

GEOBIOTEC Research Unit

GeoBioTec RU results from a reorganization process during which 6 different research units (3 from Aveiro Univ, 2 from Nova Univ and 1 from UBI) merged.

Therefore, we inherited not only the resources, skills and competences of the former RU but also the scientific cultures developed by the main host institutions, all 3 (Aveiro, NOVA and UBI) very recent and innovative universities.

Aveiro focused on:

Environmental **Geochemistry** Survey
Environmental **Geophysics** Survey
Prospecting **Industrial Minerals** Characterization
Prospecting **Ground Water** Characterization

NOVA focused on:

Paleontological **Basin Analysis** Sedimentological
Geodynamics & Geotechnics
Geo **Primary Resources** Bio

UBI focused on:

Thermal Groundwater
Geotechnics

The 6 former RU were **complementary**, covering a wider spectrum of Geosciences, **from the more fundamental to the more applied fields**, and **touching interfaces with**:

- Biology (Ecology)
- Marine Sciences
- Environmental Sciences & Engineering
- Civil Engineering
- Materials Sciences & Engineering
- Agro-Floresty Engineering
- Public Health

among others.

Presently, Geobiotec comprises **5 research groups**:

- Lithospheric Evolution;
- Complex Environmental Systems;
- Georesources, Geotechnics and Geomaterials;
- Basin Analysis and Paleontology;
- Agro-Forestry.

Each group defines its own scientific and financial strategy, obviously in accordance with the general goals of the research unit.

Main management Institution is the University of Aveiro, having two other Management Institutions, NOVA.ID.FCT - Associação para a Inovação e Desenvolvimento da FCT (NOVA.ID.FCT/FCTUNL/UNL) and Beira Interior University (UBI).

Our staff belongs to several public and private RD institutions located from North to South of Portugal.

Thematic areas

The Unit has developed several thematic areas, many of them involving members of different groups, covering the following topics:

- geodynamic evolution of the Iberian Variscan Belt;
- magmatic petrogenesis in several different crustal segments;
- isotope geology applied to magmatic petrogenesis, geochronology, and provenance studies in both geological and non-geological samples;
- hydrogeology and hydrochemistry (inc. thermal waters and geothermic resources);
- surface geophysics;
- clay mineral assemblages used for basin analysis (on-shore, continental platform);
- exploration, characterisation, processing, application and evaluation of raw materials;
- rock and soil geotechnical properties;
- properties of special clays and sands traditionally used as curative or healing materials;
- degradation mechanisms and products of natural stones, mortars and cements;
- bioindication, phytomining, bioremediation;
- biogeoecological studies;
- Biomonitoring environmental exposure and link with health quality.

ACTION PLAN

Our main focus is on topics related to the life cycle of primary raw materials (availability of minerals; prospection, recognition and exploitation of mineral deposits; beneficiation and processing; disposal, treatment and recycling of mineral wastes) and to **geo-environmental and medical geology studies** (decommissioning, closure and abandonment of mines and quarries; impacts of present and past exploitation of mineral deposits in the environment; geochemistry of atmospheric powders and soils, and its influence in human health).

Geobiotec is also focused on mobilize all researchers belonging to the 5 Groups @ 3 Poles, boosting inter-group and inter-pole closer cooperation.

The research will focus on topics related to the life cycle of primary (geobio) raw materials:

- the fundamental geological (regional and local) knowledge;
- the availability of resources; prospection and recognition;
- study of potential environmental impacts;
- exploitation of resources;
- treatment and beneficiation, processing;
- the disposal, treatment and recycling of mineral wastes;
- decommissioning, closure and abandonment;
- geo-environmental technologies
- supporting tools (geodynamics, basin analysis, rock mechanics, geophysics, geochemistry and geostatistics).

ACTION PLAN - GROUPS CONTRIBUTIONS

CES (Complex Environmental Systems)

Research on bioaccessibility is one of the main fields of interest since the integration of some of our members in the international BARGE group, boosting future research on development of methodologies to assess human bioaccessibility; an inter-laboratory trial to validate a method to estimate the oral bioaccessibility of PAHs in the solid-phase is main goal. The accumulation of PAHs in soils and dusts raises great concern in terms of human health. A very recent line of research inside the CES group is geochemistry of sediment core as records of environmental changes, and collaboration is already in course with national and international partners. The indoor environment is now included in the research carried out in urban sites. European research groups working in geochemical baselines have been showing interest in this targeted approach used by the CES group. Particular attention will also be focused on Bioindication and Phytomining, Monitoring and Bioremediation.

3G (Georesources, Geotechnics and Geomaterials)

3G cooperates with industry and scientific communities on management of natural resources: industrial minerals and clays (increasingly used to produce commodities of paramount importance for the development of societies, such as: construction materials, paper, plastics, ceramics, paint, etc.), on assessing environmental quality (hazardous events, coastal pollution and erosion, and soil degradation), as well as on the development of new applications and new products, inc. Health ones (dermocosmetics, drugs).

3G works closely with several Portuguese RUs, in order to strength the interdisciplinary capability as well as the sharing of equipment. International collaboration to assess

technological properties will continue, as well as Graduate Training Networks, such as Erasmus IP and Master.

