ALFRED-WEGENER-INSTITUT
HELMHOLTZ-ZENTRUM FÜR POLAR- UND MEERESFORSCHUNG

Campaign report **July 2012**

TIFAX 2012 Summer Campaign

Sea ice thickness measurements with Polar 5 from Station Nord and Svalbard

HELMHOLTZ ASSOCIATION

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1.0 Aims/objectives of TIFAX 2012:

During the last decade, an increased advection of thick multi-year ice that originates from an area north of Greenland, out of the Arctic through Fram Strait was observed. A replacement of this old and thick sea ice by much thinner ice might precondition for rapid sea ice retreat in summer. Aim of the TIFAX campaign is to monitor ice conditions during summer in the main export pathway of the Arctic Ocean. The campaign complements the large scale spring sea ice surveys in April 2009 and 2011 (PAMARCMIP) and is a continuation of the TIFAX campaign in 2010 and 2011.

Expedition permit: C-12-7
Total number of flight hours: 32,8 h

1.1 Name of participants:

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1.2 Weather and ice information:

Weather and sea ice information were obtained via Iridium from MODIS imagery (RapidFire), SSMI-E scenes (University Bremen) and the weather service on board the Polarstern.

1.3 Flight operations

All Polar 5 survey flights across the Fram Strait and in the area north of Greenland were performed between July 19 and 21, 2012. Flights were made towards one or more pre-defined points of return and back. Start and end node, the point of return and track length were chosen according to

1. the operation area of other on-going campaigns,
2. available fuel capacity,
3. weather condition,
4. ice condition.

In total, 3 survey flights were made between July 14 and 27, 2012. The flight time amounts to roughly 32,8 hours (including ferry).

Campaign members of TIFAX 2012 (20/7/2012)

Joint experiment with MV Arctic Sunrise (19/7/2012)

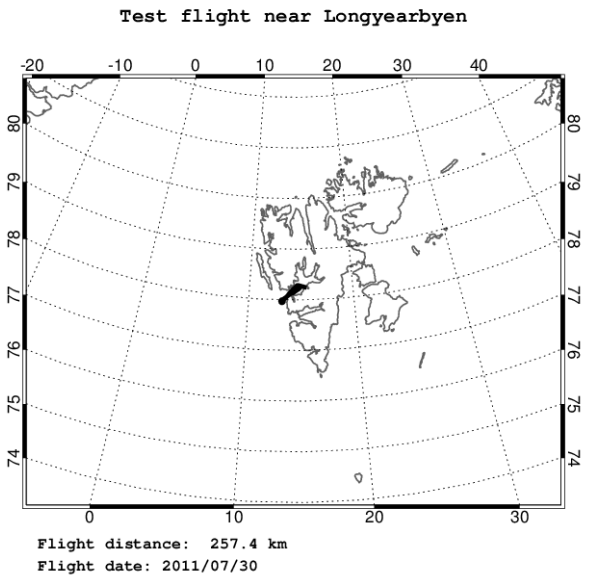
1.4 Flight hours

Date	Route	Type	Air Time	T/O Time	Ldg Time
July 14/12	BGNO-ENSB	Ferry flight	2,20	08:31	10:41
July 18/12	BGNO-ENSB	Test flight	1,40	11:05	12:28
July 18/12	ENSB-BGNO	Ferry flight	2,50	15:08	17:39
July 19/12	BGNO-BGNO	Survey flight	4,30	09:41	14:00
July 20/12	BGNO-BGNO	Survey flight	5,00	09:29	14:27
July 21/12	BGNO-BGNO	Survey flight	5,20	10:38	15:53
July 24/12	BGNO-ENSB	Ferry flight	2,20	14:28	16:43
July 25/12	ENSB-ENTC	Ferry flight	3,00	06:33	09:31
July 25/12	ENTC-ENVA	Ferry flight	2,60	10:23	12:57
July 25/12	ENVA-EDWB	Ferry flight	3,40	14:07	18:10
July 26/12	EDWB-EDWB	Test flight	1,00	08:19	09:20

Survey flight hours including test flight	**16,90**
Ferry flight hours	**15,9**
Total	**32,8**

