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Published in:
2nd International Workshop on Geoelectrical Monitoring

Publication date:
2013

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):
Doetsch , J., Christiansen, A. V., Auken, E., Fiandaca, G., & Ingeman-Nielsen, T. (2013). Monitoring of active layer refreezing in Greenlandic permafrost. In *2nd International Workshop on Geoelectrical Monitoring* (pp. 28-28). Article 13

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13

Monitoring of active layer refreezing in Greenlandic permafrost

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The state of the high-latitude permafrost for the Earth's climate system has been widely acknowledged, but permafrost dynamics in a changing climate are poorly understood. Especially the annually freezing and thawing *active layer* is critical for climate dynamics, but it is difficult to monitor without disturbing the studied system.

We use minimally invasive surface geoelectrical monitoring to image active layer refreezing and its lateral variation at high temporal resolution. Our monitoring setup on Disko island, Greenland, allows acquisition of up to 12 data sets per day, using 54 electrodes on two parallel lines. Data is automatically acquired, backed up locally and uploaded to an online database.

We test different time-lapse inversion strategies on the large amount of data and correlate our inversion results with local temperature point measurements. The comparison of the time-lapse inversion results and the temperature and moisture content measurements aims at developing a petrophysical model for partially and fully frozen soils.