Wireless Sensor Networks in Permafrost Research – Concept, Requirements, Implementation and Challenges

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Sensor node

• early warning
• remote commands
• redundant data
• easier maintenance
• data available all year

Potential

• programable storage

Switzerland

Jungfraujoch field deployment

• wireless connection

Requirements

• ultra low power consumption
• synchronous measurement cycles

Implementation & Application

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Introduction and investigations

• difficult to monitor infrastructure
• a potential source for large rockfalls
• sensitive to temperature changes

Steep rock permafrost is:

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Two project years are:

• measurement stability increased by factor 20
• time synchronisation of the nodes and measurement cycles
• stable and power efficient data routing
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Challenges and Outlook

Two project years are:

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Crack extension / mm

• data loss, a logging-only solution was installed in the autumn of the same year, the WSN did not run stable over longer time periods. To avoid data loss, a logging-only solution was installed in the autumn of the same year, the WSN did not run stable over longer time periods. To avoid...

Crackmeter measures crack extension and temperature at position 6...

Data from Matterhorn Hörnligrat (3400m a.s.l., Swiss Alps)

sensor rod and node at Jungfraujoch

WSN at Matterhorn Hörnligrat

Sensor node

sensor node