web maps creation.

GeoResources and Geomaterials activites during 2022 wer linked with other ICT groups to reinforce the strategy framed in the **goal nº 12 UN SGD** (<https://sdgs.un.org/goals>) , mainly connected with G5 with research in the Iberian Variscan Belt and the G1 and G6 providing the geomaterials characterization to assess air, soil and water pollution and exposure to toxic chemicals.

02 Publications

A. Books, chapters in books, and articles

A1. Books and chapters in books

Infante, P., Afonso, A., Jacinto, G., Rego, L., **Nogueira, P., Silva, M.**, Nogueira, V., Saisas, J., Quaresma, P., Santos, D., Góis, P., Manuel, P.R. 2022. Some Determinants for Road Accidents Severity in the District of Setúbal. In: Bispo, R., Henriques-Rodrigues, L., Alpizar- Jara, R., de Carvalho, M. (eds) Recent Developments in Statistics and Data Science. SPE 2021. Springer Proceedings in Mathematics & Statistics, vol 398. Springer, Cham. https://doi.org/10.1007/978-3-031-12766-3_14

Lima, D., **Noronha, F., Lima, A.** 2022. Development of Scientific Literacy and the Impact of Environmental Attitudes of Citizens in a Geological Natural Space. in: Vasconcelos C.- and Calheiros C. S. Editors- Enhancing Environmental Education Through Nature-Based Solution, Chapter 7. pp 83-101, ISSN 2662-9461 Integrated Science ISBN 978-3-030-91842-2 <https://doi.org/10.1007/978-3-030-91843-9>

Pires, V., Mirão, J., Sitzia, F., Lisci, C., Duarte, J., Dias, L., Alves, T., **Lopes, L.**, Martins, R. 2022. Advanced technologies for natural stone. Inovstone 4.0 - Important results from a research project on natural stone construction materials selection and performance analysis. 9th Euro-American Congress Construction Pathology, Rehabilitation Technology and Heritage Management - REHABEND 2022, 1337-1350. ISSN 23868198, ISBN 978-840942252-4

Teodoro A.C., Duarte, L. 2022. The role of satellite remote sensing in natural disaster management (chap. 10). In: Editors: Adil Denizli, Marcelo Alencar, Tuan Anh Nguyen, David Motaung (eds) Nanotechnology-Based Smart Remote Sensing Networks for Disaster Prevention, 1st Edition - May 29, 2022, Elsevier, ISBN: 9780323911665.

Teodoro A.C., Duarte, L. 2022. The synergy of remote sensing and geographical information systems in the management of natural disasters (chap. 11). In: Editors: Adil Denizli, Marcelo Alencar, Tuan Anh Nguyen, David Motaung (eds) Nanotechnology-Based Smart Remote Sensing Networks for Disaster Prevention, 1st Edition - May 29, 2022, Elsevier, ISBN: 9780323911665.

A2. Articles in peer-review Journals (ISI and Scopus)

Almeida, C.R.d., Furst, L., Gonçalves, A., **Teodoro, A.C.** 2022. Remote Sensing Image-Based Analysis of the Urban Heat Island Effect in Bragança, Portugal, Environments 2022, 9, 98. <https://doi.org/10.3390/environments9080098>

Bobos, I. 2022. Hydrothermal injection breccia with organic carbon and nitrogen in the fossil hydrothermal system of Harghita Băi, East Carpathians, Romania: an example of magmatic and non-magmatic element mobility in the upper continental crust. Geological Magazine, <https://doi.org/10.1017/S0016756822000851>

Bobos, I., de Sá, C.M., **Noronha, F.** 2022. Mineralogy, fluid inclusions, and oxygen isotope geochemistry signature of wolframite to scheelite and Fe, Mn chlorite veins from the W, (Cu,Mo) ore deposit of Borralha, Portugal. Minerals 2022, 12, 24. <https://doi.org/10.3390/min12010024>

Cardoso-Fernandes, J., Lima, J., **Lima, A.**, Roda-Robles, E., Köhler, M., Schaefer, S., Barth, A., Knobloch, A., Gonçalves, M. A., Gonçalves, F., **Teodoro, A. C.** 2022. Stream sediment analysis for Lithium (Li) exploration in the Douro region (Portugal): A comparative study of the spatial interpolation and catchment basin approaches. Journal of geochemical exploration, 236, 106978. <https://doi.org/10.1016/j.jgexplo.2022.106978>.

Carvalho, A., Ribeiro, R., Moura, R., **Lima, A.** 2002. Geophysical Exploration of Antimony Mineralizations: Alto do Sobrido and Ribeiro da Serra Mines (Portugal)". XXIIInd International Multidisciplinary Scientific GeoConference Surveying, Geology and Mining, Ecology and Management –SGEM 2022, 2022. <https://doi.org/10.5593/sgem2022/1.1/s03.033>

Costa, M., Moura, H., Pinto de Jesus, A., Suárez-Ruiz, I., **Flores, D.** 2022. Effects of Magmatic Fluids in Coals of São Pedro da Cova Coalfield, Douro Carboniferous Basin, Portugal: Insights from Inorganic Geochemistry. Minerals 12(2), 275.

Cruz, C., Sant’Ovaia, H., McCarthy, W., **Noronha, F.** 2022. Anisotropy of Out-of-Phase Magnetic Susceptibility: A Non-Standard Approach for Magnetic Subfabrics Determination in Variscan Granites of Iberian Massif. Minerals, 2022, 12, 1376, 12pp. <https://doi.org/10.3390/min12111376>

de Macedo, C. R., **da Silva, J. C. B.**, Buono, A., Migliaccio, M. 2022. Multi-polarization radar backscatter signatures of internal waves at L-band. International Journal of Remote Sensing, 43(6), 1943-1959. DOI10.1080/01431161.2022.2050435

Dias, J.M., Cruz, C., Sant’Ovaia, H., Noronha, F. 2022. Assessing the Magnetic Mineralogy of the Pre-Variscan Manteigas Granodiorite: An Unexpected Case of a Magnetite-Series Granitoid in Portugal. Minerals 2022, 12(4), 440, 1-18. <https://doi.org/10.3390/min12040440>.

Duarte, L., Teodoro, A. C., Santos, P., Rodrigues de Almeida, C., Cardoso-Fernandes, J., Flores, D. 2022. An Interactive WebGIS Integrating Environmental Susceptibility Mapping in a Self- Burning Waste Pile Using a Multi-Criteria Decision Analysis Approach. Geosciences, 12(10), 352. <https://doi.org/10.3390/geosciences12100352>.

Duarte, L., Teodoro. A.C., Gonçalves, H., 2022. Evaluation of Spatial Thinking Ability Based on Exposure to Geographical Information Systems (GIS) Concepts in the Context of Higher Education. ISPRS Int. J. Geo-Inf. 2022, 11, 417. <https://doi.org/10.3390/ijgi11080417>

Elger, K., ter Maat, G., Caldeira, R., Cimarelli, C., Corbi, F., Dominguez, S., Drury, M., Funiciello, F., Lange, O., Ougier-Simonin, A., Rosenau, M., Wessels, R., Willingshofer, E., Winkler, A., +the MSL community. 2022. The EPOS Multi-Scale Laboratories: A FAIR Framework for Stimulating Open Science Practice across European Earth Sciences Laboratories. Annals of Geophysics, 65, 3, DM318. <https://www.annalsofgeophysics.eu/index.php/annals/article/view/8790>

Errandonea-Martin, J., Garate-Olave, I., Roda-Robles; E., **Cardoso-Fernandes, J., Lima, A., Ribeiro, M.A., Teodoro, A.C.** 2022. Metasomatic effect of Li-bearing aplite-pegmatites on psammitic and pelitic metasediments: Geochemical constraints on critical raw material exploration at the Fregeneda-Almendra Pegmatite Field (Spain and Portugal). Ore Geology Reviews 150(1), 105-155. <https://doi.org/10.1016/j.oregeorev.2022.105155>.

Fahimi, A., Bontempi, E., Fiameni, L., **Guedes, A., Guimarães, R., Moreira, K., Santos, A., Valentim, B.**, Pedreanu, G., Olgun, H., Boiron, M.C, Cathelineau, M. 2022. Incineration of Aviary Manure: the Case Studies of Poultry Litter and Laying Hens Manure. Waste and Biomass Valorization 13, 3335–3357. <https://doi.org/10.1007/s12649-022-01739-4>

Fischer, T., Marchetti-Deschmann, M., Assis, A.C. Eladd, M. L., Algarra, M., Bailey, M., Barac, M., Bécue, A., Champod, C., Frascione, N., George, S., **Guedes, A.**, Heaton, C., Ron Heeren, Lazić, V., Lerma, J.L., Noskon, M., O’Hara, J., Pospíšková, K., Radovic, I.B., Rapele, M., Ristova, M., Šafaík, I., Siketic, Z., Spigulis, J., Szynkowska, M.I., Tsiatsiuyeu, A., Vella, J., van der Weerd, J., Marcel de Puit, M., Dawson, L., Francese, S. 2022. Profiling and imaging of forensic evidence - a pan-European forensic Round Robin Study Part 1: Document forgery. Science & Justice 62, 433-447. <https://doi.org/10.1016/j.scijus.2022.06.001>

Font, E., Duarte, L.V., Dekkers, M.J., Remazeilles, C., Egli, R., Spangenberg, J.E., Fantasia, A., **Ribeiro, J.**, Gomes, E., Mirão, J., Adatte, T. 2022. Rapid light carbon releases and increased aridity linked to Karoo-Ferrar magmatism during the early Toarcian oceanic anoxic event. *Scientific Reports* 12, 4342.

Gonçalves, A., Sant’Ovaia, H., Martins, H.C.B., Noronha, F. 2022. Magnetic fabrics and emplacement mechanisms of Valpaços and Freixo de Numão Variscan granites (Northern Portugal). *International Journal of Earth Sciences* 111, 1437–1468. <https://doi.org/10.1007/s00531-022-02187-0>

Gonçalves, A., Sant’Ovaia, H., Noronha, F. 2022. Role of Variscan granites in the genesis of Freixo de Numão W(Sn) district (Northern Portugal). *Journal of Iberian Geology* volume 48, 309–353. <https://doi.org/10.1007/s41513-022-00195-2>

Hitouri, S., Varasano, A., Mohajane, M., Ijlil, S., Essahlaoui, N., Ali, S.A., Essahlaoui, A., Pham, Q.B., Waleed, M., Palateerdham, S.K., **Teodoro, A.C.** 2022. Hybrid Machine Learning Approach for Gully Erosion Mapping Susceptibility at a Watershed Scale. *ISPRS Int. J. Geo-Inf.* 2022, 11, 401. <https://doi.org/10.3390/ijgi11070401>

Infante, P., Jacinto, G., Afonso, A., Rego, L., Nogueira, V., Quaresma, P., Saias, J., Santos, D., **Nogueira, P., Silva, M., Costa, R.P., Gois, P., Manuel, PR.** 2022. Comparison of Statistical and Machine-Learning Models on Road Traffic Accident Severity Classification. *COMPUTERS*. 2022; 11(5):80. <https://doi.org/10.3390/computers11050080>

Jordão, P., **Guedes, A.**, Pimentel, N. 2022. Raman Microspectroscopy applied to flint provenance at the Chalcolithic settlement of Zambujal (Torres Vedras, Portugal). *Archaeometry*. 1–18. DOI: 10.1111/arcm.12791

Kumar, A., **Couto, H.**, da Silva, J.C.G.E. 2022. Upconversion Emission Studies in Er³⁺/Yb³⁺-Doped/Co-Doped NaGdF₄ Phosphor Particles for Intense Cathodoluminescence and Wide Temperature-Sensing Applications. *Materials*, 2022, 15(19), 6563. <https://doi.org/10.3390/ma15196563>

Kuźniarska-Biernacka, I., Santos, A., Jarrais, B., **Valentim, B., Guedes, A.**, Freire, C., Peixoto, A. 2022. Application of Fe-rich coal fly ashes to enhanced reduction of 4-nitrophenol. *Cleaner Chemical Engineering*. Volume 2, 100019, <https://doi.org/10.1016/j.clce.2022.100019>

Leal, S., Lima, A., Morris, J., Pedro, M., Noronha, F. 2022. Numão gold deposit in the Iberian Variscan belt, Northern Portugal: Ore features and mineralization controls. A gold deposit in a W-Sn metallogenic province. *Ore Geology Reviews* 144. <https://doi.org/10.1016/j.oregeorev.2022.104815>.

Leal, S., Lima, A., Noronha, F., Mortensen, J., MacKenzie, D. 2022. Geological setting of the Bigorne gold deposit, Iberian Variscan belt (Northern Portugal) and Au-Bi-Te mineral assemblages as indicators of the ore-forming conditions, *Ore Geology Reviews* 141. <https://doi.org/10.1016/j.oregeorev.2021.104689>.

Magalhaes, J. M., **da Silva, J. C. B.**, Nolasco, R., Dubert, J., Oliveira, P. B. 2022. Short timescale variability in large-amplitude internal waves on the western Portuguese shelf. *Continental Shelf Research*, 246, 104812. DOI10.1016/j.csr.2022.104812

Maia, M., Barrulas, P., **Nogueira, P.**, Mirão, J., Noronha, F. 2022. In situ LA-ICP-MS trace element analysis of magnetite as a vector towards mineral exploration: A comparative case study of Fe-skarn deposits from SW Iberia (Ossa-Morena Zone). *Journal of Geochemical Exploration*, 234, 106941. <https://doi.org/10.1016/j.gexplo.2021.106941>

Maia, M., Nogueira, P., Mirão, J., **Noronha, F.** 2022. Geodiversity Assessment Through the Évora–Montemor-o-Novo Region: on the Scope of Valorising the Mining Heritage of the Ossa- Morena Zone (SW Iberia, Portugal). *Geoheritage* 14, 90. <https://doi.org/10.1007/s12371- 022-00728-2>

Maia, M., Roseiro, J., **Nogueira, P., Noronha, F.**, Fuertes-Fonte, M.;Cepedal, A., Mirão, J. 2022. New insights on the Escoural Orogenic gold district (Ossa-Morena Zone, SW Iberia): Geochemistry, fluid inclusions and stable isotope constraints from the Monfurado gold prospect. *Ore Geology Reviews*, 142, (2022), 104736, <https://doi.org/10.1016/j.oregeorev.2022.104736>

Marques, A.F.A, **Madureira, P.**, Zajacz, Z., Hu, S., Pinto Ribeiro, L. 2022. Deep sourced magma and ore-metal mobility in the D. João de Castro submarine volcano (Azores): a mineral chemistry and melt inclusion study. *Contributions to Mineralogy and Petrology*, 177-100. <https://doi.org/10.1007/s00410-022-01963-0>.

Marques, F., **Pedro, J.**, Araújo, A., Moita, P., Carneiro, J., Sousa, P., Carvalho, J., Correia, A. 2022. Insights about the Sines massif: a reinterpretation of geophysical data to the assessment of the potential for CO₂ storage through mineral carbonation. *Comunicações Geológicas*, 2022, vol. 109, nº 1, p. 33-41 <https://doi.org/10.34637/2fmc-mz67>

Medeiros, S., Fernandes, I., Fournier, B., Nunes, J.C., Santos-Silva, A., **Ramos, V.**, Soares, D. 2022. Alkali–silica reaction in volcanic rocks: a worldwide comparative approach. *Materiales de Construcción* (72) Issue 346, e278, 13 pp. doi.org/10.3989/mc.2022.16221.

