Preliminary Science Flight Report
Operation IceBridge Arctic 2011

Flight: **F09**
Mission: **CryoSat Land Ice**

Flight Report Summary

Aircraft	**P-3B (N426NA)**
Flight Number	009
Flight Request	11P006
Date	Tuesday, March 29, 2011 (Z)
Purpose of Flight	Mission CryoSat Land Ice
Take off time	11:01 Zulu from Thule Air Base (BGTL)
Landing time	18:48 Zulu at Thule Air Base (BGTL)
Flight Hours	TBD
Aircraft Status	Airworthy.
Sensor Status	All installed sensors operational.
Significant Issues	None
Accomplishments	• Low-altitude survey (1,500 ft AGL) of an ICESat ground track and a near-contemporaneous underpass of CryoSat-2 along orbit 5138. • Pass over NEEM camp and ice core drill site. • Flew two glaciers from the NW Glacier mission plan that are just south of Thule Air Base. • ATM, MCoRDS snow and Ku-band radars, accumulation radar, gravimeter, magnetometer, POS/AV, and DMS were operated on the survey lines. • Conducted one ramp pass at Thule Air Base for ATM instrument calibration at 1,500 ft AGL. Pitch maneuvers for snow and Ku-band radar over North Star Bay.
Geographic Keywords	Greenland Ice Sheet, NEEM
ICESat/CryoSat Track	ICESat track 0205 and Cryosat-2 track 5138.
Repeat Mission	No

Science Data Report Summary

Instrument	Instrument Operational			Data Volume	Instrument Issues
	Survey Area	Entire Flight	High-alt. Transit		
ATM	☑	☒	☒	68 GB	None
MCoRDS	☒	☒	☒	2 TB	None
Snow Radar	☑	☒	☒	360 GB	None
Ku-band Radar	☑	☒	☒	350 GB	None
Accumulation Radar	☒	☒	☒	264 GB	None
DMS	☑	☒	☒	190 GB	None
POS/AV	☑	☑	☑	2 GB	None
Gravimeter	☑	☑	☑	80 MB	None
Magnetometer	☑	☑	☑	TBD	None, but issues wit HF

Mission Report (Michael Studinger, Mission Scientist)

Today's mission is new design which occupies a CryoSat-2 ground track over northern Greenland, an ICESat track, and three north Greenland master grid lines connecting the ice sheet ridgeline (and the Bob Hawley traverse route) with the northwest coast. We choose this area for the CryoSat track because the ground track is approximately orthogonal to the contour lines of the ice sheet (Fig. 1), making cross-track placement of the CryoSat footprint more likely to fall at an easily predictable place – nadir. It also covers the different mode masks of Cryosat-2 and the different regimes and slopes on the ice sheet from the coast into the interior. The exact CryoSat pass over this ground track was yesterday, March 28, 2011 at 14:48 Z and near-contemporaneous with our flight. We took advantage of the rare combination of a CryoSat orbit oriented perpendicular to the slope of the ice surface and a very large cloud free area over NW Greenland (Fig. 2). In the south west we encountered some mid-level clouds that we expected from a system that was pushing in from the south over Baffin Bay, but the clouds did not pose any problems for aircraft of instrument as we had expected. At 11:15 Z we started at waypoint 020501 on the ICESat ground track which we finished at 12:38 Z. At 14:16 Z we reached the end of the CryoSat line. At 16:54 Z we continued after E150 to get a cross-over data point with the CryoSat line and to get an estimate of the cross slope. At 17:22 Z we passed over NEEM. We had clear conditions all day and only lost some data in turns over Baffin Bay due to fog. We added two glaciers from the NW Glacier mission close to Thule Air base before landing.

Individual instrument reports from experimenters on board the aircraft:

ATM: Both systems worked well. Minor data loss in SW over Baffin Bay coastal areas due to clouds.

MCoRDS: The MCoRDS system worked well.

Snow and Ku-band radar: The snow and Ku-band radars collected 100% data along the line.

Accumulation radar: worked well.

Gravimeter: Worked well. No issues.

Magnetometer: worked well.

