

From:

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Damocles
Yacht Vagabond
Inglefieldbukta
Svalbard



Damocles project / Vagabond 2008-2009 wintering report



Inglefieldbukta, from Rjurikfjellet © Eric Brossier

Vagabond, French polar yacht, spent a fifth and last winter on the East coast of Spitsbergen, to support DAMOCLES and French Polar Institute IPEV operations. This report is mainly dealing with logistic and environmental matters; only few scientific results are presented here.



Vagabond
wintering location
77°53.10'N
18°15.80'E



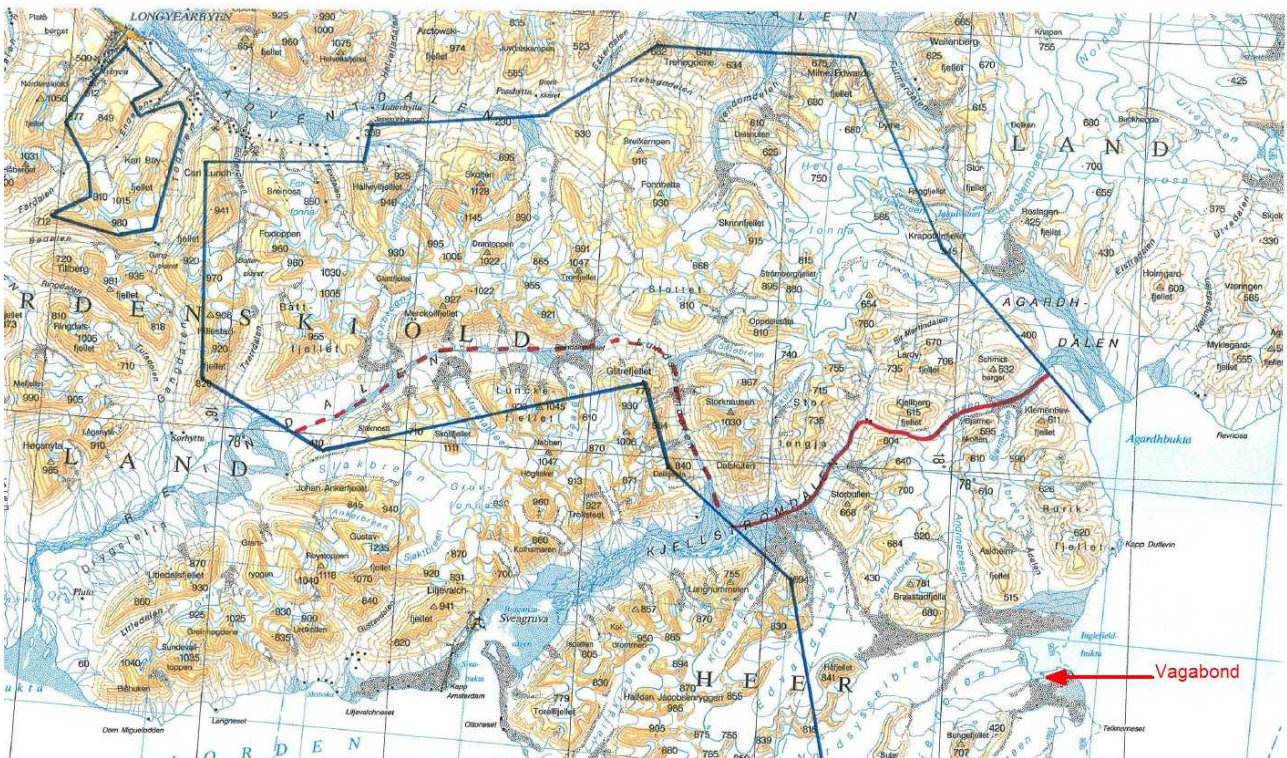
1 – Location and field occupation

Vagabond has been wintering in the fast ice of **Inglefieldbukta**, Storfjorden, at $77^{\circ}53.10'N - 18^{\circ}15.80'E$, from 5th October 2008 to 17th July 2009. The wintering location has not changed since October 2004, the same protected little bay, in the south part of Inglefieldbukta. Vagabond was moored with anchor and with ropes to shore in October. All possible ropes and anchorages on shore were removed at thaw.



