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**REPORT ON THE SCIENTIFIC AND  
ACADEMIC ACTIVITIES  
APRIL 2016 -APRIL 2019**

THREE YEARS RESEARCHER' REPORT ACCORDING WITH N.1, ART. 41.  
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IST

DECN, CTN, POLO DE LOURES

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# Report on the Scientific and Academic Activities

April 2016-April 2019

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## Contents

1. Introduction - Scientific and academic contributions, their significance and impact on the strategic development of DECN and IST .....	1
2. Principal contributions to the advance of science and technology .....	3
2.1. List of 5 representative publications in the scientific and disciplinary area of Chemical and Radiopharmaceutical Sciences.....	3
3. Other scientific contributions (2016 – 2019) .....	8
3.1. Book Chapters .....	8
3.2. Articles in International Journals with Referees .....	8
3.3. Proceedings of Refereed Conferences.....	12
3.4. Oral Presentations.....	12
3.5. Poster Presentations .....	15
3.6. Internal memoranda and progress reports.....	16
3.7. Participation in seminars, conferences and other scientific national and international meetings.....	17
4. International recognition .....	18
4.1. Evaluation of research grants/projects.....	18
4.2. Conference/workshop organization .....	18
4.3. Participation in Commissions and Working groups .....	18
4.4. Participation in international associations / directive boards .....	19
4.5. Invited talks .....	19
4.6. Scientific collaborations – networking.....	20

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5.	Scientific and teaching innovation .....	22
5.1.	Proposal of new Master & doctoral degrees .....	22
5.2.	Teaching activities .....	22
6.	Other teaching activities .....	23
7.	Supervision and training of (young) researchers .....	24
8.	Other examples of scientific and academic recognition .....	25
8.1.	Participation in PhD juries .....	25
8.2.	Participation in projects .....	25
8.3.	Refereeing Activities.....	26
8.4.	Coordination of Services/contracts.....	27
8.5.	Dissemination Activities .....	27
9.	Examples of scientific leadership .....	28
9.1.	Management & Coordination Activities.....	28
9.2.	Coordination of Scientific projects .....	28
9.3.	Project submissions.....	29

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## 1. Introduction - Scientific and academic contributions, their significance and impact on the strategic development of DECN and IST

My work realized during the three years as Investigadora Principal (com agregação) at the Department of Nuclear Sciences and Engineering (DECN)/IST, was developed in the scientific and disciplinary area of DECN Chemical and Radiopharmaceutical Sciences, particularly in Nuclear Geosciences, with a broad spectrum of activities in fields as diverse as earth sciences, cultural heritage, environment and health. I am affiliated with the research unit Center for Nuclear Sciences and Technologies (C2TN), particularly in one of the main research lines of its strategic programme - the Earth Systems, Radioactivity and Cultural Heritage thematic strand. My research activities within C2TN were developed in the Nuclear Engineering and Techniques scientific group (NET), which I am the coordinator.

During this three years I contributed significantly to the scientific output of the research unit being co-author of 34 articles of which 3 are book chapters, 24 are published in journals ranked in the ISI, 15 in the first quartile (Q1) according to the Thomson Reuters journal's ranking and 7 articles in the second quartile (Q2). I gave 6 invited talks at national and international meetings. Furthermore, during this time period I was co-author of 22 oral and 15 poster presentations at national and international conferences, some of them given by my post-docs. Several articles are the result of fruitful international collaborations i.e. with researchers from Spain, Hungary, Italy, Austria and the UK. I have also applied for several research projects, as coordinator and participant, in the frame of national (FCT) and international funding entities (H2020; CSIC), some of them being successful. In the academic domain, I contributed to the one of the DECN strategies, by contributing to the increase of teaching activities. Together with other researchers, I am co-proponent of a new master's degree in cultural heritage. I also belong to the faculty of the first approved MSc of DECN, MSc Radiation Protection and Safety in the curricular unit of "Radioactive Wastes", and of the optional curricular unit "Environmental Reconstruction and Geochronology" from the Integrated Master in Environmental Engineering, IST, Universidade de Lisboa, and take part in the faculty of a new MSc currently under evaluation. Additionally, I participate as member of jury thesis in Spain and post-docs supervisions.

Other scientific activities such as the refereeing of articles and research projects, namely from the FCT panel of grants evaluation (BD, BDE, BPD) and of the European Union (H2020) projects, organization of scientific events, dissemination activities, maintenance of experimental equipment, short term research visits and knowledge transfer are also described. All of these together with the activities related with management, coordination of research group (ETN), executive board of CTN and school council member.

With respect to these topics activities it should be highlighted in particular, that I was in the period 2016-2019:

i) Promoter and co-organizer of the first event of the "Universidade de Lisboa e o Património" in the "Ano Europeu do Património Cultural" (2018);

- ii) Co-proponent of a Masters degree “Mestrado em Ciências e Tecnologias para o Património Cultural (MCTPC), that is now waiting for the A3ES appraisal;
- iii) Member of the IST team for the proposal EuroPean trAining NetWOrk on Rare eArth elements environMental trAnsfer: from rock to human, submitted in the call MARIE SKLODOWSKA-CURIE ACTIONS. Innovative Training Networks (ITN). Call: H2020-MSCA-ITN-2018;
- iii) Referee of about 30 research papers and 6 research project proposals;
- iv) Supervisor of the set-up of the laboratory for clays characterization;
- v) Responsible for the Luminescence Dating laboratory;
- vi) Member of the *Management Committee* of the COST ACTION ES1407 “European network for innovative recovery strategies of rare earth and other critical metals from electric and electronic waste (ReCrew)”;
- vii) Member of the directive board of the Iberian Society for Archaeometry - Sociedade Ibérica "Sociedade de Arqueometria Aplicada ao Património Cultural" (SAPaC).
- viii) Member of the Management Board of CTN, Polo de Loures, IST
- ix) Member of the School Council, IST
- x) Coordinator of the Nuclear Engineering and Techniques (NET) research group of C2TN

New and further development of existing collaborations with international and national partners in the areas of earth sciences and cultural heritage, and new ones in the field of Waste Electrical & Electronic Equipment (WEEE) and Rare Earth elements recovery from secondary sources have been implemented. Taking advantage of my background and expertise on geosciences and nuclear methods of analyses, I have significantly contributed to expand the on-going research on this field. I consider that the two main research lines in which my team is currently working on, one related with the cultural heritage, and the other with recycling for the recover of critical raw materials are clearly relevant for C2TN and DECN future activities, as the national reference institutions for research in nuclear sciences.

In terms of short to medium term strategic scientific development of DECN (and C2TN), I have been involved during this period, as member of the Coordination Commission of C2TN and the Research group coordinator, in the preparation of the future Strategic Project of C2TN, particularly in the Thematic Strand – Earth Systems, Radioactivity and Cultural Heritage. I believe that my research of the past three years served to strengthen one of the main research lines, education and training at DECN. In the future, my extensive network of national and international collaborations will enable me to continuously find interesting research topics and secure funding.

## 2. Principal contributions to the advance of science and technology

The main contributions to the advance of science and technology were achieved in the areas of earth sciences and cultural heritage, with the consolidation and recognition of the work developed by national and international partners, resulting in high impact publications, invited talks and projects/contracts/services coordination/participation, as well as international conference organizations. In addition, new line of researches have been implemented in the field of Waste Electrical & Electronic Equipment (WEEE) and Rare Earth elements recovery from secondary sources, comprising its characterization and health issues resulting from its exploitation/recovery. All these lines of scientific activities based on my skills on geosciences and nuclear methods of analyses are clearly significant for C2TN and DECN future activities.

Below I highlight five publications published during this period and representative of the work and type of funding: i) FCT projects; ii) European projects; iii) Contracts/Services, as contributing to the advance of science and technology in my research field. In two of these publications I am corresponding author, while the work of the other three have been developed in different contexts: i) international collaborations/projects in which I am the co-author responsible for the archaeometric component; ii) work that has been carried out by a post-doc under my supervision, and iii) COST Action - for the discussion of approaches to the assessment of the potential for harm to human health from WEEE recycling.

In all five publications, I have been responsible for initiating the research topic, resulting from the existing collaborative network and complementary characterization of materials, for securing funding for the work and access to external research facilities as well as for supervising all steps of the experimental work, data analysis and manuscript writing.

### *2.1. List of 5 representative publications in the scientific and disciplinary area of Chemical and Radiopharmaceutical Sciences*

#### **Publication 1**

**DIAS, M. I., KASZTOVSZKY, ZSOLT, PRUDÊNCIO, M. I., VALERA, A.C., MARÓTI, BOGLÁRKA, HARSÁNYI, ILDIKÓ, KOVACS., I., SZOKEFALVI-NAGY, Z. (2018)** X-ray and neutron-based non-invasive analysis of prehistoric stone artefacts: a contribution to understand mobility and interaction networks. *Archaeol Anthropol Science*. 10. 6. 1359-1373. DOI 10.1007/s12520-016-0457-2 – Q1

This work results from an international and interdisciplinary collaborative effort developed in the frame of two European projects (IPERION CH Project H2020: BRR-527; CHARISMA GA No. FP7 - 228330: BRR-376), which I coordinate, and implement pioneering work, as it is the first time that a detailed compositional characterization of Chalcolithic stone artefacts is done.

For the Iberian Peninsula, many studies have dealt with the distribution and characterization of ornamental stones especially for Roman chronologies but using destructive techniques of analysis (radiogenic isotopes). For pre-historical stone artefacts, there is a lack of studies, particularly because due to the relevance of the artefacts, only the use of non-destructive techniques is allowed. The type of studied artefact - Stone idols, has different typologies and apparently are mostly made of marble or limestone. Sourcing carbonate rich artifacts is

problematic, especially because macroscopically they may look similar, even if they come from different sources, and from a mineralogical point of view, they are almost pure CaCO<sub>3</sub> with a very heterogeneous mixture of impurities. Some questions remain to be answered, like their compositional nature and their provenance and related outcrops (if possible), contributing to understand the interaction network in which Perdigões archaeological site was involved. So, in this work an innovative and challenged approach was implemented to evaluate the success of the combination of X-ray and neutron based non-invasive techniques, like Prompt Gamma Activation Analyses (PGAA), External Beam PIXE (particle induced X-ray emission), and neutron radiography (NR), to trace the source(s) of these Chalcolithic artifacts made of carbonate rich raw materials, studying both the artefacts and the potential raw materials. These atomic and nuclear techniques, simultaneously used for complementary chemical information, have been demonstrated to be of great value as they provide non-destructive compositional information avoiding sample preparation, crucial in so singular and rare objects. Obtained results, especially of PGAA, are very promising and useful in general assessments of provenance. The stone artefacts show signs of both nearby and long distance procurement, as well as of unknown attribution.