DMS: worked very well.

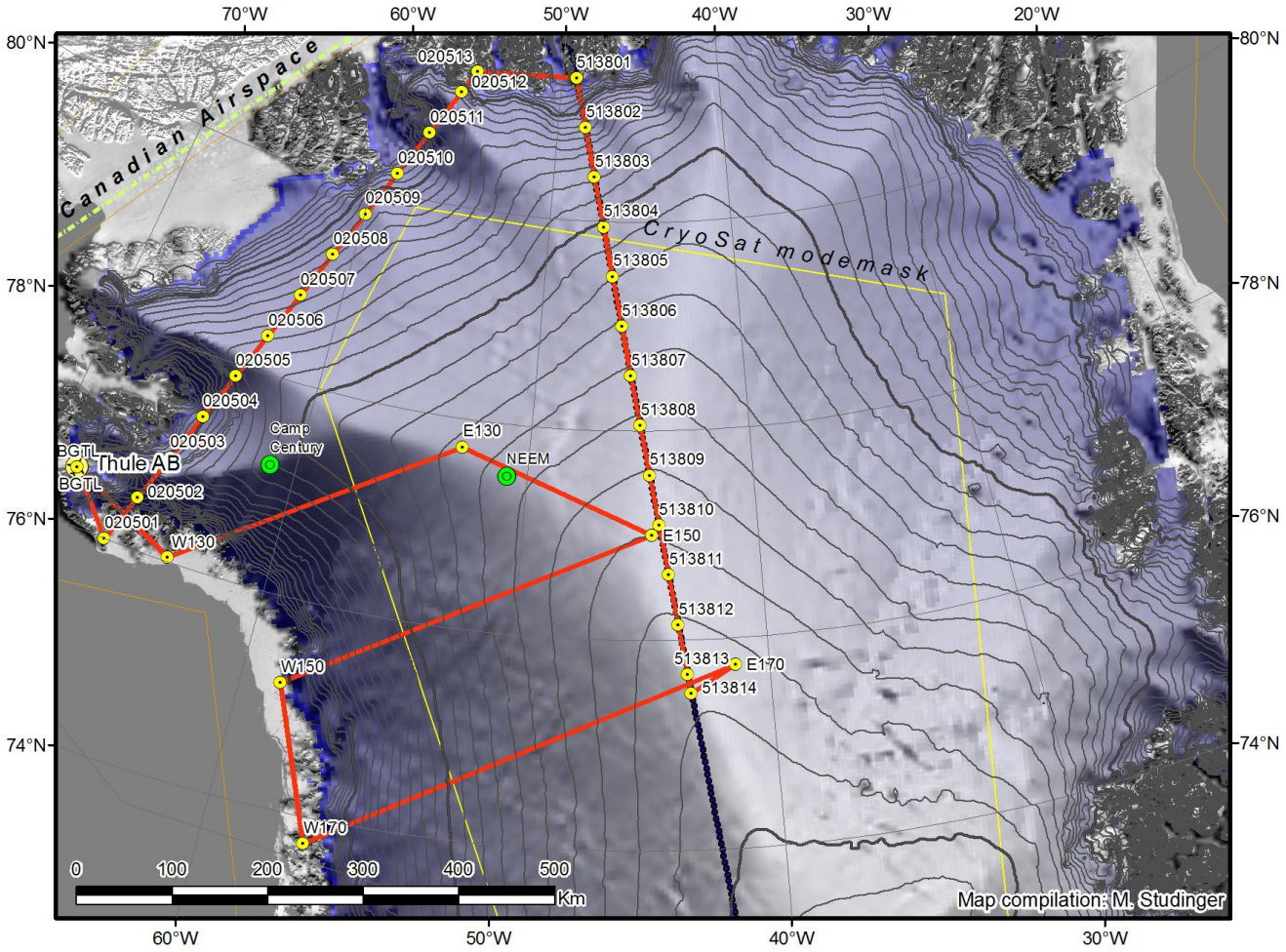

Figure 1: Mission plan for today's near-contemporaneous underpass of CryoSat-2 along orbit 5138.

