

# Science Flight Report

## Operation IceBridge Arctic 2010



**Flight:** 14  
**Mission:** Sea Ice 07

### Flight Report Summary

<b>Aircraft</b>	<b>DC-8 (N817NA)</b>
<b>Flight Number</b>	100215
<b>Flight Request</b>	108013
<b>Date</b>	Tuesday, April 20, 2010 (Z), Day of Year 110
<b>Purpose of Flight</b>	Operation IceBridge Mission Sea Ice 07
<b>Take off time</b>	11:00:49 Zulu from Thule Air Base (BGTL)
<b>Landing time</b>	20:01:59 Zulu at Thule Air Base (BGTL)
<b>Flight Hours</b>	9.1
<b>Aircraft Status</b>	Airworthy. Maximum flight elevation is limited to 25,000 ft because of a leak in the cabin oxygen regulator. The limitation affects the high-altitude portion of today's flight for LVIS data collection.
<b>Sensor Status</b>	All installed sensors operational.
<b>Significant Issues</b>	None
<b>Accomplishments</b>	<ul style="list-style-type: none"> <li>• Comparison between ATM and LVIS instruments over sea ice and land ice at 25,000 ft and 1,500 ft AGL. First CryoSat-2 underflight over sea ice at 88°N at both 25,000 ft and 1,500 ft.</li> <li>• ATM, snow-radar, Ku-band radar, POS/AV, and DMS were operated on the survey lines. LVIS was operated on the high-altitude part and in dense clouds at low elevation.</li> <li>• Gravimeter was in operation throughout the entire flight.</li> <li>• MCoRDS was operated over the low-altitude land ice portion.</li> <li>• Completed all of the planned survey lines.</li> <li>• Conducted several pitch and roll maneuvers over sea ice for LVIS instrument calibration.</li> <li>• Conducted two passes over the runway at Thule Air Base: one at 10,000 ft for LVIS instrument calibration and one at 1,200 ft AGL for ATM instrument calibration.</li> </ul>
<b>Geographic Keywords</b>	Lincoln Sea, Arctic Ocean, Camp Century, Petermann Gletscher, Greenland, Thule
<b>ICESat Tracks</b>	Old 8-day ICESat track without number
<b>Repeat Mission</b>	Camp Century, Petermann Gletscher

## Science Data Report Summary

Instrument	Instrument Operational			Data Volume	Instrument Issues
	Survey Area	Entire Flight	High-alt. Transit		
<b>ATM + Cambot</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	81 GB	None
<b>MCoRDS</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1.5 TB	None
<b>Snow Radar</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	430 GB	None
<b>Ku-band Radar</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	430 GB	None
<b>LVIS</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	50 GB	None
<b>DMS</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	112 GB	Operational anomalies
<b>POS/AV (510 + 610)</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2 GB	None
<b>Gravimeter</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	80 MB	None
<b>DC-8 Onboard Data</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	20 MB	None

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

The goals of today's mission are a direct comparison of the ATM and LVIS instruments, both over land and sea ice and a CryoSat-2 underflight over sea ice in the Arctic Ocean at high and low elevation. The ice sheet segments include multiple terrain types to allow for inter-calibration between the ATM and LVIS instruments. We begin our flight at 25,000 ft along the Camp Century corridor, then turn north on an old ICESat line from the 8-day-orbit, repeat our Petermann Gletscher line and continue north of Alert to the begin of the CryoSat-2 line. We have seen significant cloud cover in the lower parts of Petermann Gletscher and on the transit to the CryoSat-2 line. The criteria for selecting the CryoSat-2 orbit were the anticipated weather pattern for today and our flight schedule to allow an underflight within two hours of the CryoSat-2 pass over the same line. The ESA control center had planned to put the SIRAL radar on CryoSat-2 into SAR mode at 13:30Z for 10 minutes. We had planned to meet up with CryoSat-2 on the line at 13:33 at 25,000 ft elevation but were delayed by a 70 kts headwind and started surveying on the CryoSat-2 orbit at 13:47:35 Z, just 14 minutes after the satellite had passed overhead. We finished the line at 14:34:43 Z and descended to 1500 ft for the low-altitude pass of the CryoSat-2 orbit that we started at 14:42:47 Z. We left the orbit at 15:58:45 Z for transit. We return on the exact same route at 1,500 ft. We were able to underfly the clouds at low elevation and collect data along the entire return leg.