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All scientists and visitors came from Longyearbyen by **snowmobile**, a 3 to 8 hours trip depending on weather and snow conditions. Following the local authorities' regulations and the instructions from the given permit (2004/01032-13 a. 512), there was a guide for every trips, and the usual route was Longyearbyen – Adventdalen – Sassendalen – Agardhdalen – Kapp Dufferin – Inglefieldbukta, to avoid driving across the « scooter free area ». Few people had specific permission from the Governor to follow a shorter route from Vagabond to Kjellstromdalen.



Scooter free area © Governor of Svalbard

The **cabin**, set up in August 2006, at 150 m East of Vagabond's wintering position, was used to prepare and store scientific equipment, as well as safety equipment. A mast, supporting an automatic weather station, is standing next to the cabin since January 2007. Batteries are inside protected from polar bears and bad weather. The cabin and the running weather station will remain at its current location, according to the permission to continuance in research and monitoring sea ice in Storfjorden. This permission was received from the Governor on 10th June 2009.



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A large **tent** was set up on shore, as close as possible to Vagabond, in October 2008. It was first design as a shelter for a helium balloon (5 m³), used for regular weather soundings until end of February 2009. It has been also very convenient as a workshop and to store scientific and other equipments, in addition to the cabin. This tent was removed in July 2009.



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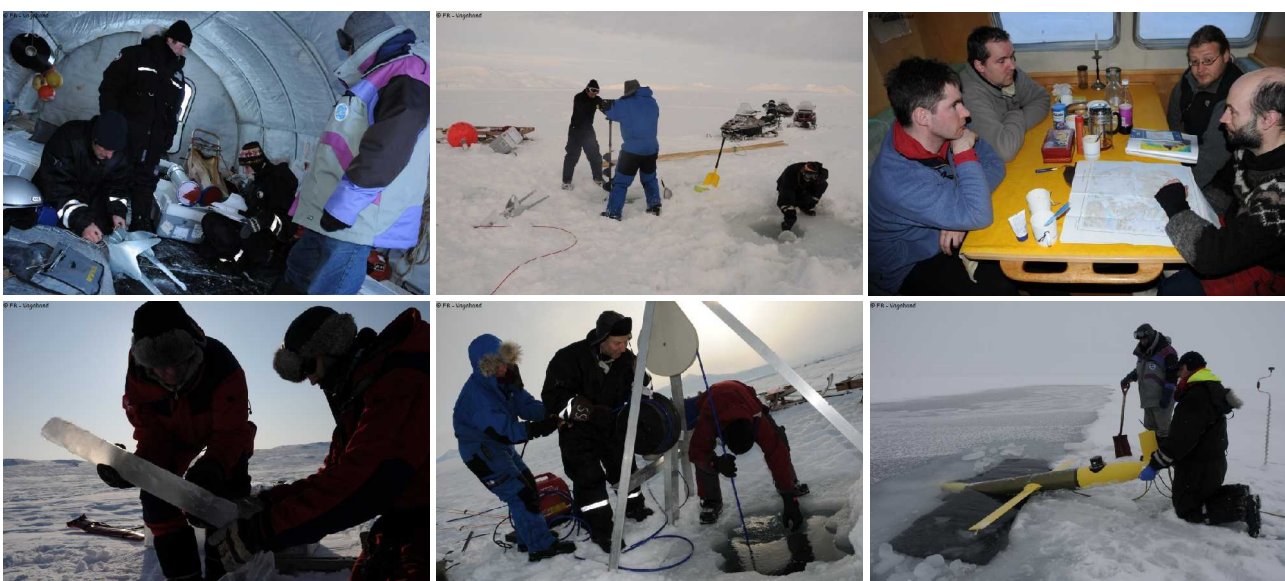
2 – Human presence

From 5th October 2008 to 17th July 2009: **899** mandays (i.e. all people staying overnight, including crew members, scientists, guides and other visitors).

