

Seismic observations in Greenland by a joint USA and Japanese GLISN team (2011-2017)

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The Greenland Ice Sheet (GrIS) is a huge storehouse of water on Earth, and has the potential to raise the global sea level by approximately 7 m if completely melted. Although researchers have been mainly studying the GrIS surface snowmelt as a response to climate warming, recent progress in ice-core drilling, remote sensing, and theoretical analyses has turned a spotlight on its basal conditions. However, the traditional observation techniques, such as ice-core drilling and ice-penetrating radar, provide only discontinuous information in both time and space.

Seismic observation is now drawing widespread attention as an alternative method for monitoring the GrIS. The Greenland Ice Sheet Monitoring Network (GLISN), an international project between 11 countries that began in 2009, now provides broadband, continuous, and real-time seismic data from 33 stations in and around Greenland. Japan is a partner country from when the GLISN project was launched, and has been sending an expedition team every year since 2011. In 2011, a joint USA and Japanese GLISN team installed the dual seismic-GPS station ICESG-GLS2 in the middle of the GrIS. During 2012-2017, we conducted maintenance of three stations on the GrIS (station codes: ICESG-GLS2, DY2G-GLS1, and NEEM-GLS3), and three stations on bedrock in coastal areas (NUUK, DBG, and SOEG). We had succeeded in real-time transmission of broad-band and continuous seismic waveform data from the three ice stations. It was the first time in the world that the seismic data with such a high sampling rate are transferred from the ice sheet. The data is now open to public and available from the IRIS Data Management Center (<http://www.iris.edu/ds/nodes/dmc/>).

In 2016, we installed a new seismic station (PILOT) beside the DY2G station to test a new data-transmission system. In 2017, we further installed another new seismic station (BGAN) at the same place for testing a new telemetry system, which deals with 240 sps data. This presentation will summarize our field activities for 2011-2017, and introduce the future plans.

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