Figure 2: Photo of NEEM camp and ice core drill site by Jim Yungel, ATM team.

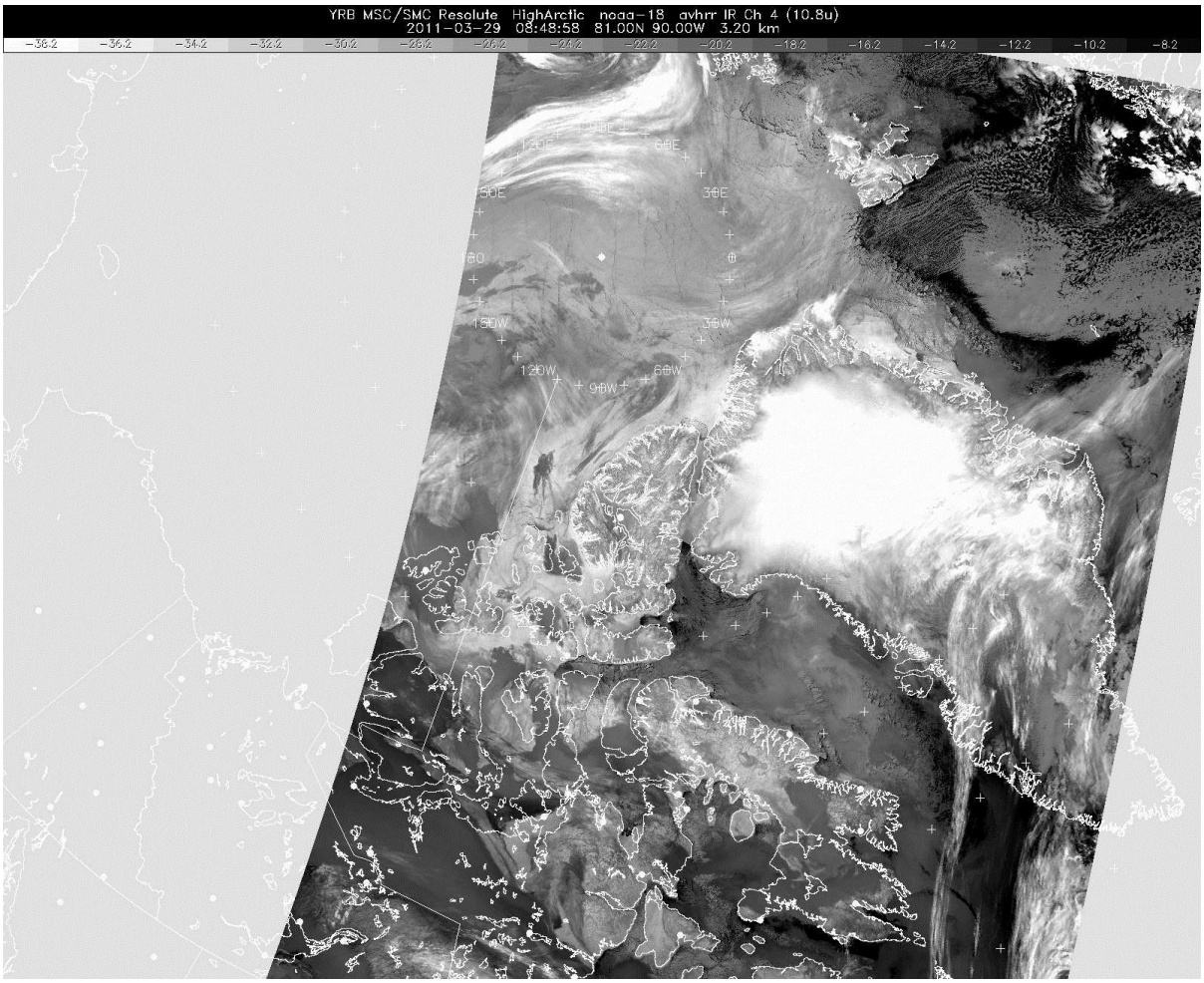

Figure 3: IR image downloaded shortly before takeoff showing a large area of NW Greenland cloud free.