Details on visitors at Vagabond:

Scientific teams:

23/03-01/04/09: 4 scientists from LOCEAN and NKE (French)
14-16/04/09: 3 scientists + 1 guide from NPI (German, Finnish, English)
17-23/04/09: 2 scientists from University of Cambridge (English, Lebanese)
26/04-03/05/09: 2 scientists from NERSC (Swedish, Norwegian)
30/04-03/05/09: 1 scientist from IPEV (French)
06-11/05/09: 4 scientists from LOCEAN and ENSIETA (French)



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Vagabond crew changes (crew members coming in and out):

05/10/08: Vagabond arrived at wintering location, 5 people on board
10/10/08: 2 people walking to Svea (3 people staying on board)
10-11/01/09: 3 people in, 3 people out / crew change with 4 snowmobiles + 3 extra drivers (1 snowmobile staying at Vagabond)
22/02/09: supply from Longyearbyen, no crew change (snowmobiles Poli Artici)
11/05/09: 1 person in, 2 people out / crew change using same snowmobiles than scientists
16/05/09: 1 person driving back to Svea (IPEV snowmobile) / helicopter assistance needed in Kjellstrodalen
08/06/09: 1 person in, 1 person out / crew change with Ecureuil helicopter from Svea
07/07/09: 4 people in / Ecureuil helicopter from Svea
15/07/09: Vagabond free from ice
17/07/09: Vagabond sailing to Tromsø, via Bear Island, with 5 people on board

Film, communication and educational teams, connected to Damocles and IPY:

None

Near relatives and friends:

28/02-01/03/09: 5 people (all Svalbard residents, from UNIS) / 4 snowmobiles
16-17/04/09: 1 person / skis
17-23/04/09: 1 person / same logistics than scientists
25-26/04/09: 4 people (Svalbard residents) / 3 snowmobiles
08/05/09: 2 people (Svalbard residents) / 2 snowmobiles

Other visitors, passing or camping nearby, no accommodation on board:

08/04/09: 2 people / skis (north to south expedition)
12/04/09: 8 people + 1 guide, GNGL / skis
22-23/04/09: 4 people + 1 guide, Spitsbergen Experience / 5 sledges & 39 dogs
24-26/04/09: 4 people + 1 guide, Svalbard Nature / skis
25/04/09: 9 people + 1 guide, GNGL / skis
25-26/04/09: 4 people + 1 guide, Spitsbergen Experience / 5 sledges & 39 dogs
27-28/04/09: 2 people / 2 sledges & 18 dogs



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All expected visitors had permission from the Governor to visit Vagabond, their names have been monitored, details available on request.

3 – Engines presence and fuel/diesel consumption

Using a wind generator and 5 solar panels is allowing us to run the inboard generator (10KW, diesel) only few hours a week. The diesel **stove** is the main diesel consumer during the wintering period (from 3 to 7 litres diesel a day). The stove is also used for cooking, propane gas consumption occurs only in June/July, when the stove is not running. During winter, Vagabond's both inboard engines (diesel) are running only 15 minutes per month, for maintenance. One **snowmobile** (2 strokes) from IPEV stayed at Vagabond from 10th January to 16st May 2009. We sometimes had to use fuel for a field generator (2KW), an 3HP ice drilling machine, a small ice corer, and a 6HP outboard engine (for the dinghy, early October and July only).

Total IPEV **snowmobile** hours (January to May 2009), use by Vagabond's crew: about **50** hours, within less than 15 km from Vagabond, mainly on sea ice, for scientific work.

Other snowmobiles, used by scientists: about **20** hours total, not including trips from/to Longyearbyen.