Müller, A., Reimer, W., Wall, F., Williamson, B., Menuge, J., Brönnér, M., Haase, C., Brauch, K., Pohl, C., **Lima, A., Teodoro, A.C., Cardoso-Fernandes, J.**, Roda-Robles, E., Harrop, J., Smith, K., Wanke, D., Unterweissacher, T., Hopfner, M., Schröder, M., Clifford, B., Moutela, P., Lloret, C., Ranza, L., Rausa, A. 2022. GREENPEG - Exploration for pegmatite minerals to feed the energy transition: First steps towards the Green Stone Age. Geological Society, London, Special Publications, 526, SP526-2021-2189. <https://doi.org/10.1144/SP526-2021-189>.

Nunes, M., Pereira, C., **Guedes, A., Santos, A.C., Valentim, B.**, Freire, C. 2022. Assessment of coal fly ash char as a substituting material of graphite with electrocatalytic activity for the oxygen reduction reaction. *Sustainable Chemistry and Pharmacy*. 27, 100705. <https://doi.org/10.1016/j.scp.2022.100705>

Oliveira, A.J.T., Martins, H.C.B., Sant’Ovaia, H. 2022. Permo-Carboniferous hypabyssal magmatism in northern Portugal: the case of the Lamas de Olo microgranite and lamprophyre dykes. *Journal of Iberian Geology*, 48, 1-28. <https://doi.org/10.1007/s41513-021-00179-8>;

Padrão, A., Duarte, L., **Teodoro, A.C.**, 2022. A GIS Plugin for Susceptibility Modeling: Case Study of Wildfires in Vila Nova de Foz Côa. *Land* 2022, 11, 1093. <https://doi.org/10.3390/land11071093>

Parianos, J., O’sullivan, A., **Madureira, P.** 2022. Geology of parts of the central and eastern Clarion Clipperton Zone. *Journal of Maps*. <https://doi.org/10.1080/17445647.2022.2035267>.

Pereira, B., Antunes, M., **Sant’Ovaia, H.**, Gonçalves, L., **Cruz, C.**, Azevedo, J., Oliveira, J., 2022. Geophysical exploration as a geothermal resources research tool at a granitic basement – the Braga area case study. *European Geologist journal European Federation of Geologists*.

Ramos, V., Andersen, J.C., Rollinson, G.K. 2022. Mineralogical and microtextural characterization of eco-friendly concrete for marine infrastructures: Methodologies for the MARINEFF Project. *Marineff International Conference 2022*, IOP Conference Series, Materials Science and Engineering (1245), 012013. <https://doi:10.1088/1757-899X/1245/1/012013>

Ribeiro, J., Suárez-Ruiz, I., **Flores, D.**, 2022. Coal related fires in Portugal: new occurrences and new insights on the characterization of thermally affected and non-affected coal waste piles. International Journal of Coal Geology 252, 103941.

Roda-Robles, E., Gil-Crespo, P. P., Pesquera, A., **Lima, A.**, Garate-Olave, I., Merino-Martínez, E., **Cardoso-Fernandes, J.**, Errandonea-Martin, J. 2022. Compositional Variations in Apatite and Petrogenetic Significance: Examples from Peraluminous Granites and Related Pegmatites and Hydrothermal Veins from the Central Iberian Zone (Spain and Portugal). Minerals, 12(11), 1401. <https://doi.org/10.3390/min12111401>.

Roque, C., Hernandez-Molina, F.J., **Madureira, P.**, Quartau, R., Magalhães, V., Brito, P., Vazquez, J.T., Somoza, L. 2022. Interplay of deep-marine sedimentary processes with seafloor morphology offshore Madeira Island (Central NE-Atlantic). Marine Geology, 443, 106675. <https://doi.org/10.1016/j.margeo.2021.106675>.

Santos-Ferreira, A. M., **da Silva, J. C. B.**, Magalhaes, J. M., Amraoui, S., Moreau, T., Maraldi, C., Boy, F., Picot, N., Borde, F. 2022. Effects of Surface Wave Breaking Caused by Internal Solitary Waves in SAR Altimeter: Sentinel-3 Copernicus Products and Advanced New Products. Remote Sensing, 14(3), 587. <https://doi.org/10.3390/rs14030587>

Santos, A.C., Guedes, A., French, D., Futuro, A., Valentim, B. 2022. Integrative study assessing space and time variations with emphasis on rare earth elements (REE) distribution and their potential on ashes from commercial (Colombian) coal. Minerals. 12, 194. <https://doi.org/10.3390/min12020194>.

Santos, D., **Cardoso-Fernandes, J., Lima, A.**, Müller, A., Brönner, M., **Teodoro, A.C.** 2022. Spectral Analysis to Improve Inputs to Random Forest and other Boosted Ensemble Tree- Based Algorithms for Detecting NYF Pegmatites in Tysfjord, Norway. Remote Sensing, 14(15), 3532. <https://doi.org/10.3390/rs14153532>.

A3. Articles in national Journals

Azzalini, A., Faria, P., **Lopes, L.**, Martins, R., Mourão, P., Pires, V. 2022. Produção de argamassa à base de cal a partir da calcinação de lamas carbonatadas provenientes da indústria das rochas ornamentais. Pedra e Cal 72, 14-18, março 2022. <http://hdl.handle.net/10174/31478>

Cardoso-Fernandes, J., Lima, A., Teodoro, A. C. 2022. Imagens de satélite, Geologia e IA, 2022. Revista de Ciência Elementar, 24-28. Casa das Ciências. Dezembro 2022.

Lopes, L. 2022. A Disputa Pelo Território e o Acesso às Matérias-Primas: Questão Antiga, Novas Abordagens. Keramica, nº 375, ano XLVII março/abril 2022. pp. 12 - 14. <https://issuu.com/apicer-ceramicsportugal>

Resta, G., Carvalho, M., **Carvalho, A.**, Frutuoso, R., **Santos, P., Lima, A., Flores, D.**, 2022. Contaminação de Arsénio nos solos na envolvente do complexo mineiro abandonado de Ribeiro da Serra. GeoCore, Edição 6, p. 18. ISSN: 2183-7848.

Sales dos Santos, j., Parise, C., **Duarte, L.**, Gonçalves de Lima, L., Silva Aguiar, M.J., **Teodoro, A.C.** 2022. Avaliação e Mapeamento da Vulnerabilidade Costeira Regional para o Complexo Portuário do Itaqui –Maranhão –Brasil: Ambientes e a Cidade Litorânea. GeoCore, Edição 6. ISSN: 2183-7848

Sant’Ovaia, H. 2022. GeoNotícias. O vulcão da Península de Reykjanes. GeoCore, Edição 6. 14-16. ISSN: 2183-7848

Sant’Ovaia, H. 2022. Campo Magnético Terrestre: da sua origem à interação com a biosfera. Boletim nº 36: 7 – 13. Associação Portuguesa de Professores de Biologia e Geologia.

B. Conference proceedings

B1. International conference proceedings

Badenhorst, C., **Guedes, A., Valentim, B.**, 2022. Novel Circular Economic Approaches for Efficient Extraction of Valuables from Spend Li-Ion Batteries (NEXT-LIB): Recovery of Anode Graphite. 2nd Online Conference for Young Researchers 2022. Circular Economy: Make It Happen. Associação Smart Waste Portugal. Oral communication at: <https://youtu.be/lP4bbouEayk>

Bobos, I. 2022. Chlorite minerals diversity in the mineralized hydrothermal systems, Book of Abstracts *MEEC 2022, Poland*

Cardoso-Fernandes, J., Almeida, C. R., Lima, A., Teodoro, A.C., Ribeiro, M.A., Roda-Robles, E., Errandonea-Martin, J., Garate-Olave, I. 2022. Spectrometry Analysis Techniques for LCT Pegmatite Halo Identification: The Role of European Projects. Conference: IGARSS 2022 - 2022 IEEE International Geoscience and Remote Sensing Symposium, Julky 2022, DOI: 10.1109/IGARSS46834.2022.9883663

Cardoso-Fernandes, J., Ribeiro, M. A., Lima, A., Roda-Robles, E., Errandonea-Martin, J., Garate-Olave, I., **Teodoro, A. C.** 2022. Contributions of lithogeochemistry to discriminate sedimentary and metasomatic processes within evolved pegmatite exomorphic haloes: insights from the LIGHTS project". XIII Congreso Ibérico de Geoquímica, Puertollano, April 2022.

Cardoso-Fernandes, J., Roda-Robles, E., Errandonea-Martin, J., Garate-Olave , I., **Lima, A., Ribeiro, M.A.,** Almeida, C. R., **Teodoro, A.C.,** 2022. Mineral chemistry and spectroscopy of metasedimentary host rocks of aplite-pegmatite dykes: one step closer to the detection of buried Lithium (Li) pegmatites in the Fregeneda-Almendra area, Conference: Goldschmidt, January 2022, DOI: 10.46427/gold2022.11309.

Cardoso-Fernandes, J., Rodrigues de Almeida, C., Lima, A., Teodoro, A. C., Ribeiro, M. A., Roda-Robles, E., Errandonea-Martin, J., Garate-Olave, I. 2022. Spectrometry Analysis Techniques for LCT Pegmatite Halo Identification: The Role of European Projects. IGARSS 2022 - 2022 IEEE International Geoscience and Remote Sensing Symposium (17-22 July 2022), p. 6436-6439. doi: <https://doi.org/10.1109/IGARSS46834.2022.9883663>.

Cardoso-Fernandes, J., Santos, D., Lima, A., Brönnner, M., Teodoro, A.C. 2022. Exploiting Sentinel-1 and Sentinel-2 data for province scale exploration: the GREENPEG project case studies". Proceedings of Living Planet Symposium 2022, Bonn, Germany, 2022

Cardoso-Fernandes, J., Santos, D., Lima, A., Teodoro, A. C. 2022. Assessing the PRISMA Potential for Mineral Exploration to Vector Low-Grade Lithium Deposits. IGARSS 2022 - 2022 IEEE International Geoscience and Remote Sensing Symposium (17-22 July 2022), p. 5985- 5988. <https://doi.org/10.1109/IGARSS46834.2022.9884607>.

Cardoso-Fernandes, J., Teodoro, A. C., Lima, A., Menuge, J., Brönnner, M., Steiner, R. 2022. Sentinel-1 and ALOS data for lineament extraction: a comparative study. Proceeding of SPIE Remote Sensing, Earth Resources and Environmental Remote Sensing/GIS Applications XIII, 122680X (26 October 2022), Berlin, Germany. <https://doi.org/10.1117/12.2636117>.

Carneiro, J., Moita, P., **Pedro, J.,** Berrezueta, E., Abdoulghafour, H., Marques, F., Araújo, A., Beltrame, A., Barrulas, P., Pinho, C., Caeiro, H., Mirao, J. 2022. Basic plutonic rocks: na unconventional solution for CO₂ storage through mineral carbonation? 2ndMedGU, Marrakech, Morocco. Springer Publishing Partner, Track 4, Environmental Earth Sciences, 1pp.

Carvalho, A., Ribeiro, R., Moura, R., Lima, A., Gloaguen, E. 2022. Gravimetric Survey in the Alto do Sobrido and Ribeiro da Serra Mines (Portugal). 16th Biennial Meeting SGA 2022 - Society for Geology Applied to Mineral Deposits, 2022.

Carvalho, A., Ribeiro, R., Moura, R., Lima, A. 2022. Comparison Between Gravimetry and Radiometry Results: Alto do Sobrido-Ribeiro da Serra Case Study". EGU General Assembly 2022, Vienna, 2022. <https://doi.org/10.5194/egusphere-egu22-418>

Carvalho, M., **Gonçalves, P.A., Flores, D.**, 2022. Analysis of charcoal fragments from a wildfire in Portugal: a preliminary petrographic characterization. Abstracts of the 38th Annual Meeting of the Society for Organic Petrology: 2022, Volume 38, Virtual, 12th –16th September 2022; ISSN 1060-7250.

Çelebi, E.E., **Ribeiro, J.** 2022. Acid drainage potential of combusted coal mining wastes: the case of São Pedro da Cova waste pile, NW of Portugal. XIII Congresso Ibérico e XIII Congresso Nacional de Geoquímica, p. 33. Puertollano (Ciudad-Real), España, 25-27 abril 2022.

Costa, M., Moura, H., Pinto de Jesus, A.D., Flores, D. 2022. Assinatura geoquímica de fluidos ígneos nos carvões da Bacia Carbonífera do Douro: setores de São Pedro da Cova e Pejão. XIII Congreso Ibérico Y XIII Congreso Nacional de Geoquímica, Puertollano (Ciudad-Real), España, 25-27 abril 2022, p. 251-264.

Costa, M., Rajnauth, A., Santos, P., Ribeiro, J., Flores, D. 2022. Petrographic and geochemical characterization of a coal waste pile affected byself-burning in the Douro Coalfield, Portugal. 73rd Annual Meeting of the International Committee for Coal and Organic Petrology (ICCP 2022), Symposium on Recent trends on coal utilization for sustainable development and energy security, 18-25 September 2022, New Dehli, India. p. 1-2.

Cruz, B., **Gonçalves, P.A., Flores, D.** 2022. Evaluation of the Quality of Portuguese Wood Pellet Fuels Through Reflected Light Microscopy. Abstracts of the 38th Annual Meeting of the Society for Organic Petrology: 2022, Volume 38, Virtual, 12th –16th September 2022; ISSN 1060-7250.

Cruz, C., Dias, J., Font, E., Noronha, F., Sant'Ovaia, H. 2022. Disclosing the redox conditions in Central Portugal magmatism: the Manteigas granodiorite case study, EGU General Assembly 2022, Vienna, Austria, 23–27 May 2022, EGU22-6004, <https://doi.org/10.5194/egusphere-egu22-6004>, 2022.

Cruz, C., Martins, H.C.B., Roseiro, J., Nogueira, P., Noronha, F., Sant’Ovaia, H. 2022. Magmatic sources and emplacement mechanisms of the Santa Eulália Plutonic Complex facies: integrating geochronological and geochemical data. *Geoquímica Ibérica: Compendio de los trabajos presentados en el XIII Congreso Nacional de Geoquímica y XIII Congreso Ibérico*. Puertollano (Ciudad-Real), España, 25-27 abril 2022, 223-231.

De Macedo, C. R., **Da Silva, J. C.**, Buono, A., Migliaccio, M. 2022. L-Band Co-Polarized Backscattering Analysis of Internal Waves. *Proceedings of IGARSS 2022-2022 IEEE International Geoscience and Remote Sensing Symposium* (pp. 6959-6962). IEEE.

Duarte, L., Castro, J.P., Sousa, J.J., and Pádua, L. 2022. GIS Application to Detect Invasive Species in Aquatic Ecosystems," *IGARSS 2022 - 2022 IEEE International Geoscience and Remote Sensing Symposium*, 2022, pp. 6013-6018, doi: 10.1109/IGARSS46834.2022.9884895.

Duarte, L., Sofia Scomparim, **Teodoro, A.C.** 2022. Vegetation phenology from Sentinel 2 data: a GIS open source application, *Proc. SPIE 12268, Earth Resources and Environmental Remote Sensing/GIS Applications XIII*, 122680S (26 October 2022); <https://doi.org/10.1117/12.2636012>.

Errandonea-Martin, J., Garate-Olave, I., Roda-Robles, E., **Cardoso-Fernandes, J., Lima, A., Ribeiro, M. A., Teodoro, A. C.** 2022. Metasomatic aureoles of highly mobile elements related to evolved granitic aplite-pegmatites from Fregeneda-Almendra (Spain-Portugal). *EGU General Assembly 2022*, May 2022. <https://doi.org/10.5194/egusphere-egu22-2508>.