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

**ATM:** Both ATM systems worked well. Occasional changes in flight elevation made it possible to obtain 100% laser returns of ATM data.

**MCoRDS:** Was operated on the low-altitude land ice portion and collected 1.5 TB data.

**Snow and Ku-band radar:** The systems worked well and collected 430 GB data each.

**Gravimeter:** System worked normally. No problems.

**DMS:** DMS had numerous operational anomalies. Collected 98% of the data.

**LVIS:** LVIS worked well with 100 % returns over CryoSat-2 line.

**POS/AV:** Systems worked well. No issues.

**DC-8 on board data:** System worked well.

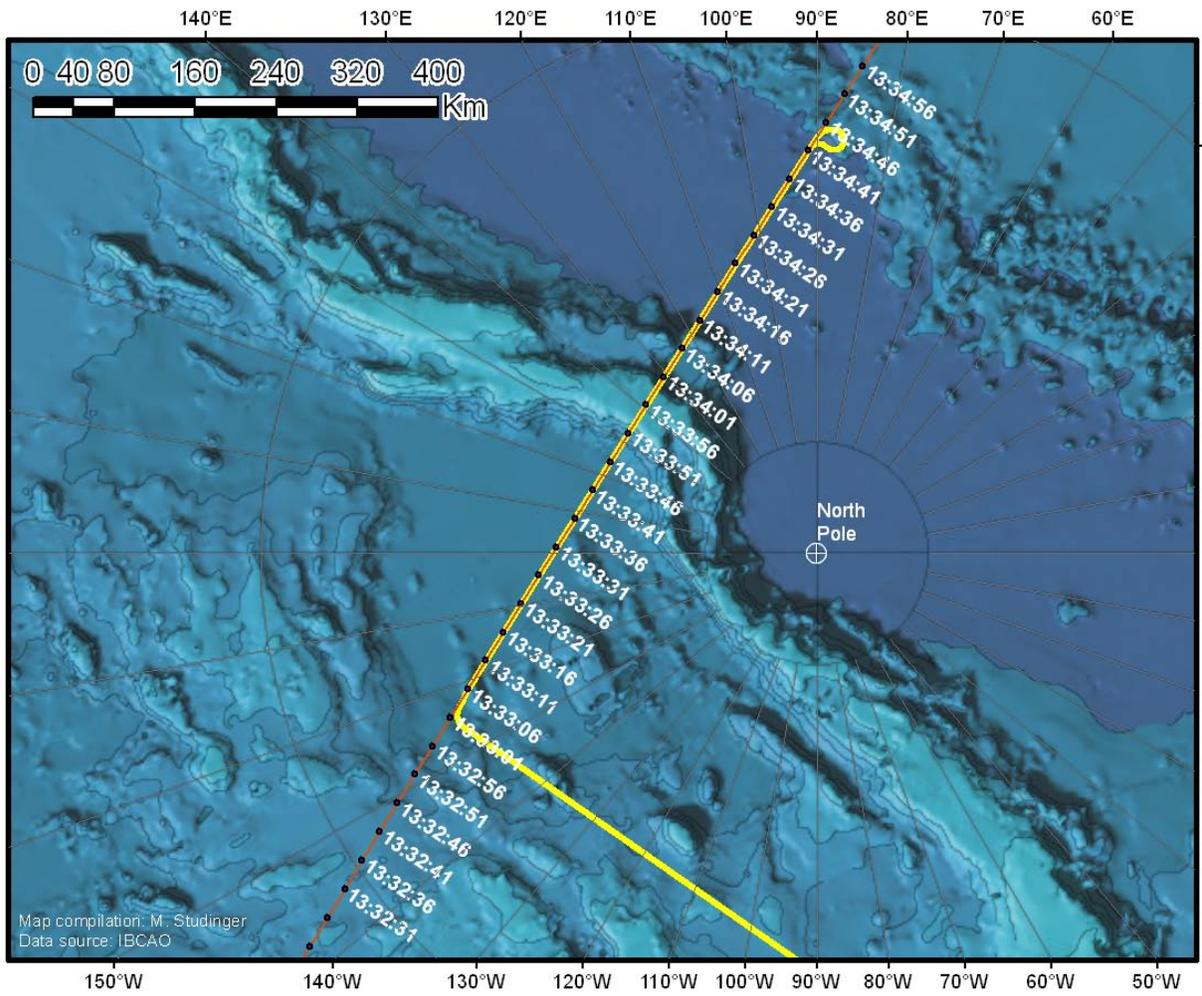


Figure 1: Revised Sea Ice 07 mission. Flight trajectory from F14 is in yellow. CryoSat-2 orbit is in orange with times of the satellite over pass indicated.

# Sea Ice 07 for 20 April 2010

8.5 hours at 440/250 knots groundspeed

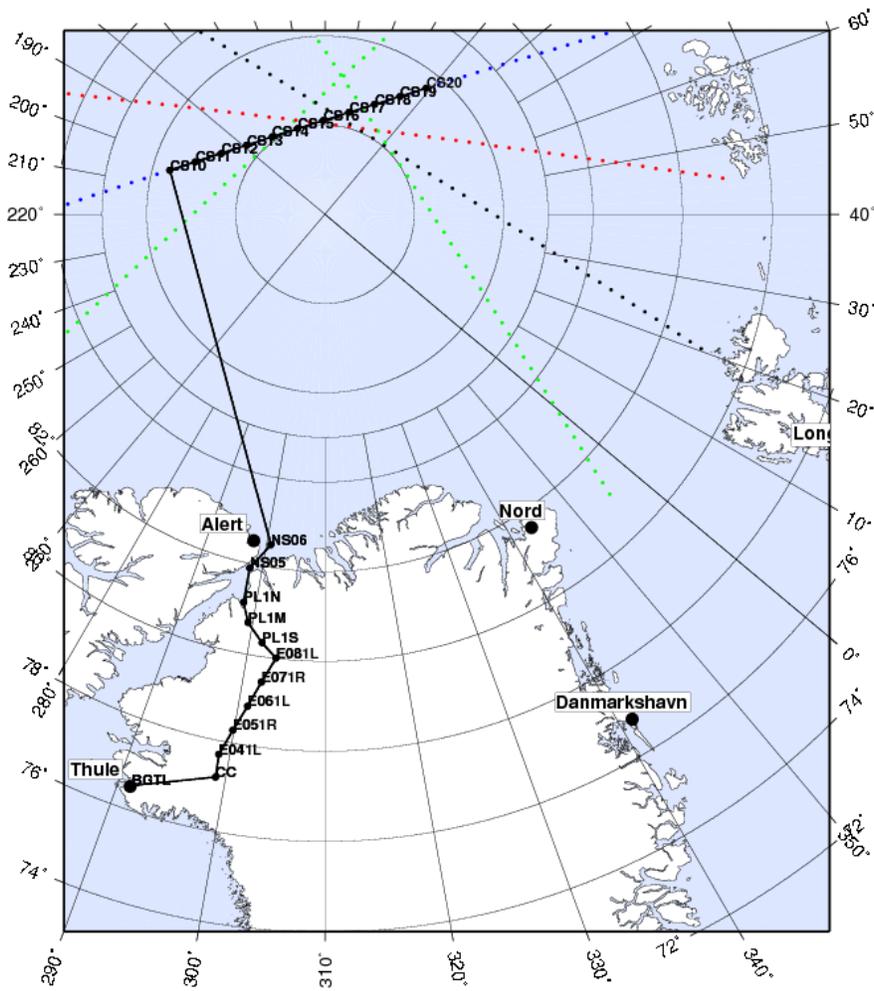


Figure 2: Waypoints and survey area of Flight 14 from John Sonntag.