Contribution ID: **20** Type: **Poster presentation**

Visual localization and 3D reconstruction as complement for astrobiological in-situ investigations

Wednesday 6 September 2023 17:40 (20 minutes)

Research in the field of astrobiology requires the study of geological and biological features in harsh environments, such as arid, cave or volcanic environments as analogs for Mars and Venus. Evaluation of in-situ measurements and laboratory analysis of samples are important for life detection and habitability characterization, but are limited if context information such as spatial relations are unavailable. Therefore, sampled data needs to be precisely localized in space and time, and to be prepared appropriately for further analysis and evaluation.

On this poster we present our progressing work on context generation for in-situ measurements with two exemplary use cases from our work at Vulcano, Italy. We use the Integrated Positioning System (IPS) as base localization platform, which is a camera-based multi-sensor system dedicated for localization, 3D reconstruction and inspections in unknown terrains. In the first use case, exploration of fumarole fields, we consider a thermal imaging camera that is attached to the IPS demonstrator. Each thermal image is localized in space and time and 3D thermal mapping provides context in the form of thermal 3D models. In the second use case, investigation of volcanic outcrops, we seek to support in-situ spectroscopy measurements (e.g., Raman spectrometer, LIBS, VNIR reflectance) that function independently from IPS. We place optical markers to identify areas of interest and provide context in the form of their global position and detailed RGB 3D models.

With this poster we intend to motivate the use of such systems as complement for astrobiological in-situ investigations by discussing results and impressions from our participation at the Vulcano Summer School 2023. Vulcano, with its wide range of comparatively easy to reach and promising analog sites for Mars and Venus, is an ideal environment to test new methods and instruments in the field. Generally, we seek to support astrobiological, geophysical and planetary in-situ investigations.

Primary author: IRMISCH, Patrick (German Aerospace Center (DLR), Institute of Optical Sensor Systems)

Co-authors: BAQUÉ, Mickael (German Aerospace Center (DLR), Institute of Planetary Research, Planetary Laboratories Department); BAUMBACH, Dirk (German Aerospace Center (DLR), Institute of Optical Sensor Systems); CHOINOWSKI, André (German Aerospace Center (DLR), Institute of Optical Sensor Systems); CORDIER, Hugo (German Aerospace Center (DLR), Institute of Optical Sensor Systems); DAHLKE, Dennis (German Aerospace Center (DLR), Institute of Optical Sensor Systems); LOMASHVILI, Ana (German Aerospace Center (DLR), Institute of Optical Sensor Systems); RAMMELKAMP, Kristin (German Aerospace Center (DLR), Institute of Optical Sensor Systems); SOHL, Frank (German Aerospace Center (DLR), Institute of Planetary Research); STEPHAN, Katrin (German Aerospace Center (DLR), Institute of Planetary Research); UNNITHAN, Vikram (Constructor University, Department of Physics & Earth Sciences)

Presenter: IRMISCH, Patrick (German Aerospace Center (DLR), Institute of Optical Sensor Systems)

Session Classification: Poster session