Fernandes, I., Santos Silva, A., **Ramos, V.**, Soares, D. 2022. Sequel of the IMPROVE Project: petrographic analysis of the concrete from concrete prism tests. *Proceedings of the 16th International Conference on Alkali-Aggregate Reaction in Concrete, Volume I*, Lisboa, Portugal (31st May-2nd June), 613-625.

Flores, D., Santos, P., Narayan, A., Espinha Marques, J., Ribeiro, J., 2022. Estudo geoquímico de uma escombreira mineira afetada por autocombustão como fonte de contaminação de solos (Bacia Carbonífera do Douro). *XIII Congreso Ibérico Y XIII Congreso Nacional de Geoquímica*, Puertollano (Ciudad-Real), España, 25-27 abril 2022, p. 1.

Font, E., Sánchez-Moreno, E.M., Dimuccio, L.A., Hillaire-Marcel, C., Ghaleb, B., **Ribeiro, J.**, Veiga-Pires, C., Trindade, R., Feinberg, J., Lima, E., Fu, R., Edwards, R., Ponte, J., Pais, A., Cunha, L., Weiss, B. 2022. Paleomagnetism of Portuguese stalagmites: advances and perspectives. EGU 2022.

Freire-Lista, D., Santos, J. F., **Lopes, L.** 2022. Characterisation and Historical Quarries Location of Marbles from Guarrazar Archaeological Site (Toledo, Spain)., EGU General Assembly 2022, Vienna, Austria, 23–27 May 2022, EGU22-1268, <https://doi.org/10.5194/egusphere-egu22-1268>, 2022. Oral presentation.

Frutuoso, R., **Lima, A.**, Soares, F., **Carvalho, A.**, Ribeiro, M. 2022. Soil Sampling Campaign and Geochemical Analysis in the Ribeiro da Serra Mine (Gondomar,Portugal)". 16th Biennial Meeting SGA 2022 - Society for Geology Applied to Mineral Deposits, 2022.

Funiciello, F., Rosenau, M., Dominguez, S., Willingshofer, E., ter Maat, G., Zwaan, F., Corbi, F., Eisermann, J. O., Guillaume, B., Souloumiac, P., Brizzi, S., Mastella, G., Reitano, R., Druguet, E., Schreurs, G., and Faccenna, C. **and the EPOS Multi-Scale Laboratories Team.** 2022. Sharing data and facilities in the analogue modelling community: the EPOS Multi-Scale Laboratories Thematic Core Service, EGU General Assembly 2022, Vienna, Austria, 23–27 May 2022, EGU22-4212. <https://doi.org/10.5194/egusphere-egu22-4212>

Gonçalves, A., Lima, L., Sant’Ovaia, H., Noronha, F. 2022. Geochemical Signatures of Variscan Granites from the Penedos-Borralha Area (Northern Portugal). Abstract book: XIII Congreso Nacional de Geoquímica and XIII Congreso Ibérico, Puertollano (Ciudad-Real), Spain, 25th-27th april 2022, 175-185. ISBN: 978-84-09-38946-9.

Gonçalves, A., Sant’Ovaia, H., Noronha, F. 2022. Petrofabric patterns of two contrasting plutons: example of Penedos and Borralha granites (Montalegre, Northern Portugal). Abstract book: European Geosciences Union (EGU), Vienna, Austria & Online, 23rd–27th may 2022, EGU22-5153.

Gonçalves, A., Sant’Ovaia, H., Noronha, F. 2022. Portuguese Variscan granites with metallogenetic potential: what are their geological, petrophysical and geochemical signatures? 16TH BIENNIAL MEETING SGA 2022. The Critical Role of Minerals in the Carbon Neutral Future. Proceedings Volume 2. Abstracts: p. 64.

Gonçalves, A., Sant’Ovaia, H., Noronha, F. 2022. Zircon U-Pb Geochronology of Variscan Intrusions from Northern and Central Portugal: Examples of Freixo de Numão and Capinha Granites. Abstract book: XIII Congreso Nacional de Geoquímica and XIII Congreso Ibérico, Puertollano (Ciudad-Real), Spain, 25th-27th april 2022, 145-154. ISBN: 978-84-09-38946-9.

Gonçalves, P.A., da Silva, F., **Nogueira, P.**, Mendonça Filho, J.G., **Flores, D.** 2022. Palynofacies and organic geochemistry of the Permo-Jurassic organic matter in the Cribas Anticline (Timor-Leste): Preliminary results. 73rd Annual Meeting of the International Committee for Coal and Organic Petrology (ICCP 2022), Symposium on Recent trends on coal utilization for sustainable development and energy security, 18-25 September 2022, New Dehli, India. p. 10-11.

Gonçalves, P.A., Santos, R., **Flores, D.** 2022. Caracterização da fração inorgânica de carbonatos da Bacia Lusitânica (Portugal). XIII Congreso Ibérico Y XIII Congreso Nacional de Geoquímica, Puertollano (Ciudad-Real), España, 25-27 abril 2022, p. 199-207.

Guedes, A., Ribeiro, H., Sant’Ovaia, H., Valentim, B. 2022. Soil forensic analyses with portable non-destructive equipment. 5.o Seminario iberoamericano: Geociencias forenses, ciencias forenses al servicio de la búsqueda de personas desaparecidas Oral communication by video.

Guimarães, R., Guedes, A., Valentim, B. 2022. Characterization of cork powder ash from three different combustion units in Portugal. 9th International Conference on Engineering for Waste and Biomass Valorisation (WasteEng2022), June 27-30, 2022 - Copenhagen – Denmark. Abstract #031. Poster presentation.

Guimarães, R., Guedes, A., Valentim, B. 2022. Simple washing and magnetic separation of cork powder ash components. 9th International Conference on Engineering for Waste and Biomass Valorisation (WasteEng2022), June 27-30, 2022 - Copenhagen – Denmark. Abstract #032. Oral presentation.

Ínsua-Pereira, G., Bobos, I., Pinto de Meireles, C. P. 2022. Serpentized ultrabasic rocks from the Bragança UAT, NE Portugal: textures and mineralogy [Poster presentation]. IMA 2022 Intervention Book, 18-22 July 2022, Lyon, France, p. 122.

Laranjeira, V., Ribeiro, J., Moreira, N., Nogueira, P., Sant’Ovaia, H., Flores, D. 2022. Suscetibilidade magnética de xistos negros associados a mineralizações de Cu em Portugal: correlação com a mineralogia e composição química. XIII Congreso Ibérico Y XIII Congreso Nacional de Geoquímica, Puertollano (Ciudad-Real), España, 25-27 abril 2022, p. 241-250.

Lima, L., Guedes, A., Bobos, I. Noronha, F. 2022. Santa Helena breccia elements REE signatures in the context of the Borralha deposit area (Northern Portugal). XIII Congreso Ibérico Y XIII Congreso Nacional de Geoquímica, Puertollano (Ciudad-Real), España, 25-27 abril 2022

Lima, L., Guedes, A., Bobos, I. Noronha, F. 2022. The geochemical signature from the lithologies of Justes deposit (Northern Portugal). XIII Congreso Ibérico Y XIII Congreso Nacional de Geoquímica, Puertollano (Ciudad-Real), España, 25-27 abril 2022.

Lima, L., Guedes, A., Bobos, I., Noronha, F. 2022. The mineralizing fluids of the Santa Helena Breccia- a unique W deposit in the Iberian Peninsula, EGU General Assembly 2022, Vienna, Austria, 23–27 May 2022, EGU22-8165, <https://doi.org/10.5194/egusphere-egu22-8165>, 2022.

Loaiza, A., Gonçalves, P.A., Mendonça Filho, J.G., Flores, D. 2022. Palynofacies Analysis of Lower-Middle Jurassic Sediments from the Lusitanian Basin (Portugal). Abstracts of the 38th Annual Meeting of the Society for Organic Petrology: 2022, Volume 38, Virtual, 12th – 16th September 2022; ISSN 1060-7250.

Lopes, L., Kullberg, J. C., Prego, A., Alves, T., Martins, R. 2022. Heritage Stone, Brecha da Arrábida, Portugal. Oral presentation on the "The 100 First IUGS Geological Sites", Zumaia, Basque Country, Spain 25 - 28 October 2022. <http://hdl.handle.net/10174/33034>

Lopes, L., Pinho, A., Cavaco, F., Duarte, I., Bonito, N., Faria, P., Martins, R. 2022. O plano nacional de intervenção nas pedreiras em situação crítica, estabilidade de taludes e questões de segurança no trabalho nas pedreiras do anticlinal de Estremoz, Portugal. Livro de atas do 9º Congresso Luso-Moçambicano de Engenharia / VI Congresso de Engenharia de Moçambique, CLME 2022/IV CEM – Desafios da Engenharia na Cooperação para o Desenvolvimento e Combate às Alterações Climáticas. J.F. Silva Gomes, Carlos C. António Clito F. Afonso e António S. Matos editores. Maputo 28 de agosto – 1 de setembro 2022. ISBN 978-989-54756-4-3. pp. 287-288. Oral presentation.

Maia, M., Nogueira, P., Barrulas, P., Mirão, J., Noronha, F. 2022. Discriminating Fe deposits from Ossa-Morena Zone (SW Iberia): Random Forest classification of in-situ LA-ICP-MS trace element analysis of magnetite . XIII Congreso Ibérico Y XIII Congreso Nacional de Geoquímica, Puertollano (Ciudad-Real), España, 25-27 abril 2022.

Mansilha, C., Melo, A., **Flores, D., Ribeiro, J., Rocha, J., Martins, V., Santos, P., Espinha Marques, J.** 2022. Abandoned Coal Mines: Assessment of Water Quality for Irrigation. A Case Study. Proceedings of the 39th IAHR World Congress - From Snow to Sea, 19–24 June 2022, Granada, Spain, p. 3310-3316. (ISSN-L 2521-7119).

Martins, R., **Lopes, L.**, Branco, E. 2022. Pedreiras de rochas ornamentais – exploração subterrânea versus exploração a céu aberto. Livro de atas do 9º Congresso Luso-Moçambicano de Engenharia / VI Congresso de Engenharia de Moçambique, CLME 2022/IV CEM – Desafios da Engenharia na Cooperação para o Desenvolvimento e Combate às Alterações Climáticas. J.F. Silva Gomes, Carlos C. António Clito F. Afonso e António S. Matos edit. Maputo 28 de agosto – 1 de setembro 2022. ISBN 978-989-54756-4-3. pp. 285-286. Oral presentation.

Medeiros, S., Fernandes, I., Fournier B., Nunes, J.C., Santos Silva, A., **Ramos, V.**, Soares, D. 2022 Alkali-silica reaction in volcanic rocks: a worldwide comparative approach. Extended abstract, Proceedings of the 16th International Conference on Alkali-Aggregate Reaction in Concrete, Volume II, Lisboa, Portugal (31st May-2nd June), 445-446.

Melo, R., Font, E., **Ribeiro, J.** 2022. Magnetic and mercury fingerprint of burnt soils from Portugal. 17th Castle Meeting on Palaeo, Rock and Environmental Magnetism, 1pp.

Mendes, J., **Santos, A.C.**, **Valentim, B.**, Kuźniarska-Biernacka, I., Peixoto, A.F., Freire, C. 2022. Recycling industrial coal fly ashes for catalytic reduction of nitroarenes. 13th Inorganic & Bioinorganic Chemistry Congress, Aveiro (Portugal), March 29-30.

Miranda, P.A., **Santos, A.C.**, **Valentim, B.**, **Guedes, A.**, Pereira, C., Peixoto, A.F., Kuźniarska- Biernacka, I. 2022. (Photo)catalytic transformation of HMF into value-added products. Libro de resúmenes del XXVI Encontro Internacional Galego-Portugués de Química. Facultade de Química da Universidade de Santiago de Compostela. Santiago de Compostela (España) 2022. Pag. 384. ISBN 978-84-09-45895-0.

Moita, P., Berrezueta, E., Abdoulghafour, H., Beltrame, M., Mirão, J., Ribeiro, C., Barrulas, P., **Pedro, J.**, Carneiro, J. 2022. Mineralogical and chemical changes induced by experiments of interaction between supercritical CO₂ and plutonic mafic rocks. A case study in Portugal., EGUGeneral Assembly Austria, EGU22-5158. <https://doi.org/10.5194/egusphere-egu22-5158>

Monteiro, M., **Santos, A.C.**, **Valentim, B.**, **Guedes, A.**, Maniukiewicz, W., Peixoto, A.F., Kuźniarska-Biernacka, I. 2022. Photocatalytic Transformation of biomass-derived compounds into valuable products. Libro de resúmenes del XXVI Encontro Internacional Galego-Portugués de Química. Facultade de Química da Universidade de Santiago de Compostela. Santiago de Compostela (España) 2022. Pag. 426. ISBN 978-84-09-45895-0.

Moreira, N., Araújo, A., **Pedro, J.**, Roseiro, J. 2022. Tectono-stratigraphic architecture of parautochthonous and allochthonous successions of Viana-Alvito region (SW of Ossa-Morena Zone). International meeting Ossa Morena and beyond; a tribute to Teodoro Palacios, Universidade da Extremadura, Universidade da Extremadura, Badajoz, 27-28.

Mota, A., **Gonçalves, A.**, Fadón, O., **Noronha, F.** 2022. Geochemistry of the Rare Earth Elements in Granites from Northern and Central Portugal and Castilla-León in Spain. Abstract book: XIII Congreso Nacional de Geoquímica and XIII Congreso Ibérico, Puertollano (Ciudad- Real), Spain, 25th-27th april 2022, 214-222. ISBN: 978-84-09-38946-9.

Mota, A., Noronha, F. 2022. Hypogenic mineralizations of W and Sn in Northern and Central Portugal, and Castille and León regions of Spain

Mota, E., **Guimarães, R.**, **Valentim, B.**, **Guedes, A.**, Freire, C., Peixoto, A.F., Kuźniarska-Biernacka, I. 2022. (Photo)catalytic reduction of 4-NPh using TiO₂ from Cork Powder Fly Ashes. Libro de resúmenes del XXVI Encontro Internacional Galego-Portugués de Química. Facultade de Química da Universidade de Santiago de Compostela. Santiago de Compostela (España) 2022. Pag. 385. ISBN 978-84-09-45895-0.

Nash, W., **Ramos, V.**, Andersen, J., Rollinson, G., Crane, R. 2022. Mineralogical characterisation of Polish Coal Gangues and assessment as a potential concrete aggregate. Book of abstracts of the 18th Euroseminar on Microscopy Applied to Building Materials (EMABM), Lille, France (15th-18th May), 35-40.

Nogueira, P., Silva, M., Infante, P., Manuel, P.R., Rego, L., Afonso, A., Jacinto, G. 2022. Combining KDE and DBSCAN clustering to understand road traffic accidents: The case of Setúbal, Portugal, IFCS22 - 17th conference of the International Federation of Classification Societies, Classification and Data Science in the Digital Age, 19-23 July 2022, Porto, p. 87

Oliveira, A., Martins, H.C.B., Sant'Ovaia, H. 2022. Unveiling the magnetic mineralogy and magma flow dynamics within subvolcanic dykes from northern Portugal, Central Iberian Zone. In: EGU General Assembly Conference Abstracts, pp. EGU22-6331. <https://doi.org/10.5194/egusphere-egu22-6331>.