In this work I was responsible for the selection of artefacts considering archaeological problem, the field work campaign to sample potential raw materials comprising limestones from the *Maciço calcário Estremenho* close to Lisbon, the marbles from the *Estremoz marble triangle*, and *breccia* from Algarve region (Tavira), and together with the colleagues from BNC, I performed laboratory work. For these studies, I have also performed the design and concept of the projects to be submitted to the European Union, and the analysis of data. I have also designed the article, and together with other co-authors, I was responsible for the preparation of the final version of the manuscript, including text and figures. This work also gave rise to one invited talk at HAS centre for energy research KFHI campus, 3 oral and 1 poster presentations.

### **Publication 2**

Rogério-Candelera, M. A., Ramírez, P.B., Bn-Behrmann, R., **Dias, M. I.**, Sanjuánd, L.G., Coutinho, M. L. Rodríguez, J. A. L., Miller, A. Z., Pike, A. W., Standish, C. D., Prudêncio, M. I., Rodrigues, A. L., Arranz, J. M. R., Gaspar, D. (2018) Landmark of the past in the Antequera megalithic landscape: A multidisciplinary approach to the Matacabras rock art shelter. *Journal of Archaeological Science* 95, 76-93. (<https://doi.org/10.1016/j.jas.2018.05.005> - Q1

This work has been done in the frame of funding by the projects HAR2013-45149-P, 2014–2017, sponsored within the National R&D Plan of the Ministry of Economy and Competitiveness (Spanish Government). It has also been carried out within the project 2013–2018, approved by the Ministry of Culture of the Andalusian Government, and also the FCT support through the UID/Multi/04349/2013 project. I am the responsible of the two Spanish projects at IST.

The Antequera megalithic landscape comprises three 5000-year-old dolmens: Menga Dolmen (the largest in Europe) and Viera Dolmen, which are both located just outside the town, while El Romeral Dolmen is a few km away. These three prehistoric burial chambers represent some of the largest and most complete megalithic structures in Europe. In 2016 the dolmens, along with two mountains closely connected to the dolmen complex, were declared UNESCO World Heritage. This paper clear enhance the interdisciplinary and science boundaries in which I usually perform my work in the field of Cultural heritage. In this work, it was performed for the first time a multi-disciplinary study of a Late Prehistoric Iberian schematic rock art site, a first attempt

at synchronising biographies of connected megaliths and rock art sites, the high-resolution non-invasive analysis of the northern area at Peña de los Enamorados and relevant conservation data was collected for future preservation of Matacabras shelter. It was possible to provide a high-resolution characterisation of the Matacabras rock art shelter, through a photogrammetric topographic survey, a detailed assessment of the graphic motifs identified using digital image processing and various types of physical and chemical analysis, a geo-chemical characterisation of pottery found on its surface, and a comparative stylistic analysis of its motifs. Our study suggests that Matacabras (and the site of Piedras Blancas I, located just below it), played an important role in the genesis of Menga, which perhaps makes it the most important rock art location of Spanish Late Prehistory.

In this paper my contribution was i) fieldwork campaign, in situ measurements and sampling; ii) geochemical and mineralogical characterization of artefacts by using Neutron activation analysis (NAA) and X-Ray diffraction (XRD); iii) assembly of archaeometric data for the article; iv) writing of the archaeometric sections and related figures.

### **Publication 3**

Rodrigues, A.L., Cardoso, G., **Dias, M.I.**, Prudêncio, M.I., Marques, R., Russo, D. (2018) Thermoluminescence as a tool for identifying archaeological “firesetting” evidence in at La Turquesa mine in Cornudella de Montsant, Catalonia. Cap 4 In N. Rafel Fontanals, M.A. Hunt Ortiz, I. Soriano, S. Delgado-Raack (eds); Prehistoric copper mining in the northeast of the Iberian Peninsula: La Turquesa or Mas de les Moreres Mine (Cornudella de Montsant, Tarragona, Spain). *Revista d'Arqueologia de Ponent*, número extra 3, 169 págs. Universitat de Lleida, ISSN 978-84-9144-029-1.

This work has been done in the frame of a contract / service with researchers from the University of Lleida, Catalunya, Spain. That was the reason for the first publication to be in the form of a book chapter in a monography of the archaeological site, as it was mandatory. Another publication in an ISI journal has already been submitted.

Recent archaeological excavations at La Turquesa mine have revealed evidence that points to fire-setting conditions during preindustrial mining activities. Fire-setting is well recognised as one of the oldest mining techniques for breaking up hard rocks, mostly in open mines. Few scientific studies exist and those there are focus mainly on the processes involved in the fire-setting (mineralogical and chemical alterations in the rock, the fuel used, the temperatures achieved). Chronological information, particularly absolute dating, is scarce, and is largely dependent of the presence of radiocarbon-datable charcoal. In this framework and considering that the archaeological remains comprise heated geomaterials, the innovative approach was to try to date them using luminescence techniques. Therefore, this study intended to find heating evidence and evaluate its ability to back up absolute dating by using luminescence techniques. The study clearly demonstrates the suitability of luminescence for identifying fire-setting in mining contexts and evaluating the absolute dating properties of the samples.

My contributions to this book chapter were i) the planning of the field work campaign and experiments; ii) initial measurements defining that the luminescence procedures were suitable to identify firesetting evidences in pre-historic mines; iii) training of A. L. Rodrigues (post-doc who is first author in this work); iv) application of X-ray diffraction protocols; v) detailed discussion of results and data analysis; vi) critical reading and corrections to the manuscript prepared by A. L. Rodrigues. This work also gave rise to 2 oral and 1 poster presentations.



#### **Publication 4**

**DIAS, M. I., PRUDÊNCIO, M. I., KASZTOVSZKY, ZSOLT, MARÓTI, BOGLÁRKA, HARSÁNYI, ILDIKÓ, FLOR, P.** (2017). Nuclear techniques applied to provenance and technological studies of and Renaissance majolica roundels from Portuguese museums attributed to della Robbia Italian workshop. *Journal of Radioanalytical Nuclear Chemistry*, 312(2), 205-219. DOI 10.1007/s10967-017-5235-9- Q2

This work results from interdisciplinary work with art-historians developed in the frame of the FCT funded project PTDC/HIS-HEC/116742/2010, which I was responsible at IST, and the European project CHARISMA GA No. FP7 228330 BRR-345 coordinated by M. I. Prudêncio. It deals with both provenance and authentication issues, by using geochemistry of trace elements obtained by neutron activation analyses, and Prompt Gamma Activation Analysis and mineralogical composition by X-ray diffraction.

High quality glazed terracotta sculptures displayed in various Portuguese museums (Museu Nacional de Arte Antiga, Museu Nacional do Azulejo, Museu Calouste Gulbenkian), point to their production in della Robbia workshop of Florence (Italy). A multitechnique analytical approach is applied for the first time to these sculptures, aiming to confirm their origin. The compositional results are similar to other della Robbia sculptures, suggesting a common origin for the raw material that was identified as carbonate rich marine origin marly clay. The applied firing temperatures was proved to be around 900°C. The differences found within each sculpture are explained by the production technique of assembling separate parts to produce these huge sculptures, and the clay pit heterogeneity. To better validate the assumption of the attribution of the analyzed sculptures to the della Robbia workshop, besides this understanding of the geological and geochemical context of the known used clay source by the family along generations, we have also compared obtained results with other published data from French and Italian della Robbia collections, and with other Florentine workshops of glazed and non-glazed sculptures. For Portuguese, French and Italian della Robbia sculptures the chemical and mineralogical results point to a common raw material—carbonate rich clay of marine origin. The body composition of these della Robbia medallions is similar to published data for della Robbia sculptures. Thus the results point to technological procedures associated with della Robbia workshop. This fact together with artistic and historical examination of these high quality sculptures leads to the attribution of all of them to the della Robbia workshop.

My contributions to this paper were i) design of the archaeometric component of the FCT project; ii) sampling campaigns at the national museums; iii) planning and realization of the experiments (at CTN and BNC); iv) detailed discussion of results and data analyses; v) preparation of the manuscript to send to co-authors; vi) final assemblage of article, comprising final text, design of figures and tables. This work also gave rise to one invited talk at the Museu Calouste Gulbenkian, 5 oral and 3 poster presentations.

#### **Publication 5**

ALESSANDRA CESARO, VINCENZO BELGIORNO, MENTORE VACCARI, ALEKSANDER JANDRIC, TRAN DUC CHUNG, **MARIA ISABEL DIAS**, ANDREW HURSTHOUSE, STEFAN SALHOFER. A device-specific prioritization strategy based on the potential for harm to human health in informal WEEE recycling. *Environmental Science and Pollution Research*. 2017. <https://doi.org/10.1007/s11356-017-0390-7 - Q2>

This work was developed in the frame of a COST Action ES1407 (Earth System Science and Environmental Management): European network for innovative recovery strategies of rare earth and other critical metals from electric and electronic waste (ReCrew). 2015-2019, in which I belong to the management committee.

This paper is the first full paper resulting from a new line of research I have started at C2TN, which has a major goal to bring forward the risk assessment resulting from the recovery of valuable materials from Waste Electrical and Electronic Equipment (WEEE), which depends on both the kind and hazardous properties of the substances contained in WEEE. Due to the presence of valuable metals, WEEE is now regarded as urban stock, available for the mining of both precious metals and rare earth elements (REE). The latter have received a great deal of recent attention, as their supply is sensitive to many factors: REEs are provided predominantly from China and export has been limited, posing an issue of supply for conventional industrial applications. The possible recovery of these strategic materials along with other valuable metals from WEEE is an important driver for the implementation of WEEE recycling practices. We propose to evaluate a strategy to identify the relative potential harm of different kinds of WEEE during informal recycling practices, by their content in metals, selected as the target substances of concern. This was based on the individual metal content, primarily located in the printed circuit boards (PCBs) of the different devices. The metal composition of the individual PCBs was identified and the dominant unregulated metal recovery practices were reviewed to identify the most suitable parameter to express the toxicity of these metals. Based on a mass-normalized cumulative toxicity, via the inhalation route, individual components were assessed from compositional variation found in the literature. The results is a semiquantitative ranking of individual components, revealing significant differences in potential harm posed by different electronic appliances and an opportunity to provide prioritization strategies in future management.

