

Preliminary Science Flight Report

Operation IceBridge Arctic 2011



Flight: F02
Mission: Sea Ice CryoSat-2 Underflight

Flight Report Summary

Aircraft	P-3B (N426NA)
Flight Number	TBD
Flight Request	11P006
Date	Thursday, March 17, 2011 (Z)
Purpose of Flight	Mission Sea Ice CryoSat-2 Underflight
Take off time	11:20 Zulu from Thule Air Base (BGTL)
Landing time	18:34 Zulu at Thule Air Base (BGTL)
Flight Hours	TBD
Aircraft Status	Airworthy.
Sensor Status	All installed sensors operational.
Significant Issues	None
Accomplishments	<ul style="list-style-type: none"> • Low-altitude survey (1,500 ft AGL) of a sea ice transect along CryoSat-2 ground track (ascending orbit 4979). Completed entire mission as planned in marginal conditions. • ATM, snow and Ku-band radars, accumulation radar, gravimeter, magnetometer, POS/AV, and DMS were operated on the survey lines. • MCoRDS was not in operation on this flight due to the sea ice mission. Instrument team used time on the aircraft during the flight to work on the system and collect test data. • Conducted one ramp pass at Thule Air Base for ATM instrument calibration at 1,000 ft AGL.
Geographic Keywords	Arctic Ocean, Lincoln Sea
ICESat/CryoSat Track	CryoSat-2 ascending orbit 4979
Repeat Mission	No

Science Data Report Summary

Instrument	Instrument Operational			Data Volume	Instrument Issues
	Survey Area	Entire Flight	High-alt. Transit		
ATM	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	36 GB	None
MCoRDS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	N/A	None
Snow Radar	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	220 GB	None
Ku-band Radar	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	220 GB	None
Accumulation Radar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	115 GB	None
DMS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	17 GB	None
POS/AV	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2 GB	None
Gravimeter	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	80 MB	None
Magnetometer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	TBD	None, but issues with HF

Mission Report (Michael Studinger, Mission Scientist)

Today's mission is intended to sample sea ice along an CryoSat-2 ground track with the spacecraft flying overhead. The CryoSat track will be flown out and back at 1500 ft AGL to enable estimation of ice drift. The weather forecast from last night and this morning indicated that the CryoSat-2 mission had the chance with the highest percentage of cloud free conditions. All other high-priority missions showed substantial cloud cover that would have resulted in substantial loss of laser altimeter data. The conditions were marginal along the entire line, but the large number of operational constraints that has been imposed on us this year leaves us no choice other than to collect data in these conditions.

We had a short delay taking off this morning caused by a failure of a board inside the cappuccino computer that talks to the LTN100 INS of the ATM laser. The board was quickly replaced and we were able to take off at 11:20 Z allowing us to complete the entire mission as planned. The issues of coupling the autopilot to the ATM navigation system have again been present most of the day and the pilots often hand-flew the aircraft. At around 12:38Z the aircraft lost all radio communications making a position report via Iridium phone necessary. At the same time the magnetometer showed extreme variations indicating strong solar activity that likely has impacted the radio communications as well. Experimenters will need to keep an eye on a potential impact on GPS data quality during the post-mission processing.

At 13:52 Z we reached the start of the survey line at waypoint 497901 but could not descent below 10,000 ft because of dense cloud cover and terrain. At around 13:00 Z we were far enough away from the terrain to descent into the clouds and the high power, narrow swath ATM laser started to get occasional surface reflections from 1700 ft AGL. Conditions improved as expected and at 13:30 Z we had good visibility near waypoint 497906 and calm conditions. At 15:08 Z we reached the end of the survey line near the border of the Russian airspace and turned around and began our second pass of the survey line in reverse direction at 15:15 Z at waypoint 497919. At 15:54:41 Z the P-3B and CryoSat-2 rendezvoused near waypoint 497912 along CryoSat's ascending orbit 4979. Both ATM lasers recorded good data, as well as the radars and DMS. At 16:55 Z, between waypoint 497903 and 497902, the conditions deteriorated again to the point that both ATM systems lost the surface and given the proximity to terrain we decided to abort the line and climb up to cruising elevation. When we reached 10,000 ft we came out of the clouds and into sunshine.

Today's flight was a successful mission that accomplished data collection along 95% of the planned survey line.

Individual instrument reports from experimenters on board the aircraft:

ATM: The ATM systems worked well and collected good data. Some of the clouds at the beginning and end of the line were too dense to be penetrated by the laser.

