

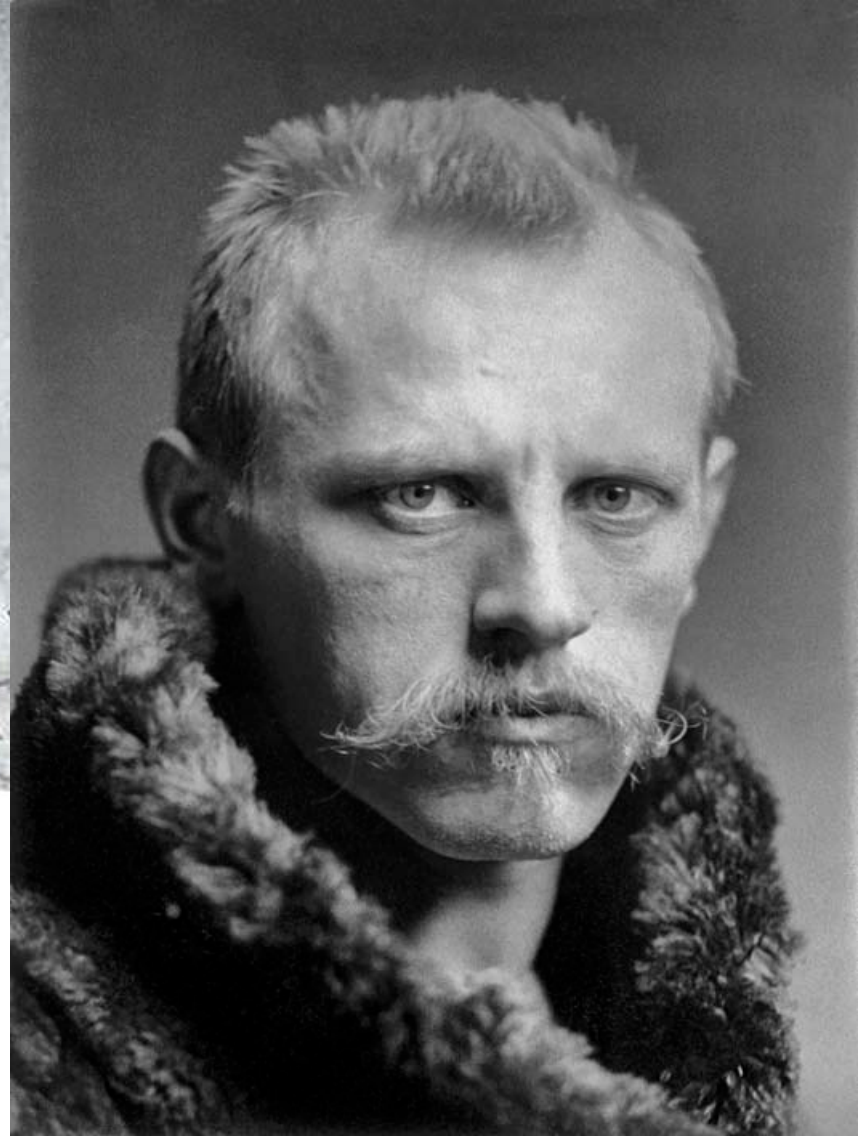
FRAM-2012

**Norwegians Return to the High Arctic with the
Research Hovercraft R/H SABV ABAA**

*John K. Hall
Yngve Kristoffersen
Gaute Hope
Harald Brekke*



GEBCO Science Day - IHB Monaco October 2, 2012



Dr. Fridtjof Nansen and the FRAM:

During FRAM's 1893-96 drift with the trans-polar current Nansen showed that the Arctic Ocean consists of several deep basins.

The FRAM saga galvanized the Norwegians, then facing a split with a much larger Sweden.

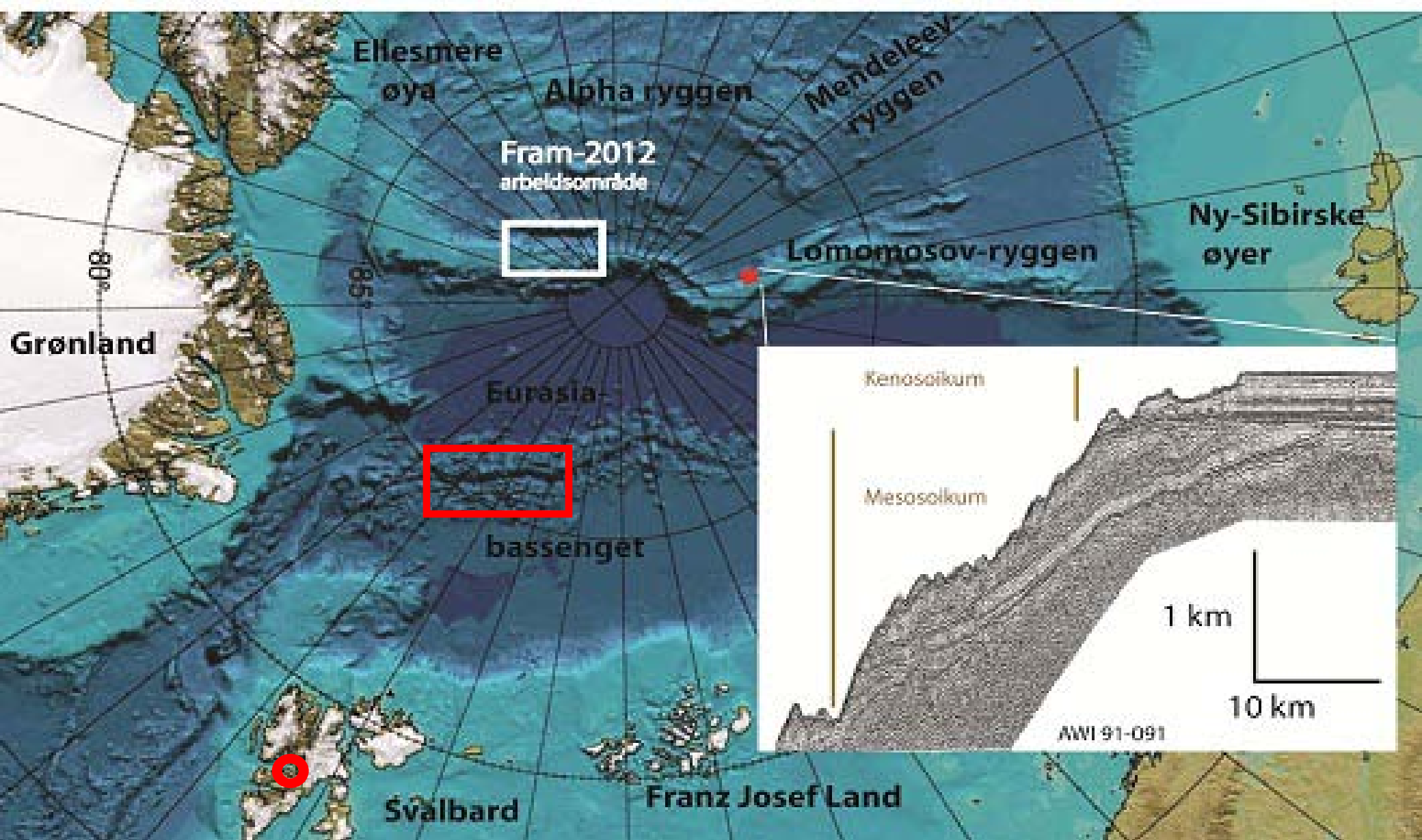
FRAM went on to explore the Canadian island with Sverdrup, and to take Amundsen to Antarctica for his trek to the South Pole.

