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Sea-Ice Thickness Monitoring from Sensor Equipped Inuit Sleds

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A novel instrumentation package capable of measuring sea-ice thickness autonomously has been designed for long-term deployment upon the dog drawn sleds of the indigenous peoples of the Arctic. The device features a range of sensors that have been integrated with an electromagnetic induction device. These include a global positioning system, temperature sensor, tilt meter and accelerometer. Taken together, this system is able to provide accurate (+/-5cm) measurements of ice thickness with spatio-temporal resolution ranging from 1m to 5m every second. Autonomous data transmission capability is provided via GSM, inspired by the fact that many of the coastal communities in Greenland possess modern cell-phone infrastructure, enabling an inexpensive means of data-retrieval.

Such data is essential in quantifying the sea-ice mass balance; given that existing satellite based systems are unable to measure ice-thickness directly. Field-campaign results from a prototype device, deployed in the North West of Greenland during three consecutive seasons, have demonstrated successful proof-of-concept when compared to data provided by ice mass balance (IMB) stations provided at fixed positions along the route of the sled. This project highlights not only the use of novel polar technology, but how opportunistic deployment using an existing roving platform (Inuit sledges) can provide economical, yet highly valuable, data for instrumentation development.