My contribution to this work was, together with Alessandra Cesaro to design the paper, with special contribution in the Introduction, methodology, informal recycling methods for PCBs and exposure routes, and in the section Approach to the assessment of the potential for harm to human health from PCBs. Of course, all of us did discussion and conclusions.

This line of research is ongoing, with other accepted work at the Environmental Science and Pollution Research by the same authors entitled "A relative risk assessment of the open burning of WEEE".

### 3. Other scientific contributions (2016 – 2019)

As other scientific contributions, the following outputs were considered: 1) book chapters; 2) Proceedings; 3) Oral Presentations; 4) Poster Presentations; 5) Participation in seminars, conferences and other scientific national and international meetings.

#### 3.1. Book Chapters

Rodrigues, A.L., Cardoso, G., Dias, M.I., Prudêncio, M.I., Marques, R., Russo, D. (2018) Thermoluminescence as a tool for identifying archaeological “firesetting” evidence in at La Turquesa mine in Cornudella de Montsant, Catalonia. Cap 4 In N. Rafel Fontanals, M.A. Hunt Ortiz, I. Soriano, S. Delgado-Raack (eds); Prehistoric copper mining in the northeast of the Iberian Peninsula: La Turquesa or Mas de les Moreres Mine (Cornudella de Montsant, Tarragona, Spain). *Revista d'Arqueologia de Ponent*, número extra 3, 169 págs. Universitat de Lleida, ISSN 978-84-9144-029-1.

Dias, M. I. & Valera, A. C. (2017) Stone travelers. Contribution of non-invasive nuclear techniques to determine culture identity, mobility and interaction in the recent prehistory of South Portugal. B.3. Chapter 9 -Ceramics, marbles and stones in neutron Light. Characterization of ceramics, marbles and other stone materials by neutron methods. “Neutron Methods for Archeology and Cultural Heritage” ed. Nikolay Kardjilov & Giulia Festa

Cabo Verde, S., Nunes, I., Silva T., Dias, M. I., Prudêncio, M. I., M. Luisa Botelho (2017). Gamma radiation for microbial decontamination of cultural heritage: case studies with parchment and ceramic tiles. IAEA RADIATION TECHNOLOGY SERIES No. 6 – Uses of Ionizing radiation for tangible cultural heritage conservation, chapter 19. 163-172.

#### 3.2. Articles in International Journals with Referees

##### Submitted, Approved and Under Revision

González-Regalado, María Luz, Guadalupe Monge, María Isabel Carretero, Manuel Pozo, Joaquín Rodríguez-Vidal, Luis Miguel Cáceres, Manuel Abad, Juan Manuel Campos, Javier Bermejo, Josep Tosquella, Tatiana Izquierdo, María Isabel Prudencio, María Isabel Dias, Rosa Marques, Antonio Monge, Josep Tosquella, Francisco Ruiz. (submitted). Trace metals as sentinels of tsunamis and historical pollution in Holocene sediments of southwestern Spain. *Geosciences*

González-Regalado, M. L., Romero, V., Abad, M., Tosquella, J., Izquierdo, T., Gómez, P., Clemente, M. J., Toscano, A., Rodríguez Vidal, J., Cáceres, L. M., Muñoz, J. M., Prudencio, M. I., Dias, M. I., Marques, R, García, E. X. M., Monge, G., Carretero, M. I., Ruiz, F. (under revision). Late Tortonian-Middle Messinian palaeoenvironmental changes in the Western Betic Strait (SW Spain). *Ameghiniana* (Q2).

Bermejo, J., Gómez, P., González-Regalado, M.L., Ruiz, F., Campos, J.M., Rodríguez-Vidal, J., Cáceres, L.M., Clemente, M.J., Toscano, A., Abad, M., Izquierdo, T., Prudencio, M.I., Dias, M.I., Marques, R., Tosquella, J., Carretero, M.I., Monge, G. (under revision). A new roman fish-salting workshop in the Saltés Island (Tinto-Odiel Estuary, SW Spain): La

Cascajera and its archaeological and geological context. Un nuevo taller pesquero-salazonero romano en la Isla de Saltés (Estuario Tinto-Odiel, SO España): La Cascajera y su contexto arqueológico y geológico. Cuaternario y Geomorfología

Ruiz, F., Rodríguez Vidal, J., Cáceres, L. M., Olías, M., González-Regalado, M. L., Campos, J. M., Bermejo, J., Abad, M., Izquierdo, T., Carretero, M. I., Pozo, M., Monge, G., Tosquella, J., Prudencio, M. I., Dias, M. I., Marques, R., Gómez, P., Toscano, A., Romero, V. (under revision). Silver and copper as pollution tracers in Neogene to Holocene sediments from southwestern Spain. *Marine Pollution Bulletin* (Q1).

González-Regalado, M. L., Monge, G., Carretero, M. I., Pozo, M., Rodríguez Vidal, J., Cáceres, L. M., Abad, M., Campos, J. M., Bermejo, J., Tosquella, J., Izquierdo, T., Prudencio, M. I., Dias, M. I., Marques, R., Soares, A. M., Gómez, P., Toscano, A., Romero, V., Ruiz, F. (under revision). New imprints of the 218-60 BCE tsunamigenic period in southwestern Spain. *Estudios Geológicos* (Q4).

## 2019

Isabel Paiva, Rosa Marques, Marta Santos, Mário Reis, Maria Isabel Prudêncio, João Carlos Waerenborgh, Maria Isabel Dias, Dulce Russo, Guilherme Cardoso, Bruno J.C. Vieira, Edgar Carvalho, Carlos Rosa, Daniela Lobarinhas, Catarina Diamantino, Rui Pinto (2019). Naturally Occurring Radioactive Material and risk assessment of tailings of polymetallic and Ra/U mines from legacy sites. *Chemosphere* 223, 171-179. <https://doi.org/10.1016/j.chemosphere.2019.02.057>

Maria Jose Madruga, Maria Isabel Prudêncio, Jose Alberto Gil Corisco, Jan Mihalik, **Rosa Marques**, Marta Santos, Mario Reis, Isabel Paiva, Maria Isabel Dias (2019). Distribution of Natural Radionuclides, Rare Earth Elements, Metals and Metalloids in a Phosphogypsum Stockpile. *International Journal of Waste Resources* 9:1. [DOI: 10.4172/2252-5211.1000363](https://doi.org/10.4172/2252-5211.1000363)

González-Regalado, M. L., Carro, B., Arroyo, M., Ruiz, F., Borrego, J., Abad, M., Izquierdo, T., Tosquella, J., Prudencio, M. I., Dias, M. I., Marques, R., Romero, V., Rodríguez Vidal, J., Cáceres, L. M., Gómez, P., Toscano, A., Monge, G., Carretero, M. I., Campos, J. M., Bermejo, J., García, E. X. M. (2019). Distribution of Benthic Foraminifera in the Marine Estuary of the Guadalquivir River (SW Spain): A Preliminary Report. *Oceanography & Fisheries*, 9, OFOAJ.MS.ID.555759. Factor de impacto 2017 (no SCI): 0.702.

González-Regalado, M. L., Gómez, P., Ruiz, F., Cáceres, L. M., Clemente, M. J., Rodríguez Vidal, J., Toscano, A., Monge, G., Abad, M., Izquierdo, T., Monge Soares, A. M., Campos, J. M., Bermejo, J., Martínez-Aguirre, A., López, G. (2019). Holocene palaeoenvironmental evolution of Saltés Island (Tinto and Odiel estuary, SW Spain) during the Roman period (1st century BC–5th century AD). *Journal of Iberian Geology*, 45, 129-145 (Q2).

M. Abad, A.F. Muñoz, M.L. González-Regalado, F. Ruiz, J. Rodríguez-Vidal, L.M. Cáceres, M.I. Carretero, G. Monge, M. Pozo, M.I. Prudencio, M.I. Dias, R. Marques, T. Izquierdo, J. Tosquella, V. Romero (2019). Palaeoenvironmental evolution of a Late Holocene peat bog in the southwestern sector of the Doñana National Park (SW Spain). *Estudios Geológicos*. 75(1), e087. ISSN-L: 0367-0449. <https://doi.org/10.3989/egeol.43417.514> (Q4)

Mentore Vaccari, Giovanni Vinti, Alessandra Cesaro, Vincenzo Belgiorno, Stefan Salhofer, Maria Isabel Dias, Aleksander Jandric (2019). WEEE treatment in developing countries: environmental pollution and health consequences. An overview. *International Journal*

of Environmental Research and Public Health. 16(9), 1595;  
<https://doi.org/10.3390/ijerph16091595>

Alessandra Cesaro, Vincenzo Belgiorno, Giuliana Gorrasi, Gianluca Viscusi, Mentore Vaccari, Giovanni Vinti, Aleksander Jandric, Maria Isabel Dias, Andrew Hursthouse, Stefan Salhofer (submitted and approved). A relative risk assessment of the open burning of WEEE. *Environmental Science and Pollution Research*. 26:11042–11052. <https://doi.org/10.1007/s11356-019-04282-3>

M.L. González-Regalado, P. Gómez, F. Ruiz, L.M. Cáceres, M.J. Clemente, J. Rodríguez Vidal, A. Toscano, G. Monge, M. Abad, T. Izquierdo, J.M. Campos, J. Bermejo, A. Martínez-Aguirre, M.I. Prudêncio, M.I. Dias, R. Marques, J.M. Muñoz. (2019). Facies analysis, foraminiferal record and chronostratigraphy of Holocene sequences from Saltés Island (Tinto-Odiel estuary, SW Spain): The origin of high-energy deposits. *Estuarine, Coastal and Shelf Science* 218, 95-105. <https://doi.org/10.1016/j.ecss.2018.12.005> - Q1

## 2018

Dias, M.I., Kasztovszky, Zs., Prudêncio, M. I., Harsányi, I., Kovács, I., Szókefalvi-Nagy, Z., Mihály, J., Káli, G., Valera, A. C., Rodrigues, A. L. (2018) Investigating beads from Chalcolithic funerary cremation contexts of Perdigões, Portugal. *Journal of Archaeological Science: Reports* 20, 434–442. (<https://doi.org/10.1016/j.jasrep.2018.04.030>)