FRAM-2012 Participants



Gaute Hope, MSc
Thesis Candidate

Prof. Yngve Kristoffersen, Retired
Professor, University of Bergen



The Original Plan called for 1-2 weeks over the Gakkel Rift Valley with hydrophone arrays monitoring small earthquakes, and then seismic profiling and coring deeper layers on the Lomonosov Ridge in support of the Danish-Canadian LOMROG-III Project. Periodic rendezvous with Swedish icebreaker ODEN would refuel the hovercraft. Like many plans in the Arctic this one soon collapsed due to the intensive fracturing of year-old ice making huge areas of rubble and pressure ridges, as well as major period of low to no visibility.

Basket holds 3000 m of 3/8" kevlar aramid line with 2 ton breaking strength, and hydraulic line feeder for recovery

Hydraulic capstan winch

Bracket with one of our four 3.5 kHz Knudsen CHIRP transducers

4 m long dart corer - can reach speeds of 95 km/hr in free fall





Hydraulically powered 190 bar air compressor

Preparations - Longyearbyen, Svalbard
(Spitsbergen) mid-July 2012



A photograph showing two men sitting at a table on a boat. The man on the left is wearing a grey shirt and is looking down at something in his hands. The man on the right is wearing a red jacket and a cap, and is looking towards the camera. The table is set with various food items, including a carton of milk, a box of 'MILD HUITOST' cheese, a container of jam, a carton of cream, a slice of cake on a plate, and several cups. A bag with 'SVALBARD' and a polar bear logo is visible on the right. The background shows the interior of the boat with windows and equipment.

Visiting Tourists - Videographer Neil Weisbrod and Sabvabaa's Owner



1519AB

EMERGENCY CABIN

Griffon
Hafslund



EM-31 Electromagnetic Ice Thickness
Measurement Probe with Acoustic
Altimeter - Measurement every 2 sec





Setting sail - Sabvabaa approaches the coastal freighter Norbjorn



Safely secured on the deck of the Norbjorn

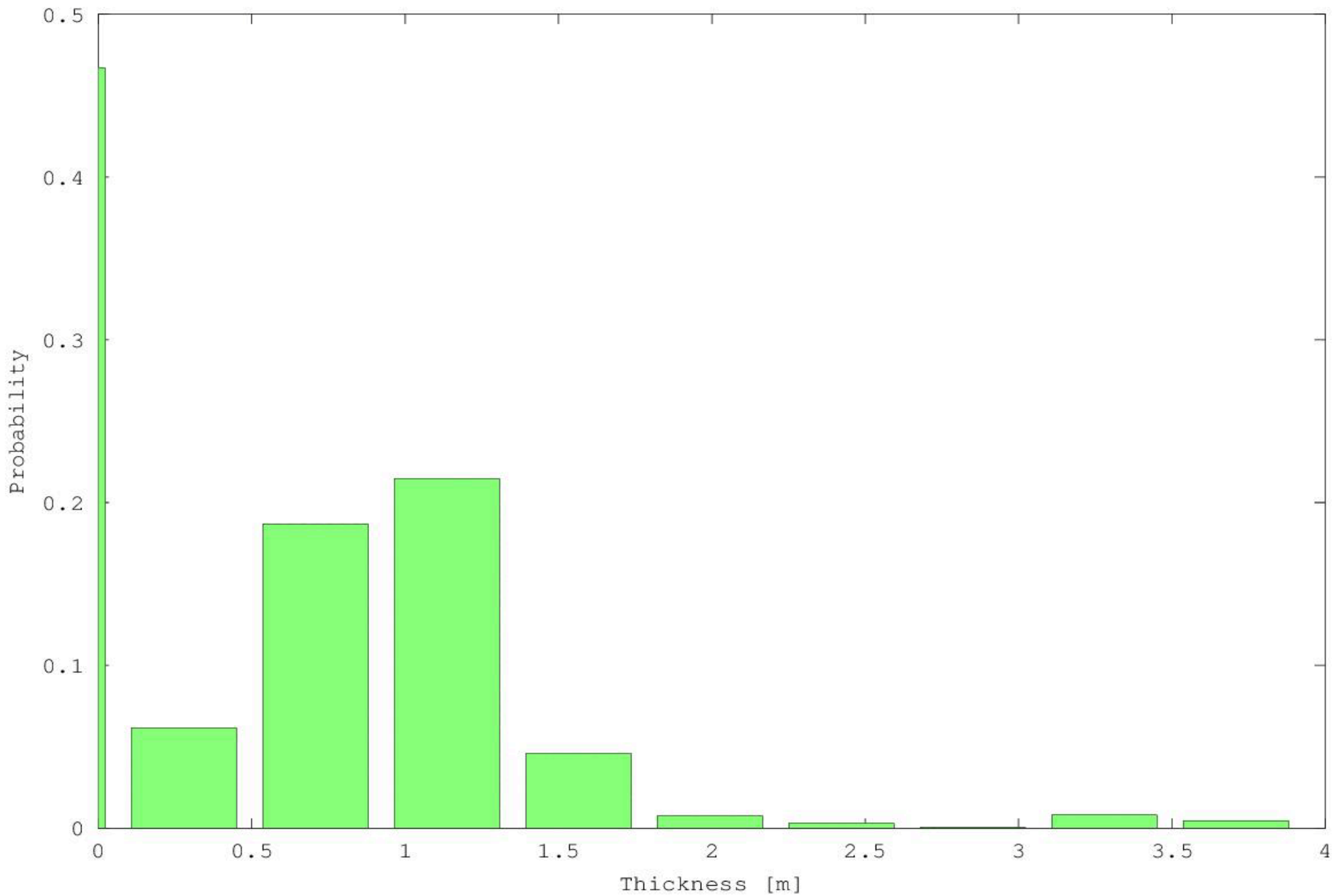


Offloaded at the ice edge by the Norbjorn, the Sabvabaa soon ran across and stopped to visit the Tromso University research vessel Lancer.

