PermaSense
Sensing in Disruptive Environments
Jan Beutel
Our patient does not fit into a laboratory
So the laboratory has to go on the mountain.
Competence in Outdoor Sensing

- Wireless systems, low-latency data transmission
- Customized sensors
- Ruggedized equipment
- Data management
- Planning, installing, operating (years) large deployments
Low-power Wireless Sensors

Aim: Understand temperatures in heterogeneous rock and ice
- Measurements at several depths
- Two-minute interval, autonomous for several years
- Survive, buffer and flush periods without connectivity
Field Site Support

• Base station
  – On-site data aggregation
  – Embedded Linux
  – Solar power system
  – Redundant connectivity
  – Local data buffer
  – Database synchronization

• Cameras
  – PTZ webcam
  – High resolution imaging (D-SLR)

• Weather station

• Remote monitoring and control
Log-haul WLAN Access & Monitoring

- Dual WLAN & 3G access network
- Redundant base stations (DH/GG/RD)
- Distributed monitoring infrastructure
Visualization with Google Earth
In Real-Time: Combined Data Overlays
Data Fusion and Interpretation

Next: high-resolution imaging

Remote gigapixel panoramas as time-lapse movies
400’000-500’000 pixel (Nikon D300s @ 300mm)
AdM - A New Lab in Chamonix...