

Preliminary Science Flight Report

Operation IceBridge Arctic 2011



Flight: F20
Mission: Sea Ice CryoVEx

Flight Report Summary

Aircraft	P-3B (N426NA)
Flight Number	020
Flight Request	11P006
Date	Friday, April 15, 2011 (Z)
Purpose of Flight	Mission Sea Ice CryoVEx
Take off time	10:21 Zulu from Kangerlussuaq (BGSF)
Landing time	18:28 Zulu at Kangerlussuaq (BGSF)
Flight Hours	8.2 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 CryoVEx ground survey line. First pass was at 1,000 ft AGL. • Completed 60 nautical miles of CryoSat-2 track 12 minutes after satellite passed overhead. • ATM, MCoRDS snow and Ku-band radars, gravimeter, magnetometer, POS/AV, and DMS were operated on the survey lines. • Accumulation radar was not operated today due to sea ice mission and high altitude. • Ramp pass at 18,500 ft AGL for ATM calibration.
Geographic Keywords	Lincoln Sea, Alert, Arctic Ocean.
ICESat/CryoSat Track	CryoSat-2 track 5399
Repeat Mission	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"/>	43.7 GB	None
MCoRDS	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1 TB	None
Snow Radar	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	100 GB	None
Ku-band Radar	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	100 GB	None
Accumulation Radar	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	N/A
DMS	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	27 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"/>	560 MB	None
Magnetometer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	420 MB	None

Mission Report (Michael Studinger, Mission Scientist)

Today's flight was a coordinated effort between ESA's CryoVEx campaign and NASA's Operation IceBridge. The CryoVEx 2011 teams are currently operating from CFS Alert and have installed corner reflectors and GPS buoys on the sea ice north of Alert yesterday using a Kenn Borek Twin Otter. Today and tomorrow, teams from the University College London and the University of Alberta are on the ice making in situ measurements along the profiles between the corner reflectors. A DC-3/BT-67 Basler from the Alfred Wegener Institute in Germany participates in the experiment with a towed EM bird for sea ice thickness measurements and a laser altimeter. The Technical University of Denmark is operating the ASIRAS radar, the airborne version of CryoSat's SIRAL radar on a Twin Otter. Today, we had all four aircraft operating on the same survey line to make measurements for comparison with CryoSat-2, which was flying overhead. What a great day for sea ice research!

The NASA IceBridge teams participated by collecting data along a 0.5 km long profile, that will be surveyed tomorrow by the UCL team on the ground, which had installed the corner reflectors and GPS buoys yesterday. After transiting from Kangerlussuaq, we had enough time to fly 6 passes over the survey line making sure we got close enough within a few tens of meters to the corner reflectors. The visual aids have been invaluable and were clearly visible from 1500 ft and at 250 kts. On several of the passes we got closer than 10 meters to the corner reflectors and saw once a 25 dB increase in signal amplitude on the snow radar. The purpose of this experiment is to tie all the different measurements together and calibrate the CryoSat-2 measurements in cold conditions over sea ice. Today's data set of ground measurements, multiple airborne measurements with a comprehensive suite of instruments and a CryoSat pass will create a landmark data set to shed light on fundamental issues in remote sensing of sea ice. After finishing the 6 passes we had time to fly 60 miles of the CryoSat line before heading back to Kangerlussuaq. CryoSat-2 was passing overhead just 12 minutes before us.

Today was a great example of what can be accomplished when many organizations and nations work together. It was a great coordination effort. Well done everyone and in particular Jim from Ice Shelf Alert for coordinating all the traffic in the area today.

Individual instrument reports from experimenters on board the aircraft:

ATM: worked well and collected 43.7 GB data. 25.3 GB data were from high altitude.

MCoRDS: The MCoRDS system worked well and collected high altitude data over sea ice.

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

Accumulation radar: was not operated today due to sea ice and high altitude.

Gravimeter: Worked well. No issues.

Magnetometer: worked well.

DMS: worked very well and got images of corner reflectors on all passes.