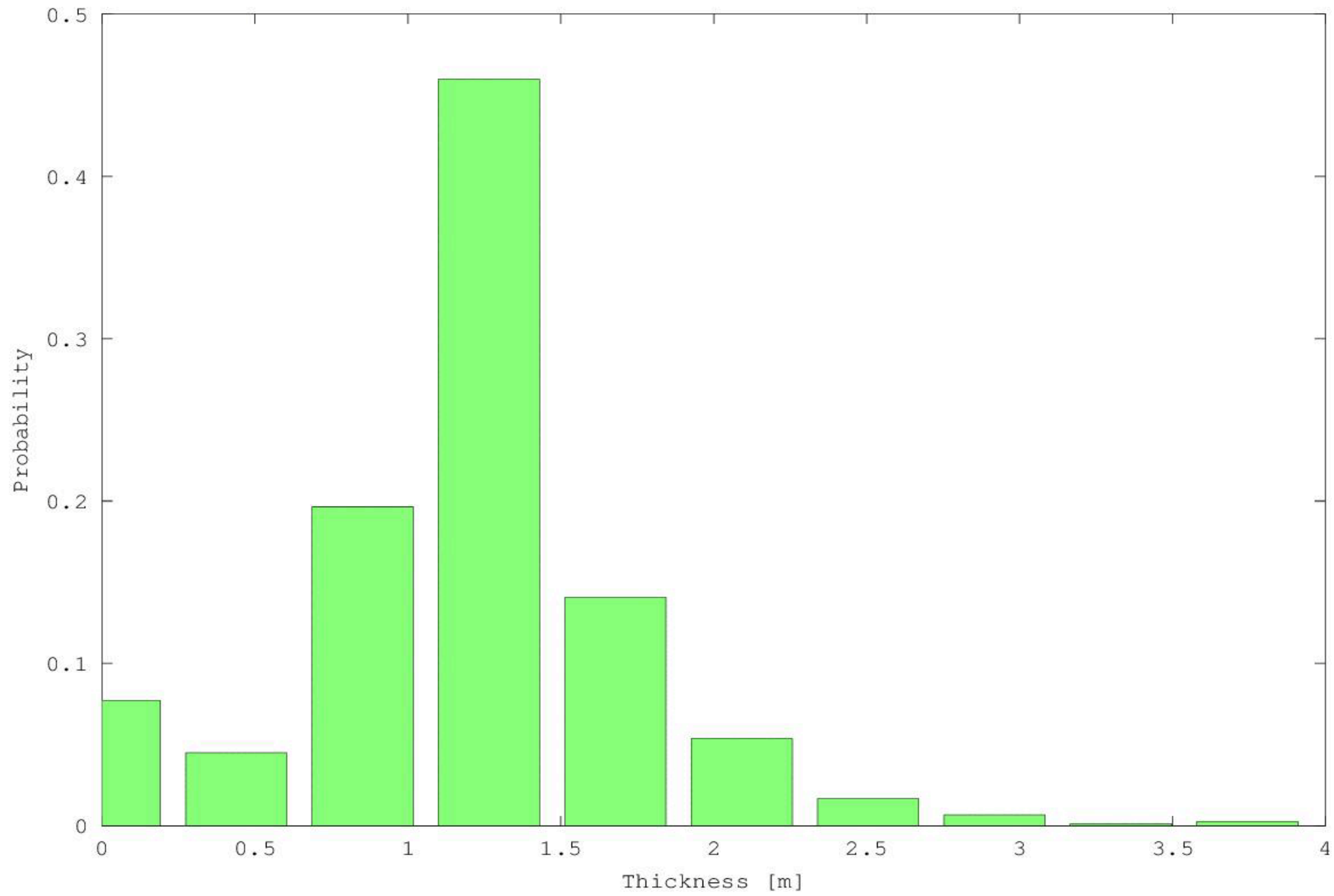


Gaute Hope working on the data processing - ice thickness on the way north

Ice thickness, distribution, 81.04N - 81.43N



Ice thickness, distribution, 82.95N - 83.1N





First (of four) polar bears encountered, This one apparently was quite aggressive.



Calibrating the EM31 thickness measurements by augering a hole and making a direct measurement - Note the near white-out conditions with no horizon or shadows.

Most of the way up to the ODEN rendezvous point, near 84.5N, the craft suffered a burnout of its main 130 amp alternator and the charge splitter feeding the two battery banks. Smaller 65 amp alternators were supplied in time to ODEN in Longyearbyen, but were too little to support the scientific electricity needs, now augmented by the wind-generator on the roof. Ola Johannessen at the Nansen Center used the good services of the 333rd Squadron of the Royal Norwegian Air Force in Andoya to deliver the larger alternators via their Orion-C 4 engine ASW aircraft as an exercise.





One of the Royal Norwegian Air Forces Orion-C aircraft at Andoya.



The Orion approaching for the airdrop

Courtesy Thomas Varming aboard ODEN



ODEN arrived 50 minutes later, with 2000 liters of fuel, showers and a festive meal. The hovercraft was quickly fixed and running.

Courtesy Thomas Funck aboard ODEN



Courtesy Bjorn aboard ODEN



Courtesy Bjorn aboard ODEN



Courtesy Lars & Brian aboard ODEN



The ODEN and Sabvabaa



Courtesy Thomas Funck aboard ODEN





Courtesy Bjorn, aboard ODEN

Plagued by white-out conditions and fog for 22-24 hours a day, as well as vast areas of rubble ice, the Sabvabaa was able to get up to 85N with vast expenditure of fuel. However it was evident that they could not reach the next rendezvous point 160 nm ahead, halfway to the Lomonosov Ridge. The decision was made to remain over the rift valley of the Gakkel Ridge, and to spend three weeks monitoring small earthquakes over a segment of the Gakkel Ridge and its upper flanks. Triangular hydrophone arrays were laid out - 3 to 5 km on a side, and some 300 small earthquakes recorded and located. One large earthquake was heard and felt. Periodically the arrays were recovered and reset as drift took the craft away from the rift valley.



Example of white-out concealing a mound of ice and snow. Yngve is standing behind it.



Contents of the aluminum truck



Example of one of the hydrophone stations, built in Bergen by Gaute Hope



At least once a day the poor visibility resulted in losing lift due to ground obstructions. The melt ponds were a great problem as their topography generally was more than 50 cm while the hover height is 60-73 cm. In addition the craft was sometimes up to 1300 kg over its 2200 kg payload.



Griffon
Hovercraft

DL1519AB R/H SABVABAA

The solution is to build a block wall so as to lift up and slide off, or to use our electrical winch pulling on a pipe put into a bored hole in the ice.





An extreme case requiring 15 hours of work, including use of a chain saw *under* the craft.

Maintenance: Tensioning the belt for the propulsion fan. Tools and spares of all kinds are carried.