2.0 Daily report

2.1 *July 14-18, 2012*

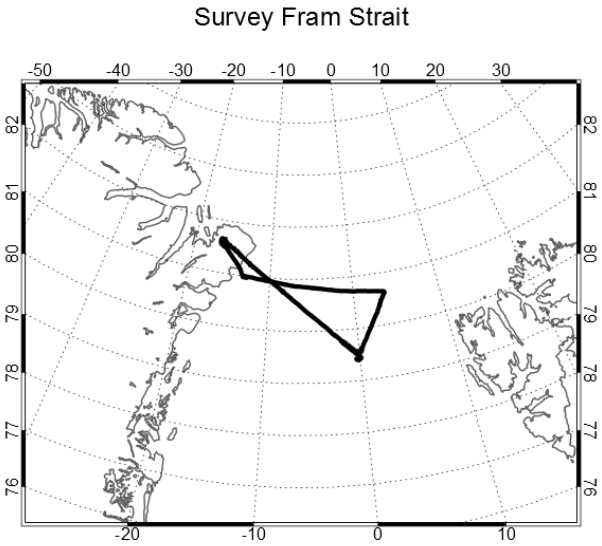


The participants arrived in Longyearbyen on July 14 early morning. The Polar 5, coming from Station Nord, landed at 10:41 UTC same day. After finishing system integrations on July 18 in Longyearbyen one day later than planned, a flight was performed in the morning of July 18 near Longyearbyen to test mounted instruments and communication with the EM-Bird. After a successful test flight, the plane was loaded and prepared for ferry to Station Nord same day. On the way out to Station Nord sea ice information were provided to the MV Arctic Sunrise which had problems navigating in thick ice. On the way to the ship and further to Station Nord LIDAR and Laserscanner measurements were made in addition to standard meteorological data retrieval.

Flight information	Date	Air time	T/O Time	Ldg Time
Ferry Station Nord to Longyearbyen	14.07.2012	2,2	08:31	10:41
Testflight around Longyearbyen	18.07.2012	1,40	11:05	12:28
Ferry flight to Station Nord via FS Arctic Sunrise	18.07.2012	2,50	15:08	17:39

Track	Instruments	Details
Testflight near Longyearbyen	Test of all instruments	*no comments*
Ferry to Station Nord from Longyearbyen	LIDAR	*no comments*
	Laserscanner	*no comments*
	Basic meteorology, INS/GPS, AIMMS 20	*no comments*

2.2 *July 19, 2012*



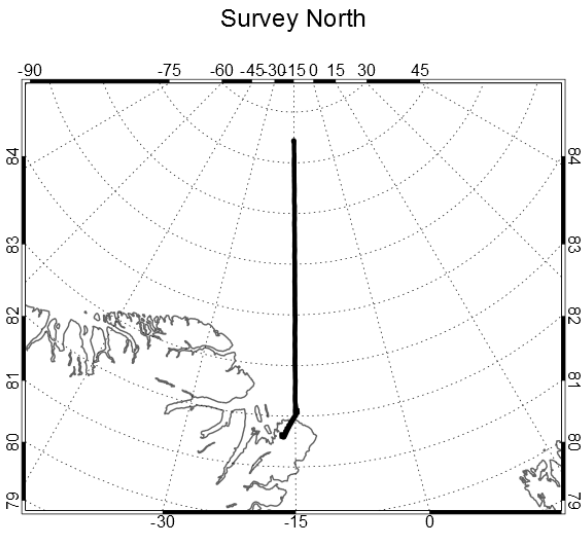
First survey flight was performed east of Station Nord. Weather conditions were good with high visibility and temperatures above zero. Sea ice showed high melt pond coverage during the entire flight. On the way out, EM-Bird and Laserscanner measurements were made. East of 3° E low fog banks appeared making low level EM-Bird flights impossible. Therefore flight was interrupted at 3°E and course changed towards position of MV Arctic Sunrise for a joint experiment. On the way out to ship position no measurements were made. At ship position, fog banks cleared and two EM-Bird transects were made over a floe next to MV Arctic Sunrise. The flight back to Station Nord was made at 10.000 ft while making LIDAR measurements.

Flight information	**Date**	**Air time**	**T/O Time**	**Ldg Time**
Flight across from Fram Straight towards 80.5N and 3E and to position of FS Arctic Sunrise	19.07.2012	4,30	09:41	14:00

Track	**Instrument**	**Details**
Way out to 80.5N, 3W from Station Nord	EM-Bird measurements (4 Profiles)	*GPS information missing for entire flight. Strong instrument drift*
	Photogrammetric System	*Image interval 7 sec.*
	Basic meteorology, INS/GPS, AIMMS 20	*no comments*
	Laserscanner	*Laserscanner covers the first 4 EM-Bird transects*
Way to FS Arctic Sunrise	EM-Bird measurements over floe near Arctic Sunrise (2 Profiles)	*Short profiles only*
	Photogrammetric system	*Image interval 7 sec.*
	Basic meteorology, INS/GPS, AIMMS 20	*no comments*
Way back to Station Nord	LIDAR	*no comments*
	Photogrammetric system	*Image interval reduced to 36sec. Temporarily failure of the system near Station Nord*
	Basic meteorology, INS/GPS, AIMMS 20	*no comments*

2.3 *July 20, 2012*

Good weather conditions (high visibility, clear sky but heavy southern winds) on July 20, 2012 made a flight towards 87.2N, 15W possible. The track follows flight patterns of TIFAX 2010 and 2011 campaign. On the way out, EM-Bird and Laserscanner measurements were made. At 87.2N low level clouds and fog banks appeared such that flight was interrupted and returned to Station Nord at 10.000 ft. On the way back, drop sondes and LIDAR measurements were made.