LE (Lithospheric Evolution)

Research on Isotope Geology focused on Rb-Sr and Sm-Nd systems, relevant for a variety of purposes, such as: geochronology; geochemistry of igneous processes; characterization of alteration and metasomatic events; provenance studies (in a wide range of geological and non-geological materials). Provenance studies will touch different areas, since Sr and Nd isotope ratios are potentially useful in tracing the origin of sediments, dust, beverages, foods, archaeological remains, etc. A significant effort will be put on subjects such as estuarine geology, marine geology and pollution research.

SB (Sedimentary Basins)

Basic and Applied research will be carried on Meso-Cenozoic basins, with important potential for hydrocarbons exploration and a particular position linking the Atlantic and the Tethyan and Mediterranean Seas, allowing key studies to unravel the evolution of past living organisms, climate changes and global changes.

Recently the group has been also focused on the history of the Ediacaran-Lower Paleozoic basins of northern Gondwana that were later deformed-metamorphosed in the Upper Paleozoic Variscan orogeny and involved on the crustal growth and recycling processes associated to the formation of some ore deposits in Iberia.

AF (Agro Forestry)

Short/medium-term research in Agroforestry will consist of the development of the 7 national and international projects already approved for funding, and consolidating the MSc and PhD offer. Multidisciplinary cooperation with other groups (SBP and 3G) is already evident (approved projects and masters and doctoral courses involve colleagues from the SBP and 3G groups) but the cross-teaming will still be more pronounced, notably with the use of a geochemistry approach to the Agro Geo-Resources soil and water. The tools used by geoscientists such as drone remote sensing, image processing, prospection, and geostatistics will enable a truly multidisciplinary approach improving crop yields on the way to "precision agriculture" .

PATHWAYS

Our main strength is the combination of applied and fundamental research in a very successful manner.

Our major goal is to increase integration of activities between the 5 Groups @ 3 Poles, promoting:

- ***Implementation of policies boosting productivity***
- ***Improving Internationalization***
- ***Development of complementary offers***

Policies are being put forward to strongly encourage projects and supervision of thesis involving researchers from at least two groups and institutions.

Implementation of coordination policies favouring the **preparation and submission of Research Projects (national and international) gathering researchers from as most groups as possible**, in order to reduce the risk of individual researchers continue to do their research **without integration** into our main objectives.

Implementation of Annual Research Workshops, together with publication of a “Review of Research at Geobiotec” and a Web Page acting also as Repository of papers and projects.

Improving the Human Resources Policies

Recently, GeoBioTec opened several positions for PhD researchers, recruited among postdocs. These new job opportunities has been done and will be pursuit in close articulation with the Host Institutions.

Some of the postdocs were previously integrated in more than one RU and now will be 100% on GeoBioTec, boosting their contributions to the RU activities and productivity.

Improving the Human Resources Policies

We are also improving our relationships with Industry, not only for funding but also to put forward job opportunities (even creating *start ups*).

Our participation in two colabs and on KIC Raw Materials is also a relevant tool for this goal.

Improving the Posgraduation Activities

The continuous development of our post-graduation platform is also a powerful tool to these objectives through the increasing participation, as supervisors, of junior PhD staff from all the different Host Institutions. Special attention will be also given to the development of joint PhD courses in

Geosciences, as well as to the former Erasmus Mundus M.Sc. course, the 'IMACS - International Master in Advanced Clay Science'

To implement policies boosting productivity

Creating positive discrimination for researchers publishing more papers, on better journals. Material support policies will be put forward to boost submission of papers to journals having higher IF, and simultaneously awarding the most active members to quick disseminate research results. Regular internal seminars, involving all researchers of GeoBioTec, will be organized.

Improving Internationalization

Internationalization must be improved; some groups are clearly international in outlook and approach whereas others seem to have been less so. Geobiotec is already a very active member of several national and international initiatives, developed having in mind the H2020 societal concerns.

To develop complementary offers

Regarding young researchers formation, services for the industry and knowledge transfer activities. Private and public contracts are common but can be improved and should ensure funding of the centre; there are many valuable knowledge transfer opportunities; relevant support staff is in place, and are clearly experienced in providing back-up to a project like this. Infrastructure funded (e.g. Isotope, XRay, ICP labs) would support a wide range of projects across all the participants and externals.

DELIVERIES

Our selection of deliveries reflects the special focus on the increase of quality of the integrated members, being expected that in the next two years staff members and full time researchers will publish more and better.

Thus, our main indicators are:

- ***Publication of a minimum of 2 Scopus indexed papers per year per member (at least one with an IF higher than 2)***
- ***50% increase on number of national and international Research Project Proposals (involving always at least 2 groups)***
- ***25% increase on number of Doctoral and PosDoctoral Fellowships applications (at least half of them involving 2 groups on supervision)***
- ***25% increase on number of RD contracts with Regional and Local entities as well on contracts with industry (at least 25% of them involving 2 groups)***
- ***25% increase on number of internalization initiatives, such as participation on networks and (co)organization of international events (at least 25% of them involving 2 groups)***