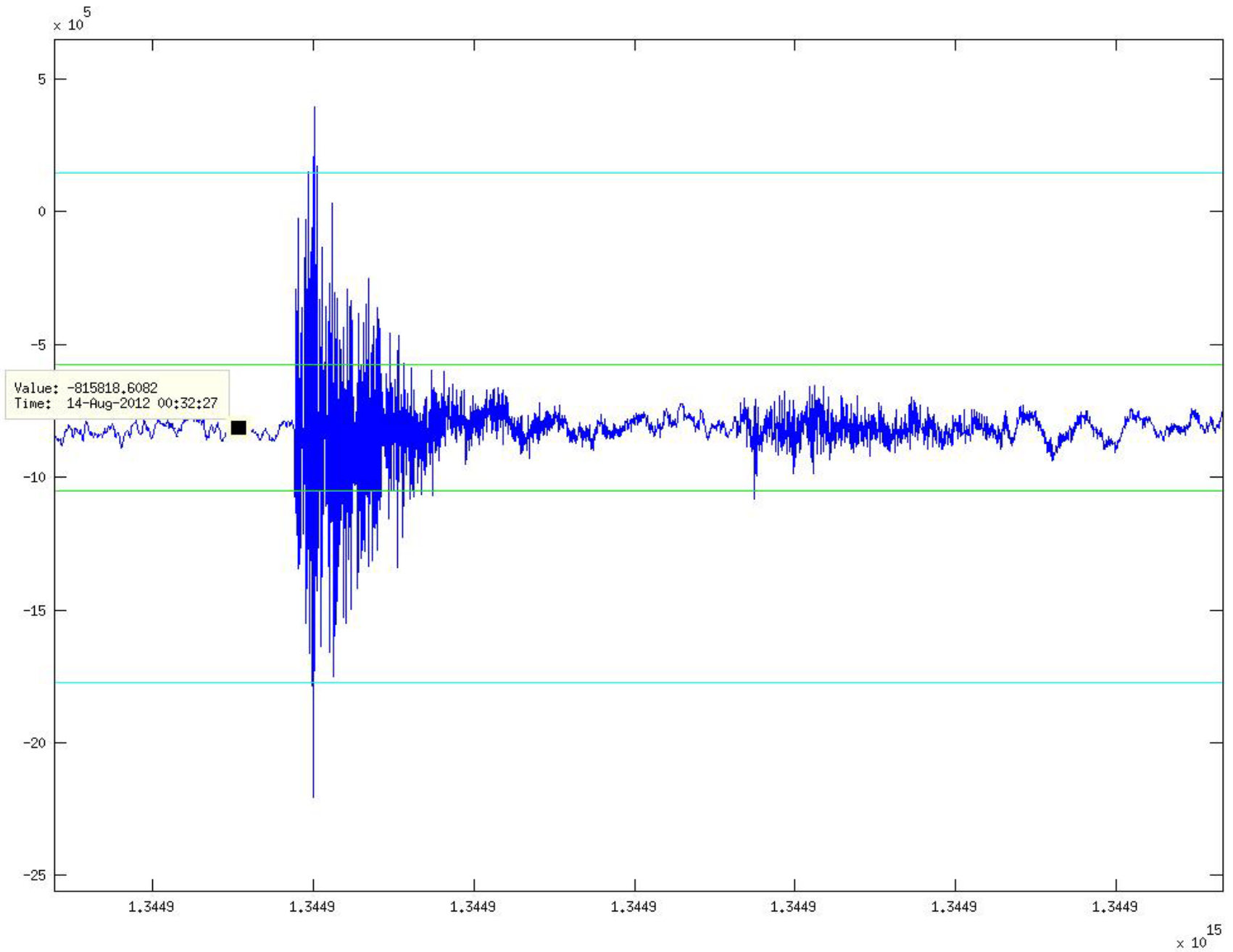


With time fuel was conserved to last until the next rendezvous with ODEN





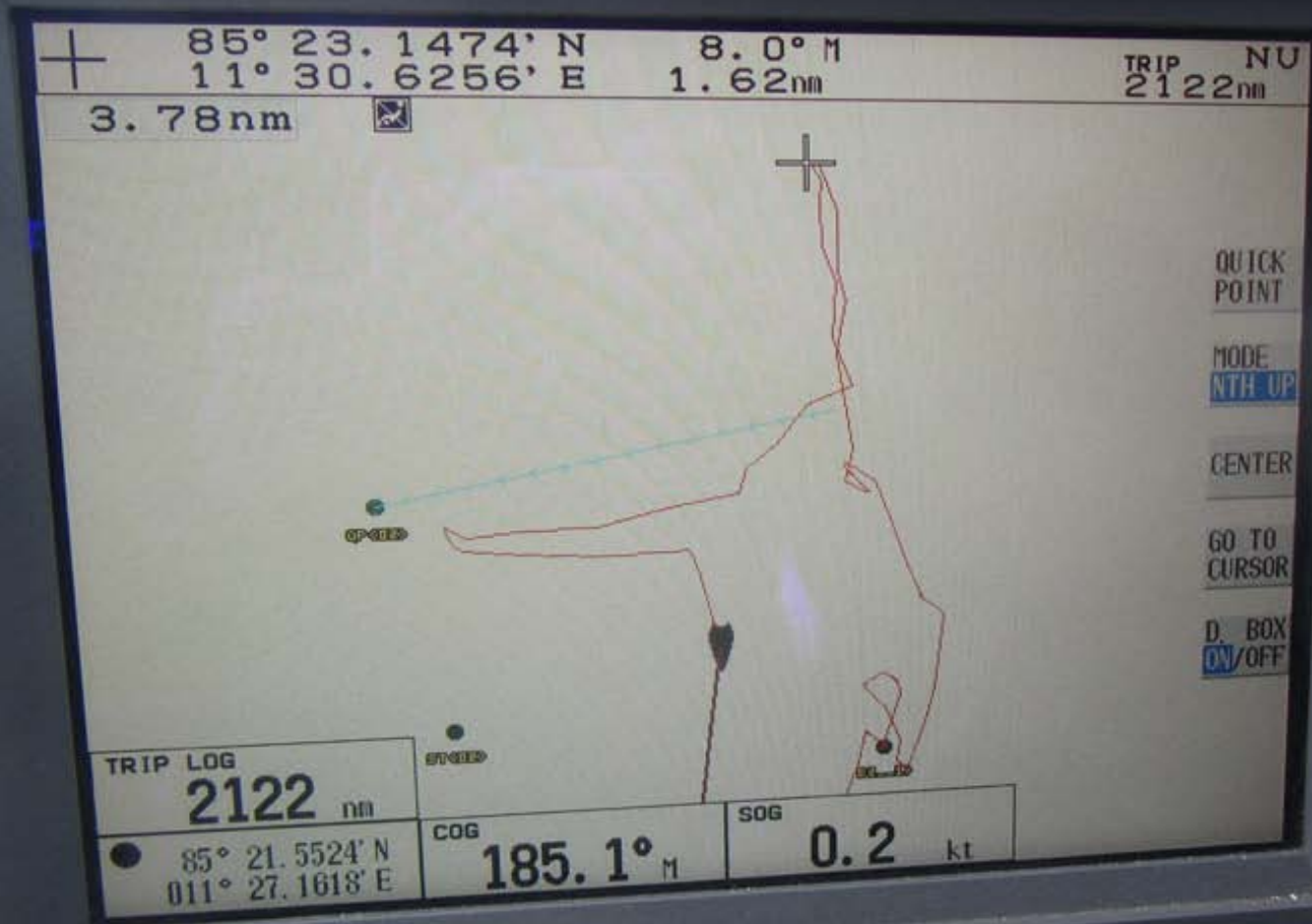
Fuel conservation - limited heating with the Refleks stove.



A repair of a small 8" tear in the thin aluminum hull.