Rogério-Candelera, M. A., Ramírez, P.B., Bn-Behrmann, R., Dias, M. I., Sanjuánd, L.G., Coutinho, M. L. Rodríguez, J. A. L., Miller, A. Z., Pike, A. W., Standish, C. D., Prudêncio, M. I., Rodrigues, A. L., Arranz, J. M. R., Gaspar, D. (2018) Landmark of the past in the Antequera megalithic landscape: A multidisciplinary approach to the Matababras rock art shelter. *Journal of Archaeological Science* 95, 76-93. (<https://doi.org/10.1016/j.jas.2018.05.005> - Q1

Trindade, Maria J., Dias, Maria I., Rocha, Fernando, Prudêncio, Maria I., Marques, Rosa (2018). Geochemistry of mudrock units from the Meso-Cenozoic Algarve Basin, Portugal. *Geosciences Journal* 22 (5), 733-749. <http://dx.doi.org/10.1007/s12303-017-0085-6> - Q1

R. Marques, B. J. Vieira, M. Isabel Prudêncio, J. C. Waerenborgh, M. Isabel Dias, F. Rocha (2018). Chemistry of volcanic soils used for agriculture in Brava Island (Cape Verde) envisaging a sustainable management. *Journal of African Earth Sciences* 147, 28–42. <https://doi.org/10.1016/j.jafrearsci.2018.06.014> - Q2

Dias, M. I., Kasztovszky, Zsolt, Prudêncio, M. I., Valera, A.C., Maróti, Boglárka, Harsányi, Ildikó, Kovacs., I., Szokefalvi-Nagy, Z. (2018) X-ray and neutron-based non-invasive analysis of prehistoric stone artefacts: a contribution to understand mobility and interaction networks. *Archaeol Anthropol Science*. 10. 6. 1359-1373. DOI 10.1007/s12520-016-0457-2 – Q1

Alessandra Cesaro, Vincenzo Belgiorno, Mentore Vaccari, Aleksander Jandric, Tran Duc Chung, Maria Isabel Dias, Andrew Hursthouse, Stefan Salhofer (2018). A device-specific prioritization strategy based on the potential for harm to human health in informal WEEE recycling. *Environmental Science and Pollution Research*. Volume: 25 Issue: 1 Pages: 683-692 <https://doi.org/10.1007/s11356-017-0390-7> - Q2

## 2017

- Dias, M. I., Prudêncio, M. I., Valera, A. Provenance and circulation of Bell Beakers from Western European societies of the 3rd millennium BC: The contribution of clays and pottery analyses. *Applied Clay Science* 1476 (2017) 334-342. – Q1
- Marques, R., Prudêncio, M.I., Waerenborgh, J.C., Vieira, B.J., Rocha, F., Dias, M.I., Madeira, J., Mata, J. (2017). Extrusive carbonatite outcrops - a source of chemical elements imbalance in topsoils of oceanic volcanic islands. *Catena* 157, 333-343. <http://dx.doi.org/10.1016/j.catena.2017.05.035> - Q1
- Marques, R., Prudêncio, M.I., Waerenborgh, J.C., Rocha, F., Ferreira da Silva, E., Dias, M.I., Vieira, B.J.C., Marques, J.G., Franco, D. (2017). Volcanic conduits of the Chã das Caldeiras caldera (Fogo Island, Cape Verde) – REE and Fe crystalchemistry. *Procedia Earth and Planetary Science* 17, 928-931. <https://doi.org/10.1016/j.proeps.2017.01.023> - Q2
- Marques, R., Prudêncio, M.I., Freitas, M.C., Dias, M.I., Rocha, F. (2017). “Chemical element accumulation in tree bark grown in volcanic soils of Cape Verde – a first biomonitoring of Fogo Island”. *Environmental Science and Pollution Research* 24, 11978-11990. DOI 10.1007/s11356-015-5498-z – Q2
- Dias, M. I., Prudêncio, M. I., Kasztovszky, Zsolt, Maróti, Boglárka, Harsányi, Ildikó, Flor, P. (2017). Nuclear techniques applied to provenance and technological studies of and Renaissance majolica roundels from Portuguese museums attributed to della Robbia Italian workshop. *Journal of Radioanalytical Nuclear Chemistry*, 312(2), 205-219. DOI 10.1007/s10967-017-5235-9- Q2
- Dias, M.I., Prudêncio, M.I. (2017). Fingerprinting ceramic workshops in the Lusitania Roman world: an appraisal based on elemental characterization by instrumental neutron activation analysis. *Archaeological and Anthropological Sciences*, 9, Issue 5, 777–788. <http://dx.doi.org/10.1007/s12520-015-0303-y> Q1

## 2016

- Jorge Sanjurjo-Sánchez, Juan-Luis Montero Fenollós, Maria Isabel Prudêncio, Víctor Barrientos, Rosa Marques, Dias, M.I. (2016). Geochemical study of beveled rim bowls from the Middle Syrian Euphrates sites. *Journal of Archaeological Science: Reports* 7, 808–818
- Odriozola, C.P., Villalobos-García, R., Burbidge, C., Boaventura, R., Sousa, A.C., Rodríguez-Ariza, O., Parrilla-Giraldez, R., Prudêncio, M.I., Dias, M.I. (2016). Distribution and chronological framework for Iberian variscite mining and consumption at Pico Centeno, Encinasola, Spain. *Quaternary Research* 85, 159-176. <http://dx.doi.org/10.1016/j.yqres.2015.11.010> - Q1
- Marques, R., Prudêncio, M.I., Waerenborgh, J.C., Rocha, F., Ferreira Da Silva, E., Dias, M.I., Madeira, J., Vieira, B.J.C., Marques, J.G. (2016). Geochemical fingerprints in topsoils of the volcanic Brava island, Cape Verde. *Catena* 147, 522-535. <http://dx.doi.org/10.1016/j.catena.2016.08.008> - Q1
- Prudêncio, M.I., Roldán, C., Dias, M.I., Marques, R., Eixea, A., Villaverde, V. (2016). A micro-invasive approach using INAA for new insights into Palaeolithic flint archaeological artefacts. *Journal of Radioanalytical and Nuclear Chemistry* 308, 195-203. <http://link.springer.com/article/10.1007%2Fs10967-015-4294-z> – Q2

### *3.3. Proceedings of Refereed Conferences*

#### **2017**

- Dias, M.I., Waerenborgh, J.C., Prudêncio, M.I., Paiva, M.I., Lobarinhas, D., Carvalho, E., Rosa, C., Marques, R., Franco, D., Cardoso, G. (2017). Chemistry, mineralogy and iron speciation of mine tailings to identify potential metals secondary sources. World Congress on Geochemistry and Marine Science. 29.
- Prudêncio, M.I., Marques, R., Waerenborgh, J.C., Vieira, B.J., Dias, M.I., Rocha, F. (2017). Chemistry of volcanic soils used for agriculture in Brava Island (Cape Verde). EGU 2017 General Assembly, Geophysical Research Abstracts Vol. 19, EGU2017-16064.
- Marques, R., Prudêncio, M.I., Rocha, F., Dias, M.I., Franco, D. (2017). Rare Earth and other Chemical Elements Accumulation in Vines of Fogo Island (Cape Verde). EGU 2017 General Assembly, Geophysical Research Abstracts Vol. 19, EGU2017-17284.
- Marques, R., Prudêncio, M.I., Waerenborgh, J.C., Rocha, F., Ferreira Da Silva, E., Dias, M.I., Vieira, B.J.C., Marques, J.G., Franco, D. (2017). Volcanic conduits of the Chã das Caldeiras caldera (Fogo Island, Cape Verde) – REE and Fe crystalchemistry. WRI-15. Procedia Earth and Planetary Science 17, 928-931. DOI: 10.1016/j.proeps.2017.01.023

#### **2016**

- M.I. Dias, M.I. Prudêncio, A. Pais, A.L. Rodrigues, R. Marques (2016). A chemical study of Portuguese archaeological faience by INAA as a valid tool to investigate provenance. Proceedings of 1<sup>o</sup> International Conference of Portuguese faience (16th 19th centuries). ISBN 978-84-7956-158-1. 59-64.
- Dias, M.I., Prudêncio, M.I., Pais, A., Rodrigues, A. L., Marques, R. (2016) A chemical study of Portuguese archaeological faience by INAA as a valid tool to investigate provenance. Proceedings of 1<sup>o</sup> International Conference of Portuguese faience (16th 19th centuries). ISBN 978-84-7956-158-1. 59-64.
- C. Roldán, A. Eixea, V. Villaverde, S. Murcia, M.I. Prudêncio, M.I. Dias, R. Marques. (2016). “Técnicas analíticas aplicadas al estudio de la composición y procedencia de sílex arqueológicos en la región central del Mediterráneo español”. digitAR, nº 3, 23-30. DOI:[https://doi.org/10.14195/2182-844X\\_3\\_3](https://doi.org/10.14195/2182-844X_3_3)

### *3.4. Oral Presentations*

#### **2019**

- M. I. Dias, M. I. Prudêncio, Z. Kasztovszkyc, I. Harsányi, J. Mihaly, A. C. Valera. Solving archaeological research problems by prompt gamma activation analyses and complementary techniques. 2nd International Conference on Radioanalytical and Nuclear Chemistry, May 5–10, 2019, Budapest, Hungary.
- M. I. Dias, A. L. Rodrigues, I. Kovács, Z. Szőkefalvi-Nagy, M. I. Prudêncio, Z. Kasztovszkyc, B. Maróti, R. Marques, P. Flor, G. Cardoso. Chronological assessment of della Robbia sculptures by using PIXE and Luminescence techniques. 16th International Conference on Particle

Induced X-ray Emission. 24-29 March 2019 · Cultural and Congress Centre of Caldas da Rainha, Portugal.

Ana Luísa Rodrigues, Maria Isabel Dias, António Carlos Valera, Maria Isabel Prudêncio, Rosa Marques, Guilherme Cardoso, Dulce Russo. Luminescence dating of ceramics as a contribution to the establishment of ditch' fill dynamics in calcite-rich contexts. *Materiais 2019, XIX Congress of Sociedade Portuguesa de Materiais and X International Symposium on Materials*, Lisboa, Portugal, 14-17 Abril 2019.

Rosa Marques, Maria Isabel Prudêncio, Maria Isabel Dias, João Carlos Waerenborgh, Dulce Russo, Maria Alexandra Gaspar, Manuela Martins. Archaeological ceramics characterization by nuclear techniques. *Materiais 2019, XIX Congress of Sociedade Portuguesa de Materiais and X International Symposium on Materials*, Lisboa, Portugal, 14-17 Abril 2019.

