

Science Flight Report

Operation IceBridge Antarctica 2010



Flight: F02

Mission: Sea Ice 02/CryoSat-2 underflight

Flight Report Summary

Aircraft	DC-8 (N817NA)
Flight Number	110107
Flight Request	118003
Date	Thursday, October 28, 2010 (Z), Day of Year 301
Purpose of Flight	Mission Sea Ice 02
Take off time	14:01:32 Zulu from Punta Arenas (SCCI)
Landing time	02:19:03 Zulu at Punta Arenas (SCCI), October 29, 2010
Flight Hours	12.4
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 three sea ice transects in the Weddell Sea. Accomplished entire mission as planned. • Underpass of ESA's CryoSat-2 satellite in the northern Weddell Sea. • ATM, snow and Ku-band radars, gravimeter, LVIS, 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. • Conducted a ramp pass (1,500 ft AGL) at Punta Arenas airport for ATM and DMS instrument calibration. • Conducted calibration maneuvers over open water/sea ice for snow and Ku-band radars after waypoint CS99 in the northern Weddell Sea. • Conducted pitch and roll maneuvers for LVIS calibration over Strait of Magellan.
Geographic Keywords	Weddell Sea, Antarctica
ICESat/CryoSat Track	CryosSat-2 ascending orbit 2951
Repeat Mission	Yes (2009).

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"/>	97 GB	None
MCoRDS	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	None
Snow Radar	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	408 GB	None
Ku-band Radar	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	408 GB	None
LVIS	<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"/>	121 GB	None
POS/AV (510 + 610)	<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
DC-8 Onboard Data	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	40 MB	None

Mission Report (Michael Studinger, Mission Scientist)

The first segment of today's mission between waypoints 301a and 302 is an exact repeat of the IceBridge mission from October 30, 2009. The second segment between waypoints 302 and CS01 connects the line from last year with a new line along today's CryoSat-2 ground track. We downloaded the latest CryoSat-2 orbit files from ESA just minutes before the door closed on the DC-8 this morning and John Sonntag calculated the precise CryoSat-2 ground track in flight.

We begin the flight with a low-elevation ramp pass at Punta Arenas airport for DMS boresight calibration and ATM range bias estimate. This is necessary for DMS because the ramp pass two days ago was during night hours and without sufficient illumination of the ground targets. After crossing the Antarctic Peninsula at cruising altitude we descent to our first waypoint 301a in the north-west Weddell Sea. The weather turned out to be excellent as predicted until half way between waypoints 302 and CS01, where we encountered clouds that were predicted by the forecast we got during the weather brief.

We have a 50 – 60 kts cross wind from the West that will likely result in fast moving sea ice. We decided to fly a 30 minute delay loop, leaving the line at 21:40 Z to delay our rendezvous with ESA's CryoSat-2 satellite and to move the underflight location well before the end of the survey line, which will allow us to interpolate the fast moving sea ice before and after the underpass. As an additional advantage we will collect repeat data that can be used to estimate instrument accuracy and internal consistency of the data. We return to the line at 22:01:15 Z, about 42 nautical miles south-east the point where we left the line. At 22:54 Z, just minutes before the CryoSat-2 underpass, we watch the first out of two beautiful sunsets in the northern Weddell Sea on today's flight. At 23:01:17.7 Z we reach the position of the predicted CryoSat-2 ground track at 42°4'23.6"W 64°47'56.8"S (preliminary estimate), about 50 nautical miles before the end of the line at waypoint CS99, with CryoSat-2 passing south to north on an ascending orbit 2951 (see map on page 4 of this report). We had an 18 kts cross wind at the time of the underflight. At 23:18 Z we started to climb for a 3 hour transit back to Punta Arenas.

Individual instrument reports from experimenters on board the aircraft:

ATM: The ATM systems worked well and collected good data. Some of the clouds in on the south-east corner of the survey area 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 calibration of the system.

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

Gravimeter: Worked well. No issues.

DMS: DMS worked well. No issues. Occasional clouds obscured the surface.