Total **fuel** consumption (October 2008 to July 2009): about **280** litres for all snowmobiles, field generator, ice drilling machine, and outboard engine. 80 litres of fuel came on board Vagabond in October, the rest came by snowmobile during the field season.

Total **diesel** consumption (October 2008 to July 2009): about **2500** litres for stove, central heating

and inboard generator. The total capacity of Vagabond's diesel tanks is over 4000 litres.

Total **paraffin** consumption for oil lamp: **5 litres**. Vagabond is all equipped with leds.

Total **propane gas** consumption: **4 kg**.

Helicopters, with landing:

- Super Puma on 11th April 2009, called to rescue crew on drifting ice in Storfjord
- Ecureuil from Svea on 7th May 2009, used to pick up instruments in Storfjord
- Super Puma on 16th May 2009, called for help in Kjellstromdalen (snowmobile in river)
- Ecureuil from Svea on 8th June 2009, used for crew change
- Ecureuil from Svea on 7th July 2009, used for crew change

All requested flights with Ecureuil had landing permission from the Governor. Various helicopters have been seen flying in the area, without landing.

4 – Domestic animals presence

3 Greenlandic dogs from Svalbard:

- Jin and Frost, born 21st April 1999, joined Vagabond in September 2004

- Imiaq, born 9th August 2002, joined Vagabond in September 2005

1 Leica from Yakutia: Zagrey, born in 1998, joined Vagabond in February 2008, died on 19th April 2009 (killed by a polar bear).

These 4 dogs have been watching for polar bear, and pulling the sledge or the pulka. They have been vaccinated against rabies every year (September) in Longyearbyen. They have always been chained up to their dog houses, on the closest beach or next to the boat when ice was thick enough (December to July). From July 2009, Jin, Frost and Imiaq will be assigned to AWIPEV station in Ny-Alesund.



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1 more dog stayed at Vagabond from 5th October 2008 to 10th January 2009 (total 5 dogs).

39 dogs stopped at Vagabond on 22-23rd and 25-26th April, and 18 dogs on 27-28th April 2009.



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5 – Waste management

All waste have been brought back to Longyearbyen with snowmobiles during winter, until 11th May 2009. Then, all garbage bags were stored on board until mid-July, when Vagabond stopped in Tromso (first stop after leaving Svalbard). Glass and metal was thrown in the sea. Sewage from the toilets in the ship have been dropped in the sea under the ice, as well as water from washing (less than 10 litres a week). No soap was use to wash dishes, then dish water was given to the dogs. Nothing has been burnt, except dog houses.

6 – Others environmental aspects

Fuel, diesel or oil spillage: few litres when filling up snowmobiles tanks.

No reindeer seen near Vagabond's wintering location this year, but some were seen on the northern side of the bay. Few foxes came in the vicinity, apparently more than previous winters. First ivory gull and first snow bunting this year seen on 29th April. Common eiders and kittiwakes on 2nd May, guillemots on 11th May, geese mid-May. Brent geese and terns have been nesting close to the boat in June. Many ringed seals, up to 200 hundreds on pack ice in Inglefieldbukta before breaking up. A large group of white whales and narwhals together was seen mid July along the ice edge.



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7 – Safety

Inside the boat:

- 1 Iridium phone
- 1 VHF and 1 SSB radio
- 1 grab box with emergency beacon, portable VHF, GPS, spare Iridium phone, ice screws, spare headlight, food, water...
- 1 riffle, 1 signal pistol, spare ammunitions, flares and bangers
- 1 trip wire
- 8 survival suits, used when thin ice around the boat (October - November), and when ice is breaking up (July)
- safety equipment for offshore sailing, following 1st category French sailing regulations: life raft for 10 people, fire extinguishers...
- 3 heating systems: diesel stove, central heating, electric heaters
- 6 electricity supply possibilities: inboard diesel generator, spare fuel generator, solar pannels, wind generator, alternators from main engines (2)

