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# Science Flight Report

## Operation IceBridge Arctic 2012



**Flight:** F16  
**Mission:** Sea Ice – MABEL Underflight

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### Flight Report Summary

<b>Aircraft</b>	<b>P-3B (N426NA)</b>
<b>Flight Number</b>	17
<b>Flight Request</b>	12P006
<b>Date</b>	Tuesday, April 10, 2012 (Z)
<b>Purpose of Flight</b>	Operation IceBridge Mission Sea Ice – MABEL Underflight
<b>Take off time</b>	12:20 Zulu from Kangerlussuaq (BGSF)
<b>Landing time</b>	19:24 Zulu at Kangerlussuaq (BGSF)
<b>Flight Hours</b>	9.3 hours
<b>Aircraft Status</b>	Airworthy.
<b>Sensor Status</b>	All installed sensors operational.
<b>Significant Issues</b>	None
<b>Accomplishments</b>	<ul style="list-style-type: none"><li>• Low-altitude survey (1,500 and 3,000 ft AGL) of a sea ice transect together with the ER-2 and MABEL flying at 60,000 ft.</li><li>• ATM, snow, Ku-band, accumulation radar, gravimeter, magnetometer, DMS and KT-19 skin temperature sensor were operated on the survey lines.</li><li>• The MCoRDS radar was in operation during the high altitude transit over land ice.</li><li>• Several pitch and roll maneuvers over sea ice for snow and Ku-band radar calibration.</li><li>• Ramp pass at Kangerlussuaq at 1,500 ft AGL.</li></ul>
<b>Geographic Keywords</b>	Greenland
<b>Satellite Tracks</b>	None
<b>Repeat Mission</b>	None

## Science Data Report Summary

Instrument	Instrument Operational			Data Volume	Instrument Issues
	Survey Area	Entire Flight	High-alt. Transit		
ATM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	51 GB	None
MCoRDS	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1.2 TB	N/A
Snow Radar	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	420 GB	None
Ku-band Radar	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	420 GB	None
Accumulation Radar	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	100 GB	None
DMS	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	73.4 GB	None
KT-19 Skin Temp.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	6.2 MB	None
Gravimeter	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1.5 GB	None
Magnetometer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	345 MB	None

### Mission Report (Michael Studinger, Mission Scientist)

This is a new mission, intended to sample sea ice cover along the east coast of Greenland in conjunction with MABEL, a photon counting LiDAR that is used for algorithm development for ICESat-2. The MABEL instrument is flown on an ER-2 out of Keflavik, Iceland. The geometry of this line was selected by Ron Kwok based on an analysis of sea ice cover during April from 2003 to 2011. We transit from Kangerlussuaq to the sea ice off the east coast of Greenland at high altitude, conduct an out-and-back survey with the northbound segment at low altitude and the altitude of the southbound segment to be selected based on MABEL beam configuration, and return over the ice cap at high altitude. The outbound survey was flown at 1500 ft AGL and the return line at 3000 ft AGL to get a wider swath to allow drift estimates. At 12:41 Z, 25 nautical miles before the southern end of the line at waypoint S1 we started collecting data. At 12:50 Z we reached S1. The ER-2 reached S1 at 12:58 Z. At 13:22 Z the ER-2 passed overhead of the P-3, unfortunately in cloudy conditions. We encountered a very strong headwind of 44 kts on the northbound segment that was not in the forecast. We had to shorten the return line and start climbing at 16:48 Z. We took advantage of having 3 pilots on board today, allowing us to fly missions longer than 8 hours and also were able to extend the operating hours of Kangerlussuaq airport.

### Individual instrument reports from experimenters on board the aircraft:

**ATM:** Both ATM systems worked well and collected good data along the entire line in cloud free conditions, except for a few patches of low clouds and ice fog near both ends of the line. ATM collected a total of 4.1 hours of science data with 95% coverage.