FURUNO



DISP

SAVE MOB

ALARM CLEAR MENU

RANGE

ABC 1 DEF 2 GHI 3

JKL 4 MNO 5 PQR 6

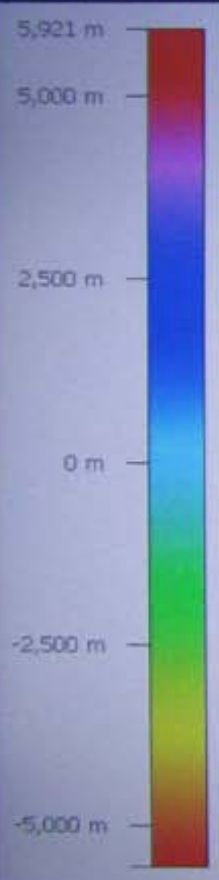
STU 7 VWX 8 YZA 9

EBL VRM # 0 GAIN

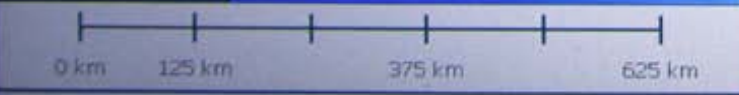
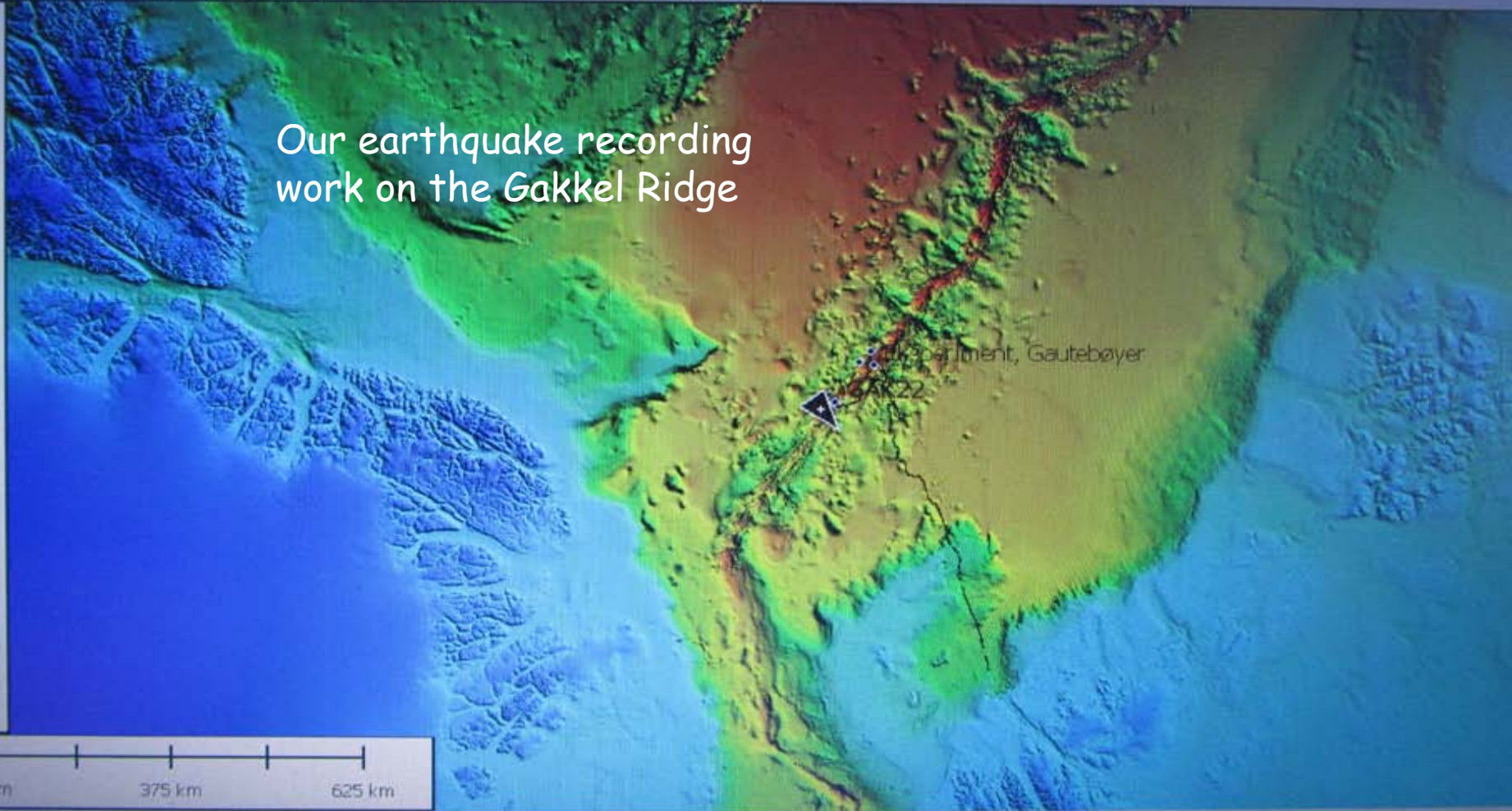
HIDE SHOW POWER BRILL

