



## **Experiences with a Decade of Wireless Sensor Networks in Mountain Cryosphere Research**

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Research in geoscience depends on high-quality measurements over long periods of time in order to understand processes and to create and validate models. The promise of wireless sensor networks to monitor autonomously at unprecedented spatial and temporal scale motivated the use of this novel technology for studying mountain permafrost in the mid 2000s. Starting from a first experimental deployment to investigate the thermal properties of steep bedrock permafrost in 2006 on the Jungfrauoch, Switzerland at 3500 m asl using prototype wireless sensors the PermaSense project has evolved into a multi-site and multi-discipline initiative. We develop, deploy and operate wireless sensing systems customized for long-term autonomous operation in high-mountain environments. Around this central element, we develop concepts, methods and tools to investigate and to quantify the connection between climate, cryosphere (permafrost, glaciers, snow) and geomorphodynamics.

In this presentation, we describe the concepts and system architecture used both for the wireless sensor network as well as for data management and processing. Furthermore, we will discuss the experience gained in over a decade of planning, installing and operating large deployments on field sites spread across a large part of the Swiss and French Alps and applications ranging from academic, experimental research campaigns, long-term monitoring and natural hazard warning in collaboration with government authorities and local industry partners.

### Reference

<http://www.permasense.ch>

Online Open Data Access

<http://data.permasense.ch>