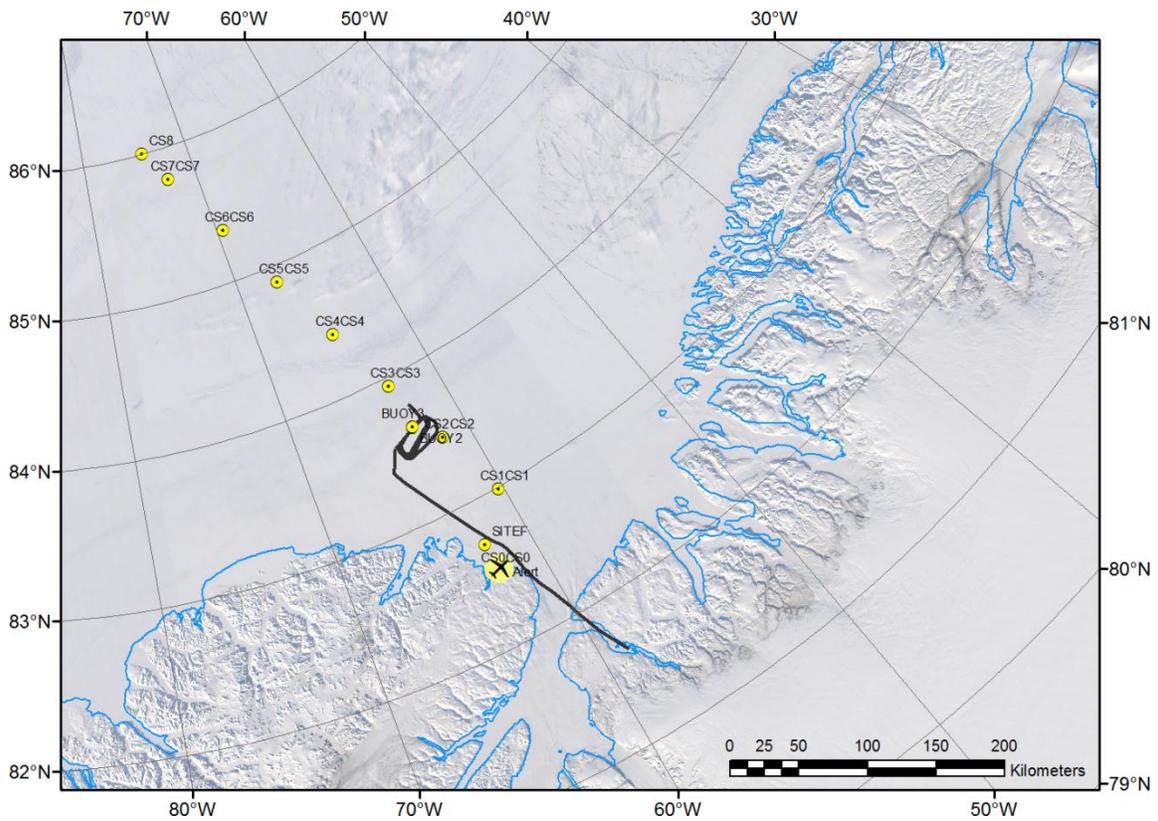


Figure 1: Mission plan for today's flight and segments of the P-3 trajectory.