Oliveira, A.J.T., Martins, H.C.B., Sant'Ovaia, H. 2022. Petrology and geochemistry of hypabyssal dykes from the Vila Nova de Foz Côa area of northern Portugal (Central Iberian Zone). XIII Congreso Nacional de Geoquímica y XIII Congreso Ibérico, Puertollano, Spain, Abstract book, p. 186-198.

Ortiz-Loaiza, W.A., Gonçalves, P.A., Mendonça Filho, J.G., Flores, D. 2022. Palynofacies analysis of Lower-Middle Jurassic sediments from the Lusitanian Basin (Portugal). In: Abstracts of the 38th Annual Meeting of The Society for Organic Petrology, Volume 38, p. 17, 12-16 September. ISSN 1060-7250. (Online)

Pacheco, M., Pinto, T.V. Sousa, C.M., Guedes, A., Coelho, P.J., Freire, C., Clara Pereira, C. 2022. WO₃_naphthopyran hybrid nanomaterials: the new frontier to accomplish enhanced light-responsive textiles. Hybrid Materials 2022. Seventh International Conference on Multifunctional, Hybrid and Nanomaterials (elsevier.com) Genoa Italia.

Pereira, G., Bobos, I., Meireles, C. 2022 Textures and mineralogy of serpentized rocks from the UAC, Bragança, Portugal, Book of Abstracts IMA Congress, 2022, Lyon, France.

Ramos, V., Andersen, JC, Rollinson, G.K., Bourguiba, A., Sebaibi, N., Boutouil, M. 2022. Mineralogical and microtextural characterization of the surface of concrete immersed in seawater for 3, 6 and 12 months. Book of abstracts of the 18th Euroseminar on Microscopy Applied to Building Materials (EMABM), Lille, France (15th-18th May), 51-56.

Ribeiro, J. 2022. Uncontrolled combustion of coal gangue: an overview about environmental impacts and potential solutions for reuse and rehabilitation in cases from Portugal. Mineralogia - Special Papers, Mineralogical Society of Poland, 50, 2pp.

Ribeiro, J., Celebi, E.E., Erbolato Filho, J., Pereira, A. 2022. Understanding the burning of coal mining waste deposits triggered by forest fires - contributes to evaluation of environmental impact. EGU Galileo conference - Fire impacts at the Earth surface across space and time: perspectives for future fire management, p. 39.

Rodrigues, M., Guedes, A., Bobos, I., Noronha, F. 2022. Contributions to the knowledge of lithiophilite-triphylite from the Mesquitela pegmatite (Mangualde). XIII Congreso Ibérico Y XIII Congreso Nacional de Geoquímica, Puertollano (Ciudad-Real), España, 25-27 abril 2022.

Roseiro, J., Moreira, N., Nogueira, P., De Oliveira, D., Eguiluz, L. 2022. Revisiting geochemical data from the Ossa-Morena Zone peralkaline rocks: New insights on petrogenesis during the Cambrian-Ordovician rift-related alkaline magmatism in the Iberian Massif, EGU General Assembly 2022, Vienna, Austria, 23–27 May 2022, EGU22-9260, <https://doi.org/10.5194/egusphere-egu22-9260>, 2022.

Sant'Ovaia, H., Cruz, C., Font, E. 2022. Authigenic magnetite in soils: pollution fingerprints in a former wolfram mining, EGU General Assembly 2022, Vienna, Austria, 23–27 May 2022, EGU22-4141, <https://doi.org/10.5194/egusphere-egu22-4141>, 2022.

Santos, A.C., Badenhorst, C., Bialecka, B., **Guedes, A.,** Predeanu, G., Wagner, N., **Valentim, B.** 2022. Graphitization of coal chars. In: book of abstracts of the 73rd Annual Meeting and Symposium of the International Committee for Coal and Organic Petrology. September 18– 25, 2022, New Delhi, India.

Santos, D., Cardoso-Fernandes, J., Lima, A., Teodoro, A. C. 2022. The potential of spectral unmixing method applied to PRISMA hyperspectral images in the identification of Li minerals: an evaluation for prospecting purposes. Proceeding of SPIE Remote Sensing, Earth Resources and Environmental Remote Sensing/GIS Applications XIII, 1226811 (26 October 2022), Berlin, Germany. <https://doi.org/10.1117/12.2636034>.

Santos, P., Monteiro, M., Ribeiro, J.A., Pereira, C., **Espinha Marques, J., Ribeiro, J.,** Azenha, M., **Flores, D.** 2022. Potentially toxic elements in mining waste affected by coalfires in a Douro Coalfield waste pile. XIII Congreso Ibérico Y XIII Congreso Nacional de Geoquímica, Puertollano (Ciudad-Real), España, 25-27 abril 2022, p. 265-274.

Silva M.G., Nogueira, P., Henriques, R., Gonçalves, M.A. 2022. Remote sensing in Ossa-Morena Zone: lithological and mineralogical mapping using satellite and multispectral drone imagery, Ossa Morena and beyond: a tribute to Teodoro Palacios, International Meeting University of Extremadura, Badajoz, Spain, 26-27 January 2022, p. 41

Silva, M., Nogueira, P., Henriques, R., Gonçalves, M. 2022. Application of unsupervised machine learning techniques for lithological and soil mapping in Ossa-Morena Zone, EGU General Assembly 2022, Vienna, Austria, 23–27 May 2022, EGU22-9265, <https://doi.org/10.5194/egusphere-egu22-9265>, 2022.

ter Maat, G. and Wessels, R. **and the EPOS TCS Multi-Scale Laboratories Team.** 2022. How to publish your data with the EPOS Multi-scale Laboratories data publication chain, EGU General Assembly 2022, Vienna, Austria, 23–27 May 2022, EGU22-8427. <https://doi.org/10.5194/egusphere-egu22-8427>

Tomillo, P., Suárez-Ruiz, I., Díaz-Somoano, M., **Ribeiro, J.,** Luis, D. 2022. Geochemical and Petrological data exploration of selected samples from coal polluted beaches in the Castrillón Minucipality (Asturias, Spain). Abstracts of the 38th Annual Meeting of The Society for Organic Petrology, vol. 38, pp. 64.

B2. National conference proceedings

Almeida, C. R., Teodoro, A. C., Gonçalves, A. 2022. Using Remote Sensing data to analyze the Urban Heat Island in Bragança, Portugal. IJUP 2022.

Almeida, C. R., Teodoro, A. C., Gonçalves, A. 2022. Using Remote Sensing data to analyze the Urban Heat Island in Bragança, Portugal. Livro de resumos das Jornadas do ICT 2022, pag. 26, 2022.

Almeida, C. R., Teodoro, A. C., Lourenco, M. C. , Carvalho, S. 2022. Application of Spectrometry in the Sustainable Management and Control of the Agro-Production System. Livro de resumos das Jornadas do ICT 2022, pag. 39, 2022.

Cardoso-Fernandes, J., Teodoro, A. C., Lima, A. 2022. Lightweight Integrated Ground and airborne Hyperspectral Topological Solution (LIGHTS) project: future perspectives for Lithium exploration in Europe. Livro de resumos das Jornadas do ICT 2022, pag. 33, 2022.

Carvalho, A., Ribeiro, R., Moura, R., Lima, A. 2022. Radiometric Survey of Alto do Sobrido and Ribeiro da Serra Mines (Gondomar, Portugal). VII Jornadas ICT, 2022.

Carvalho, C., Bobos, I., Noronha, F. 2022 The Sn-W ore deposit of Bejanca (Viseu district, Portugal): Preliminary data. Jornadas do ICT, Évora. Livro de Resumos, 10-11 fevereiro 2022.

Costa, M., Moura, H., Pinto de Jesus, A.D., Flores, D. 2022. Influência dos processos geológicos na mineralogia dos carvões da Bacia Carbonífera do Douro: setores de São Pedro da Cova e Pejão. Livro de Resumos das Jornadas do ICT 2020, Universidade de Évora, fevereiro de 2022, pp. 19.

Cruz, C., Nogueira, P., Noronha, F., Sant’Ovaia, H. 2022. Santa Eulália Plutonic Complex emplacement: new inferences from gravimetric and radiometric data. Jornadas do ICT, Évora. Livro de Resumos: 22-23, 10-11 fevereiro 2022, Porto (online), Portugal. (apresentação oral)

Cruz, C., Sant’Ovaia, H., Noronha, F. 2022. Magnetic characterization of geological materials: methodologies and applications. Magnetism in Portugal 2022. Young Researchers. Abstract Book: p. 11. 12-13 September, FCUP, Porto. (apresentação oral).

Hernandez, H., **Sant’Ovaia, H.**, Moura, R. 2022. Caracterização integrada usando técnicas geofísicas para avaliar o impacto ambiental no subsolo da Mina de Regoufe – Arouca. Jornadas do ICT 2022. Livro de Resumos: 28, 10-11 February 2022, Porto (online), Portugal.

Erbolato Filho, J., **Ribeiro, J.**, Pereira, A. 2022. Radioatividade de resíduos mineiros da exploração de carvão na Bacia Carbonífera do Douro (Portugal) - efeitos da autocombustão. XIII Congresso Ibérico e XIII Congresso Nacional de Geoquímica, p. 38.

Ferreira, N., **Cruz, C.**, **Sant’Ovaia, H.** 2022. Geologia em contexto escolar: O ICT e o Clube Ciência Viva na Escola – uma parceria de sucesso. Jornadas do ICT, Évora. Livro de Resumos: 42, 10-11 fevereiro 2022, Porto (online), Portugal.

Flores, D. 2022. SHS: Saúde do Solo em torno de antigas áreas mineiras: caracterização, análise de risco, e intervenção – Apresentação de um projeto transdisciplinar. Livro de Resumos das Jornadas do ICT 2020, Universidade de Évora, fevereiro de 2022, pp. 29-30.

Fonseca, C., **Gonçalves, P.A.** 2022. A matéria orgânica no sistema geológico. Contributos para o conhecimento dos processos geológicos e antropogénicos. Revista Ciência Elementar V10(02): 028, <http://doi.org/10.24927/rce2022.028>

Gonçalves, A., **Sant’Ovaia, H.**, **Noronha, F.** 2022. Zircon U-Pb Geochronology of Freixo De Numão and Capinha Granites (Northern and Central Portugal): constraints on emplacement age. Jornadas do Instituto de Ciências da Terra, 10th-11th february 2022, University of Évora, Évora, Portugal, on-line conference (poster presentation)

Guimarães, R., **Guedes, A.**, **Valentim, B.** 2022. Extração de componentes solúveis das cinzas volantes de pó de cortiça. In: Livro de resumos das Jornadas do ICT, 10-11 de fevereiro 2022, p. 32.

Ínsua-Pereira, G., **Bobos, I.**, Pinto de Meireles, C. P. 2022. Petrographic study of ultrabasic rocks from the Conlelas sector, Upper Allochthonous Complex, Bragança, Portugal [Digital panel presentation]. Jornadas do ICT 2022 – Livro de Resumos, 10-11 February 2022, Évora, Portugal, p. 47.

Laranjeira, V., **Ribeiro, J.**, Moreira, N., **Nogueira, P.**, **Flores, D.** 2022. Análise petrográfica da matéria orgânica em xistos negros: contributos para o estudo de mineralizações de Cu na Zona Ossa-Morena. Livro de Resumos das Jornadas do ICT 2020, Universidade de Évora, fevereiro de 2022, pp. 45.

Lima, L., Guedes, A., Bobos, I., Noronha, F. 2022. The mineralizing fluids of the Santa Helena Breccia- a unique W deposit in the Iberian Peninsula. Livro de resumos das Jornadas do ICT, 10-11 de fevereiro 2022, p. 50.

Lopes, L., Vieira, A., Matos, J., Martins, R. 2022. A Mina que ainda ficou: avaliação do potencial mineiro em prata (Ag) e ouro (Au) das escombreiras da Mina de São Domingos. Apresentação na 9^a Jornada Interdisciplinar da Mina de São Domingos, Mértola. 25 de novembro de 2022.

<https://jornadasminasdomingos.wordpress.com/>;
<http://hdl.handle.net/10174/32916>.

Lourenco, M. S. C., **Almeida, C.R., Teodoro, A.C.**, Carvalho, S. M. P. 2022. Prediction of Catharanthus roseus stress by hyperspectral reflectance and photosynthesis under di- and polychromatic light spectra with extended UV-A. Poster. Acta Horticulturae. 2022.

Magalhaes, J. M., **da Silva, J.C.B.**, Nolasco, R., Dubert, J., Oliveira, P.B. 2022 On the variability of internal waves on the western Portuguese shelf. Paper presented in 7AS JORNADAS DE ENGENHARIA HIDROGRÁFICA / 2AS JORNADAS LUSO-ESPAÑOLAS DE HIDROGRAFIA, Lisbon.

Oliveira, A., Sant’Ovaia, H., Martins, H.C.B. 2022. Low-field AMS fabrics and magnetic mineralogy of hypabyssal dykes from northern Portugal. Jornadas do ICT 2022, Évora, Portugal, Abstract book, pp. 17.

Pereira, B., Antunes, I.M.H., **Sant’Ovaia, H.**, Gonçalves, L., Azevedo, J., Oliveira, J. 2022. Estabelecimento de guias de prospeção de recursos geotérmicos em Portugal - contributos para uma proposta metodológica. Jornadas do ICT, Évora. Livro de Resumos: 37, 10-11 February 2022, Porto (online), Portugal.

Pereira, B., Antunes, I.M.H., **Sant’Ovaia, H.**, Gonçalves, L., **Cruz, C.**, Azevedo, J., Oliveira, J. 2022. Recursos geotérmicos na região noroeste de Portugal: avaliação exploratória em sectores dos rios Cávado e Ave. 13.^º Seminário sobre Águas Subterrâneas. 28 e 29 de abril de 2022. Universidade de Lisboa, Instituto Superior Técnico, Departamento de Engenharia Civil, Arquitectura e Georrecursos (DECivil).

Pereira, S., **Guedes, A., Ribeiro, H., Valentim, B., Cruz, C., Sant’Ovaia, H., Martins, H.C.B., Abreu, I., Noronha, F., Flores, D.** 2022. Assessment of PTE in soils associated with the Regoufe Mining área. Jornadas do ICT, Évora. Livro de Resumos: 41pp, 10-11 fevereiro 2022, Porto (online), Portugal.

Ramos, V., Andersen, J.C., Rollinson, G.K. 2022. Mineralogical and microtextural study of raw materials for eco-friendly concrete marine structures (Project MARINEFF). Conference Programme and Abstracts of the Young Coastal Scientists and Engineers Conference, Bournemouth, Bournemouth University, UK (4th - 5th April), 6.

Rodrigues, M., Guedes, A., Bobos, I., Noronha, F. 2022. Estudo de inclusões fluidas em litiofilite-trifilite do pegmatito da Mesquitela (Mangualde) Livro de resumos das Jornadas do ICT, p. 48-49.

Rolo, R., **Cruz, C.**, Pereira, B., **Sant’Ovaia, H.** 2022. Estudo gravimétrico de carácter exploratório em zonas com potencial geotérmico (região de Braga). Jornadas do ICT, Évora. Livro de Resumos,, 10-11 fevereiro 2022, p. 20-21.

Sant’Ovaia, H., Cruz, C., Font, E., Guedes, A., Noronha, F., Flores, D. 2022. Authigenic magnetite in soils: pollution tracer in a former tungsten mine? Livro de resumos das Jornadas do ICT, 10-11 de fevereiro 2022, p. 24-25.