Outside the boat:

- 1 rifle + ammunitions inside a waterproof bag (stored on deck)
- 4 dogs + sledge (on pack ice)
- 1 snowmobile + sledge + fuel
- 1 cabin (on land, at 150 m)
- 1 tent (on land, at 40 m)

Inside the cabin:

- 2 sleeping bags
- 1 stove
- fuel, matches, candles & food for 1 week for 2 people
- 1 rifle + ammunitions + bangers + safety flares
- 1 fire extinguisher
- 1 small solar panel (to charge VHF, Iridium, or GPS)

Drifting ice:

From Vagabond's log book, 11th April 2009:

« A seal and a flying snowmobile. Here is what Léonie (2 years old) remembers from today. This morning, the weather is very nice, our little family is going on pack ice for usual work and for picnic. A seal, curious, is looking at us, Léonie and me, then dives. France is now coming, on skis behind three dogs. The CTD is just put back on the sledge, behind the snowmobile, when wind from west is rising suddenly, we shorten lunch and turn back to the boat. "The sea !" is saying Léonie in front of open water. Few hectares of pack ice broke up, a 10 meters wide lead is blocking our way, we are drifting offshore at 0,5km/h... Our Iridium phone is working fine. Luckily, despite the strong wind, it is not cold, and above all, sky is clear. So the helicopter can come. Soon we are flying over the lead, now huge (about 300 meters wide). The snowmobile and the sledge are transported to Vagabond during a second flight. A third flight is necessary to find again the scientific winch, detached from the sledge. The Governor's Super Puma rescue team was so efficient that we didn't have much time think about such a drift without helicopter... Only the winch did not recover from this misadventure. Now we have to follow Argos position of the scientific instruments set up under the ice on 30th March 2009, hoping we will be able to reach them soon. »



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On 7th May 2009, using the Ecureuil helicopter from Svea, 2 people flew to Storfjord, to the latest Argos position sent by the scientific mooring. We needed twenty minutes searching with the helicopter to find the big red buoy which has been drifting for one month across the frozen fjord. Ice was thick enough to land, and the valuable instruments, still hanging under pack ice, could be recovered after 2 hours of work. See drifting track further.

Polar bears:

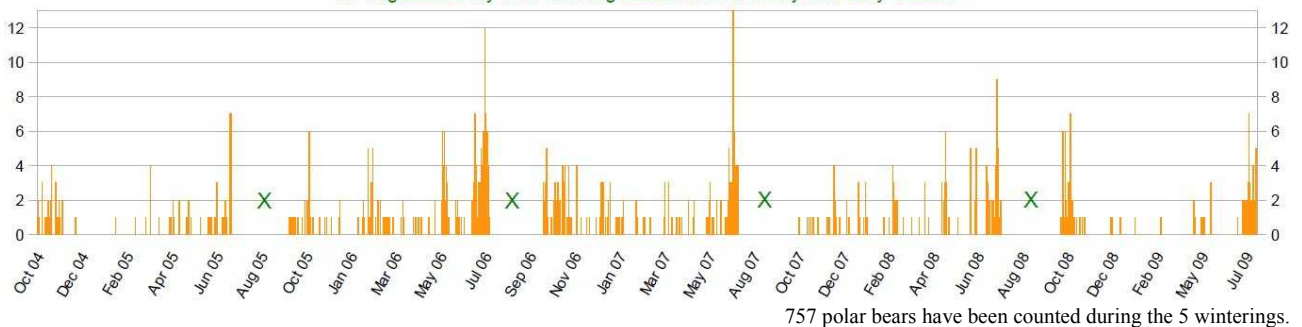
123 polar bears have been seen from 5th October 2008 to 17th July 2009. Polar bears were scared away when getting too close from Vagabond, using the search light or making noise, sometimes with bangers. 757 polar bears have been monitored from Vagabond since October 2004, data and pictures available on request.