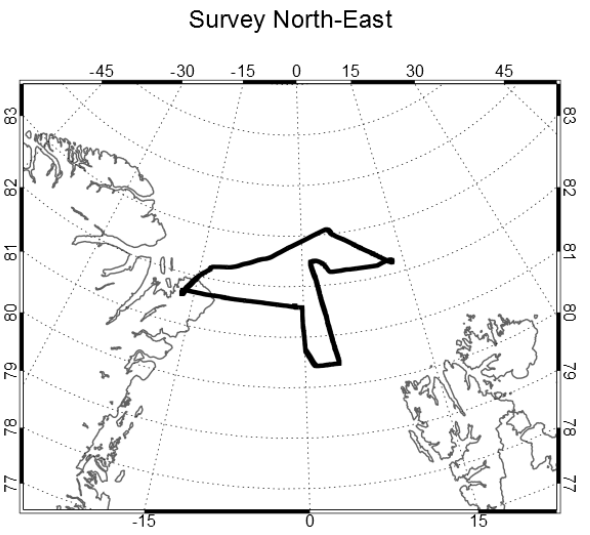


Flight information	Date	Air time	T/O Time	Ldg Time
Flight from Station Nord towards 87.2N, 15W	20.07.2012	5,00	09:29	14:27

Track	Instrument	Details
Way out to 87.2N, 15W from Station Nord	EM-Bird measurements (5 Profiles)	*GPS failures*
	Photogrammetric System	*Image interval 7 sec.*
	Basic meteorology, INS/GPS, AIMMS 20	*no comments*
	Laserscanner	*Laserscanner measurements parallel to EM-Bird measurements*
Way back to Station Nord	LIDAR	*no comments*
	Photogrammetric system	*Image interval reduced to 36sec. Temporarily failure of the system near Station Nord*
	Drop sondes (14)	*no comments*
	Basic meteorology, INS/GPS, AIMMS 20	*no comments*

2.4 *July 21, 2012*

For July 21 a flight towards 84.5N, 30E was planned. However, low fog banks being the consequence of heavy winds and lead openings the day before were making Bird measurements impossible. Therefore course was changed on-flight towards 82N, 10E while making LIDAR measurements at 10.000 ft. A clear spot between 80.2N and 81.5N enabled a short EM-Bird survey. The flight was interrupted at 81.5N 0E and returned to Station Nord back at 10.000 ft.



Flight information	Date	Air time	T/O Time	Ldg Time
Flight from Station Nord towards 83N, 10W. Return to 82N, 15E due to low level clouds and back to Station Nord	21.07.2012	5,20	10:38	15:53

Track	Instrument	Details
Surveying flight for clear spots (way out)	LIDAR	*no comments*
	Photogrammetric system	*Image interval 24 sec.*
	Basic meteorology, INS/GPS, AIMMS 20	*no comments*
Clear spot between 80.2N and 81.5N	LIDAR	*no comments*
	Photogrammetric system	*Image interval increased to 7 sec.*
	Basic meteorology, INS/GPS, AIMMS 20	*no comments*
Way back to Station Nord	LIDAR	*no comments*
	Photogrammetric system	*Image interval reduced to 24sec.*
	Basic meteorology, INS/GPS, AIMMS 20	*no comments*

2.5 ***July 22-27, 2012***

A change in wind direction brought fog to Station Nord making a continuation of survey flights impossible. Snow and rain fall until July 24 weakened the landing strip. Because the weather service did not forecast any significant change for the following days, the campaign was ended and the crew prepared for ferry back to Longyearbyen same day.
Back in Longyearbyen, Polar 5 was loaded and the crew returned to Bremerhaven via Tromsö and Trondheim early next morning (25. July, 2012). In Bremerhaven (morning of July 26) another short flight was made to account for a missing instrument calibration (box flight pattern for radiation sensor). The rest of the science crew is leaving Longyearbyen on July 27 (except Jürgen Gräser leaving July 28).

Flight information	**Date**	**Air time**	**T/O Time**	**Ldg Time**
Ferry from Station Nord to Longyearbyen	24.07.2012	2,20	14:28	16:43

Flight information	**Date**	**Air time**	**T/O Time**	**Ldg Time**
Ferry from Longyearbyen to Bremerhaven (Route ENSB-ENTC-ENVA-EDWB)	25.07.2012	3,00	06:33	09:31
		2,60	10:23	12:57
		3,40	14:07	18:10

Flight information	**Date**	**Air time**	**T/O Time**	**Ldg Time**
Test flight in Bremerhaven to calibrate radiation sensor (box flight pattern)	26.07.2012	1,00	08:19	09:20