Santos, D., Teodoro, A.C., Cardoso-Fernandes, J., Lima, A. 2022. Técnicas de deteção remota para identificação de pegmatitos NYF em Tysfjord, Noruega. Livro de resumos das Jornadas do ICT 2022, pag. 44, 2022.

Santos, P., Espinha Marques, J., Ribeiro, J., Flores D. 2022. Elementos potencialmente tóxicos presentes nos solos da envolvente da antiga mina de carvão de São Pedro da Cova - Avaliação do Risco Ecológico. Livro de Resumos das Jornadas do ICT 2022, Universidade de Évora, fevereiro de 2022, pp. 43.

Silva M.G., Henriques, R., Gonçalves, M.A., **Nogueira, P.** 2022. Soil and lithological mapping using supervised classification in the Mociços Mine. The use of drone imagery, Jornadas do ICT, 10-11 February 2022, Zoom (Universidade de Évora), p.27

Torres, J., Ferreira, L., Machado, G., Soares Pinto, S., Cruz, C., Ribeiro, J., Espinha Marques, J., Sant’Ovaia, H., Flores, D. 2022. Projeto SHS – Contributos das Ciências da Terra, Educação, Sociologia e Belas Artes para o desenvolvimento de um projeto focado na exploração mineira. Livro de Resumos das Jornadas do ICT 2020, Universidade de Évora, fevereiro de 2022, pp. 57.

Viveiros, J., **Santos, A.C., Valentim, B.,** Peixoto, A.F., Kuźniarska-Biernacka, I. 2022. Photocatalytic transformation of biomass derivatives into value added products 15^a ediçãoEncontro Investigação Jovem da Universidade do Porto, Porto (Portugal), May 4-6. Abstract 19551.

Yakovenko, A., Guedes, A. 2022. Mineralogy and fluid inclusion studies in quartz from the Li-rich pegmatite veins from Segura. Young Researcher Meeting - IJUP. 4-6 May. Book of abstracts, p. 343. <https://www.up.pt/ijup/ijup-2022/#programa>

Yakovenko, A., Guedes, A., Boiron, M.C., Cathelineau, M., Martins, I., Mateus, A. 2022. Fluid inclusion studies in quartz from the Li-rich pegmatite veins from Segura. Jornadas ICT, 10-11 February 2022. Livro de resumos, p. 43. <https://www.icterra.pt/index.php/2022/01/07/jornadas-ict-10-e-11-de-fevereiro-2022/>

C. Reports

Caldeira, R., Gonçalves, M., **Guedes, A.**, et al. 2022. Deliverable D3.6 (WP3): “Report on collaborations with existing ESFRIs and other world-class RIs”, Excite project 101005611, HORIZON 2020, May 2022.

Guedes, A. 2022. Project MOSTMEG - Predictive models for strategic metal rich, granite-related ore systems based on mineral and geochemical fingerprints and footprints. Second Project Report to management of ERA-MIN Joint Call 2019. October 2022, 47 pp.

Guedes, A. 2022. Project MOSTMEG - Predictive models for strategic metal rich, granite-related ore systems based on mineral and geochemical fingerprints and footprints. Progress Report nº 2 to Fundação para a Ciência e a Tecnologia. October 2022, FCT electronic submission system, with annex.

Lopes, L. 2022. FW A-046_2022 - Granito Branco Almeida ALS. GD/33235/2022 - Prestação de Serviços a estabelecer com a FrontWave no âmbito da realização de ensaios para análise e descrição petrográfica num litotipo. 7 p.

Lopes, L. 2022. FW A-052_2022 - Calcário Onia A. GD/49593/2022 - Prestação de Serviços a estabelecer com a FrontWave no âmbito da realização de serviços de análise e descrição petrográfica para 1 litotipo. 7 p

Lopes, L. 2022. FW A-073_2022 - Calcário Moleanos M14. GD/41148/2022 - Prestação de Serviços a estabelecer com a FrontWave no âmbito da realização de ensaios para análise e descrição petrográfica num litotipo. 7 p.

Lopes, L., Martins, R., Pinho, A., Duarte, I. 2022. Estudo geológico e geotécnico da parcela 8/159 do artigo rústico Nº 159 e prédio urbano Nº 1054. 42p. GD/45936/2022 - Prestação de Serviços a estabelecer com a Filomena Cavaco & Nuno Bonito, Soluções de Engenharia, no âmbito da realização de diversos estudos geotécnicos relacionados com a estabilidade de taludes de Pedreiras.

Lopes, L., Martins, R., Pinho, A., Duarte, I. 2022. Estudo geológico e geotécnico da Pedreira nº 2158 “S. Marcos”. 48p. GD/45936/2022 - Prestação de Serviços a estabelecer com a Filomena Cavaco & Nuno Bonito, Soluções de Engenharia, no âmbito da realização de diversos estudos geotécnicos relacionados com a estabilidade de taludes de Pedreiras.

Lopes, L., Martins, R., Pinho, A., Duarte, I. 2022. Estudo geológico e geotécnico da pedreira nº 5532 “Courela dos Baixaréis”. 47 p. GD/45936/2022 - Prestação de Serviços a estabelecer com a Filomena Cavaco & Nuno Bonito, Soluções de Engenharia, no âmbito da realização de diversos estudos geotécnicos relacionados com a estabilidade de taludes de Pedreiras.

Lopes, L., Martins, R., Pinho, A., Duarte, I. 2022. Estudo Geológico e Geotécnico da Pedreira nº5327 “Tapada do Mouro”. 50p. GD/45936/2022 - Prestação de Serviços a estabelecer com a Filomena Cavaco & Nuno Bonito, Soluções de Engenharia, no âmbito da realização de diversos estudos geotécnicos relacionados com a estabilidade de taludes de Pedreiras.

Ramos, V., Andersen, J., Rollinson, G., Crane, R., Littler, K., Coggan, J. 2022. WP T1: 8 prototypes + 4 optimised designs. Progress Report T1.2.1 of the project Marineff, Period 8 (01.01.2022-30.06.2022), July, 74 pp.

Ramos, V., Andersen, J., Rollinson, G., Crane, R., Littler, K., Coggan, J. 2022. WP T2: Mineralogical and microstructural characterization of Rockpools. Progress Report T2.2.1 of the project Marineff, Period 8 (01.01.2022-30.06.2022), July, 16 pp.

Ramos, V., Andersen, J., Rollinson, G., Crane, R., Littler, K., Coggan, J. 2022. WP C: Communication. Progress Report C of the project Marineff, Period 8 (01.01.2022-30.06.2022), July, 7 pp.

Ramos, V., Andersen, J., Rollinson, G., Crane, R., Littler, K., Coggan, J. 2022. WP T1: 8 prototypes + 4 optimised designs. Progress Report T1.2.1 of the project Marineff, Period 7 (01.07.2021-31.12.2021), January, 15 pp.

Ramos, V., Andersen, J., Rollinson, G., Crane, R., Littler, K., Coggan, J. 2022. WP T2: Mineralogical and microstructural characterization of Rockpools. Progress Report T2.2.1 of the project Marineff, Period 7 (01.07.2021-31.12.2021), January, 12 pp.

Ramos, V., Andersen, J., Rollinson, G., Crane, R., Littler, K., Coggan, J. 2022. WP C: Communication. Progress Report C of the project Marineff, Period 7 (01.07.2021-31.12.2021), January, 27 pp.

Ribeiro, J. 2022. Petrographic study of organic matter in rock samples. Report to ChronoSurveys, 11 pp.

Santos, P., Flores, D. 2022. Coal mining wastes: assessment, monitoring and reclamation of environmental impacts through remote sensing and geostatistical analysis - CoalMine - POCI- 01-0145-FEDER-030138. (www.fc.up.pt/coalmine/). Scientific Final Report, Fundação para a Ciência e a Tecnologia, Ministério da Educação e Ciência, 2022.

Sant'Ovaia, H. 2022. GeoResources and Geomaterials (G3) Report 2021. ICT. 43 pp.

Teodoro, A.C. 2022. Addendum to Deliverable D2.3 (WP2) - New algorithms for satellite image processing. GREENPEG Project. Report, April 2022, 17 pp.

Teodoro, A.C. 2022. Deliverable D2.4 (WP2) - Data library of spectral reflectance; road map for maintenance of processed image data. GREENPEG Project. Report, April 2022, 16 pp.

Valentim, B. 2022. Project DEASPHOR - Design of a product for SUBSTITUTION of phosphate rocks. Project Final Report to management of ERA-MIN Joint Call 2017. July 2022, 49 pp.

Valentim, B. 2022. Project DEASPHOR - Design of a product for SUBSTITUTION of phosphate rocks. (ERA-MIN Joint Call 2017). Project Final Report to Fundação para a Ciência e a Tecnologia. July 2022, FCT electronic submission system, with annex.

D. Others

D1. Data bases

Cardoso-Fernandes, J., Teodoro, A.C., Santos, D., Rodrigues de Almeida, C., Lima, A. (2022). Spectral Library of European Pegmatites, Pegmatite Minerals and Pegmatite Host-Rocks – The Greenpeg Database (Version 1) [Data set]. Zenodo. <https://doi.org/10.5281/zenodo.6518319>.

Rodrigues de Almeida, C., Santos, D., Vasques, J., Cardoso-Fernandes, J., Lima, A., Teodoro, A. C. (2022). A LCT Pegmatite Spectral Library of the Aldeia spodumene deposit: contributes to mineral exploration [Data set]. Zenodo. <https://doi.org/10.5281/zenodo.7318444>.

D2. Guest Editor

Ana Claudia Teodoro: (I) Academic Editor, Scientific Reports, 2022. (II) Academic Editor, Hindawi, 2022. (II) Guest Editor in Special Issue (ISI Web of Science e Scopus). (III) Guest Editor of Remote Sensing, 2022. MDPI Special Issue on “New Trends on Remote Sensing Applications to Mineral Deposits”- Volume II. (IV) Guest Editor of Sustainability, 2022. Special Issue on “Applications of GIS and Remote Sensing for Sustainable Spatial Planning. (V) Guest Editor of Geomatics, 2022. Special Issue on “GIS Open Source Software Applied to Geosciences”.

Deolinda Flores, Patrícia Santos: Guest Editors of the Special Issue “Geochemistry, Environmental Impact and Remediation of Mining Areas”, in Minerals (MDPI) which is dedicated to the results obtained in project SHS.

Joana Cardoso-Fernandes: Guest Editor of the Special Issues "New Trends on Remote Sensing Applications to Mineral Deposits" and "New Trends on Remote Sensing Applications to Mineral Deposits-II" both in Remote Sensing (MDPI).

José da Silva, J.M. Magalhaes, C. Wang: Guest Editors of the Special Issue: Advances of Remote Sensing on North Pacific Ecosystems, the Equatorial Pacific Band, and Adjacent Seas. A special issue of Remote Sensing. MDPI. ISSN 2072-4292.

E. Models

José da Silva: Model runs in a nonhydrostatic fully-nonlinear numerical model to simulate oceanic gravity currents and the generation of internal waves.

F. Computational applications

José da Silva: Implementation of a computational application to retrieve fraction of wave breaking in the deep ocean by means of satellite remote sensing data in the visible wavelengths.

03 Completed PhD Thesis

Maia, M. 2022. Metallogenetic evolution of gold and iron deposits from the Ossa-Morena Zone (SW Iberia)-Constraining ore deposition conditions and vectoring future mineral exploration. Earth Space Sciences PhD, specialization in Geological Processes, University of Évora, (Supervisors **Pedro Nogueira, Fernando Noronha, J. Mirão**).

Santos, A. 2022. Assessing the rare earth metals and carbon potential of coal ashes from a Portuguese Power Plant and its temporal and lateral variation. Geosciences PhD. Cotutelle PhD program UP/UA (Supervisors **Bruno Valentim, Alexandra Guedes**)

Sousa, M.G.S. 2022. Complexo Metamórfico da Foz do Douro: contribuição para o estudo da evolução geotectónica do NW Peninsular. Geosciences PhD. Cotutelle PhD program UP/UA. (Supervisors **Fernando Noronha, Helena Sant’Ovaia**)

04 Completed MSc Thesis

Carvalho, C. 2022. Remote sensing, geological mapping and sampling in stream sediments for the exploration of Lithium (Li) and associated minerals. Coorientação. Mestrado em Geologia. FCUP. (Supervisors **Alexandre Lima, Ana Teodoro, Joana Cardoso-Fernandes**).

Cruz, A.M.B. 2022. Avaliação de riscos e ordenamento do território: aplicação a um caso prático na região de Estremoz. Mestrado. Universidade de Évora. (Supervisors: **Luís Lopes, António Pinho**).

de Almeida, H.H. 2022. Integração de metodologias geofísicas na avaliação do impacto ambiental no subsolo da Mina de Regoufe – Arouca. Mestrado em Geologia, FCUP. (Supervisors **Helena Sant’Ovaia, Rui Moura**).

de Grisi Lapa, I. 2022. Sinergia entre Sentinel-6 e Jason-3: Observações de Ondas Internas em altímetros SAR e convencional. Mestrado em Deteção Remota. Faculdade de Ciências da Universidade do Porto (Supervisor: Jorge M. Magalhaes; Co-supervisor **José C.B. da Silva**).

Fernandes, j. 2022. Monitorização integrada da escombreira de São Pedro da Cova através de técnicas geoespaciais. Mestrado em Engenharia Geográfica. FCUP. (Supervisors **Ana Teodoro, Lia Duarte**).

Fernandes, J.F.F.L. 2022. Monitorização integrada da escombreira de S. Pedro da Cova, através de técnicas geoespaciais. Mestrado em Engenharia Geográfica. (Supervisors **Ana Cláudia Teodoro, Lia Duarte**).

Loaiza, W.A.O., 2022. Variação da fácie orgânica durante o Jurássico Inferior-Médio na região de São Pedro de Moel - Monte Real (Bacia Lusitânica, Portugal). Mestrado em Geologia, FCUP. (Supervisors **Paula Alexandra Gonçalves, Deolinda Flores**);

Moreira, M.R. 2022. Avaliação geológico económica das zonas de oxidação dos jazigos metálicos. Mestrado em Geomateriais e Recursos Geológicos. (Supervisor **Iuliu Bobos**).

Piedade, M. 2022. Contribuição para a análise de riscos de movimentos de massa em taludes na cidade do Porto” por Marta Piedade. Mestrado em Geologia, FCUP em colaboração com a Câmara Municipal do Porto. (Supervisor **Helena Sant’Ovaia**).