MCoRDS: The MCoRDS system was not operated on this flight due to the sea ice mission, but the instrument team used the flight for testing, configuring and calibrating the system.

Snow and Ku-band radar: The snow and Ku-band radars collected 100% data along the low altitude segment of the survey line. Both systems collected 220 GB each.

Accumulation radar: worked well and collected 115 GB of data.

Gravimeter: Worked well.

Magnetometer: worked well, but was impacted by occasional HF radio transmissions and possibly vibrating HF antennas.

DMS: DMS worked well and collected 2781 images.

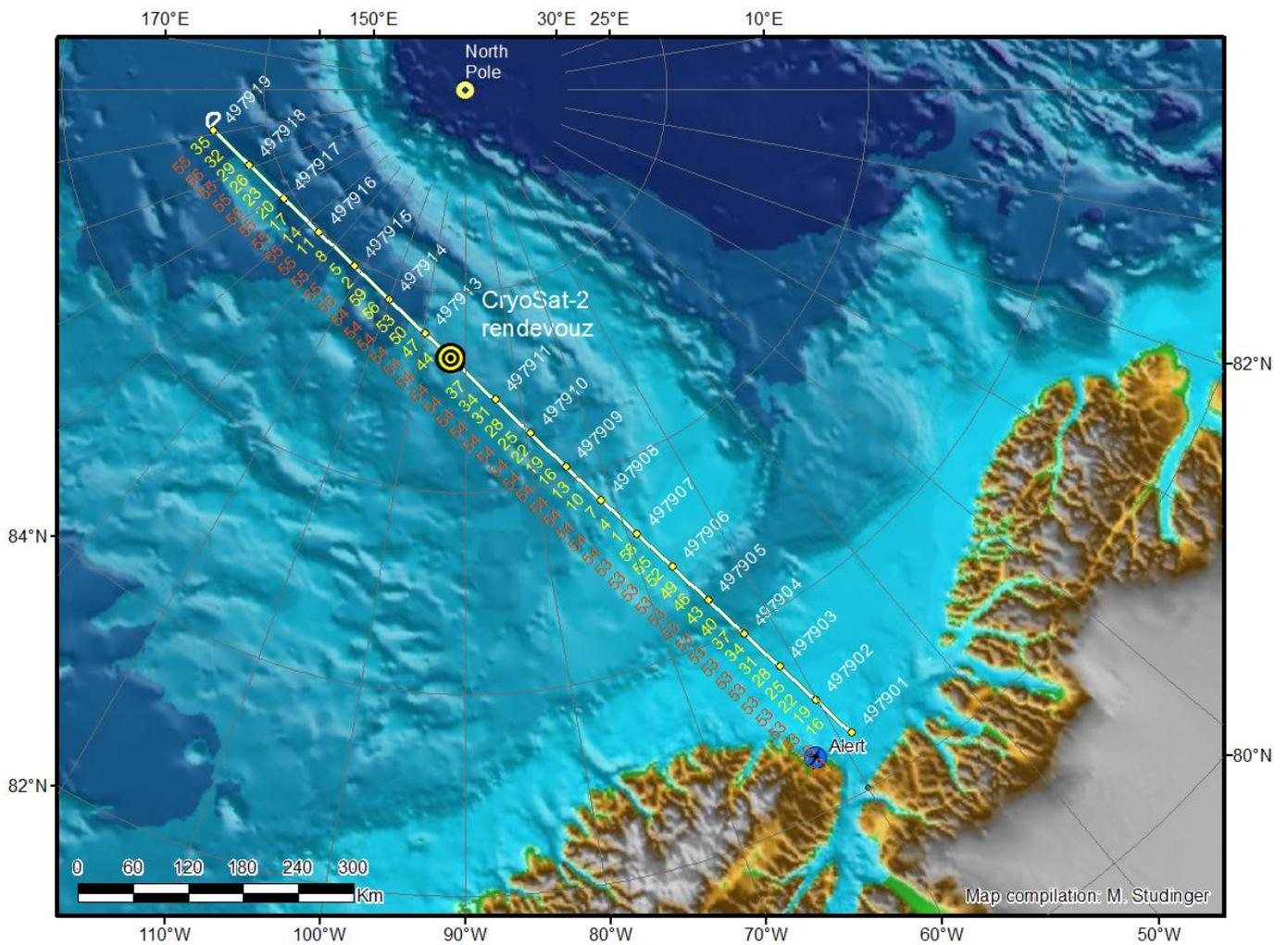


Figure 1: Sea ice including CryoSat-2 underflight. The yellow circles and white numbers indicate the waypoints along the survey line. The red numbers are minutes of the 15th hour (in Zulu) and yellow numbers are seconds of the CryoSat-2 ascending orbit 4979.