## 2018

M. I. Dias, *Estudos interdisciplinares de Património Cultural. 1º Encontro “A Universidade de Lisboa e o Património”*. 19-20 Nov. 2018. Instituto Superior Técnico, U. L. Portugal.

M. I. Dias, M. I. Prudêncio, Zs. Kasztovszky, I. Harsányi, I. Kovács, Z. Szőkefalvi-Nagy, J. Mihaly, György Káli, A. C. Valera. Investigating artefacts from Chalcolithic funerary cremation contexts (Portugal) by using non-invasive nuclear techniques. *42nd International Symposium on Archaeometry (ISA 2018)*. Mérida, Yucatán, Mexico. May 20-26, 2018.

Sanjurjo Sánchez, J.; Blanco-Rotea, R.; Prudêncio, M. I.; Dias, M. I. . OSL dating of lime mortars in a singular building of NW Spain: Sta. Eulalia de Boveda (Lugo). *MoDIM 2018: Mortar Dating International Meeting*. 25-27 Oct 2018 Bordeaux (France).

Prudêncio M. I., Marques R., Waerenborgh J.C., Rocha F., Vieira B. J. C., Dias M. I., Silva T.P. REE and Fe crystalchemistry in topsoils of Fogo Island (Cape Verde). *27th Colloquium of African Geology (27 CAG) and 17th Conference of the Geological Society of Africa (GSAf17)*, Aveiro, Portugal, 21-28 Julho 2018.

Ana Luísa Rodrigues, Pedro Valério, Maria Isabel Dias, Maria Isabel Prudêncio, Maria Fátima Araújo, António Monge Soares, Luís Cerqueira Alves, Rosa Marques, Susana Sousa Gomes. Entre a ciência e o património cultural. *Encontro Ciência 2018, na sessão sobre o Objetivo de Desenvolvimento Sustentável 11 - Cidades e Comunidades Sustentáveis - ODS.11, Salvar o Património Cultural e Natural I*, Lisboa, Portugal, 2-4 Julho 2018.

Aleix Eixea, Alvaro Martínez-Alfaro, Miguel Angel Bel, Clodoaldo Roldan, Sonia Murcia, Maria Isabel Dias, Maria Isabel Prudêncio, Rosa Marques, Alfred Sanchis, Valentin Villaverde. First data on the characterization of siliceous raw materials and the catchment areas from Cova de les Malladetes (Barx, Valencia). *18th UISPP WORLD CONGRESS*, Paris, 4-9 Junho 2018. [sciencesconf.org/uispp2018:178878](https://sciencesconf.org/uispp2018:178878)

## 2017

Rodrigues, A. L., Dias, M. I., Cardoso, G., Prudêncio, M. I., Marques, R., Franco, D. Luminescence Dating, dosimetry and compositional studies applied to cultural heritage. The international prominence of the luminescence dating laboratory of C2TN. *1st Workshop C2TN: Radiation For Science And Society*, Bobadela, Portugal, 6th December 2017



- Dias, M.I., Waerenborgh, J., Prudêncio, M.I., Paiva, M.I., Lobarinhas, D., Carvalho, E. Rosa, C. Marques, R., Cardoso, G. Franco, D. Chemistry, mineralogy and iron speciation of mine tailings to identify potenciales metals secondary sources. World congress on geochemistry and marine science. Novembre 16-17 2017, USA.
- Prudêncio, M.I., Dias, M.I., Paiva, M.I., REE geochemistry in surficial enviroments and acid mine drainage. World congress on geochemistry and marine science. Novembre 16-17 2017 Atlanta USA.
- Dias, M.I., Prudêncio, M.I., Azulejos de Lisboa, Portugal (XVII-XX): identificação de matérias primas e tecnologias de produção. XII Congresso Ibérico, 25-28 Outubro, Burgos, Espanha, 2017.
- Prudêncio, M.I., Dias, M.I., Kasztovszky, Z., Maróti, B., Harsányic, I., Kovács, I., Szőkefalvi-Nag, Z., Valera, A.C.. Pre-historic funerary votive assemblages – stone vases provenancing using non-destructive neutron techniques. NINMACH 2017 – 2nd International Conference on Neutron Imaging and Neutron Methods in Archaeology and Cultural Heritage Research, 11-13 October, Budapest, Hungary, 2017.
- Dias, M.I., Kasztovszky, Z., Prudêncio, M.I., Harsányic, I., Kovács, I., Szőkefalvi-Nag, Z., Mihály, J. Káli, G., Valera, A.C.. Investigating beads from Chalcolithic funerary cremation contexts of Perdigões, Portugal. NINMACH 2017 – 2nd International Conference on Neutron Imaging and Neutron Methods in Archaeology and Cultural Heritage Research, 11-13 October, Budapest, Hungary, 2017.
- Dias, M.I., Prudêncio, M.I., Paiva, M.I., Lobarinhas, D., Carvalho, E. Rosa, C. Material source analyses and geochemistry about two REE secondary deposits in northern Portugal. The 2nd Conference on European Rare Earth Resources, ERES 2017, 28-31 May, Santotini, Greece, 2017
- Marques, R., Prudêncio, M.I., Rocha, F., Dias, M.I., Franco, D. Rare Earth and other Chemical Elements Accumulation in Vines of Fogo Island (Cape Verde). EGU 2017 General Assembly, Viena, Austria, 23-28 Abril 2017.

## 2016

- M. Isabel Dias & M. I. Prudêncio. The Roman amphorae kilns from the western and southern coast of Lusitania: chemical patterns for provenancing. 41st International Symposium on Archaeometry (Kalamata 15-21 May 2016).
- M. Isabel Dias, António Valera, M. I. Prudêncio, Zsolt Kasztovszky. Non-Invasive Nuclear Techniques Applied To Stone Idols Characterization: Mobility And Interaction In The Recent Prehistory Of South Portugal. Raw materials exploitation in Prehistory: sourcing, processing and distribution, 10-12 March 2016, Faro, Portugal.
- Roldán, C., Eixea, A., Villaverde, V., Murcia, S., Prudêncio, I., Dias, M.I., Marques, R. Compositional variability of flint and implications in the identification of raw materials sources of pre-historical artefacts, Eastern Spain. Raw materials exploitation in Prehistory: sourcing, processing and distribution, 10-12 March 2016, Faro, Portugal.
- Madruza, M.J., Prudêncio, M.I., Corisco, J., Marques, R., Santos, M., Reis, M., Paiva, I., Dias, M.I. Radiological and compositional assessment of a phosphogypsum stock pile area. V Congresso

de Proteção Contra Radiações da Comunidade dos Países de Língua Portuguesa, Coimbra 10-12 Março de 2016.

### *3.5. Poster Presentations*

#### **2019**

Ana Luísa Rodrigues, Maria Isabel Dias, António Carlos Valera, Maria Isabel Prudêncio, Rosa Marques, Guilherme Cardoso, Dulce Russo. Chronological assay of a Pre-historical circular stone structure (Perdigões, Portugal). *Materiais 2019, XIX Congress of Sociedade Portuguesa de Materiais and X International Symposium on Materials, Lisboa, Portugal, 14-17 Abril 2019.*

#### **2018**

Ana Luisa Rodrigues, Maria Isabel Dias, Maria Isabel Prudêncio , Rosa Marques , Guilherme Cardoso , Dulce Russo . Nuclear And Radiation-Based Methods As Tools To Cultural Heritage Safeguard. C2TN. 2nd Workshop C2TN: Radiation For Science And Society.11th December 2018

Rosa Marques, Maria Isabel Prudêncio, João Carlos Waerenborgh, Bruno José Cardoso Vieira, Maria Isabel Dias, Dulce Russo, Guilherme Cardoso. Geochemistry Of Surficial Environments Of Oceanic Volcanic Islands In Arid And Semi-Arid Climates – A Contribution To Regional Development Planning. C2TN. 2nd Workshop C2TN: Radiation For Science And Society.11th December 2018

Isabel Paiva, Mário Reis, Maria José Madruga, Eva Andrade, M. Fátima Araújo, M. Isabel Dias, M. Isabel Prudêncio, Rosa Marques, Joaquim Marçalo, João Carlos Waerenborgh, Bruno J. C. Vieira, João Paulo Leal, Marta Santos, Pedro Valério, Leonor Maria, Bernardo Monteiro, José M. Carretas, Dulce Russo, Guilherme Cardoso, Catarina Galinha, José Manuel Bénitez, Fernanda Margaça, Pedro Vaz. Radioactive Waste: Research, Education And Training, Public Perception And Societal Acceptance. C2TN. 2nd Workshop C2TN: Radiation For Science And Society.11th December 2018

Rodrigues, A. L., Dias, M. I., Prudêncio, M. I., Flor, P. Cronologia e tecnologias de produção de esculturas de Della Robia em Portugal. A Universidade de Lisboa e o património - 1º ENCONTRO – Instituto Superior Técnico, Lisboa, 19-20 Novembro 2018

Rodrigues, A.L., Dias, M.I., Cardoso, G., Prudêncio, M.I., Marques, R., Russo, D., Fontanals, N.R., Soriano, I. Identifying archaeological “firesetting” evidence by luminescence protocols at the La Turquesa mine in Catalonia, Spain. UK Luminescence and ESR dating meeting, Sheffield, Reino Unido, 11-12 Setembro de 2018

Ana Luísa Rodrigues, Maria Isabel Dias, António Valera, Maria Isabel Prudêncio, Rosa Marques, Guilherme Cardoso, Dulce Russo- Luminescence and compositional studies to the establishment of fill dynamics in Neolithic/Chalcolithic ditch enclosures from south of Portugal. 42nd International Symposium on Archaeometry (ISA 2018). Mérida, Yucatán, Mexico. May 20-26, 2018.

#### **2017**

Rosa Marques, Maria Isabel Prudêncio, João Carlos Waerenborgh, Bruno Vieira, Maria Isabel Dias, Dulce Franco. Nuclear methods to build geochemical maps of oceanic volcanic islands – societal benefit. C2TN. 1st Workshop C2TN: RADIATION FOR SCIENCE AND SOCIETY, Bobadela, Portugal, 6th December 2017

Marques, R., Rodrigues, A. L., Cardoso, G. Franco, D., Prudêncio, M. I., Dias, M. I. Nuclear techniques applied to Cultural Heritage for a sustainable development C2TN. 1st Workshop C2TN: Radiation For Science And Society, Bobadela, Portugal, 6th December 2017.

