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Continuous broadband seismic observation on the Greenland Ice Sheet under Greenland Ice Sheet monitoring Network

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We have installed the ice sheet broadband seismograph station, called ICE-S (DK.ICESG) in June 2011, in collaboration with IRIS Polar Services under the GreenLand Ice Sheet monitoring Network (GLISN), which is a new, international, broadband seismic capability for Greenland being implemented through the collaboration between Denmark, Canada, France, Germany, Italy, Japan, Norway, Poland, Switzerland, and the USA. The primary purpose of GLISN project is to define the fine structure and detailed mechanisms of glacial earthquakes within the Greenland Ice Sheet. 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. Glacial earthquakes have been observed at seismic stations within Greenland (Larsen et al, 2006), but the coverage was very sparse and a broadband, real-time seismic network was needed to be installed throughout Greenland's Ice Sheet and perimeter. The National Institute for Polar Research and Japan Agency for Marine-Earth Science and Technology are members of GLISN project and we have started to operate ICESG station since 2011. The station is equipped with a CMG-3T broadband seismometer and a Quanterra Q330 data logger. We have visited the station again in May, 2012 and successfully retrieved one year of continuous records from the broadband seismometer and updated the telemetry system to eventually allow real time monitoring of the station. ICESG station is now daily sending 1 Hz continuous data over the iridium satellite system using RUDICS. The observed three component seismograms demonstrate that the quality of this ice sheet station is good enough to record not only local earthquakes around Greeland but also teleseismic earthquakes. We could record three component broadband seismograms for April 11, 2012 Off the west coast of Northern Sumatra earthquake (Mw8.6). These seismograms show high signal to noise ratio characteristics of this station.