Cryoseismology breakout group (main points)

1. The fundamental limitation for modeling ice-sheet behavior and its effect on future climate is poor understanding of the physics of ice-stream and outlet-glacier movement. Seismology can contribute useful constraints to help answer fundamental physics questions related to glacier/ice-sheet dynamics.

2. Changes in glacier behavior involve dynamic mass movements that can be both (1) monitored and (2) investigated by seismological techniques:

--- What are the enabling conditions for ice-shelf collapse?
--- What are the dynamics that govern steady and stick-slip ice-stream flow?
--- What physical parameters control calving at outlet glaciers?
--- What conditions/processes controls the advection of meltwater to the glacier base?

3. Seismological structural investigations of critical areas:

--- Structure of the Ross Ice Shelf (>400,000 km**2) (ice and subsurface)
--- Structure of ice (anisotropy, plumbing, basal conditions)

4. First-order investigations of continental/lithospheric structures beneath major ice sheets. The solid earth provides the boundary conditions for glacial movement in terms of topography, heat flow, basal material properties, and the viscosity of the mantle for long term glacial adjustment.

5. Contributions of polar observatories to investigations of global Earth Structure, e.g., the inner core.

6. Glacier processes (stick-slip sliding, calving) as analogs of earthquakes, landslides, avalanches.

Resources:

1. Seismology as a tool for monitoring the changing behavior of glaciers and ice sheets require long-term observations provided by permananent/long-term networks in Antarctica and Greenland.

2. Focused studies of specific localized ice phenomena (e.g., ice-shelf cracking) require easily deployable instruments designed for the extreme environment (portability, communication, power, cost).