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Number of polar bears seen daily at or near Vagabond (Inglefieldbukta) from October 2004 to July 2009

X: Vagabond away from wintering location from mid July until early October



757 polar bears have been counted during the 5 winterings.

Most of time, dogs were very efficient to warn and scare polar bears. But on a quiet night, with no wind, our dog Zagrey was killed and partly eaten by a polar bear. We didn't hear any of the dogs before, and in the morning (19th April 2009), I found the polar bear sleeping near the dead dog. The 3 other dogs were quiet, probably too scared to bark. The polar bear had a face without fur at some points, showing its black skin.



The polar bear that killed our dog Zagrey © Eric Brossier

8 – Continuous scientific work done by Vagabond's crew

Although it was probably the coldest winter in five years (2004-2009), fast ice conditions in Storfjord were not as good as previous seasons. This made snowmobile access and some of the scientific work more difficult. Fast ice broke up several times, about once per month (22/02, 18/03, 11/04 and 14/05/2009), at 2 km from the shoreline, 4 km east of Vagabond.



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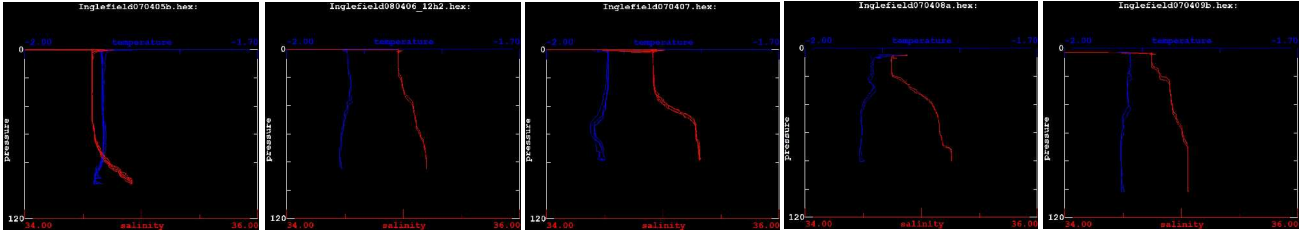
CTD:



From 2004 to 2009, 573 CTD casts were done at 129 different locations © Eric Brossier & France Pinzon du Sel

As soon as sea ice and light conditions were safe enough, CTD casts (conductivity/salinity, temperature, depth) were done in Storfjord, off Inglefieldbukta, by 100 m depth when possible. The locations very much depended on access: finding a way with a snowmobile in between hummocks, snow drifts, slush or thin ice areas is often harder than the scientific work itself. The main locations in 2009 were $77^{\circ}52,70'N - 18^{\circ}27,68'E$, $77^{\circ}52,80'N - 18^{\circ}25,51'E$, $77^{\circ}53,02'N - 18^{\circ}36,97'E$, and $77^{\circ}52,84'N - 18^{\circ}27,19'E$. Up to 6 km from shore, so 8 km from Vagabond. 71 casts were done from 26th February to 15th May 2009, using snowmobile from the boat to carry the CTD (Seabird

SBE19+), the hand winch and the equipment to the CTD location.

