



Cryoseismology

Fabian Walter (1) and Evgeniy Podolskiy (2)

(1) ETH Zürich, Switzerland (fwalter@vaw.baug.ethz.ch), (2) Arctic Research Center, Hokkaido University, Sapporo, Japan

Cryoseismology is a rapidly growing research area. The last decade witnessed an explosion in yearly number of publications in this field, which has led to unprecedented insights and discoveries in ice dynamics throughout the cryosphere. Modern and more portable seismic instrumentation has made installation in harsh alpine and polar environments possible and revealed cryospheric seismicity in a broad frequency (0.001 to 100 Hz) and moment magnitude range (from M_{-3} to M_7).

In this presentation we review key discoveries in cryoseismology. We focus on some of the most prominent seismogenic processes, including iceberg calving and basal sliding of glaciers and ice sheets. Here, seismological techniques have had a particularly strong impact on glaciological research. Moreover, we discuss typical microseismic signals encountered on glaciers and ice sheets and common approaches to event detection, catalogue building and seismic source studies.

Finally, we describe techniques and challenges associated with seismometer installation in direct contact with glacial ice. This is particularly difficult on ice surfaces subject to substantial melt. Simple adaption of conventional installation for earthquake or near-surface seismology allows for high-quality campaign data but usually involves frequent station visits. On the other hand, the use of borehole seismometers has produced multi-seasonal seismic records requiring little or no maintenance.