05 PhD, research, post-doc fellowships, and researcher contracts signed in 2022

(UIDP/04683/2020 and UIDB/04683/2020 budget)

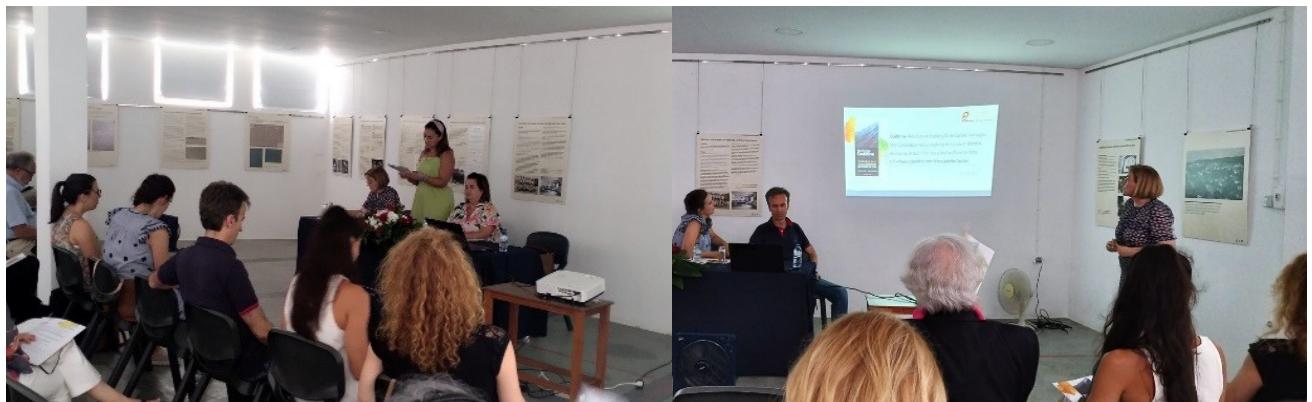
Dina Isabel Guerreiro Cabrita - “Estagiário de Investigação”; contract signed in June 2022

Bruno Rafael Novais Texeira - “Estagiário de Investigação”; contract signed in June 2022

Douglas Barbosa dos Santos - PhD student Grant; contract signed in November 2022

06 Scientific Events participation, Field trips participation, Conferences organization

“2º Workshop do Projeto CoalMine”, hosted at Museu Mineiro de São Pedro da Cova, with the support of the Junta de Freguesia de São Pedro da Cova, 15th July 2022 (Deolinda Flores: organization).



“1º Workshop do Projeto SHS”, with the collaboration of the consortium members, hosted at FCUP, 11th April 2022. (Deolinda Flores: organization).

GREENPEG's 3rd Progress, Advisory Board & Think Tank Meeting + GREENPEG & MINE.THE:GAP International Clustering Workshop + Test site visit (2022/10/25 - 2022/10/28): Organization of the project meetings in Porto and fieldtrip to the Barroso-Alvão pegmatite field (Joana Cardoso-Fernandes, Alexandre Lima, Ana Claudia Teodoro: organization).





GREENPEG - International Clustering Workshop, 26th October 2022, Porto, Portugal
(Alexandre Lima, Ana Teodoro, Joana Cardoso-Fernandes: organization).

GREENPEG – Technical workshop: Integration of WP2, 3, 3 and 5 results into toolsets, 28th October 2022, Porto, Portugal **(Alexandre Lima, Ana Teodoro, Joana Cardoso-Fernandes:** organization).

Fieldwork in Lavadores/ Mindelo: Due to the existing FCUP-ICT Porto and Salamanca University partnership, fieldwork was conducted in Lavadores and Mindelo to collect magnetic susceptibility data and also sample cores to performed Anisotropy of Magnetic Susceptibility measurements. In this fieldwork, the colleagues from Salamanca were guided by **Cláudia Cruz, Helena Sant'Ovaia and Maria dos Anjos Ribeiro** (8 June 2022).



Fieldwork in “Embalse de El Pintado” (Spain), Marão and Moncorvo: Due to the existing partnership between ICT Porto and ICT Évora, fieldwork was carried out in El Pintado, Moncorvo and Marão to collect samples and magnetic susceptibility data in carbonate rocks. In the fieldwork, participated: **Cláudia Cruz and Helena Sant'Ovaia** from ICT Porto and Noel Moreira and Gonçalo Silvério from ICT Évora.



Fieldwork in the region of Bejanca (Viseu district), and Bragança: three field works campaign for sample collection and cartography work in the region of Bejanca (Viseu district), and Bragança (**Iuliu Bobos**).

Fieldtrip Bragança – A one-day sampling campaign has been carried out in the vicinities of the Samil and Ousilhão localities, Bragança, NE Portugal, for collection of ultrabasic rock samples; we collected a set of 12 samples of dunite and hornblendite rocks; some of these samples have further been selected and analyzed by transmitted and reflected light microscopy, electron microprobe and x-ray diffraction. (Guilherme Ínsua).



GREENPEG stream sediment campaign in the Barroso-Alvão pegmatite field: held in the Spring/Early Summer 2022, coordinated by Alexandre Lima and Joana Cardoso-Fernandes.

GREENPEG field campaign in the Barroso-Alvão pegmatite field: held in the February 2022 for the sample collection for the construction of a spectral library, coordinated by **Alexandre Lima and Joana Cardoso-Fernandes**.



GREENPEG – Field Trip to Ribeira de Pena, held in October 2022 (**Alexandre Lima, Ana Teodoro, Joana Cardoso-Fernandes**).

Participation in XIII Congreso Ibérico Y XIII Congreso Nacional de Geoquímica:
Alexandra Mota, Ana Marta Gonçalves, António Oliveira, Claudia Cruz, Deolinda Flores, Fernando Noronha, Helena Sant’Ovaia, Joana Fernandes, Joana Ribeiro, Mariana Costa, Patrícia Santos, Paula Gonçalves and Vanessa Laranjeira participated in the XIII Congreso Ibérico Y XIII Congreso Nacional de Geoquímica held in Puertollano (Ciudad-Real), España, 25-27 abril 2022, p. 265-274.



Alexandra Guedes: (I) organization of the “5.o Seminario iberoamericano: Geociencias forenses, ciencias forenses al servicio de la búsqueda de personas desaparecidas”. 26 e 27 de outubro 2022. Colombia. <https://www.uan.edu.co/component/k2/item/5137-5to-seminario-iberoamericano-geociencias-forenses-ciencias-forenses-al-servicio-de-la-busqueda-de-personas-desaparecidas-circunvalar-presencial>; (II) coordination of Universidade Júnior, VERÃO EM PROJECTO- “Ciência Forense-Investigação Criminal”; (III) lecture entitled “Applications of Raman Spectroscopy in Forensic Science”. Seminar “Quimica e Sociedade” FCUP. September 15th.

Alexandre Lima: integrated the Meeting Organization team of SPERTUS and presented in a round table intitled S3 – Transição energética, desafios em Ciência e tecnologia
<https://www.up.pt/spertus/#schedule>



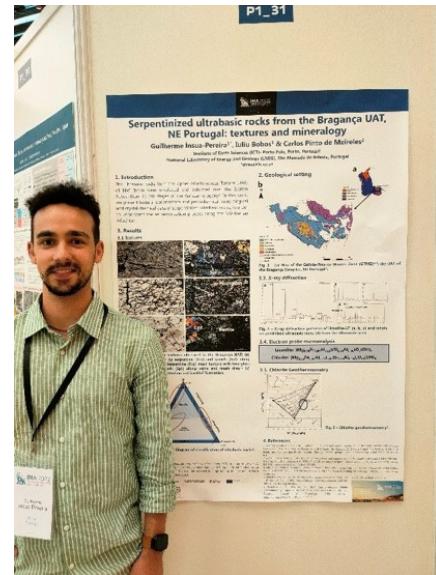
Ana Claudia Teodoro: (I) lecture: Forest fire risk maps: a remote sensing and GIS approach. 5th Algerian Geoscience and Remote Sensing School (5th AGRSS-2022). Argélia, 2022. <https://www.univ-blida.dz/agrss2022/>. (II) Lecture "Introdução à Detecção Remota por Satélite" no âmbito da "Earth Observation School" do projeto DOPPLER realizada em Maputo, Moçambique. (III) Lecture "Aplicações costeiras" no âmbito da "Earth Observation School" do projeto DOPPLER realizada em Maputo, Moçambique. (IV) Participation in Program Committee of International Conference on Geographical Information Systems Theory, Applications and Management, 2022; Scientific Committee of XII Colóquio Brasileiro de Ciências Geodésicas, 2022; Scientific Committee of V Simpósio Brasileiro de Geomática, 2022; Scientific Committee of the SPIE Europe Remote Sensing "Earth Resources and Environmental Remote Sensing/GIS Applications XIII", 2022; Program Committee of the IEEE/IGARSS International Geoscience and Remote Sensing Symposium (IGARSS), 2022; Program Committee of 12th International Conference On Geographical Information Systems Theory, Applications and Management (GISTAM), 2022; chair in SPIE Europe Remote Sensing, 2022. "Earth Resources and Environmental Remote Sensing/GIS Applications XII". Session Chair (Environmental Monitoring Concepts I).

Bruno Valentim: (I) invited speaker at NEXT-LiB Workshop in Connection to The PROMETIA Annual Scientific Seminar, 1-2 December 2022, Barcelona, Spain. Can binders be completely removed without being dissolved? – Evaluation from petrographic analysis; (II) invited speaker at NEXT-LiB Workshop in Connection to The PROMETIA Annual Scientific Seminar, 1- 2 December 2022, Barcelona, Spain. Session 4: Metal Extraction and Sustainability. Innovative study on solvent extraction for LIBs recycling: can we separate everything? (III) invited speaker at BMA Workshop 2022. Only virtual, March 14, 2022. Portuguese ashes: contribution of petrography to their characterization.

Claudia Cruz: moderator of the session "Molecular and Bio Magnetism" in Magnetism in Portugal 2022 – Young Researchers, that took place in 12 and 13 of September 2022 at FCUP (<https://magnetism2022pt.sciencesconf.org/>).

Fernando Noronha: (I) Member of "Conselho Consultivo sobre Reversão da Refinaria da PETROGAL- C.M. Matosinhos". (II) Participated in the FCUP team that prepared an opinion on the 2EIA da mina do Romano" carried out by FCUP for C.M.Montalegre.

Guilherme Ínsua: (i) five-day trip to Oviedo, Spain, in July 2022 for electron microprobe analyses of previously selected samples; the analyses have been performed in the Scientific and Technical Services of the University of Oviedo; a total of 16 samples have been analyzed. (II) participated in 3rd General Meeting of the International Mineralogical Association (IMA 2022) – International conference hosted in Lyon, France, focused on various fields of Mineralogy and Geochemistry; poster presentation in the session *Serpentinites and beyond*, presenting a textural, petrochemical, and mineralogical (XRD and EPMA) characterization of serpentinized ultrabasic rocks from the Bragança region, NE Portugal.



Helena Couto: member of the jury of the 30th Young Scientists Contest, Ciência Viva co-organized with the Youth Foundation (National Science Exhibition). Integrated the evaluation panels of Earth Sciences and Environmental Sciences.



GOLDSCHMIDT Hawaii's 2022

11309

GREENPEG

Mineral chemistry and spectroscopy of metasedimentary host rocks of aplite-pegmatite dykes: one step closer to the detection of buried Lithium (Li) pegmatites in the Fregeneda-Almendra area

J. CARDOSO-FERNANDEZ^{1,2*}, E. RODA-RORLES¹, J. JERRANDONNEA-MARTIN¹, L. GARATE-OLAVE¹, A. LIMA^{1,3}, M. A. RIBEIRO^{2,3}, C. R. DE ALMEIDA^{1,3}, A. C. TEODORO^{2,3}

¹ U PORTO, ² ICT, INSTITUTO UNIVERSITARIO DO PORTO, ³ INSTITUTO DE CIENCIAS DA TERRA, INSTITUTO POLITECNICO DE VISEU, UNIVERSIDADE DE VISEU

DISCOVER PEGMATITES IN EUROPE

Goldschmidt 2022 – 15 July – Joana Cardoso-Fernandes, UPORTO

Joana Cardoso-Fernandes: (I) integrated the European Association of Geochemistry (EAG) Communications Committee in January 2023, for a two-year mandate, being responsible for the EAG pages in Elements Magazine, the EAG Blog and social media, the EAG newsletter, the EAG Forum, and overall promotion of the EAG and geochemistry. (II) invited speaker at the 2022 Pegmatite Workshop held out at the Maine Mineral & Gem Museum (Bethel, Maine, United States) between September 6 and September 12 2022, with the presentation entitled “Digital tools for pegmatite exploration in the Iberian Peninsula”.(III) invited speaker at the 2022 Goldschmidt congress, held between 10-17 July 2022 in Honolulu, Hawaii, USA, with the presentation entitled “Mineral chemistry and spectroscopy of metasedimentary host rocks of aplite-pegmatite dykes: one step closer to the detection of buried Lithium (Li) pegmatites in the Fregeneda-Almendra area” in session “8hT2 - Raw materials for a low carbon future”.

Lia Duarte: (I) presentation of “WebSIG para visualização e disseminação de informação da escombreira de São Pedro da Cova” on the Workshop of the project CoalMine; (II) participation on the Workshop of SHS project: Soil health surrounding former mining areas: characterization, risk analysis, and intervention.

Luis Lima: placement of one week at the University of Oviedo to perform electron microprobe analyses. This work was supervised by Professor Miguel Fernandez.

Luis Lopes: (I) participation in EFG EuroWorkshop "Natural Hazards, Geothermal and Geological Heritage: Expressions of Geodiversity" & 80th Council Meeting, Pico Island, Azores, Portugal. 19 - 25 May 2022. Website: <https://efgazores2022.wordpress.com/>. (II) Organization of GLOBAL STONE CONGRESS 2023 START UP, June 2 2022, ExpoSalão – Batalha. The event was moderated by Luís Lopes I. (III) Member of the Scientific Committee and moderator on “PANEL VI, GEOTECHNICS AND MINERAL RESOURCES”on the 9th Luso-Mozambican Engineering Congress, VI Mozambique Engineering Congress, Maputo. (IV) Member of the Scientific Committee of the 74th Geological Congress of Turkey.

Marcela Rodrigues: placement of 10 days (December) at the Università di Milano Bicocca, Italy to performed high temperature experiments on melt inclusions. This work was supervised by Professor Rosario Esposito from the Dipartimento di Scienze dell'Ambiente e della Terra.

Patrícia Santos: (I) participation in “2º Workshop do Projeto CoalMine”, hosted at Museu Mineiro de São Pedro da Cova, with the support of the São Pedro da Cova Parish Council, 15th July 2022. (II) participation in “1º Workshop do Projeto SHS”, with the collaboration of the consortium members, hosted at FCUP, 11th April 2022. (III) Coorganization of the “1º Workshop do Projeto SHS”, with the collaboration of the consortium members, hosted at FCUP, 11th April 2022. (IV) Coorganization of “2º Workshop do Projeto CoalMine”, hosted at Museu Mineiro de São Pedro da Cova, with the support of Junta de Freguesia de São Pedro da Cova, 15th July 2022;

Pedro Madureira: Member of the program Committee of the Conference Deep Sea Minerals (2022). 26-27 October, Bergen, Norway.
<https://geopublishing.no/event/deepseaminerals/>

Renato Guimarães: placement of one month (February) at the University of Brescia, Italy supervised by Professor Elza Bontempi, Dipartimento di Ingegneria Meccanica e Industriale.

07 Nacional and International Projects

Project NORTE-01-0145-FEDER-000056 - “Soil health surrounding former mining areas: characterization, risk analysis and intervention”. NORTE-45-2020-75 - Sistema de Apoio à Investigação Científica e Tecnológica (SAICT) -Projetos Estruturados de I&D&I- Horizonte Europa. 2021-2023.

Deolinda Flores (P.I.). Participants ICT/FCUP: **Alexandra Guedes, Alexandre Lima, Ana Cláudia Teodoro, Bruno Valentim, Fernando Noronha, Helena Martins, Helena Ribeiro, Helena Sant’Ovaia, Ilda Abreu, Joana Torres, Joana Ribeiro, Lia Duarte, Maria dos Anjos Ribeiro, Patrícia Santos.**

This project is under development by a consortium composed by five R&D Institutions from different and complementary areas, namely: Earth Sciences (ICT and CERENA), Chemistry (CIQUP), Sociology (IS-UP) and Art, Design and Society (i2ADS). The main objective is to study the environmental impact of the mining legacy in the North of Portugal and the contamination caused by the mining waste disposal, namely the impact on the soils and groundwater of the surrounding areas. The study areas are: Regoufe mining area; Ribeiro da Serra (soils and waters) and Montalto (waters) Mines; and Pejão Coal Mine.