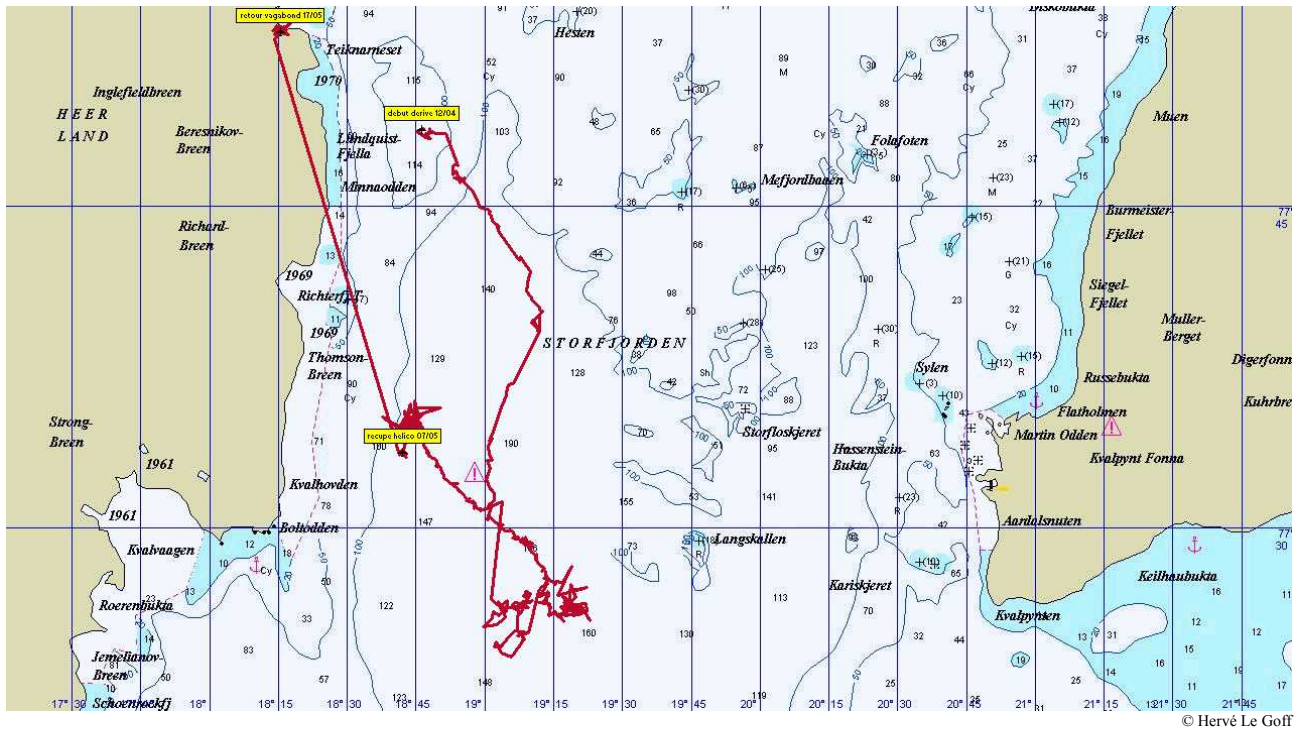


Salinity (red) and temperature (blue) in Storfjord, in front of Inglefieldbukta, every year on 7th April, from 2005 (left) to 2009 (right).

Water depths have been measured at all CTD stations, data is available on request (for mapping authorities for instance).