LVIS: LVIS system worked very well on all lines and collected data during low-altitude segments in profiling mode.

POS/AV: Systems worked well. No issues.

DC-8 on board data: System worked well.

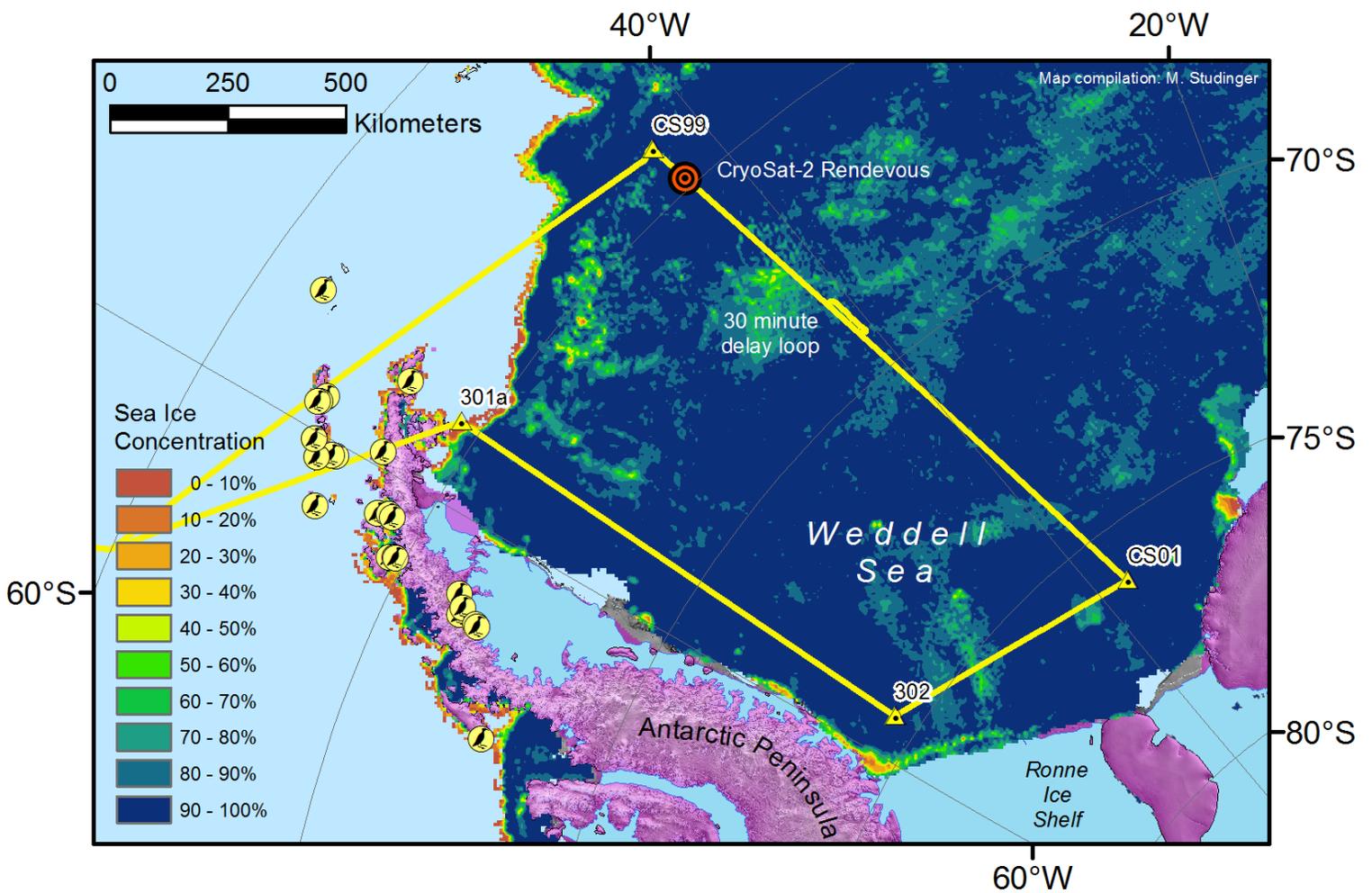


Figure 1: Sea ice mission 02 plotted over sea ice concentration from AMSR-E data (Oct 28, 2010)

