

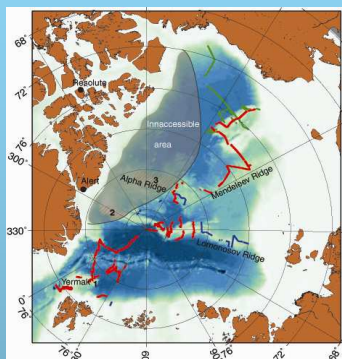


Autonomous buoy for seismic reflection data acquisition in the inaccessible parts of the Arctic Ocean

2007-2008
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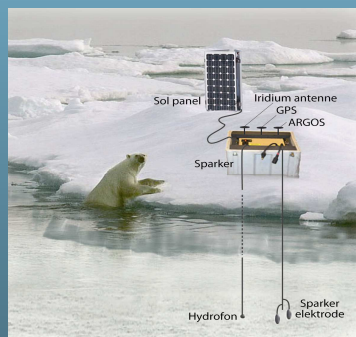
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The challenge



A large area of the Arctic Ocean is not accessible to icebreakers and marine surveys using towed equipment.

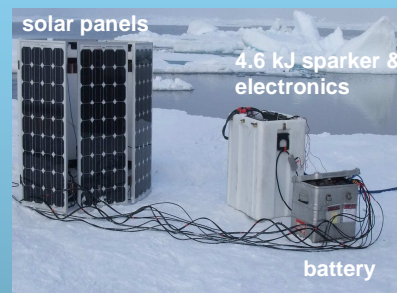
The concept



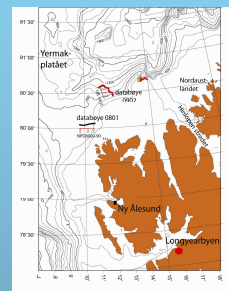
An autonomous buoy which collects seismic reflection data and transmits to shore in real time via the Iridium satellite system:

- GPS triggers a shot every 50 meter;
- records 8 sec. data and stores on disc;
- detects water bottom in the data and extracts the subsequent 1 sec of data;
- transmits to Bergen via Iridium as 2 kB short burst (SBM) messages.

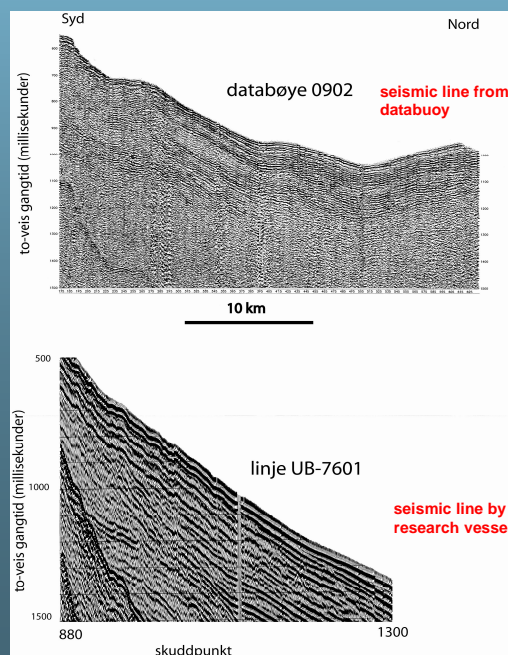
Field tests



Deployment on the ice north of Svalbard



Test locations of the seismic buoy (thick red, green and black lines).



Results

- we have successfully developed an autonomous buoy for acquisition of single channel seismic reflection data from drifting sea ice in the Arctic Ocean and real-time data transmission to shore via Iridium.
- we have two-way data communication where buoy operation, acquisition and data transmission parameters can be set from shore.
- the buoy data show 400-700 meter seismic sub-bottom penetration using a 4.6 kJoule sparker source and recording with a single hydrophone.

Remaining challenges

- power supplied by batteries charged by solar panels and wind mill has proven insufficient for stable operation;
- this problem will be remedied by use of a fuel cell (90 W) which runs on ethanol (~1.5 liter/day).

Plans

- deployment July-August 2010 on Yermak Plateau north of Svalbard (82° N);
- deployment in 2011 on the Lomonosov Ridge, central Arctic Ocean.

Acknowledgement

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