Report on the outcomes of a Short-Term Scientific Mission[1]

Action number: CA20108

Grantee name: Iveta Smetanová

Details of the STSM

Title: Radon in underground environment and its relation to meteorological and microclimatic condition

Start and end date: 01/10/2024 to 12/10/2024

Description of the work carried out during the STSM

Description of the activities carried out during the STSM. Any deviations from the initial working plan shall also be described in this section.

(max. 500 words)

During the visit to Dr. Maria Candelaria Martín Luis from the University of La Laguna, Tenerife, Spain (ULL) we performed radon activity concentration and microclimate monitoring in two lava caves in Tenerife, using the measuring devices from both institutions – Earth Science Institute of Slovak Academy of Sciences (ESI) and ULL. Both continuous and track radon detectors were used for radon monitoring.

The monitoring was carried out in two volcanic lava caves situated in the northern flank of Pico-Viecho volcano, Tenerife. The previously planned monitoring in the well was replaced by the monitoring in the Felipe Reventon cave (FR), where radon research has never been carried out, at the suggestion of the speleologist from the ULL. This cave is situated close to the El Viento Cave (EVC) and is not open to the public. Monitoring in two caves allowed us to compare the radon activity concentration and microclimate condition in them.

In FR cave, with a length of approximately 500m, eight monitoring stations were established, using track detectors Ramarn (ESI) and Raduet (ULL). In one of them also continual Rn detectors from both ESI (RPP) and ULL (Sarad) were placed, together with temperature and pressure sensor.

In EVC, the research was conducted in a 180 m long tourist section of the cave, as well as in a closed part approximately 1 km long. On a tourist route four monitoring stations were established, with track

[1] This report is submitted by the grantee to the Action MC for approval and for claiming payment of the awarded grant. The Grant Awarding Coordinator coordinates the evaluation of this report on behalf of the Action MC and instructs the GH for payment of the Grant.

detectors from both institution, in one of them also continuous Rn detectors were placed and temperature and pressure sensor.

In a part closed for the public, which is much longer than the tourist part, eight stations with track detectors were situated, in one of them continuous Rn detectors were placed together with temperature and pressure sensor.

Detectors were placed in the caves for 11 days. The position of the detectors was chosen according to the cave morphology and consulted with the speleologists. After their collecting, the track detectors were sent for the laboratory evaluation.

Description of the STSM main achievements and planned follow-up activities

Description and assessment of whether the STSM achieved its planned goals and expected outcomes, including specific contribution to Action objective and deliverables, or publications resulting from the STSM. Agreed plans for future follow-up collaborations shall also be described in this section.

(max. 500 words)

STSM achieved its planned goals. The preliminary results from continuous radon detectors showed the highest Rn levels in closed part of EVC, ranging from 6000 to 8400 Bq/m3. On a tourist rout in EVC Rn reached much lower levels from 100 to 2300 Bq/m3, with very distinctive daily variations, probably resulting from the influence of atmospheric temperature and pressure on a cave microclimate, caused by the multiple cave openings. Rn activity in a FR cave ranged between 3000 and 4500 Bq/m3 and the daily variation were not so significant due to more stable microclimate conditions. The preliminary results confirmed the lowest temperature of cave air in a closed part of EVC, in a monitoring station situated approximately in the middle of a cave and the highest in a FR cave.

After their laboratory evaluation, also the results from track detectors will be compared. After the detailed analyses of the obtained outcomes will be finished, a joint article with the new information regarding the micrometeorological measurements in two lava caves and the relation of the respective micrometeorological conditions to radon activity will be published. Also the article comparing seasonal correction factors obtained in karst and lava caves situated in a different climate and microclimate conditions is planned to be published.

As for the contribution to Action objective, a multidisciplinary network of researchers with diverse background in meteorology/climatology was established during this visit (WG1 - Networking and Communication), consisting of geophysicist from ESI in Slovakia and three scientists with geological, speleological and chemical background from the La Laguna University, Tenerife. The results from short-term monitoring during this STSM visit can help us to understand on how meteorological and microclimate data influence radon activity in underground spaces in different climate and geological conditions (WG3 - Dissemination and application – further extension of knowledge exchange and introduction of new research fields).

The Metadata and the data from the particular measurements will be provided and stored at Micromet_ KSP.

Grantee enters max 500 word summary here.