

Science Flight Report

Operation IceBridge Arctic 2012



Flight: F14
Mission: Fram Gateway (modified) & ESA CryoVEx

Flight Report Summary

Aircraft	P-3B (N426NA)
Flight Number	15
Flight Request	12P006
Date	Monday, April 2, 2012 (Z)
Purpose of Flight	Operation IceBridge Mission Fram Gateway (modified) & ESA CryoVEx
Take off time	11:00 Zulu from Thule Air Base (BGTL)
Landing time	18:55 Zulu at Thule Air Base (BGTL)
Flight Hours	8.1 hours
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 orbit 10520 and the Fram Strain flown in previous years. • CryoSat-2 underpass at 11:29 Z – 50 minutes before P-3 survey. • Joint survey with ESA's CryoVEx Twin Otter and AWI's BT-67. • Completed entire mission as planned. • ATM, snow, Ku-band, accumulation radar, gravimeter, magnetometer, DMS and KT-19 skin temperature sensor were operated on the survey lines. • The MCoRDS radar was not in operation due to sea ice mission. • Several pitch and roll maneuvers over sea ice for snow and Ku-band radar calibration. • Ramp pass at Thule at 2,000 ft AGL.
Geographic Keywords	Arctic Ocean, Alert, Lincoln Sea, Fram Strait
Satellite Tracks	CryoSat-2 orbit 10520; ICESat orbit 0253.
Repeat Mission	Partial reflight of March 28, 2011.

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"/>	63 GB	None
MCoRDS	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	N/A
Snow Radar	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	540 GB	None
Ku-band Radar	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	540 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"/>	150 GB	None
KT-19 Skin Temp.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	7.8 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"/>	320 MB	None

Mission Report (Michael Studinger, Mission Scientist)

We modified the Fram Gateway mission plan for today in order to accommodate data acquisition along a CryoSat-2 orbit together with two aircraft stationed in Alert as part of ESA's CryoVEx campaign. We started the flight with the joint survey line. The plan was to fly three aircraft and CryoSat-2 within hours on the same satellite orbit. In addition to the P-3 (N426NA), the Technical University of Denmark (DTU Space) has chartered a DHC-6-300 Twin Otter (TF-POF) from Norlandair and has installed a laser scanner and ASIRAS, which is the airborne version of SIRAL, the radar that flies on the CryoSat-2 spacecraft. The third aircraft was a Basler BT-67 (DC-3) aircraft, 'Polar 5' (C-GAWI) from the Alfred Wegener Institute in Germany, which participated in the joint flight. The Polar 5 is equipped with an EM-31 bird for measuring sea ice thickness, an airborne laser scanner, and nadir looking video and camera systems.

The sequence of events we had developed worked out perfectly. We had excellent weather in the survey area, which was an incredible help. N426NA reached the start of the survey line at the coast of Ellesmere Island at 12:19 Zulu. At 13:43 Z we reached the end of the CryoSat-2 survey line and turned towards the Fram Gateway waypoints. At 17:24 Zulu we reached the end of the survey line at waypoint NS06 near Alert and started climbing for the transit back to Thule.

It was an uneventful flight. We have collected another landmark data set today together with our partners from ESA's CryoVEx campaign that will advance our understanding of CryoSat-2 data and how the various airborne measurements can be linked to satellite data.

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 the coast that we expected from the satellite image (Fig.3). ATM collected a total of 4.7 hours of science data with 99% coverage.

MCoRDS: The MCoRDS system was not operated on this flight due to the sea ice mission and the team used the flight for test recordings.

Snow and Ku-band radar: The snow and Ku-band radars worked well and collected almost 5 hours of data.

Accumulation radar: Worked well.

Gravimeter: Worked well.

Magnetometer: Worked well.

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

KT-19 skin temperature sensor: System worked well.

