

## **Europlanet Expert Exchange program 2022 - Report**

*Applicant details:* Andrea Borsato, The University of Newcastle, Australia

*Host details:* Fulvio Franchi, Botswana International University of Science and Technology (BIUST), Palapye, Botswana.

*Timing of visit:* 5 – 16 September 2022

The visit was intended to initiate a new collaboration between Australia, and Botswana for the investigation of terrestrial extreme environments and to improve the analytical capability on carbonate samples at BIUST. The first 4 days of the visit were dedicated to the field trip to Gcwihaba cave (Kwihabe, Ngamiland), that preserves thousands of years of climate and environmental history and can be utilised as an analogue to detect traces of ancient microbial life on Earth.

During the two days' visits to the cave, we discussed with BIUST researchers the best way to select and collect samples of biological and microbiological interest, investigate topics and logistical problems for a new collaborative research grant, and discuss about possible strategies for monitoring the cave dripwater chemistry and microbiology.

In the second part of the visit, I examined the BIUST' geochemical laboratories in Palapye which includes stable isotope MS and the trace element ICP-MS and ICP-OS facilities, and discuss with the technical and academic staff strategies and approaches in order to optimise the micro-sampling techniques and geochemical analyses focussed on elements of astrobiological interest.

During the last three days of the visit I, delivered the workshop "*Applied Carbonate Sedimentology*" and the lecture series "*Trace and minor elements in continental and marine*

*carbonates: Analytical techniques, sources and transport, partition, incorporation, and climate-environmental significance*". The workshop and lectures were attended by academic and technical staff as well as several undergraduate and graduate students at the Earth and Environmental Science Department. The lectures were articulated in two different sessions allowing the students to ask questions and assimilate the concepts.



Finally, I explored along with the BIUST academic staff the opportunity to analyse the trace element concentration of some Botswana continental carbonates samples (from both caves and alkaline lakes environment) at the X-ray fluorescence beamline at the Australian Synchrotron, as well as the European Synchrotron Radiation Facility. This can open new possibility for investigating at ultra-high resolution trace elements in layers and features potentially associated with organic matter and microbiological activity, thus facilitating the African researchers in the field of astrobiology.