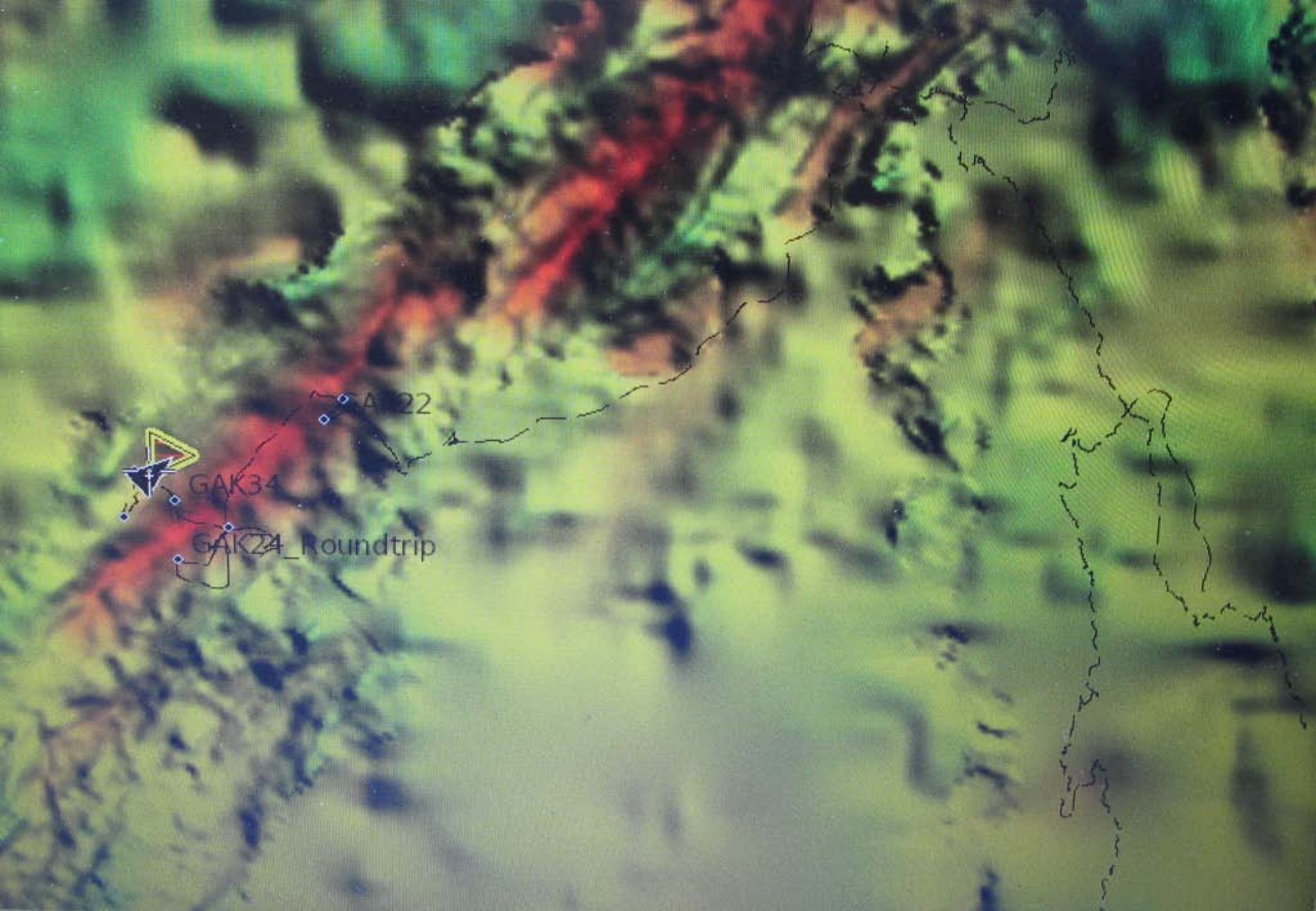
NAVnet vx2 C-MAP NT MAX

Thank God for GPS! We've applied for a farthest north record on a hovercraft from Guinness World Records



Our earthquake recording work on the Gakkel Ridge





GAK22

GAK34

GAK24_Roundtrip

Second rendezvous with ODEN.



Courtesy Martin Breum aboard ODEN



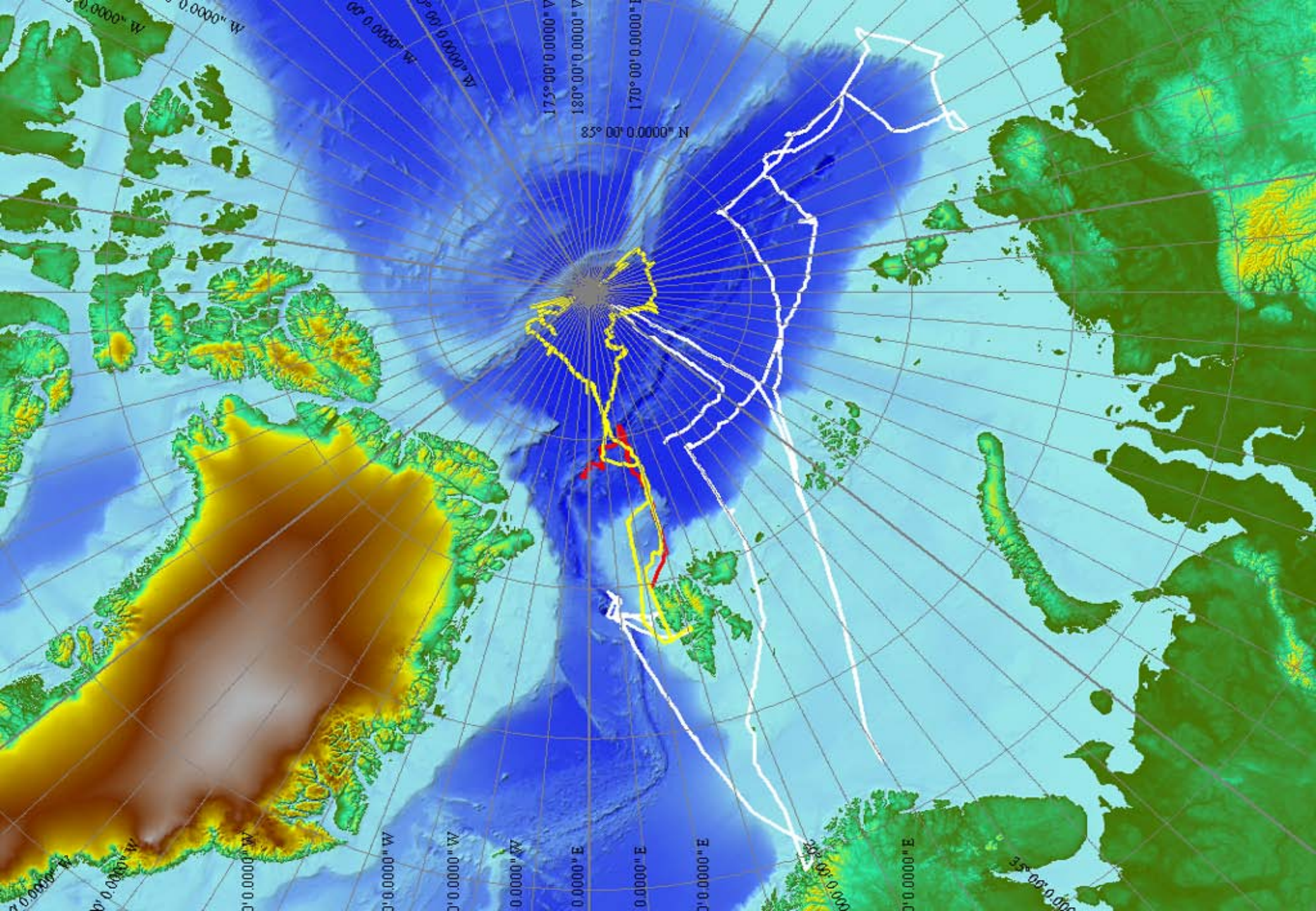
ODEN Chief Scientist Christian Marcussen approaches the craft
Courtesy Martin Breum photographer/journalist aboard ODEN

