

Planning of the Greenland Ice Sheet Monitoring Network (GLISN) for observing global warming

Masaki Kanao[1]; Seiji Tsuboi[2]

[1] NIPR; [2] IFREE

<http://polaris.isc.nipr.ac.jp/~pseis/>

The Greenland Ice Sheet and its response to climate change have potentially a great impact upon mankind, both through long-term sea level rise and through modulation of fresh water input to the oceans. Internationally monitoring the dynamic response of the Greenland Ice Sheet to climate change is a fundamental component of long-term observational efforts for monitoring climate change.

Glacial earthquakes have been observed along the edges of Greenland with strong seasonality and increasing frequency since 2002 (Ekstrom et al, 2003, 2006) by continuously monitoring data from the Global Seismographic Network (GSN). These glacial earthquakes in the magnitude range 4.6-5.1 may be modeled as a large glacial ice mass sliding downhill several meters on its basal surface over duration of 30 to 60 seconds.

The detection, enumeration, and characterization of smaller glacial earthquakes are limited by the propagation distance to globally distributed seismic stations, i.e., the Global Seismographic Network (GSN) with the International Federation of Digital Seismograph Networks (FDSN). Glacial earthquakes have been observed at seismic stations within Greenland (Larsen et al, 2006), but the current coverage is very sparse.

In order to define the fine structure and detailed mechanisms of glacial earthquakes within the Greenland Ice Sheet, a broadband, real-time seismic network needs to be installed throughout Greenland Ice Sheet and perimeter. The International Polar Year 2007-2008 is a chance to initiate this program with international collaboration.

This effort, led in this proposal by The IRIS Consortium for the United States, is international in its scope and approach, and involves the participation of the Geological Survey of Denmark and Greenland (GEUS), GeoForschungsZentrum Network (GEOFON) of Germany, ETH Zurich of Switzerland, Istituto Nazionale di Geofisica e Vulcanologia (INGV) of Italy, Cambridge University of Great Britain, NIPR and JAMSTEC of Japan.

The open collaboration of these national groups creates a foundation welcoming other international interest and participation, not only for seismological monitoring Greenland Ice Sheet, but also for other in situ observations which may use the infrastructure being developed. All of the partners are committed to free, unrestricted, open access to all data from GLISN to anyone in real-time.