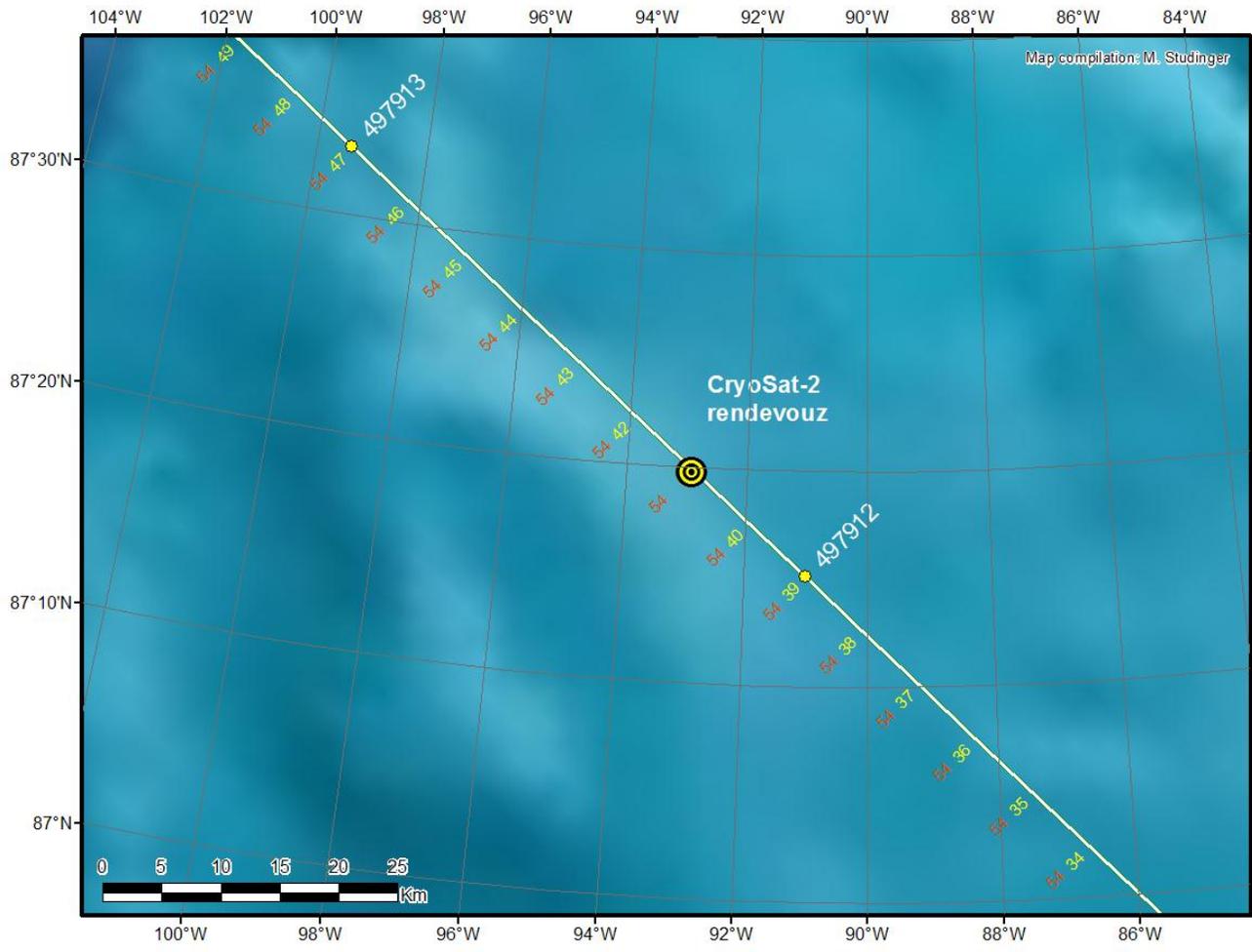


Figure 2: 15:54:41 Z time of P-3/CryoSat-2 rendezvous near waypoint 497912 on CryoSat-2 ascending orbit 4979.