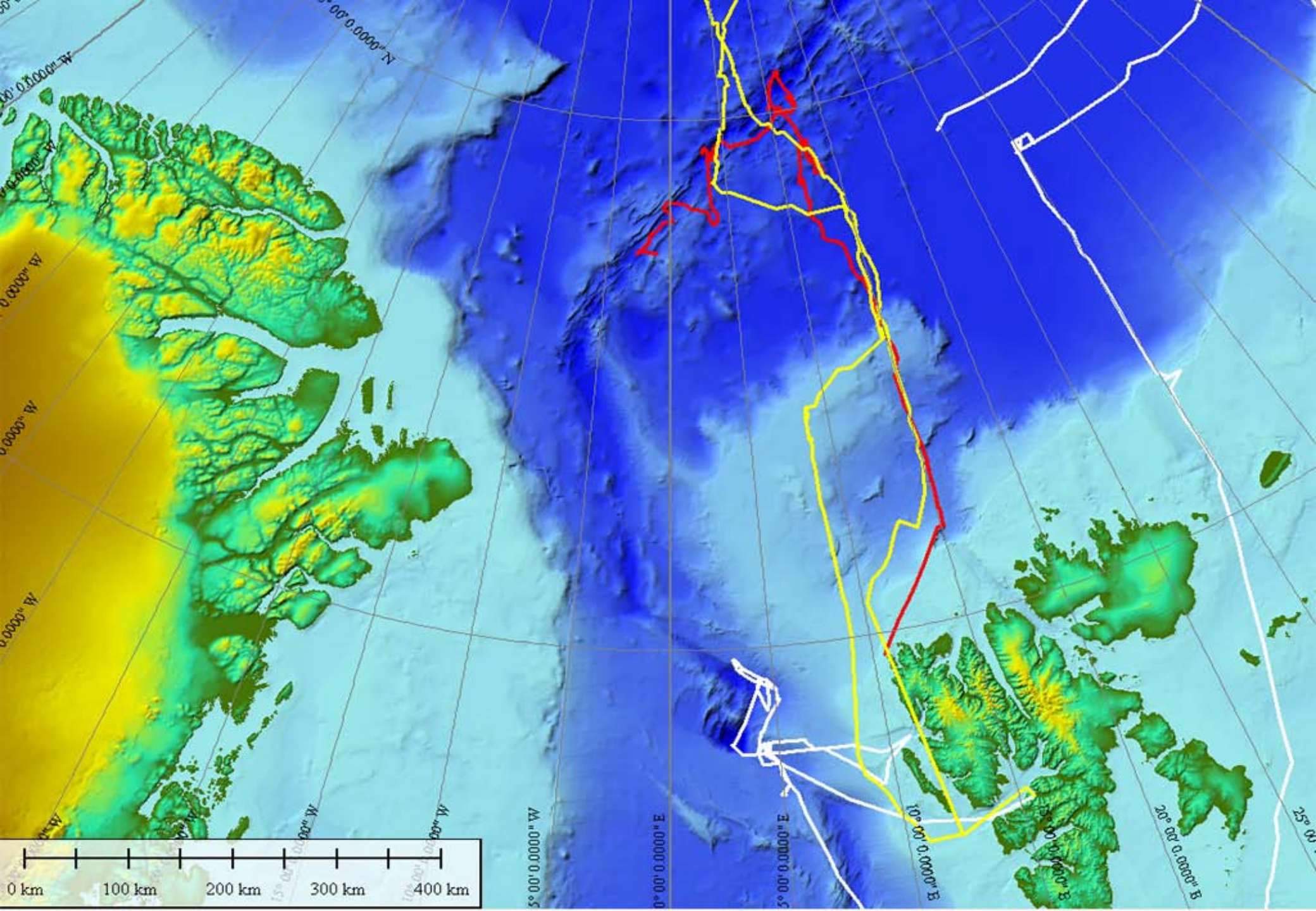


Courtesy Martin Breum
aboard ODEN



Courtesy Martin Breum aboard ODEN





Media Advisory: Arctic sea ice breaks lowest extent on record

The National Snow and Ice Data Center (NSIDC) is part of the Cooperative Institute for Research in Environmental Sciences at the University of Colorado Boulder. NSIDC scientists provide [Arctic Sea Ice News & Analysis](#) content, with partial support from NASA.

Arctic sea ice cover melted to its lowest extent in the satellite record yesterday, breaking the previous record low observed in 2007. Sea ice extent fell to 4.10 million square kilometers (1.58 million square miles) on August 26, 2012. This was 70,000 square kilometers (27,000 square miles) below the September 18, 2007 daily extent of 4.17 million square kilometers (1.61 million square miles).

NSIDC and NASA scientists will host a media teleconference today, August 27, at 1 p.m. MDT/3 p.m. EDT, to discuss this new record low Arctic sea ice extent.

NSIDC scientist Walt Meier said, "By itself it's just a number, and occasionally records are going to get set. But in the context of what's happened in the last several years and throughout the satellite record, it's an indication that the Arctic sea ice cover is fundamentally changing."

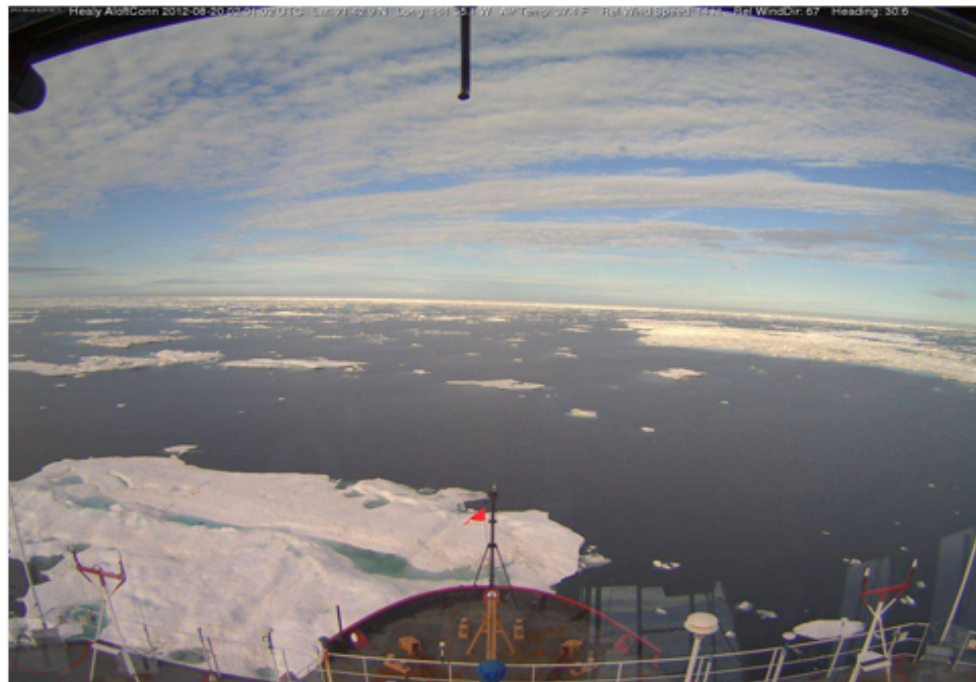
According to NSIDC Director Mark Serreze, "The previous record, set in 2007, occurred because of near perfect summer weather for melting ice.

Apart from one big storm in early August, weather patterns this year were unremarkable. The ice is so thin and weak now, it doesn't matter how the winds blow."