**MCoRDS:** The MCoRDS system was operated on the high altitude transit over the Greenland Ice Sheet.

**Snow and Ku-band radar:** The snow and Ku-band radars worked well.

**Accumulation radar:** Worked well.

**Gravimeter:** Worked well.

**Magnetometer:** Worked well and used the LDEO data logger today without problems

**DMS:** DMS worked well and collected data on the primary system only today. 9531 images.

**KT-19 skin temperature sensor:** System worked well.

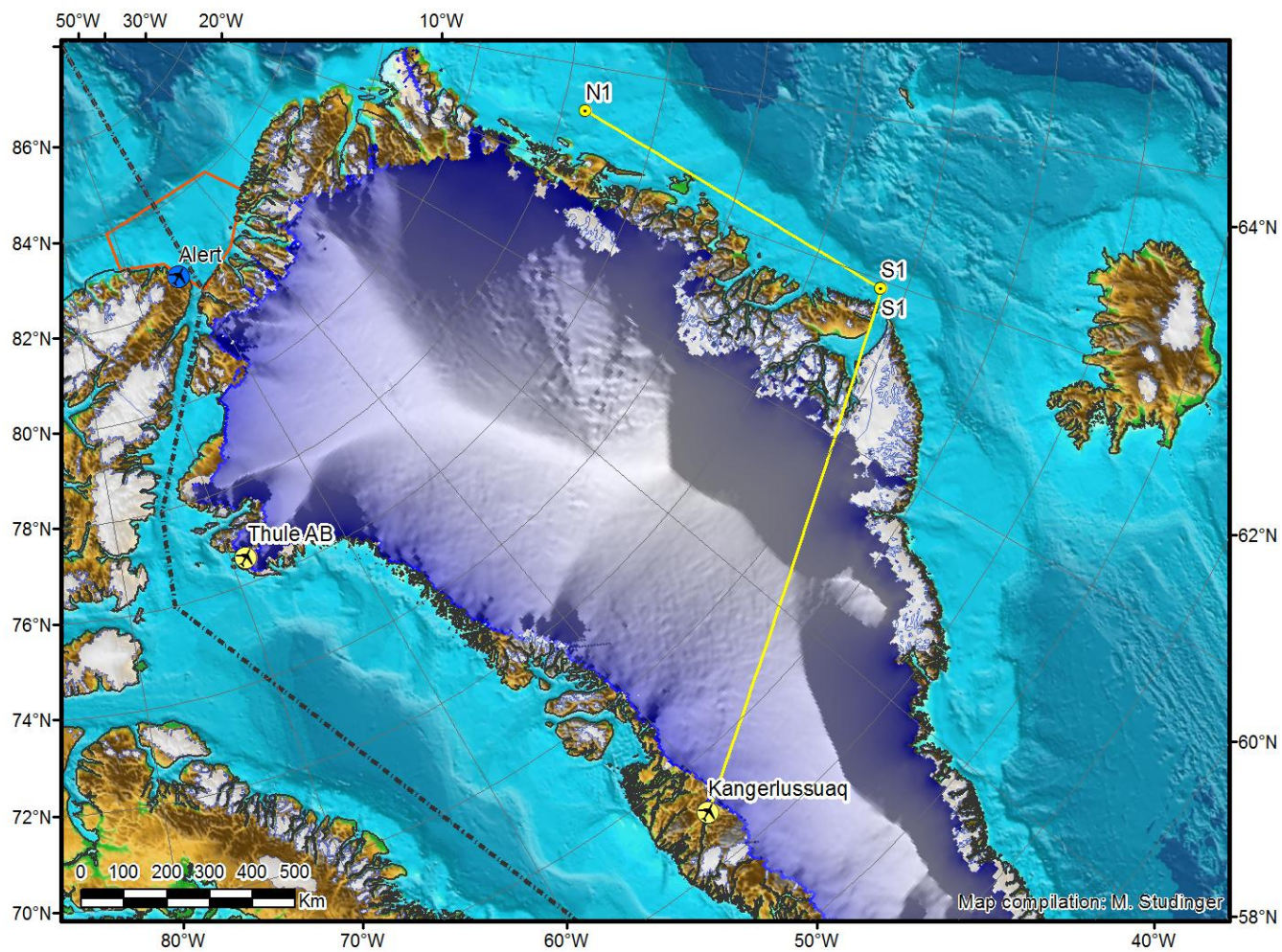


Figure 1: Today's sea ice mission plan (yellow). Red box outlines the temporary CryoSat-2 SAR mode mask north of Alert. We teamed up with NASA's ER-2 and MABEL operating out of Iceland.

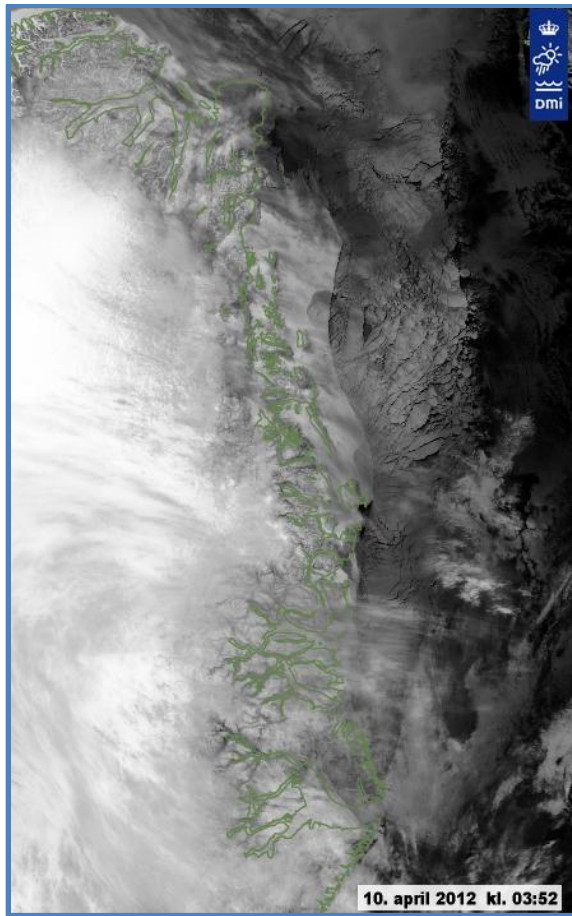


Figure 2: NOAA infrared satellite image from DMI showing cloud cover in the survey area.