[EE] Evening Poster | U (Union) | Union

[U-03]Cryoseismology - a new proxy for detecting surface environmental variations of the Earth -

convener:Genti Toyokuni(Research Center for Prediction of Earthquakes and Volcanic Eruptions, Graduate School of Science, Tohoku University), Masaki Kanao(National Institute of Polar Research), Seiji Tsuboi(海洋研究開発機構)

Thu. May 24, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

Several kinds of environmental signals associated with ocean - cryosphere - solid earth systems have recently been detected in bi-polar regions. Ice-related seismic motions for small magnitude events are generally named ice-quakes (ice-shocks) and can be generated by glacially related dynamics. Such kinds of cryoseismic sources are classified into the movements of ice sheets, sea-ice, oceanic tide-cracks, icebergs and the calving fronts of ice caps. Cryoseismic waves are likely to be influenced by variations in environmental conditions, and the continuous study of their time-space variability provides indirect evidence of climate change. As glacial earthquakes are the most prominent phenomena found recently in polar regions, in particular on the Greenland in this 21st century, the new innovative studies from seismology are expected by long-term monitoring under extreme conditions in the Earth's environment.

Taking these issues into account, the conveners are willing to invite many contributions to a special session on "Cryoseismology", which will cover the recent achievements on glacial related seismic events and associated phenomenon observed in polar regions. It is particularly encouraged to have contributions based on seismic signals involving the dynamics of ice sheets, sea-ice, icebergs and glaciers. Although the glacial earthquakes are the most prominent evidence found recently in polar regions, all related topics involving polar seismology are welcome, such as studies of crust and mantle structure in the area, comparison of tectonic and glacier-related seismicity, recent triggered earthquakes and active volcanoes, glacial isostatic adjustment (GIA), harmonic tremor associated with cryoseismic events, etc.

[U03-P04]Seismic observations in Greenland by a joint USA and Japanese GLISN team (2011-2017)

*Genti Toyokuni[1], Dean Childs[2], Masaki Kanao[3], Yoko Tono[4], Seiji Tsuboi[5] (1.Research Center for Prediction of Earthquakes and Volcanic Eruptions, Graduate School of Science, Tohoku University, 2.IRIS/PASSCAL, 3.NIPR, 4.MEXT, 5.JAMSTEC)

Keywords:GLISN project, Greenland Ice Sheet (GrIS), Seismic observation

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.

Acknowledgments: The Japanese GLISN team has been supported by research grants from JSPS (24403006).