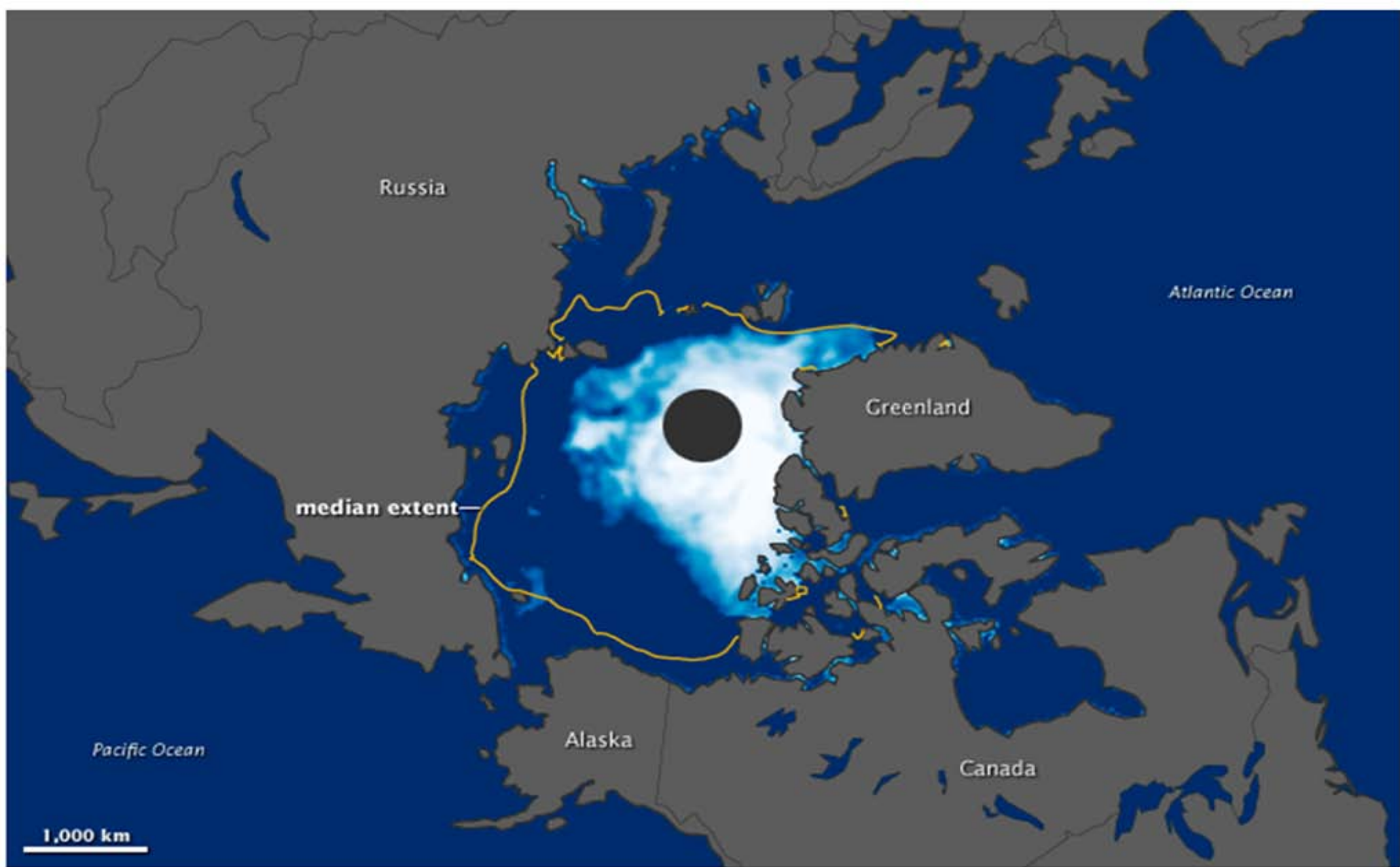
"The Arctic used to be dominated by multiyear ice, or ice that stayed around for several years," Meier said. "Now it's becoming more of a seasonal ice cover and large areas are now prone to melting out in summer."

With two to three weeks left in the melt season, NSIDC scientists anticipate that the minimum ice extent could fall even lower.

In 2007, Arctic sea ice extent reached an all-time low in the satellite record that began in 1979.



Scattered ice floes are seen from the bridge of the *USCGC Healy* on August 20, 2012 northwest of Barrow, Alaska. Arctic sea ice fell to its lowest daily extent in the satellite record on Sunday, August 26, 2012. —Credit: U.S. Coast Guard



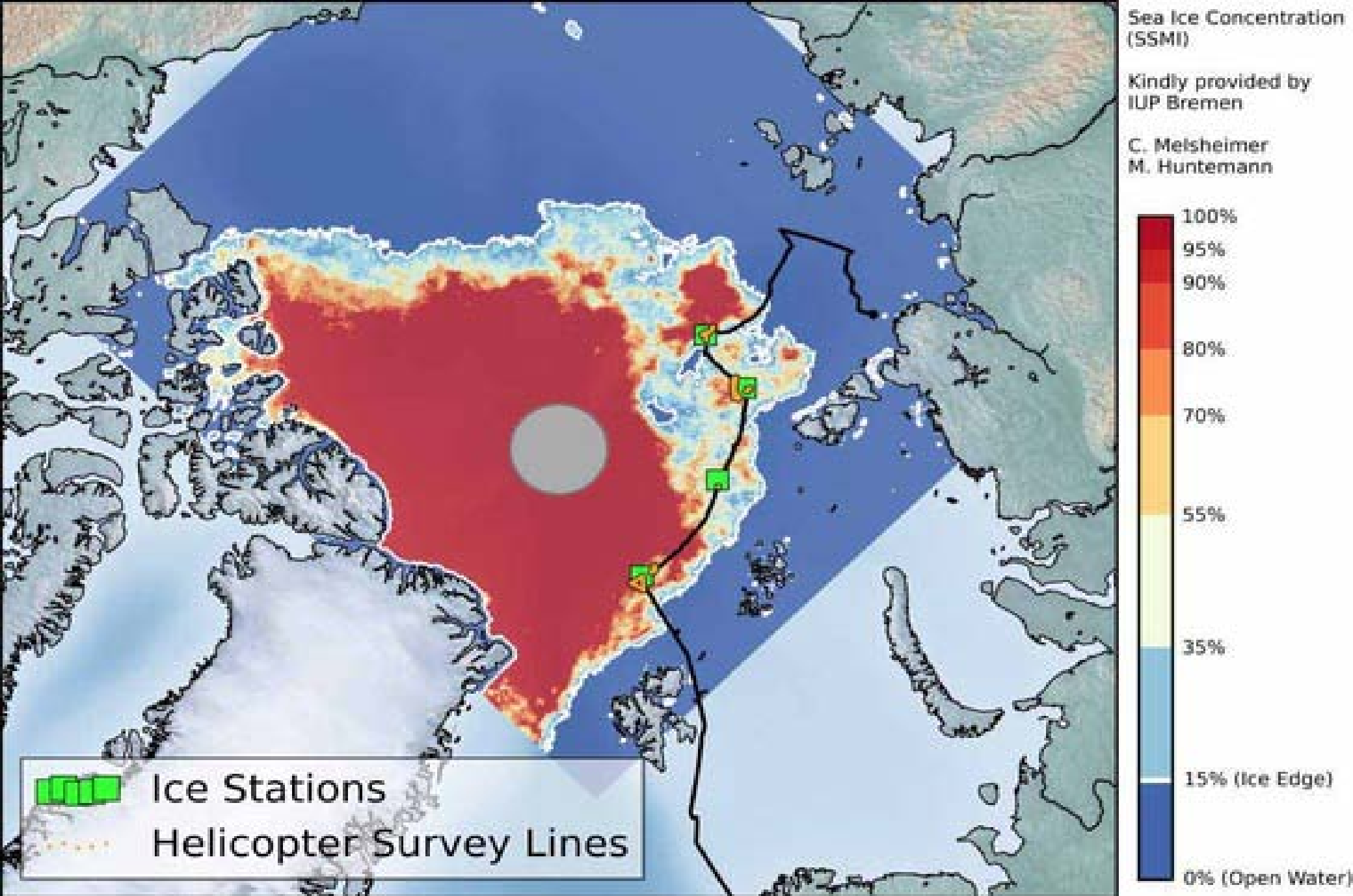
acquired August 26, 2012

Sea Ice Concentration (percent)





The impending return of SABVABAA courtesy of the AWI Icebreaker Polarstern, shown here in Loneyearbyen - July 2012





Pictures from AWI's Website on Polarstern's ARK-XXVII/3 Cruise















*Thank you for your
attention*



Gaute Hope 2011