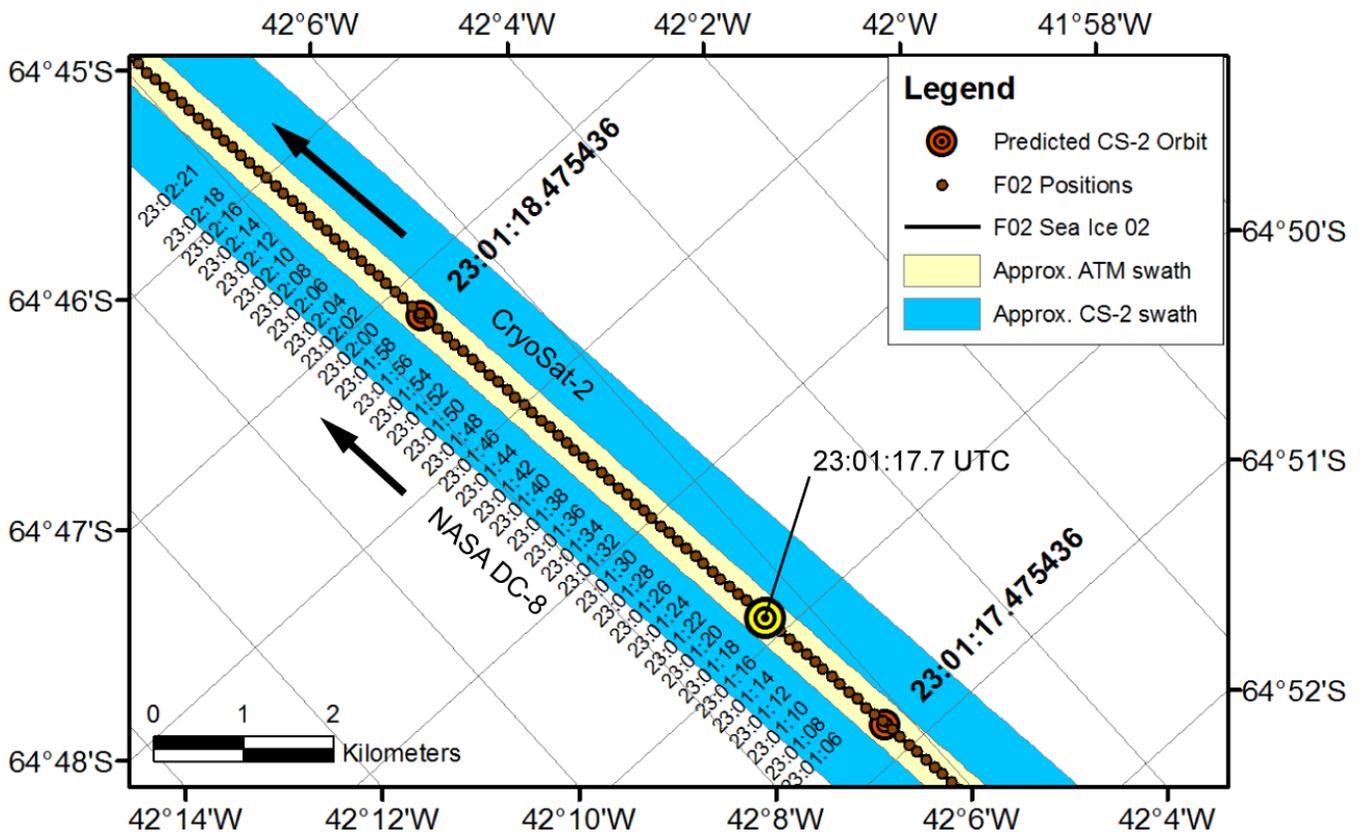


Figure 2: CryoSat-2 underpass in the Weddell Sea.