The sampling and most of the analytical results were already obtained. The data processing is under development as well as the preparation of manuscripts to be submitted to international journals. The first and the second manuscripts have been accepted just at the end of this year in the Special Issue “Geochemistry, Environmental Impact and Remediation of Mining Areas”, in the journal Minerals, organized within this project, being Guest Editors D. Flores and P. Santos.





CoalMine - POCI- 01-0145-FEDER-030138

CoalMine - Coal mining waste: evaluation, monitoring and recovery of environmental impacts through remote detection and geostatistical analysis (www.fc.up.pt/coalmine/), POCI-0145-FEDER-030138, co-financed by: COMPETE 2020, Portugal 2020 and European Regional

Deolinda Flores (PI). Participants: **Ana Cláudia Teodoro, Joana Ribeiro, Lia Duarte, Jorge Espinha, Patrícia Santos, R. Fonseca.**

CoalMine is a project financed by FCT (AAC nº 02/SAICT/2017) and developed by a consortium consisting of ICT (Porto and Évora Poles) and Requimte. The project closed on the 25th July 2022 and the final evaluation was “Approved” with a very positive appreciation. The final results were presented on the 2nd Workshop of the CoalMine project on the 15th July 2022 (see figure), and was hosted at Museu Mineiro de São Pedro da Cova, with the support of the Junta de Freguesia de São Pedro da Cova. The project team achieved the majority of the proposed deliverables, including 7 papers in international journals (one of which was selected for the cover of the journal issue, see figure) and 2 in national journals, above the initial objective. The total number of reports, seminar, postgraduate thesis, and computational applications were also in line with the initial proposal.



Project NORTE-01-0145-FEDER-00007- “Development of Sustainable Materials for Water Splitting: an integrated study from cradle to grave”. NORTE-45-2020-75 - Sistema de Apoio à Investigação Científica e Tecnológica (SAICT) -Projetos Estruturados de I&D&I- Horizonte Europa. 2021-2023

This project aims to evaluate the national mineral resources, to develop national competences for fabrication of water splitting materials, and to assess the environmental safety of the fabricated materials, in that way contributing to the neutral climate impact of Smart Cities and to the national hydrogen strategy (EN-H2).

The H2Innovate project aims at, congregating the complementary expertise existing in four UPorto research centers (CIQUP, GreenUPorto, ICT and IFIMUT), contributing to assess and harmonize the existing data on national relevant mineral resources, to develop new oxide nanomaterials that can be used in the electrochemical and photoelectrochemical water splitting for hydrogen production, to issue recommendations on the safe environmental production and management of the raw materials and final products and to disseminate for the community the findings generated in the project.

Principal Investigator: Carlos Pereira (FCUP). Participants ICT/FCUP: **Alexandra Guedes, Alexandre Lima, Fernando Noronha, Helena Martins, Helena Sant’Ovaia, Maria dos Anjos Ribeiro.**

Project PIPA - GUIFARQ II - Projeto de Investigação Arqueológica de Guifões

Helena Couto is scientific consultant for the area of Geology and Geological Characterization of Materials, project from Universidade de Letras da Universidade do Porto (2019 - 2022).

International Geological Correlation Project 653 (2016-2022)

The onset of the Great Ordovician Biodiversification Event do IGCP (International Geoscience Programme) – Project co-lead by Thomas Servais, David Harper, Olga T. Obut, Cristian Rasmussen, Alycia Stigali and Zhang Yuandong, IUGS/UNESCO International Geoscience.

Helena Couto is member.

Project GREENPEG – "New Exploration Tools for European Pegmatite Green-Tech Resources", funded by the European Commission under Horizon 2020



Participants ICT/FCUP: **Ana Cláudia Teodoro, Alexandre Lima, Rui Moura, Clara Vasconcelos, Maria dos Anjos Ribeiro, Joana Cardoso-Fernandes, Douglas Santos.**

The GREENPEG project aims to develop multimethod exploration toolsets for the identification of European, buried, small-scale (0.01–5 million m³) pegmatite ore deposits of the Nb–Y–F (NYF) and Li–Cs–Ta (LCT) chemical types. The target raw materials are Li, high-purity quartz for silica and metallic Si, ceramic feldspar, rare earth elements, Ta, Be and Cs, which are naturally concentrated in granitic pegmatites. Silicon and Li are two of the most sought-after green technology metals as they are essential for photovoltaics and Li-ion batteries for electric cars, respectively. GREENPEG will change the focus of exploration strategies from large-volume towards small-volume, high-quality ores and overcome the lack of exploration technologies for pegmatite ore deposits by developing toolsets tailored to these ore types.

Project "INOVMINERAL 4.0, "Evaluation of the country's litiniferous mineral resources, from a perspective of total valorization of the aplitic-pegmatitic resources with minimum waste production", funded by the National Innovation Agency



Participants ICT/FCUP: **Alexandre Lima, Maria dos Anjos Ribeiro, Ana Cláudia Teodoro, Lia Duarte, Joana Cardoso-Fernandes, Douglas Santos.**

The project focuses on the innovation and reorientation of the industrial models that sustain the Mineral Resources Sector, through the development of advanced technologies, new products and software that respond to the entire value chain: prospecting and mineral research, integrated valorization of mineral resources and gains in market share.

Project DOPPLER – "DevelOpment of PaloP knowledge in Radioastronomy" funded by the Aga Khan Development Network and the Portuguese Science and Technology Foundation. DOPPLER is also supported by the National Portuguese -- ICT Cluster TICE.PT.



Participants ICT/FCUP: **Ana Cláudia Teodoro, Lia Duarte, Joana Cardoso-Fernandes.**

DOPPLER is a partnership between Portuguese and Mozambican institutions to foster ongoing collaborations in particular, those dealing with Radioastronomy, Earth Observations, and Big Data, matching similar African-Europe capacity building projects targeting Anglophone countries in the region. DOPPLER includes initiatives to further those ongoing endeavours, with advanced training on areas such as biodiversity, food security, and resource management. Of most importance, DOPPLER will foster science, industry and government linkages through training and knowledge transfer. DOPPLER work packages include: organizing pedagogical workshops; promote synergies with industry; leverage placements and team visits between Portugal and Mozambique; organize scientific and technological demonstrations in schools, universities and industry.

**# Project SNAP – "Sustainable Management and Control of Agro-Production Systems"
financed by the Northern Regional Coordination and Development Commission.**

Participants ICT/FCUP: **Ana Cláudia Teodoro, Joana Cardoso-Fernandes Cátia Rodrigues de Almeida, Douglas Santos.**

The SNAP project aims to develop the scientific and technological knowledge of selected agro processes targeting the ability of their sustainable management and control in various contexts, including the multiple types of the so called Plant Factories or Vertical Farms. The relevance of SNAP is huge since feeding large urban centers by timely supplying food, as well as a variety of medicinal or cosmetic products of vegetal origin produced in locations close to them entails substantial cuts in food costs and anthropogenic footprint, due to the significant decrease in environmental pressure in rural environments, in transportation, distribution, storage, and conservation. Moreover, the envisaged capability of controlling plant growth in a strongly controlled, and minimally intrusive context promotes not only a whole new level of food security, but also practically minimize the different market supply and consumer acquisition times which strongly mitigates the loss of perishable foods.

**# Project MTS/BRB/0091/2020 - MontObEO -
Observatório da biodiversidade de Montesinho:
uma ferramenta de Observação da Terra para a
conservação da biodiversidade**



A.C. Teodoro: Co-Pi. Participants ICT/FCUP: **Lia Duarte.**

We intend to provide a new framework that combines ecological models, remote sensing data, and trend analysis tools to estimate species extinction risk through spatio-temporal changes in habitat suitability. Specifically, we want to demonstrate that (1) Reductions in habitat suitability by human actions (e.g. habitat loss, degradation, and fragmentation) can be predicted by ecological models; (2) Species living in places with great environmental changes over time (e.g. urbanized areas) are prone to higher extinction risks; (3) Remote sensing variables are associated with species' vulnerability to extreme weather. In summary, we will test the reliability of SRS-ENMs for monitoring quantitatively the spatial distribution of habitat suitability as a surrogate for species' potential extinction risk over time in response to human-induced environmental changes.

Project EXCITE - Electron and X-ray microscopy Community for structural and chemical Imaging Techniques for Earth materials, H2020-INFRAIA-2020-1 (Integrating and opening research infrastructures of European interest), Topic: INFRAIA-02-2020, Type of action: RIA (Research and Innovation action), Project number: 101005611, 2021-2024.



Principal Investigator FCUP: **Alexandra Guedes**. Participants ICT/FCUP: **Violeta Ramos**.

EXCITE aims developing a community-driven technological imaging advancements that will strengthen and extend the current implementation of leading-edge microscopy for earth-materials research. In particular, the EXCITE strategy is to integrate joint research programmes with networking, training, and trans-national access activities, to enable both academia and industry to answer critical questions in earth-materials science and technology. <https://excite-network.eu/>

RIIF- “RED IBEROAMERICANA DE INVESTIGADORES FORENSES” CYTED 622RT0133, supported by Programa Iberoamericano de Ciencia y Tecnología para el Desarrollo.



Portuguese delegate: Alexandra Guedes

Participants ICT: Helena Ribeiro, Helena Sant’Ovaia e Bruno Valentim e Ana Santos.

The RIIF is oriented towards the development of forensic intelligence for the search for clandestine pits and the improvement of technical-scientific methods of forensic investigation, in order to provide alternative solutions to the families of the disappeared and other victims of violent acts that gave rise to armed conflicts, organized crime and daily violence.

<https://www.cyted.org/es/riif>

ERA-MIN Joint Call 2019: Project MOSTMEG - Predictive models for strategic metal rich, granite-related ore systems based on mineral and geochemical fingerprints and footprints. 2020-2023.



Principal Investigator FCUP: **Alexandra Guedes**. Participants ICT/FCUP: **Violeta Ramos and Bruno Valentim**.

The main goal of MOSTMEG project is to develop and validate predictive models for strategic metal-rich, granite-related ore systems by refining available concepts and exploration strategies, using mineral and geochemical criteria as pathfinders or vectors to mineralized systems. Such systems may range from quartz-lodes, breccia pipes and skarns enriched in W-Sn-F(-P-Bi-Sb-Cu)-bearing mineral associations, greisenized granite cupolas and aplite-pegmatite-hosted mineral assemblages incorporating Sn-Ta-Y-F(-W-Nb) or Li-Cs- Be-Ta(-P-Rb).

<https://mostmeg.rd.ciencias.ulisboa.pt/>

Project POCI-01-0145-FEDER-022151- C4G- Colaboratório para as Geociências, Roteiro Nacional de Infraestruturas de Investigação de Interesse Estratégico.



Participant ICT/FCUP: **Alexandra Guedes**.

The Collaboratory for Geosciences (C4G) is a distributed research infrastructure of the Portuguese Roadmap, the only one dedicated to Solid Earth Sciences, with the objective of sharing scientific resources in order to optimize the creation and diffusion of scientific knowledge in Portugal and internationally.

DRI/India/0315/2020 “Integrated solution for coal ash as a source of critical elements and as a substituting material for natural graphite and clay through development of some value-added products. Supported by FCT.

Principal Investigator: **Bruno Valentim**. Participants: **Alexandra Guedes, Helena Ribeiro, Ana Santos**.

EXPL/CTM-CTM/0790/2021- “PhotoBioTrans - Photocatalytic Transformation of biomass- derived compounds into valuable products”. Supported by FCT.

Participating as “Additional Research Unit”: Instituto de Ciências da Terra - Polo do Porto (ICT).

Investigators: **Bruno Valentim, Alexandra Guedes, Ana Santos.**

ERA-MIN Joint Call 2021. Project PHIGO-
“Thermal Processing of P-rich ashes aiming for
HIGH-GRADE PHOSPHORUS Products”



Principal Investigator: **Bruno Valentim**. Participants: **Alexandra Guedes**

The EU phosphorus requirements are supplied by import from Mideast, Russia and China. Due to its economic importance and supply risk, the European Union included the phosphorus and phosphate rocks (PR) in the “List of critical raw materials (CRM) for the EU”. Phosphorus is also difficult to be substituted. One of the most sustainable options to secure future P supply within EU is recovery of P from food production and consumption chain which is also the EU P strategy. The 1st pillar of the strategy is biowastes incineration which will enrich the P-content by 6-7 times to a P-rich fraction and at the same time produce green energy. The innovative PHIGO solution aims to optimize the incineration step (the 1st pillar of the strategy) and to develop a sustainable technology for efficient P-extraction from the P-rich ashes (the 2nd pillar of the strategy) and thereby enabling closing the P loop in the EU P-strategy. <https://www.era-learn.eu/network-information/networks/era-min3>

ERA-MIN/0003/2018 project: NEXT-LiB - Novel Circular Economic Approaches for Efficient Extraction of Valuables from Spend Li-ion Batteries. ERA-MIN Joint Call 2018.



Principal Investigator FCUP: **Bruno Valentim**. Participants ICT/FCUP: **Alexandra Guedes**.

The project aims to develop and demonstrate efficient processes and innovative techniques for the extraction of metals and separation of graphite from spent LIBs and to overcome the barrier and obstacles which limit the recovery efficiency.

ERA-MIN/0002/2017 project: DEASPHOR-Design of a product for SUBSTITUTION of phosphate rocks. ERA-MIN2 Join Call 2017.



ERA-MIN 2

RESEARCH & INNOVATION PROGRAMME ON RAW MATERIALS
TO FOSTER CIRCULAR ECONOMY

Project Coordinated: **Bruno Valentim**. Participant ICT/FCUP: **Alexandra Guedes**.

The main objective of this project is the recycling of phosphorus from aviary litter ash as a substituting material of phosphate rocks. However, aviary litter ash is not economically attractive to substitute phosphate rocks, and also composed by materials that are impurities of the P2O5 extraction process. Therefore, novel solution is proposed to produce P-rich concentrates from aviary litter ash.

S34I – (101091616 - S34I - HORIZON-CL4-2022-RESILIENCE-01). Duração: 30 meses.

Principal Investigator (projeto coordenado pela FCUP): **Ana Teodoro**.

Participants: **A. Lima, J. Cardoso-Fernandes**.

CAVALI – Lithium Value Chain

<https://cerena.ist.utl.pt/projects/cavali-cadeia-de-valor-do-litio>

The CAVALI project aims to develop up to the maximum limit considered as possible and feasible, the value chain of the production cycle of lithium-based batteries for electric vehicles, thus enhancing the maximization of the added value resulting from the exploitation of the national resources of this metal.

Participants ICT/FCUP: **Alexandre Lima, Maria dos Anjos Ribeiro, Joana Cardoso-Fernandes**

Project CALCINATA: ALT20-03-0247-ERDF-072239 – Project - Production of lime-based mortar from the calcination of carbonated sludge from the ornamental stone industry (marbles and limestone) ALT20-03-0247-FEDER-072239 - Portugal 2020/SI - Sistema de Incentivos à Investigação e Desenvolvimento Tecnológico (SI I&DT),



involves a consortium of 3 entities: INEDITBROWN LDA (leader), SOLIDEFENDER and Universidade de Évora.

