X-Sense

Monitoring Alpine Mass Movements at Multiple Scales

- Permafrost Meeting 2nd December 2010 -

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X-Sense Key Personnel

- **ETH Zurich**
  - Embedded and Wireless Technology
    - Lothar Thiele, Jan Beutel
  - Geodesy and Photogrammetry
    - Alain Geiger

- **University Zurich**
  - Physical Geography
    - Stephan Gruber

- **GAMMA SA**
  - SAR Remote Sensing
    - Tazio Strozzi, Urs Wegmüller

- **ETH Zurich**
  - Geodesy and Photogrammetry
    - Alain Geiger

- **BAFU/FOEN**
  - Federal Office for the Environment
    - Hugo Rätzo
X-Sense Proposed Platform

- Host Station: processing, fusion, storage
- IN-SAR Satellite Imaging
- Reference GPS, High Resolution Imaging
- Non-moving position
- Wireless Sensors, Crack Dilatation, Temperature
- GPS Sensor, Moving debris, moving rock slope
- Base Station
- Solar Power
Field Site Selection

Orographic right side of Mattervalley (VS) on September 2, 2010

Grosse Grabe, Gugla, Dirru and Grabengufer rockglaciers
GPS Testbed

- Preliminary GPS testbed on Dirru rock glacier
  - Financially supported by BAFU/FOEN and canton Wallis
  - 3 permanent GPS stations
  - Low-cost L1 GPS receivers
  - Solar panels
  - Local data storage
Geoscientific Analysis

Pilot phase:
- Velocity variation
- Acceleration during snowmelt infiltration
- Reaction to warm/cold periods
- Supports feasibility of planned analysis
New GPS Logger Devices

- 30 GPS logger devices have been designed and manufactured in partnership with Art-of-Technology AG
- Testing is currently ongoing
- Deployment is planned for Q4/2010
Test Installation Randa/Dirruhorn

- 20 km WLAN link from Zermatt to Randa
  - Collaboration with CCES/RECORD + COGEAR (S. Loew, P. Burlando; ETHZ)
- New Base Station test installation on designated Dirruhorn field site (4 km WLAN link, solar power)
  - Will be upgraded with GPS-capable Core Station in Q4/2010
Proposed X-SENSE Technical Evolution

2010
- GPS Loggers

2011
- Online GPS Prototype

2012
- Online GPS/Sensor System

Data
- GPS Data
- Data/Specs
- Data/System

Results
- Science results
- Experience
- X-Sense