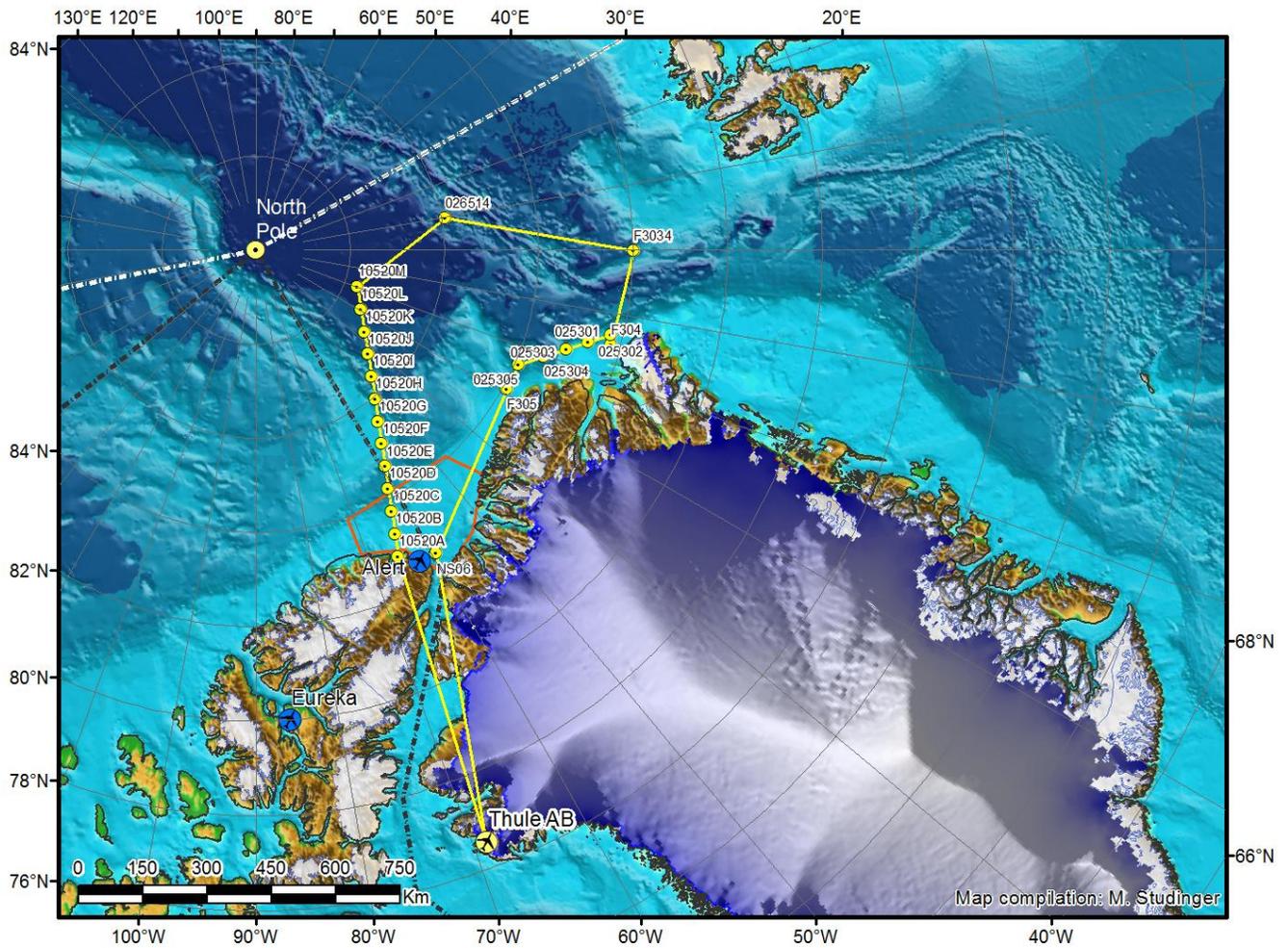


Figure 1: Today's sea ice mission plan (yellow). Red box outlines the temporary CryoSat-2 SAR mode mask north of Alert. We teamed up with ESA's CryoVEx experiment along CryoSat-2 orbit 10520 north of Alert.

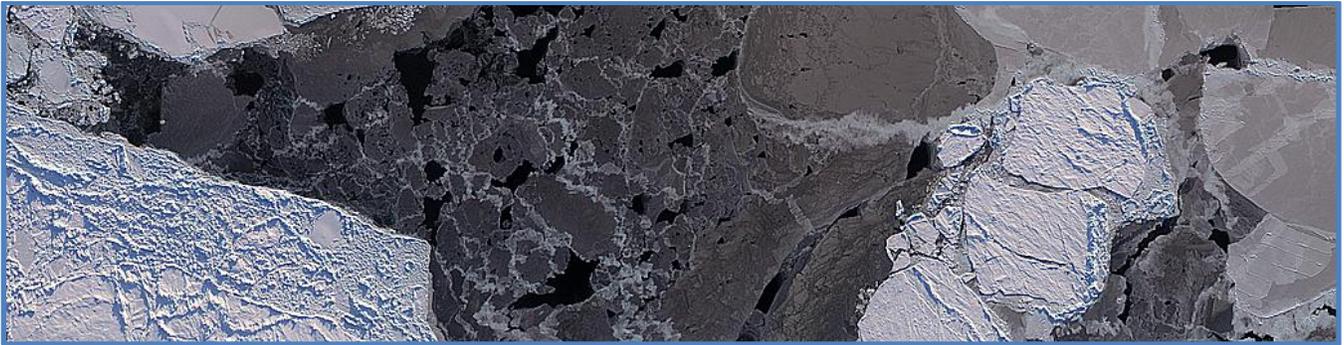


Figure 2: DMS mosaic from Eric Fraim showing one of many leads we saw today with a variety of different types of sea ice. We saw many leads near the coast of northern Greenland that can be seen in the IR satellite image below (Fig. 3).

