

PanAfGeo

Pan-African Support
to Geological Sciences and
Technology Africa-EU Partnership

Appui panafricain aux géosciences
du partenariat Afrique-UE

Apoio pan-africano às geociências
da parceria África-UE

WP-B TRAINING SESSION – MINERAL RESOURCES ASSESSMENT

The WP-B delivered its first training session in Portuguese and took place in Lubango-Angola. It brought together 27 participants from five African Portuguese-speaking countries, i.e. Angola, Guinea-Bissau, Mozambique, Cabo Verde and São Tomé & Príncipe, from PALOP (Países Africanos de Língua Oficial Portuguesa). We also had 3 guests from Angolan institutions and two Co-Leaders from Nigeria and Namíbia.

The first training session of WP-B was conducted from 20-30 November 2022. It was jointly organised by LNEG, Portugal (Maria João Batista, WP-B leader; Vitor Lisboa), PGI, Poland (Mr. Stanislaw Wolkovicz and Mr. Pawel Urbanski), Geo-ZS (Mr. Marko Komac) and IGEO – Instituto Geológico de Angola (Mr. Canga Xiaquivuila, Presidente do Conselho de Administração). Locally, Mr. Domingos Cordeiro from IGEO was very helpful and contributed to the successful organisation of this session.

On 22th November the participants were asked to present their institutions and the mineral resources projects in their countries, this way the trainers had a better idea of their background and the potential feedback of the Return-to-Work projects. On November 23th, the welcome address of the opening ceremony was given by a recorded speech of Mr. Canga Xiaquivuila followed by Mr. José Manuel Plastov, Director Técnico of IGEO. The welcome speech was also given by the Honorary Consul of Portugal in Lubango, Mrs. Carolina Felix and the Ambassador of Poland, Mr. Myśliwiec Piotr and the Deputy Co-Leader, Mr. Aphary Muyongo from the Geological Survey of Namibia, followed by the opening remarks of Mrs. Maria João Batista. After the Official opening Maria João Batista presented the PanAfGeo project and introduced the training session dedicated to “Mineral Resources Assessment” and also the Return-to-Work project that the participants have to provide in one year as feedback. The opening day sessions were dedicated to the Co-Leaders presentations relating to the mineral exploration at the Geological Survey of Nigeria and at the Geological Survey of Namibia.

PanAfGeo

Pan-African Support
to Geological Sciences and
Technology Africa-EU Partnership

Appui panafricain aux géosciences
du partenariat Afrique-UE

Apoio pan-africano às geociências
da parceria África-UE



The ten-day training was organized as classroom-type sessions lectures, field visits, equipment demonstrations and laboratory tests.

The training related to the theme of construction materials, ornamental stones and industrial rocks and minerals, which took place between the 22nd and 30th of November, had a total duration of 23 hours, parted into presentations of 1:00 h and 1:30 h, with 2 practical laboratory classes of 3:00h each, and a one-day field trip to visit a quarry and ornamental rock transformation unit.

The theoretical training dealt with the subjects described below.

- Geological construction materials, with emphasis on aggregates, ornamental rocks, raw materials for cement and clay for construction ceramics (5:00h). This theme, given its importance, involved the largest number of training hours, with emphasis being given to the aspects that allow characterizing these materials, which determine their quality and the limitations or limit conditions in which they can be used. Within the scope of these materials, common and specific prospecting practices were also addressed, as well as the mapping of mineral resources, namely ceramic raw materials.
- Laboratory tests and analyses on dimension stones and their applicability (1:00h). This training constituted the theoretical support of the laboratory practice, in which the following were addressed: rock alterability; the different physical-mechanical tests for the characterization of ornamental rocks, regarding their identification, evaluation of performance on site and durability; general specifications concerning the main physical and mechanical properties of rocks; and recommended tests for the characterization of ornamental granite and marble, in different applications of these rocks.

