

## STSM Report

STSM PERIOD: 20/03/2017 – 24/03/2017

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- **Welcome and visit to INESC TEC main building**

Overview of INESC TEC - Centre for Information Systems and Computer Graphics P activities and organization. Institutional presentation of INESC TEC, followed by an introductory presentation about radon in geophysical contexts (sources, instrumentation, measurements, applications). The morning presentations were followed by a joint discussion about research activities of the participant and preparation of the work plan for the rest of the week.

- **Joint monitoring of gamma radiation and atmospheric electric field**

The host presented a detailed explanation and demonstration of the usage and general principles of instruments for measuring gamma radiation and the local atmospheric electric field, specifically the **Campbell Scientific CS110 Electric Field Meter Sensor** (Fig. 1) and the **SCIONIX NaI(Tl) sensor for detection of gamma radiation** (Fig. 2).



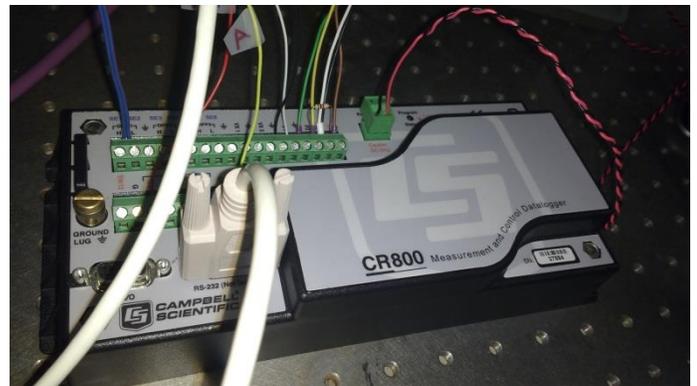
Fig. 1. Campbell Scientific CS110 Electric Field Meter Sensor



Fig. 2. SCIONIX - NaI(Tl) detector

- **Lab of radioactivity instrumentation and fiber optical sensors**

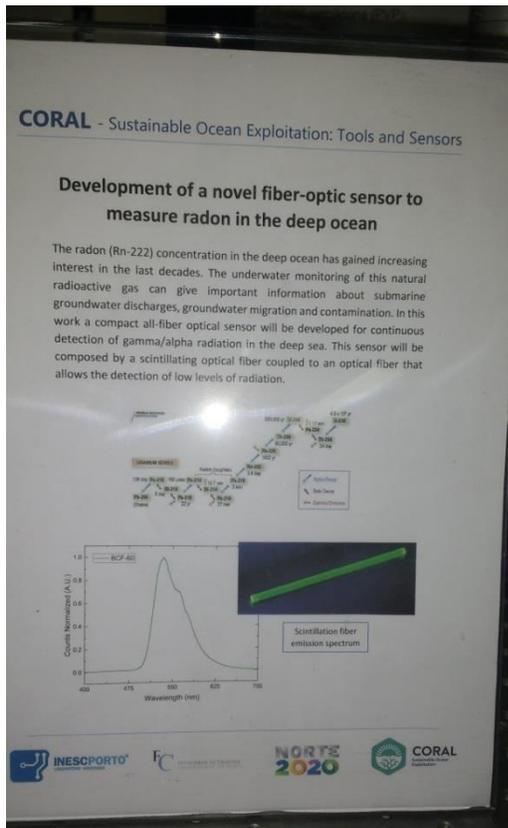
A visit was carried out to the photonics center of INESC TEC, in the Faculty of Sciences of the University of Porto. Instruments for continuous measurement of radon-222 volume activity - alpha and for detection of gamma radiation (Fig. 3) currently being used in laboratory tests have been presented. Information on the **Campbell Scientific datalogger CR800** and support software package was provided. The main idea about simultaneously alpha and gamma measurements of environmental radioactivity was explained.





**Fig. 3. Instruments for radioactivity measurements alpha and gamma.**

The main concept of using optical fibre-based sensors for radon measurement, currently in development at the host institution, was also briefly addressed (Fig. 4).



**Fig. 4. Fiber-optic sensor to measure radon in the deep ocean.**

- **ENA-ARM facility in the Atlantic** (<https://www.arm.gov/capabilities/observatories/ena>)

The gamma radiation monitoring campaign currently ongoing in the Azores was presented, followed by discussing about continuous gamma radiation monitoring (data pre-processing, preliminary results and interpretations) at the Eastern North Atlantic (ENA), Graciosa Island ARM facility.

- **Other topics discussed during the STSM**

Radon applications, e.g. as a volcanic and seismic proxy and as an atmospheric and hydrological tracer, and best methods for statistical data analysis for those applications.

Radon concentrations variability, importance of long term radon measurements and knowledge of meteorological parameters for understanding radon variability.

Previous experience on continuous radon monitoring and resulting signals, e.g. Amram tunnel (Israel), with special emphasis on multi-year, seasonal, intra-seasonal and daily variability of radon.

R software for statistical data analysis and graphics (<https://www.r-project.org/>) and Python.