Rodrigues, A.L., Dias, M.I., Prudêncio, M.I., Marques, R., Rocha, F., Valera, A.C. Dinâmicas de preenchimento de uma estrutura circular no recinto de fossos dos Perdigões (Reguengos de Monsaraz, Portugal): Composição e datação por luminescência. XII Congresso Ibérico de Arqueometria, Burgos, Espanha, 25-28 Outubro 2017.

Rodrigues, A. L. Dias, M. I., Prudêncio, M. I., Flor, P. Chronological and technological issues of Della Robbia Sculptures in Portugal. European Meeting on ancient ceramics, Bordeaux, França, 6-9 Setembro, 2017.

Rodrigues, A. L. Dias, M. I., Valera, A. C., Prudêncio, M. I. The contribution of ceramics to the establishment of fill dynamics in negative archaeological structures. European Meeting on ancient ceramics, Bordeaux, França, 6-9 Setembro, 2017.

Prudêncio, M.I., Marques, R., Waerenborgh, J.C., Vieira, B.J., Dias, M.I., Rocha, F. Chemistry of volcanic soils used for agriculture in Brava Island (Cape Verde). EGU 2017 General Assembly, Viena, Austria, 23-28 Abril 2017.

## 2016

Marques, R., Prudêncio, M.I., Waerenborgh, J.C., Rocha, F., Ferreira Da Silva, E., Dias, M.I., Vieira, B.J.C., Marques, J.G., Franco, D. Volcanic conduits of the Chã das Caldeiras caldera (Fogo Island, Cape Verde) – REE and Fe crystalchemistry. 15th Water-Rock Interaction International Symposium, WRI-15, Évora, Portugal, 16-21 Outubro 2016.

Prudêncio, M.I., Dias, M.I., Coroado, J., Marques, R., Cardoso, G., Rocha, F. Material characterization of monumental terracota sculptures of the Monastery of Alcobaça. 41st International Symposium on Archaeometry, Kalamata, Grécia, 15-21 Maio de 2016.

### *3.6. Internal memoranda and progress reports*

Description	Date
Progress Reports of NET group, C2TN	2016
Progress Reports of NET group, C2TN	2017
Progress Reports of NET group, C2TN	2018
Progress Reports of Research Projects	2016-2019

### *3.7. Participation in seminars, conferences and other scientific national and international meetings*

- 3<sup>rd</sup> Users Meeting – IPERIOCN CH. Feb., 2019. Musee do Louvre, Paris, France
- 2nd International Conference on Radioanalytical and Nuclear Chemistry, May 5–10, 2019, Budapest, Hungary.
- 16th International Conference on Particle Induced X-ray Emission. 24-29 March 2019 · Cultural and Congress Centre of Caldas da Rainha, Portugal.
- 2nd Workshop C2TN: Radiation for Science and Society, CTN – IST, 11 de Dec. 2018
- 3<sup>o</sup> seminário - Extrair e Produzir: dos primeiros artefactos à Industrialização” - “Fragmentos de Arqueologia de Lisboa”. Secção de Arqueologia da Sociedade de Geografia de Lisboa e Centro de Arqueologia de Lisboa (Câmara Municipal de Lisboa). Nov., 2018
- A UNIVERSIDADE DE LISBOA E O PATRIMÓNIO - 1<sup>o</sup> ENCONTRO, IST, Lisboa, Portugal, 19-20 Nov. 2018
- International Symposium of Archaeometry, Mérida, México, 2018
- Word Congress on Geochemistry and Marine Science, Atlanta, USA, Nov. 2017.
- The 2nd Conference on European Rare Earth Resources, ERES 2017, 28-31 May, Santotini, Greece, 2017
- Reunião do projecto ENVIREE - ENVIRONMENTALLY friendly and efficient methods for extraction of Rare Earth Elements from secondary sources. Call - 2nd ERA-MIN Joint Call 2014. FCT Call Number - ERA-MIN/004/2014, Cracóvia. Polónia, 25-28 Abril, 2017
- Seminário encerra Loures InSS - No Dia Mundial do Ambiente, a 5 de junho, realizou-se o Seminário Loures InSS 2017. O Seminário contou com a participação de Isabel Dias, Membro do Conselho de Administração do Polo de Loures, Campus Tecnológico e Nuclear do Instituto Superior Técnico, Rui Pinheiro, presidente da Associação de Defesa do Ambiente de Loures, Anália Torres, da Valorsul, Nuno Bonneville, da MOBI-E - Mobilidade Eléctrica, Filipe Delgado, da Força Aérea Portuguesa, José Archer, presidente da Associação “Bandeira Azul da Europa” e Rui Faria, da IKEA Portugal.
- V Congresso de Protecção Contra Radiações da Comunidade dos Países de Língua Portuguesa, Coimbra 10-12 Março de 2016.
- 1st Workshop C2TN: RADIATION FOR SCIENCE AND SOCIETY, Bobadela, Portugal, 6 December 2017
- Workshop C2TN - Thematic strands: cultural heritage & geoprocesses, strategic resources and global change. Bobadela, Portugal, 27 Setembro 2017.
- First meeting dedicated to the build-up of an an REE ITN proposal – Marie Curie PhD grants, Rennes, France, 7 Julho 2016
- Feira do Ambiente – Loures InSS – Quinta dos Remédios. 3 – 5 Junho 2016
- 1st International Symposium on Archaeometry, Kalamata, Greece, 15-21 Maio 2016.
- Reunião do projecto ENVIREE - ENVIRONMENTALLY friendly and efficient methods for extraction of Rare Earth Elements from secondary sources. Call - 2nd ERA-MIN Joint Call 2014. FCT Call Number - ERA-MIN/004/2014, Mercoule. Prague, Rep. Checa. 17-20 Abril, 2016
- Reunião da acção COST 1407 - RECREEW - European network for innovative recovery strategies of rare earth and other Critical metals from electrical and electronic waste, Universidade do Porto, 11-12 de Abril de 2016.
- Raw materials exploitation in Prehistory: Sourcing, processing and distribution. 10-12 March 2016, Faro – Portugal.

## 4. International recognition

One of the indicators for international recognition are invitations to evaluate research proposals for national and international funding agencies (see below the list of evaluations performed during this three years period) as well as the invitation to organize conferences/workshops, and invited talks. Further proof of the high international recognition is the election to be President, and then member of the Directive board of the Iberian Society for Archaeometry - Sociedade Ibérica "Sociedade de Arqueometria Aplicada ao Património Cultural" (SAPaC), as well as of the Standing Committee of the International Symposium on Archaeometry (ISA). I will also be the coordinator of the organizing committee of the ISA symposium to be held in Lisbon, in 2020. Another relevant proof of the international recognition is the invitation to take part of several H2020 research projects to coordinate and/or participate in workpackages of diverse scientific domains, related with cultural heritage, rare earth elements recovery from secondary sources, WEEE recycling and health impact, geochemistry of the earth surface.

### *4.1. Evaluation of research grants/projects*

- 2016 Individual Grant Evaluation Panel of FCT to PhD grants (BD), PhD grants in companies (BDE) and post-doctoral grants (BPD) in the scientific area of History and Archaeology, in the sub-area – Archaeometry – Cultural Heritage.
- 2017 Individual Grant Evaluation Panel of FCT to PhD grants (BD), PhD grants in companies (BDE) and post-doctoral grants (BPD) in the scientific area of History and Archaeology, in the sub-area – Archaeometry – Cultural Heritage.
- 2018 Evaluator of H2020 Projects – work programme 2018-2020. FET-Open RIA 2018

### *4.2. Conference/workshop organization*

- Member of the Organizing Committee of the 1<sup>o</sup> Encontro da Universidade de Lisboa e o Património, IST, November 2018
- Member of the Organizing Committee of the Word Congress on Geochemistry and Marine Science, Atlanta, USA, November 2017.
- Member of the Organizing Committee of the XIII Congresso Ibérico de Arqueometria, CIA, Burgos, 25-28 October 2017

### *4.3. Participation in Commissions and Working groups*

- Member of the Management committee of the COST ACTION ES1407 “European network for innovative recovery strategies of rare earth and other critical metals from electric and electronic waste (ReCreew)”. 2015 – 2018.

#### *4.4. Participation in international associations / directive boards*

Throughout my career, I have participated in several national and international scientific associations, taking in all of them a proactive role, having been part of the social organs / directive board of some of them. During this three years period I have been:

- 1ª vogal - Sociedade Ibérica "Sociedade de Arqueometria Aplicada ao Património Cultural" (SAPaC), elected by members, 2016 - 2019.
- President of Sociedade Ibérica "Sociedade de Arqueometria Aplicada ao Património Cultural" (SAPaC), elected by members, 2011 - 2016.

#### *4.5. Invited talks*

##### **2019**

Dias M. Isabel, Non-destructive analyses of Chalcolithic artefacts from Perdigões, Portugal using neutron-based methods. IPERION CH 3<sup>rd</sup> Users Meeting, Paris, 12 Feb. 2019.

##### **2018**

Dias M. Isabel, Prudêncio, M. I., Amaro, Clementino, Gonçalves, C., The roman figlina in Garrocheira (Benavente), a production centre Amphorae supplier to Olisipo and to the Tagus estuary. A olaria romana da Garrocheira (Benavente), centro de produção Fornecimento de contentores a Olisipo e estuário do Tejo. 3º seminário - Extrair e Produzir: dos primeiros artefactos à Industrialização” - “Fragmentos de Arqueologia de Lisboa”. Secção de Arqueologia da Sociedade de Geografia de Lisboa e Centro de Arqueologia de Lisboa (Câmara Municipal de Lisboa). Nov., 2018

Dias M. Isabel M. Fátima Araújo e M. Isabel Prudêncio O nuclear e o património cultural no C2TN – Contributos para os museus e a sociedade. Encontro Museus do Técnico. IST. 2018

##### **2017**

Dias M. Isabel, Geochemistry And Mineralogy Of Two Ree Secondary Deposits In Northern Portugal In The Frame Of The Enviree Project. C2TN Workshop: Cultural Heritage & Geoprocesses, Strategic Resources And Global Change, 2017

##### **2016**

Dias M. Isabel, Técnicas nucleares e de luminescência para a valorização do património cultural. C2TN 2016 Thematic strand Workshop, 2016.