Participant ICT: **Luís Lopes**.

Project LITHOS: ALT20-03-0246-FEDER-000036 - Laboratory for Innovation and Technological Hub for Ornamental Stone, financiamento Portugal 2020.

Project dedicated to equipping the Mechanical Testing Laboratory of the University of Évora with technical means.



Participant ICT: **Luís Lopes**.

Project ANTECIPA: ALT20-03-0246- FEDER-000070 – Models of predictability of Ornamental Rocks on site and in operation.

The main objective of this project is to predict the behavior of Dimension Stones on site based on their physical-mechanical properties, geological context and historical knowledge of how they behaved when they were used in the past.



Participant ICT: **Luís Lopes**.

Project I4Stone: ALT20-03-0247-FEDER-072231 – Development of digital 4D registration systems and predictability of geological resources.

The project involves a consortium of two entities led by ARROW4D - CONSULTORES DE ENGENHARIA E GEOFÍSICA, LDA, and Universidade de Évora and is dedicated to the development of autonomous equipment for the automatic acquisition and processing of data in ornamental stone quarries.

Participant ICT: **Luís Lopes**.

Project Sustainable Stone by Portugal - Agenda Mobilizadora: Valorização da pedra natural para um futuro digital, sustentável e qualificado.

The project main objectives are reinforcing research, technological development and innovation in Portuguese Dimension Stone Industry.

Participant ICT: **Luís Lopes**.

Project ERA-MIN/0005/2018 – AUREOLE

tArgeting eU cRitical mEtals (Sb, W) and predictability of Sb-As-Hg environmental issues - Project Fundação para a Ciência e a Tecnologia (Lisboa) 2019-10 to 2022-09.



Targeting European Critical Metals (Sb, W) & predictability of Sb-As-Hg environmental issues

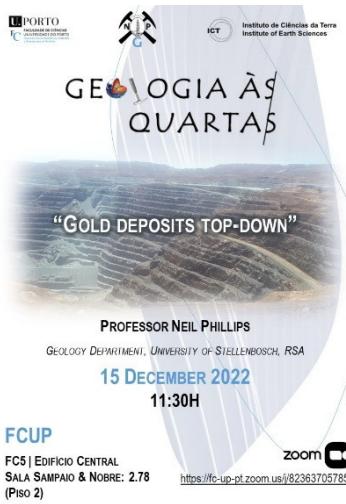
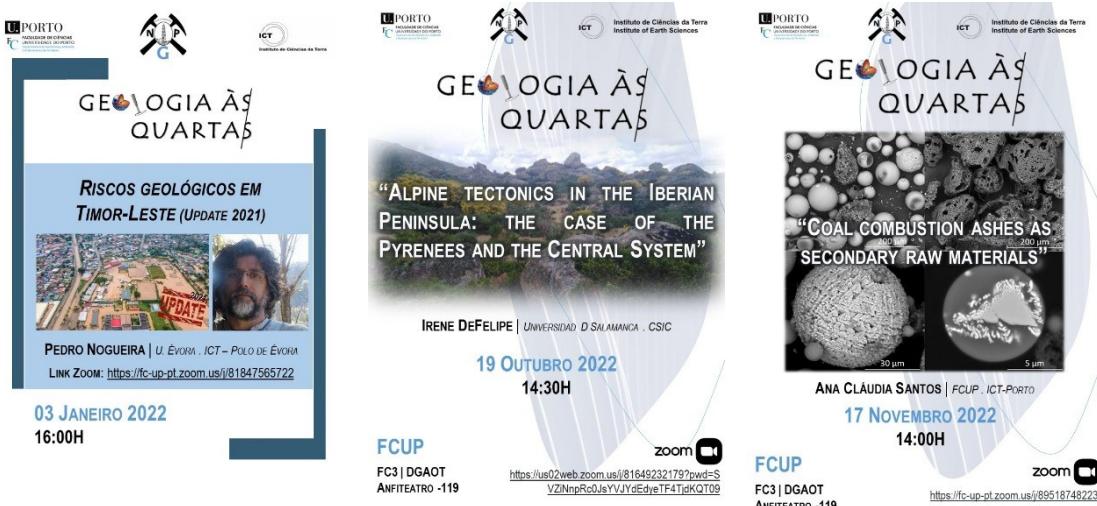
Participants ICT/FCUP: **Alexandre Lima, Maria dos Anjos Ribeiro, Lia Duarte, Helena Sant’Ovaia, A.C. Teodoro.**

Antimony (Sb) is widely used in industrial operations. Its most promising use may be for rechargeable Li- & Na-ion batteries. The project is based on disruptive concepts: i) new 3D large-scale metallogenetic model integrating deep-seated processes to determine the spatial distribution of ore deposits; ii) the use of mineral prospectivity data weighted by surface data to determine the probability of environmental risk over large areas. Then, a large-scale identification of these areas should be a priority. In this 3 years project, it will produce i) a new 3D metallogenetic model that will contribute to the understanding of the mineralizing processes; ii) a new understanding of surface processes that control the mobilisation & transport of metalloids; iii) a new large-scale mineral prospectivity and iv) a new large-scale environmental risk assessment by weighting mineral prospectivity with earth surface properties.

08 Scientific dissemination

"Geologia às Quartas"

Organization of the cycle of lectures "Geologia às Quartas" (monthly) at FCUP/ICT-Porto with simultaneous dissemination using the ZOOM platform. The lectures were given by Pedro Nogueira (ICT, Évora, January), Irene DeFelipe (University of Salamanca, October), Ana Santos (ICT, Porto, November), and Neil Phillips (University of Stellenbosch, December).



"Dia do Geólogo"

Organization of the Geologist Day 2022 (FCUP/ICT-Porto) in person and with simultaneous transmission by the ZOOM platform. The event was attended by the special guest speakers, the Professor José Feliciano and Professor Fernando Noronha.



DIA DO GEÓLOGO

PROGRAMA

14h30	Sessão de Abertura
15h00	Professor Fernando Noronha [FCUP ICT-Porto] ▪ "A Geologia na FCUP nos anos 40"
15h30	Professor José Feliciano [FEUP LNEG] ▪ "Andanças e Reflexões de um Geólogo da Cartografia"
17h00	V Concurso de Fotografia Geológica ▪ Divulgação dos Vencedores e Entrega dos Prémios
17h15	Porto de Honra

FCUP

DEPARTAMENTO DE GEOCIÊNCIAS, AMBIENTE E
ORDENAÇÃO DO TERRITÓRIO

FC3 | DGAOT

ANFITEATRO -119

LINK ZOOM:
<https://fc-up-pt.zoom.us/j/82751531702>

30 MAIO 2022

14h30 (INÍCIO)



Workshop "Which chemical elements are present in minerals and rocks?"

Collaboration with "Agrupamento de Escolas de Rio Tinto nº3 (AERT3)", under the scope of the partnership protocol with the ICT/Live Science Club of AERT3, namely through the Workshop: "Which chemical elements are present in minerals and rocks?" for students from 10th to 12th grades. The workshop was performed in 19th May 2022. The workshop was given by Helena Sant'Ovaia and Cláudia Cruz.



Dissemination video about the Master's degree in Geology at FCUP, shared in Youtube and other social media such as Facebook and Instagram. Participation of ICT members: **Alexandre Lima, Maria dos Anjos Ribeiro, Ricardo Ribeiro, Filipa Dias, Joana Cardoso-Fernandes.**

Alexandra Guedes: presentation at the “Mostra de Mestrados” - Mestrado em Geomateriais e Recursos Geológicos.

Alexandre Lima: Guest Speaker at Workshop Developments in Mineral Prospectivity Mapping with the lecture: Remote sensing to ground geochemistry & 3D modelling: Li case studies, held in ISTO, Orleans, France.



Alexandre Lima, Ana C. Teodoro and Joana Cardoso-Fernandes: public dissemination in televised interview about lithium, its main applications, and employed exploration methods (February 2022).



Alexandre Lima, Filipa Dias: (I) public dissemination in televised interview about lithium in France Television program Envoyé Special <https://youtu.be/8kYGKUU-vwk>. (II) public dissemination in televised interview about lithium in France Television TF2 program.

https://www.francetvinfo.fr/replay-jt/france-2/20-heures/portugal-discorde-autour-dune-mine-de-lithium_4934213.html



Ana Claudia Teodoro: Newspaper article in “Expresso” about the project S34I, Sustainable Supply of Raw Materials for EU Industry.

Claudia Cruz: lecture subjected to karst geology in the 41th Speleology Initiation Course (1st to 22nd October 2022). This course was the responsibility of the Centro de Estudos e Atividades Especiais - Liga para a Proteção da Natureza .



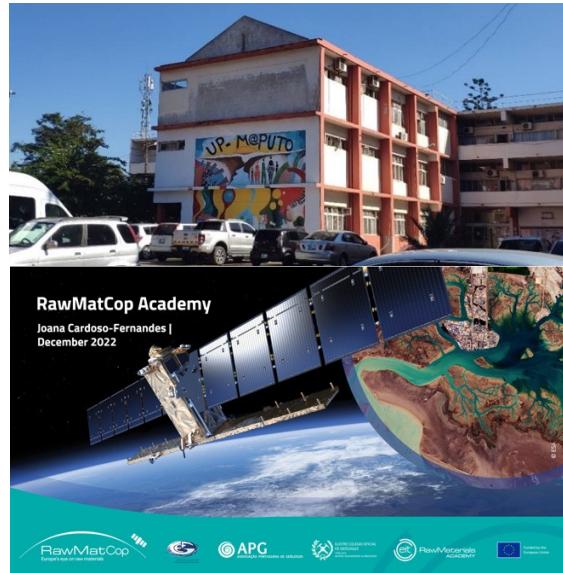
Deolinda Flores: (i) Lecture “Escombeiras em autocombustão: Processos, impactes ambientais e monitorização” presented in the colloquium “Bacia Carbonífera do Douro: Novos desenvolvimentos II” organized by M.J. Lemos de Sousa and C. Rodrigues, Academia de Ciências de Lisboa (15th September 2022). (ii) Lecture - “A realidade da escombeira de São Pedro da Cova: Estudos desenvolvidos e impactos nas áreas envolventes” presented at the Encontra-te com... on the subject of A escombeira da Mina, Museu Mineiro de São Pedro da Cova (19th March 2022).



Helena Couto collaborated as a scientific adviser with the Canelas Geological Interpretation Center (CIGC), Arouca Geopark.

Helena Sant’Ovaia: (I) Two Webinars – “Saídas de campo virtuais em ambiente Google Earth: áreas protegidas de Portugal insular” and “Saídas de campo virtuais em ambiente Google Earth: áreas protegidas no Parque Nacional Peneda Gerês” promoted by Areal Editores, directed to Secondary School Teachers. (II) Field trip to Regoufe mine in the scope of “Na rota do ouro negro e de mares de outros Tempos. Férias com geologia” directed to Secondary School Teachers. (III) Lecture “Sedimentos” presented in Ovar and participation in a talk within the plastic exhibition "Sedimentos" at the Júlio Dinis Museum /Câmara Municipal de Ovar. (IV) Lecture “Ensino da Geologia: desafios para o futuro on the scope of “Geologia Toca a Todos. Ciclos de Webinars. Smartfone group”. (V) Lectures “A importância da Ciência” and “Processos geológicos na Península Ibérica”, directed to Secondary School students. (VI) *Skype Talks*, with Secondary School students.

Joana Cardoso-Fernandes: (I) Lecture and practical exercises under the theme "Aplicações da deteção remota às Geociências" in the frame of the Earth Observation School 2022 held in Maputo, Mozambique. (II) Guest Speaker under RawMatCop Academy 2022 entitled "Sentinel-2 data in lithium pegmatite exploration: the case study of the Fregeneda-Almendra pegmatite field" in the December 2022 edition.



Lia Duarte: (I) participation in Dias Abertos 2022, collaboration in the chat for students' questions; (II) participation in Mostra da UP; (II) organization of Google Earth Engine Workshop.

Luis Lopes: (I) Field trip in the Estremoz Anticline – Guidance for visit to quarries and ornamental stone processing plants for a group of the International Master in Management of Services and Technology at ISCTE-UL, on May 5, 2022. (II) Conference about regional geology of Northeast Alentejo, on October 18, 2022 at Escola Públia Hortêncio de Castro, Vila Viçosa (O Património Geológico da Região dos Mármoreos A geologia na base do desenvolvimento industrial e da valorização do geoturismo do Alentejo) and field trip on the same topic on November 8. Collaboration with the school's Live Science Club. (II) Portuguese Association of Geologists “Férias com Geologia” (Hollydays with Geology) initiative: August 5 and 6, 2022: “Praia de São Pedro do Estoril, passeio pelo mundo cretácico” (Beach of São Pedro do Estoril, a walk in the Cretaceous World). (IV) Portuguese Association of Geologists “Férias com Geologia” (Hollydays with Geology) initiative: September 7 and 9, 2022: “Circuito geológico e tecnológico pelo anticlinal de Estremoz” (Geological and technological circuit along the Estremoz anticline). (V) Marble mining in Portugal, from 2000 years ago to the present. Lecture by invitation at the X Mining Forum (Federal University of Pernambuco), July 6 - 8, 2022. <https://www.xforumdemineracao.com.br>. (VI) Radio Diana Program “Falando com Luis Lopes e Rui Salgado 25 de janeiro de 2022” https://www.youtube.com/watch?v=TdRQ65T_KhE



Patrícia Santos: (I) In May 11th 2022, by invitation of The Portuguese Association of Geologists presented the webinar intituled “Prospeção Geológica: Conhecer o Valor Debaixo dos Nossos Pés” (Geologic Exploration: knowing the value below our feet). This presentation was included in a cycle of webinars promoted by the national association in regard of 2022 - The Year of Mineral Resources.

Prospeção Geológica: Conhecer o Valor Debaixo dos Nossos Pés

11 de maio de 2022
patricia.santos@fc.up.pt





Mónica Santos



APG
ASSOCIAÇÃO PORTUGUESA DE GEÓLOGOS



U.PORTO
FACULDADE DE CIÉNCIAS
UNIVERSIDADE DO PORTO



ICT
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2022
Recursos
Minerais

09 Awards and Distinctions

Ana Marta Gonçalves: PhD medal award. Awards and Distinctions Ceremony, November 4th 2022, FCUP.

Ana Teodoro: World's Top 2% Scientists List" (Stanford Ranking, EUA) in 2021.

Fernando Noronha: European Federation of Geologists Medal of Merit for 2022.



Joana Fernandes: PhD medal award. Awards and Distinctions Ceremony, November 4th 2022, FCUP.

Lia Duarte: International Award Soldera Case Basse Award For Young Researchers in the category Viticulture with the paper "QVigourMap: A GIS Open Source Application for the Creation of Canopy Vigour Maps". Novembro 2022.

Mariana Costa: Awarded the first honorable mention of the Research Prize of the Junta de Comunidades de Castilla La Mancha, with the work entitled " Assinatura geoquímica de fluidos ígneos nos carvões da Bacia Carbonífera do Douro: setores de São Pedro da Cova e Pejão ", at the XIII Congresso Ibérico de Geoquímica and XIII Congresso Nacional de Geoquímica (XIII CIG/XIII CNG) held in Puertollano (Ciudad Real), Spain, 25-28 April 2022.

Mariana Costa: received the distinction of "Best final average grade - Masters in Geology 2021/2022". 2021/2022". Awards and Distinctions Ceremony, November 4th 2022, FCUP.