Submitted Abstract

ID IMC22-FSAbstr- 609

First Author First Name Last Name	 Riccardo (1) Scandroglio
Submitting Author First Name Last Name	 Riccardo Scandroglio
Correspondence	r.scandroglio@tum.de
Co-Authors **>> E-Mails will be not listed**	Offer, Maike (1); Rehm, Till (2); Krautblatter, Michael (1)
Organisations	1: Technical University of Munich, Landslide Research Group, Germany 2: Environmental Research Station Schneefernerhaus, Germany
Country	Germany
Region	Western Europe
Title	Monitoring Mount Zugspitze From Inside: The Kammstollen Laboratory For Deciphering Bedrock Internal Thermo-Hydrological Processes.
Keywords	Bedrock Permafrost, Ert, Long-Term Monitoring, Outdoor Laboratory, Thermo-Hydrological Processes
Type	List Of Focus Session
Focus Session ID	26

Abstract

Warming of high alpine bedrock permafrost in the last decades and the resulting slope stability reduction put humans and infrastructures at high risk. To monitor this hazard, electrical resistivity tomography (ERT) recently became the standard for detection of thermal state changes in permafrost, developing up to 4D quantitative monitoring. Nevertheless, bedrock thermal and hydrological responses cannot be fully understood with this single technique: a multimethod monitoring that includes underground information as well as external forcing is fundamental to decipher internal dynamics.

This is the case at the Kammstollen, a 850m long communication tunnel between 2660 and 2780m asl, located meters to few decameters under the ridge at the border between Germany and Austria. The first ERT permafrost monitoring here was conducted in 2007, this has been monthly repeated in the last decade and enriched with continuous logging of rock/air temperatures and seasonal record of water infiltration. In addition, our yearly resistivity, rock temperature, and displacement measurements on the overlaying ridge offer precise knowledge on surface processes, supplemented by 120 years of climate records on the summit.

Year-round access to the tunnel enables uninterrupted monitoring and maintenance of instruments for reliable data collection. “Precisely controlled” natural conditions, restricted access to the site for researchers only and unique logistical support by the Environmental Research Station Schneefernerhaus, make this location particularly attractive for developing benchmark experiments.

Here, we present the recently modernized layout of the outdoor laboratory and results from this exceptional multimethod data set of still unpublished data. We want to encourage the discussion on further analysis approaches for the present data and on new potential future experiments in the Kammstollen, aiming at understanding not only permafrost thermal evolution but also bedrock internal thermo-hydrological dynamics.