PanAfGeo

Pan-African Support
to Geological Sciences and
Technology Africa-EU Partnership

Appui panafricain aux géosciences
du partenariat Afrique-UE

Apoio pan-africano às geociências
da parceria África-UE



- Mineral potential of the Cunene Anorthositic Complex, namely the potential in natural stone and aggregates (1:30h). In this theme, the following were addressed: the different existing anorthosite ornamental lithotypes, aspects related to fracturing and rock flaws, exploration, sampling for characterization tests with practical examples from the PLANAGEO project. Red granites and other industrial rocks and minerals related to this complex were also characterized.
- Lithium deposits and their importance in the energy transition. Industrial minerals: their uses and deposits (1:30h). In this training, reference was made to: the main types of lithium resources, their products and applications, practical examples of the characterization of lithium resources in Portugal and, the relationship of this metal with the energy transition, pros and cons of the lithium industry and its environmental impact. In the context of other relevant industrial minerals, the following were considered: quartz (in the form of sand and compact mineral in pegmatites or veins); feldspar; limestone to produce lime, different fillers, and soil conditioner; ball clays and kaolins. For all the minerals mentioned, the characteristics required for the main industrial uses were indicated. Practical laboratory training (6:00h) took place at the IGEO Laboratory in Congenge, on the Lubango environs and involved the demonstration and explanation of the most important ornamental stone identification tests, namely, determination of apparent density and open porosity, water absorption (at atmospheric pressure), flexural strength and compressive strength; a Los Angeles test was also carried out on a crushed stone sample, as this is one of the most important characterization tests for coarse aggregates. The test procedures in accordance with the respective standards did not allow

PanAfGeo

Pan-African Support
to Geological Sciences and
Technology Africa-EU Partnership

Appui panafricain aux géosciences
du partenariat Afrique-UE

Apoio pan-africano às geociências
da parceria África-UE

viewing them in one working day, therefore two practical classes were held, so that the trainees could visualize and understand the complete procedures of the tests, in different lithologies (granite, anorthosite and marble). Training was also provided on the process of selecting suitable and quality samples for testing.

A morning visit was made to an ornamental anorthosite quarry (Black Angola granite), the Metarochas quarry in the exploration nucleus of Tchiquatite (Huíla). This is the main area where this rock, known worldwide, is explored. The Metarochas quarry is a good quarry example as it allows the observation of the rock in depth (4 floors). In the quarry, the trainees were able to observe in situ the characteristics of this lithotype and other anorthosite lithotypes, in stone blocks stored in the park. Indication was given about the most relevant aspects to be considered in the selection and exploitation of the rock, as well as relevant aspects of the cutting/blasting; the main constraints to exploration were also identified (e.g., fracturing, rock flaws). On the same day, an afternoon visit was made to the MARLIN plant in Chibia (Huíla). This is the main ornamental rock transformation unit in the provinces of Huíla and Namibe, where a wide variety of ornamental rocks occurs. Here the trainees were able to see how stone is cut, finished, and processed when necessary (e.g. waterproofing). The trip was carried out in all-terrain vehicles from Lubango (training location).



PanAfGeo

Pan-African Support
to Geological Sciences and
Technology Africa-EU Partnership

Appui panafricain aux géosciences
du partenariat Afrique-UE

Apoio pan-africano às geociências
da parceria África-UE



The training also included practical cases of mineral resources exploration techniques with equipment demonstration, such as: portable XRF and the advantages of using it in an early phase of mineral exploration, and how to read the data produced. A lecture was also given on the gamma ray spectrometer: how and when to use it and interpret the data. Another lecture presented examples of exploration of metallic mineral resources in Africa and in Europe. Taking advantage of the Angolan experience in diamond exploration a lecture was given by an Angolan professor. Other lectures broached very important subjects to EU such as the circular economy including the conservation of mineral resources by means of responsible production, consumption, reuse, and recovery of wastes. Economy of resources was also taught, including mineral reserves classification (UNFC) and the principles that provide the classification framework and comparison with other used classifications. The Critical Raw Materials for EU, USA and Japan and their role in the global market for raw materials. Subjects such as the supply of raw materials influenced by the effect of war and pandemic and how it affected the prices in the common products of every country were also taught.

PanAfGeo

Pan-African Support
to Geological Sciences and
Technology Africa-EU Partnership

Appui panafricain aux géosciences
du partenariat Afrique-UE

Apoio pan-africano às geociências
da parceria África-UE

During the conclusion session, concluding remarks were given by Maria João Batista, Vitor Lisboa, Stanislaw Wolkovicz, Marko Komac and the Co-Leader of Nigeria and the Deputy Co-Leader of Namíbia. Some words were also delivered by Mrs. Carolina Felix, Honorary Consul of Portugal in Lubango and by the President of the Board of Directors of LNEG highlighting the success of the training and the importance of having organised such a session dedicated to Portuguese-speaking African geoscientists. In the end, was concluded that the network now constituted with this group of participants needs to be developed in future cooperation especially raising subjects related with climate change and energy transition and the raw materials needed for these challenges. After the training certificates were formally handed over to each participant.



PanAfGeo

Pan-African Support
to Geological Sciences and
Technology Africa-EU Partnership

Appui panafricain aux géosciences
du partenariat Afrique-UE

Apoio pan-africano às geociências
da parceria África-UE



The communication of the training of PanAfGeo-2 was published in *Jornal de Angola* (<https://www.jornaldeangola.ao/ao/noticias/especialistas-africanos-falam-sobre-minerais/>) and in the <https://www.pressreader.com/angola/opais-angola/20221125/281938841923497>.