Dias M. Isabel, Stone idols from Chalcolithic Perdigões ditched enclosures. IAEA Technical Cooperation: Nuclear Technology for cultural heritage characterization and preservation.12-01-2016 Budapest (HAS centre for energy research KFI campus)

#### 4.6. Scientific collaborations – networking

- University of Brescia, Italy
- University of Salerno, Italy
- BOKU University, Vienna, Austria
- Université de Rennes 1, France
- Jacobs University Bremen
- Synchrotron Soleil
- Centre d'Étude de l'énergie Nucléaire
- Hamburg University of Applied Sciences
- Università degli Studi di Napoli Federico II
- Università di Bari
- AMPHOS21
- Partner Organisations
- Amb3E – Associação Portuguesa de Gestão de Resíduos
- Cordouan Technologies
- Ecole Nationale Supérieure de Chimie de Rennes
- Université de Lorraine
- University of the West of Scotland
- Université Paris-Saclay
- Universiteit Leuven
- Universidad de Huelva
- Agência Internacional de Energia Atómica
- Budapest Neutron Centre, Hungarian Academy of Sciences, Association of the KFKI Research Institutes EK – WIGNER
- Câmara Municipal de Lisboa, Departamento de Cultura
- Câmara Municipal de Oeiras
- Câmara Municipal de Loures
- Centre de Recherches et de Restauration des Musées de France, Museu do Louvre, Paris (France)
- CNRS (France)
- Direção Geral do Património Cultural
- ERA, Arqueologia Lda
- Hungarian National Museum (Hungary)
- Instituto de História da Arte (IHA/FL/UL)
- Museu dos Jerónimos
- Museu Nacional de Arqueologia
- Museu Nacional de Arte Antiga
- Museu Nacional do Azulejo
- Museu de Alcobaça
- Museu Calouste Gulbenkian
- Universidade da Corunha (Spain)
- Universidade de Aveiro – Departamento de Geociências
- Universidade de Cabo Verde
- Universidade de Cádiz (Spain)
- Universidade de Huelva (Spain)
- Universidade de Lisboa: Faculdades de Ciências e de Letras
- Universidade de Salamanca (Spain)
- Universidade de Sevilha (Spain)
- Universidade do Algarve
- Universidade de Rennes (France)

- Mercoule Lab. (France)
- Chalmers University of Technology, Swede
- CHALMERS Chalmers University of Technology (Sweden)
- AGH Akademia Górniczo-Hutnicza im. Stanisława Staszica v Krakowie (Poland)
- AICU The Alexandru Ioan Cuza University of Iași (Romania)
- KIT Karlsruher Institut für Technologie (Germany)
- PIPAS Primus.inter.pares AS (Norway)
- EDM Empresa de Desenvolvimento Mineiro (Portugal)
- CEA le Commissariat à l'énergie atomique et aux énergies alternatives (France)
- CGS Council for Geoscience (South Africa)
- SAVONA Savona Project s.a. (Poland)
- BRGM Bureau de Recherches Géologiques et Minières (France)



## 5. Scientific and teaching innovation

The proposals of a Master degree in the Cultural Heritage field, as well as of one optional curricular unit to an existing Integrated Master at IST certainly contributed for an innovative line of research/formation at IST, together with an Innovative Training Networks (ITN) in REE recovery and its impact in the environment and human health for a PhD program.

### *5.1. Proposal of new Master & doctoral degrees*

- Co-proponent of a Masters degree “Mestrado em Ciências e Tecnologias para o Património Cultural (MCTPC), that is now waiting for the A3ES appraisal;
- Member of the IST team for the proposal EuroPean trAining NetwOrk on Rare eArth elements environMental trAnsfer: from rock to human, submitted in the call MARIE SKLODOWSKA-CURIE ACTIONS. Innovative Training Networks (ITN). Call: H2020-MSCA-ITN-2018.

### *5.2. Teaching activities*

- 2016...– curricular unit “Radioactive Wastes” from the Master degree in Protection and Radiological Safety. IST. Universidade de Lisboa.
- 2012... – UC optional “Environmental Reconstruction and Geochronology”. Integrated Master in Environmental Engineering, IST, Universidade de Lisboa.

## 6. Other teaching activities

Considering the increasing relevance of cultural heritage and the recognition of an increasing number of stakeholders in that field, a short course has been promoted and implemented with great success at CTN, IST, in a new domain regarding the usual ones at IST, taking advantage of the expertise in nuclear methods of analyses applied to cultural heritage.

- Co-Coordinator of the “Course on Nuclear Techniques in Cultural heritage”

17-18 and 24-25 November 2016, Departamento de Engenharia e Ciências Nucleares, Instituto Superior Técnico – Portugal

The course aimed to provide technical knowledge and practical demonstrations of advanced nuclear techniques for the analysis of objects / materials / cultural heritage contexts. Participants could bring samples to be analyzed by some of the techniques presented. The course was designed for professionals, researchers and students of archeology, art history, conservation and restoration, chemistry, physics, geology, geography, etc.

- Curricular units of the course “Course on Nuclear Techniques in Cultural heritage”:

- . X- ray Diffraction

- . Luminescence Dating

- . Multidisciplinary case studies for different chronologies using nuclear techniques applied to ceramic, lithic materials, and archaeological contexts

## 7. Supervision and training of (young) researchers

During this three years period, I have supervised the work of 5 post-doc in two main lines of research: i) the cultural heritage – application of nuclear and related techniques of analyses to paleoenvironmental reconstruction, characterization of cultural heritage and absolute dating by using luminescence techniques; ii) geosciences and geochemistry of clays applied to the management of radioactive wastes repositories. In addition, I have supervised the work developed by two technicians in the luminescence dating, the INAA and XRD laboratories, and in the preparation of analyses laboratories.

### Post-Doc's supervision:

5. Javier Garcia Rivas (Bolsairo C2TN/FCT) – Nanomaterials and its application in the management of radioactive wastes, in a view to the identification of geomaterials suitable for radioactive wastes repositories (Ref. BLL 224/2018)
4. Aleix Eixea (bolsa Ministerio de Educación, Cultura y Deporte del Gobierno de España). 2017-2018 – Petrographic and physico-chemical characterization in archaeology: determination of sources of lithic materials and its relation with the archaeological sites.
3. José Manuel Benitez (bolsairo C2TN/FCT). 2018 – Studies of geomaterials for the identification and characterization of suitable materials for radioactive waste repositories. (Ref. BL 210/2017)
2. Ana Luisa Rodrigues (bolsaira FCT). 2018-2021 – Natural and Anthropic dynamics in ditch archaeological sites: infill of negative structures and raw materials provenances. (SFRH/BPD/114986/2016)
1. Ana Luisa Rodrigues (bolsaira C2TN/FCT). 2016-2017 – Nuclear and related techniques of analyses applied to paleoenvironmental reconstruction and characterization of cultural heritage. (ref: BL 36/2016\_IST-ID)

### Technician's supervision:

2. Scientific and technological guidance of Superior Technician Guilherme Cardoso in the work developed in the Luminescence Dating Laboratory, comprising not only the experimental component, but also the fieldwork campaigns, in situ measurements of gamma spectrometry and sampling strategy.
1. Scientific and technological guidance of Technical Assistant Dulce Franco in the Luminescence dating laboratory, the neutron activation analyses (INAA) laboratory and the sampling preparation laboratories, in the tasks mainly related with sampling protocols, laboratory protocols for preparation of samples for X-ray diffraction, INAA and clays characterization, and also the maintenance of the samples database.

## 8. Other examples of scientific and academic recognition

Other examples of scientific and academic recognition include invitations to integrate academic juries, research projects (listed below), refereeing of research articles in ISI journals (I have received several Certificate of Reviewing, and outstanding contribution in reviewing of Elsevier in Q1 journals), and also a contribution to a magazine from the media (Magazine of the “Publico” newspaper - Pontos de Vista) related to my research group activities within C2TN. Further, the recognition is also attested by the coordination of services/contracts with national and international public and private entities.

### *8.1. Participation in PhD juries*

Javier García Rivas, “Cristaloquímica y génesis de arcillas magnéticas”. Orientadores: Mercedes suarez Barrios (Univ. Salamanca) e Emilia Garcia Romero (Univ. Compl. Madrid), 2018.

### *8.2. Participation in projects*

#### FCT funding:

- Aplicações da Radiação Ionizante para um Ambiente Sustentável (ARIAS). (RECI/AAG-TEC/0400/2012). Coordenador: CTN/IST (Fernanda Margaça). (2012-2016).
- Variação Espacial da Taxa de Dose em Solos e Sedimentos (VADOSE). (PTDC/AAC-AMB/121375/2010). Coordenador: CTN/IST (Christopher Burbidge). Outros parceiros: Univ. Aveiro. (2012-2016).

#### European funding:

- VISUAL - Santa Vitória - Utensils And Ornaments Of An Enclosure Site (IPERION CH – FIXLAB PLATFORM B - NIPS-NORMA and the PGAA facilities of BNC, Budapest Neutron Centre, Wigner Research Centre for Physics HAS, Centre for Energy Research HAS). BNC proposal number BRR\_ 563 (2018)
- COST Action ES1407 (Earth System Science and Environmental Management): European network for innovative recovery strategies of rare earth and other critical metals from electric and electronic waste (ReCrew). 2015-2019.
- Mining-metallic resources, trade and commerce in the Prehistory and Protohistory of the Iberian Peninsula (Catalonia and the northern Valencian Country). Ministry of the Economy and Competitiveness (HAR2014-54012-P) (2017)
- 2nd ERA-MIN Joint Call 2014. FCT Call Number - ERA-MIN/004/2014: ENVIREE - ENVIRONMENTALLY friendly and efficient methods for extraction of Rare Earth Elements from secondary sources. Network on the industrial handling of raw materials for European industries. (2015-2017). Co-Responsible for WP1.