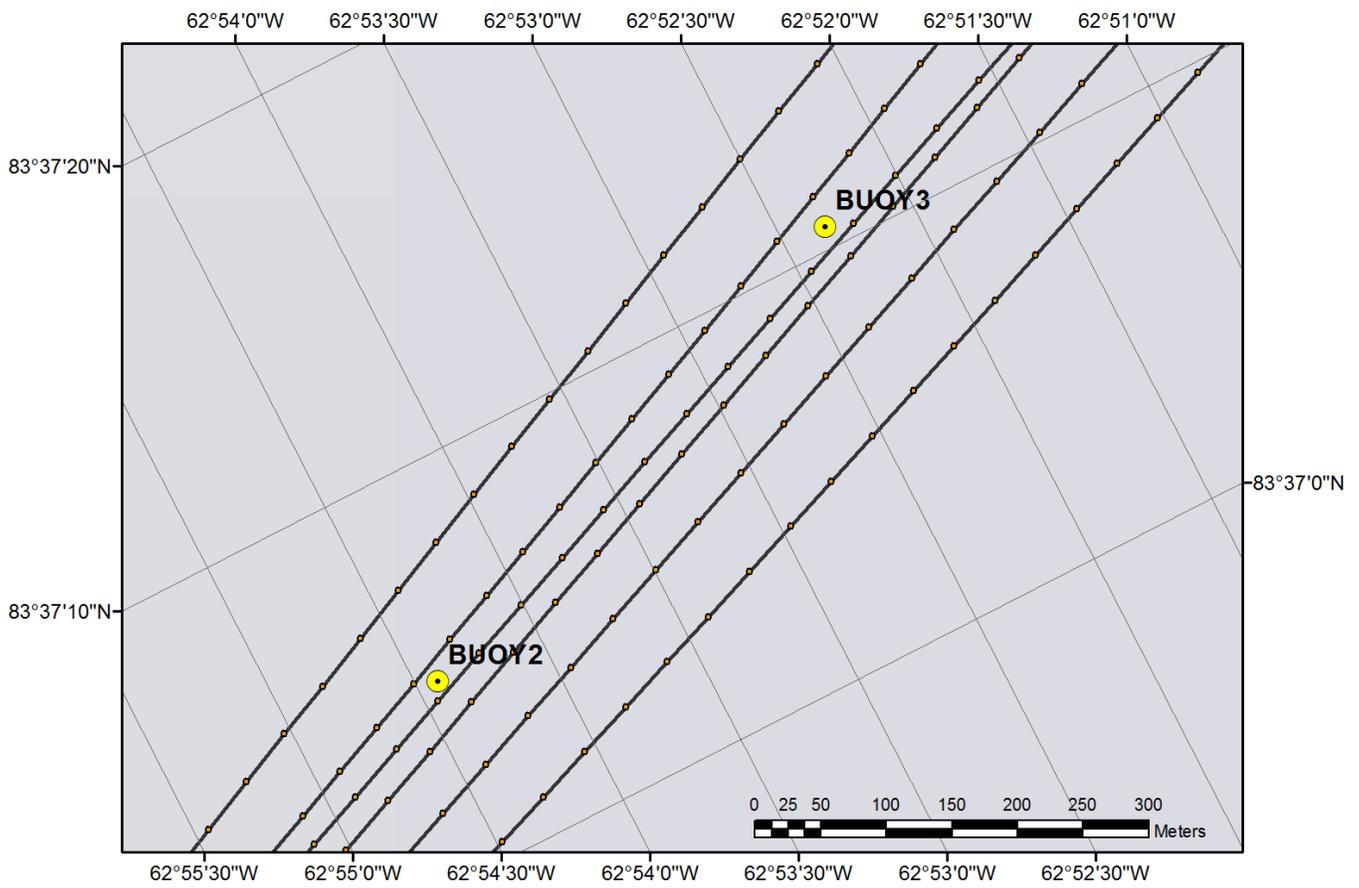


Figure 2: P-3 trajectory passing over the GPS buoys.

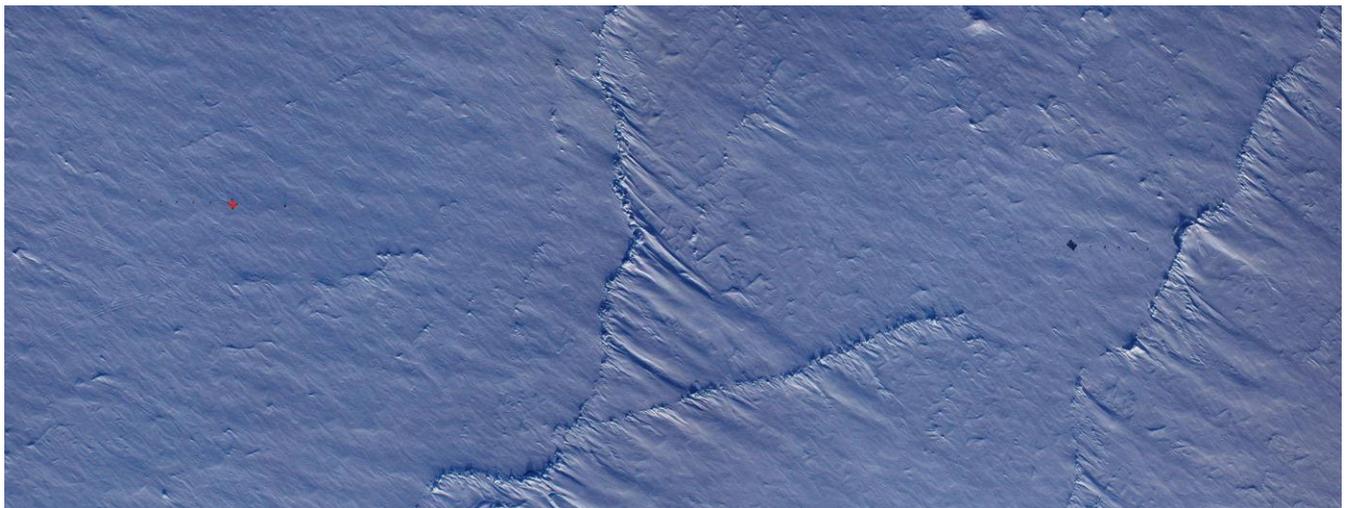


Figure 3: DMS image of survey line (450 meters long) between corner reflectors and GPS buoys.



Figure 4: DMS image of corner reflector and visual markers (5 x 5m in size).