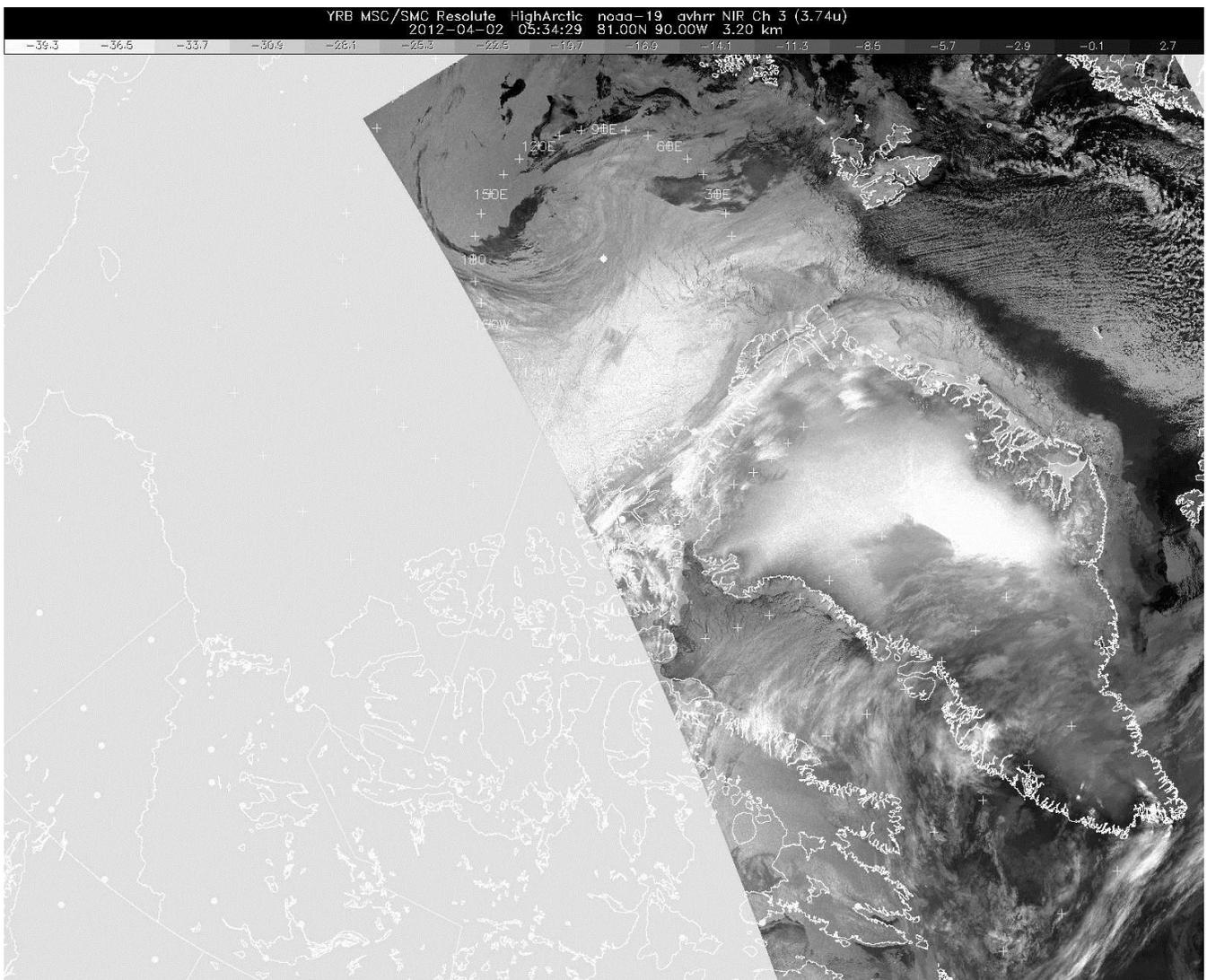


Figure 3: Infrared satellite image (3 μm) showing cloud cover in the survey area.