### *8.3. Refereeing Activities*

#### ISI journals:

- Ancient TL
- Analytical Methods
- Antiquity
- Applied Clay Science
- Archaeological and Anthropological Sciences
- Archaeometry
- British Archaeological Reports - BAR
- Carbonates and Evaporites
- Catena
- Chemosphere
- Chemie der Erde
- Clays and Clay Minerals
- CSR\_Continental Shelf Research
- Digital
- Elsevier Books (theme Geology)
- GNTe\_Non destructive Testing and Evaluation
- Journal of Analytical Atomic Spectrometry
- Journal of Archaeological Science: Reports
- Journal of Archaeological Sciences
- Journal of Conservation of Glazed Ceramics
- Journal of Cultural Heritage
- Journal of Environmental Management
- Journal\_European\_Ceramic\_Society
- Journal of King Saud University - Science
- Journal of Radioanalytical and Nuclear Chemistry
- Journal of the European Ceramic Society
- Microchemical Journal
- Nuclear Instruments & Methods In Physics Research (Section A)
- Open Journal of Archaeometry
- Ocean & Coastal Management journal
- Palaeogeography, Palaeoclimatology, Palaeoecology
- Plos One
- Periodi di Mineralogia
- Quaternary International
- RSC Advances - Royal Society of Chemistry
- Science and Technology of Archaeological Research
- The Royal Society Journals

#### Proceedings:

Raw materials exploitation in Prehistory: Sourcing, processing and distribution. 10-12 March 2016, Faro – Portugal.

#### *8.4. Coordination of Services/contracts*

- Luinescence dating of sediments – OSL - Robert López, University of Barcelona. Coordenator: M. Isabel Dias & Ana Luisa Rodrigues CTN, IST 2018-2019
- Terracota dating studies - initial luminescence tests. The Fladgate Partenership. Coordenator: M. Isabel Dias & Ana Luisa Rodrigues CTN, IST Sept. 2018
- Dosimetry, initial luminescence tests and luminescence dating of mateials from La Turquesa mine, Tarragona. Núria Rafel, Universidade de Lleida, Catalunha. Coordenator: M. Isabel Dias & Ana Luisa Rodrigues CTN, IST July 2017
- Ceramic artefacts studies – initial luminescence test. (CTN-LUM-1005). Jorge Leão. Coordenator: M. Isabel Dias & Ana Luisa Rodrigues CTN, IST Dec. 2016
- Composition and luminescence initial tests of a set of three ceramic objects. Private collector. Coordenator: M. Isabel Dias & Ana Luisa Rodrigues CTN, IST; 2016
- Composition and luminescence dating of a Chinese porcelain. Leilões Cabral e Moncada. Coordenator: M. Isabel Dias, CTN, IST; 2016
- Composition and luminescence initial tests of a terracota objects Private collector. Coordenator: M. Isabel Dias CTN, IST; 2016
- Composition and luminescence initial tests of a Chinese porcelain. Leilões Cabral e Moncada. Coordenator: M. Isabel Dias, CTN, IST; 2016
- Composition and luminescence dating of a Chinese porcelain. Private collector Luis Cancell de Abreu. Coordenator: M. Isabel Dias, CTN, IST; 2016

#### *8.5. Dissemination Activities*

- Contribution for the article in the magazine of the “Publico” newspaper - Pontos de Vista - As radiações ao serviço da ciência e da sociedade. Julho 2018
- Participation in several dissemination activities promoted by IST and CM Loures along this three years.

## 9. Examples of scientific leadership

Scientific leadership is mainly evidenced by being member of the IST management bodies, the management and coordination activities of research group, projects and services, as well as of scientific projects and new projects submissions. In addition, the successful publication record and communications described above confirm a successful guiding of the research team and creation of synergies, with the establishment of a rich international research network, project management, writing of articles, presentations in international conferences and grant applications. Besides the supervision of post-docs described above, examples of scientific leadership include the coordination and submission of research projects (and encouraging post-docs to do the same) and the maintenance and development of laboratories. Further attesting scientific leadership is the invitation/election to take part of functions in management and supervisory bodies and coordination of research groups and other scientific and dissemination activities representing the CTN, IST, particularly at a regional scale (Loures Town Hall).

### *9.1. Management & Coordination Activities*

- Member of the Management Committee of Polo de Loures, CTN, IST. Member appointed by the President of Instituto Superior Técnico, since 2014 (Diário da República dispatch - extract 5222/2014).
- Member of the School Council of Instituto Superior Técnico. Member since January 2015.
- Coordination of research group Nuclear Engineering And Techniques Group from the C2TN research Unit since 2014
- Member of the Coordination Commission of C2TN since 2014
- Responsible for the running and maintenance of the luminescence dating laboratory, CTN, IST.
- Responsible for the activities of technicians (definition of the objectives to be achieved and the SIADAP classification: Superior Technician Guilherme Cardoso; Technical Assistant Dulce Franco).

### *9.2. Coordination of Scientific projects*

#### FCT funding:

The Della Robbia sculptures in Portugal: History, Art and Laboratory. Financiado pela Fundação para a Ciência e Tecnologia, com a refª PTDC/HIS-HEC/116742/2010. Coordinator: FCSH/UNL (Pedro Flor). Coordinator IST: M. Isabel DIAS. Participants: FL/UL; FCG; IGESPAR; MNAA; IHA/FCSH/UNL (2012-2016).

#### European funding:

IPERION CH Project H2020: BRR-527. "Personal ornaments at chalcolithic funerary contexts of SW Iberian Peninsula: The Perdigoes site" (2017). Coordinator: M. Isabel Dias

IPERION CH Project H2020: BRR- 484. “Interconnections: archaeological beads and trade in Perdigiões during the 3rd millennium BC” (2016). Coordinator: M. Isabel Dias

CSIC - Nature, Society and Monumentality: High-Resolution Archaeological Research of the Antequera Megalithic Landscape (HAR2013-45149-P). Financiado pelo Plan Nacional I+D. Dirección General de Investigación. Ministerio de Economía y Competitividad, Secretaría General de Investigación. Coordinator: Leonardo Sanjuan. Univ. Sevilha, Espanha. Coordinator IST: M. Isabel DIAS. (2015-2018).

ENVIREE - ENVIRONMENTALLY friendly and efficient methods for extraction of Rare Earth Elements from secondary sources. Financiado por ERAMIN. Network on the industrial handling of raw materials for European industries. Call - 2nd ERA-MIN Joint Call 2014. FCT Call Number - ERA-MIN/004/2014. Start - 1st January 2015 (2015-2017). Responsible for WP1 – M. Isabel Dias

Stone Idols from Chalcolithic Perdigiões Ditched Enclosures (Southern Portugal): Funerary Practices, Raw Materials and Interaction Networks. Projecto co-financiado pela Comissão Europeia no âmbito da Acção 'Research Infrastructures' do programa 'Capacities' com a refª GA No. FP7- 228330. CHARISMA - Cultural Heritage Advanced Research Infrastructures (CHARISMA). Synergy for a Multidisciplinary approach to Conservation /Restoration. Fixlab Platform B – Budapest Research Reactor. BNC (Budapest Neutron Centre). BRR-376. C2TN coordinator – M. Isabel DIAS (2014-2016).

### *9.3. Project submissions*

#### Under evaluation:

EuroPEan trAining NetwOrk on Rare eArth elements environMental trAnsfer: from rock to human, submitted in the call MARIE SKLODOWSKA-CURIE ACTIONS. Innovative Training Networks (ITN). Call: H2020-MSCA-ITN-2018. Coordinator: Melanie Devranche (Univ. Rennes). Investigador responsável IST: M. I. Prudêncio. Colaboradores: França, Alemanha, Itália, Espanha, Bélgica, Reino Unido.

Instrumenta domestica romana. transculturación vs aculturación en el extremo suroccidental de hispania (area onubense y algarveña /alentejana). No âmbito “del Plan Andaluz de Investigación, Desarrollo e Innovación (PAIDI 2020), convocadas pela Junta de Andalucía” Coordenação: Nuria de la O Vidal Teruel, Universidad de Huelva, Coordinator IST: Maria Isabel Dias.

Del Atlántico al Tirreno: El Betis, el Tiber y sus puertos marítimos-fluviales en la conformación de la Provincia Baetica. No “ámbito del Plan Andaluz de Investigación, Desarrollo e Innovación (PAIDI 2020), convocadas por la Junta de Andalucía”. Coordinator: Javier Bermejo Meléndez, Universidad de Huelva, Coordinator IST: Maria Isabel Dias.

#### Rejected:

As coordinator:

DIASPORA - Exportação, importação e mimese na Diáspora Portuguesa. A marca dos viajantes no quotidiano: leitura interdisciplinar. “The Portuguese Diaspora: an interdisciplinary reading of the travelers impact.” 02/SAICT/2017 do H2020:. Coordinator: M. Isabel Dias (C2TN, IST).



Participants: ERA - Arqueologia S.A.; Faculdade De Ciências Sociais E Humanas Da Universidade Nova De Lisboa; Instituto Superior De Agronomia.

As participant:

CHARM - Valorization of the Cultural Heritage. Micro and non-invasive analytical techniques in the characterization and authentication of archaeological and museological assets archaeological and museological assets. Submetido ao Programa de Sistema de Apoio à Investigação Científica e Tecnológica - Aviso N.º 02/SAICT/2017; Coordinator: A. L. Rodrigues. Instituições Participantes: ERA - Arqueologia S.A.

RadGeoMap - Integrative use of indoor and soil-air radon, and geological data towards radon potential mapping. 02/SAICT/2017 do H2020. Coordinator: Mário Reis; Colaboradores: Universidade de Coimbra e CERENA (IST-ID).

Sustainable Processes for recovery of Refractory Metals – SUPREME. SC5-06-2018 New technologies for the enhanced recovery of by-products. Chalmers – Coordinator. CENIM-CSIC. Strategic Minerals Spain. AGH. IST. PIPAS. GEOMET. Evalion. A.I. Cuza University. BERG-TUKE. C-Tech Innovation. ExtractHive. CGS. JUELICH. Veolia. Bacanora Minerals. Plymouth Minerals. Fraunhofer Institute. Leading Edge Materials. M. Isabel Dias - WP leader. Assessment of available materials and their characterization.

EuroPeAn trAining NetWOrk on Rare eArth elements environMental trAnsfer: from rock to human, submitted in the call MARIE SKLODOWSKA-CURIE ACTIONS. Innovative Training Networks (ITN). Call: H2020-MSCA-ITN-2017. Investigador responsável: Melanie Devranche (Univ. Rennes). IST coordinator: M. I. Prudêncio. Participants: França, Aleanha, Itália, Espanha, Bélgica, Reino Unido.

FIREWINE - Identification of Fingerprints for volcanic wines. 02/SAICT/2017 do H2020: Coordinator: Rosa Marques; Participants: Instituto Superior de Agronomia (ISA) e Universidade dos Açores



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Maria Isabel Marques Dias

Lisbon, 20th May 2019