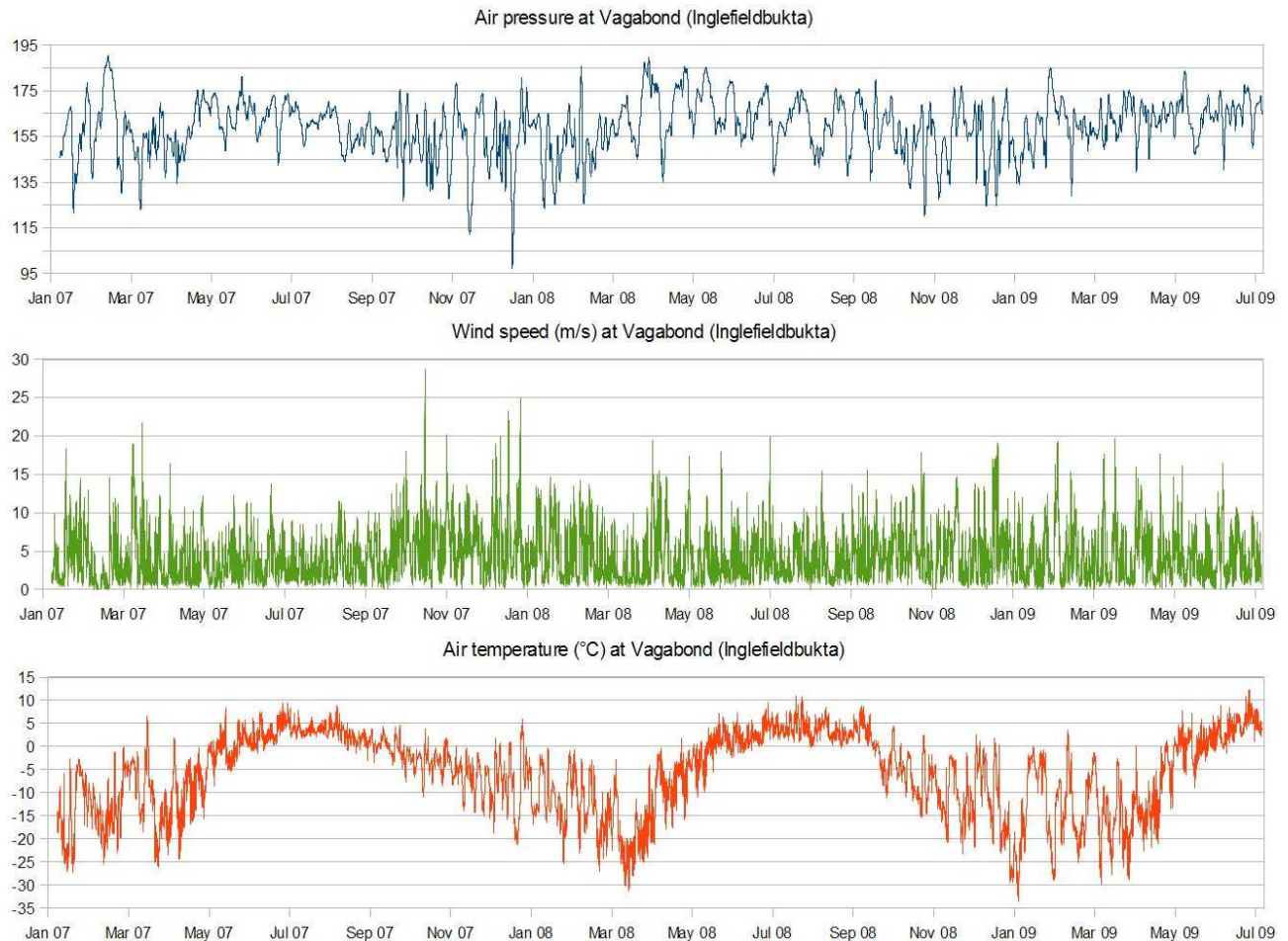
Currents:

A current meter (ADCP) and a CTD (MOPS) were set up under the ice on 30th March 2009, at 77°53,02'N – 18°36,97'E, in front of Inglefieldbukta. The instruments started drifting on 11th April (fast ice broke up after strong wind), and could be recovered on 7th May, thanks to the Argos beacon. Here is the unpredicted track of these instruments, that were supposed to stay still in fast ice at initial position.



Weather:

Damocles weather station: at the cabin, the automatic weather station has been recording wind direction, wind speed, air pressure and temperature, non stop since 14th January 2007. Data is automatically sent to France for Damocles scientists, using Iridium connexion, and is also locally downloaded regularly. A solar panel is charging up the battery, which can last during the dark period. There has been no problem with storms neither with polar bears. Following the permission from the Governor, this station will stay operational after Vagabond's departure.



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Weather soundings: from 18th March 2008 until 20th February 2009, a captive 5m³ helium balloon has been used for weather soundings, up to 2000 meters. Longyearbyen Tower (SB-LTT@avinor.no) has been informed before every sounding, approximately once per week, when the weather was fair enough, and the wind less than 15 knots. From October 2008, the balloon could be safely stored in the big tent, on the shore nearby Vagabond.



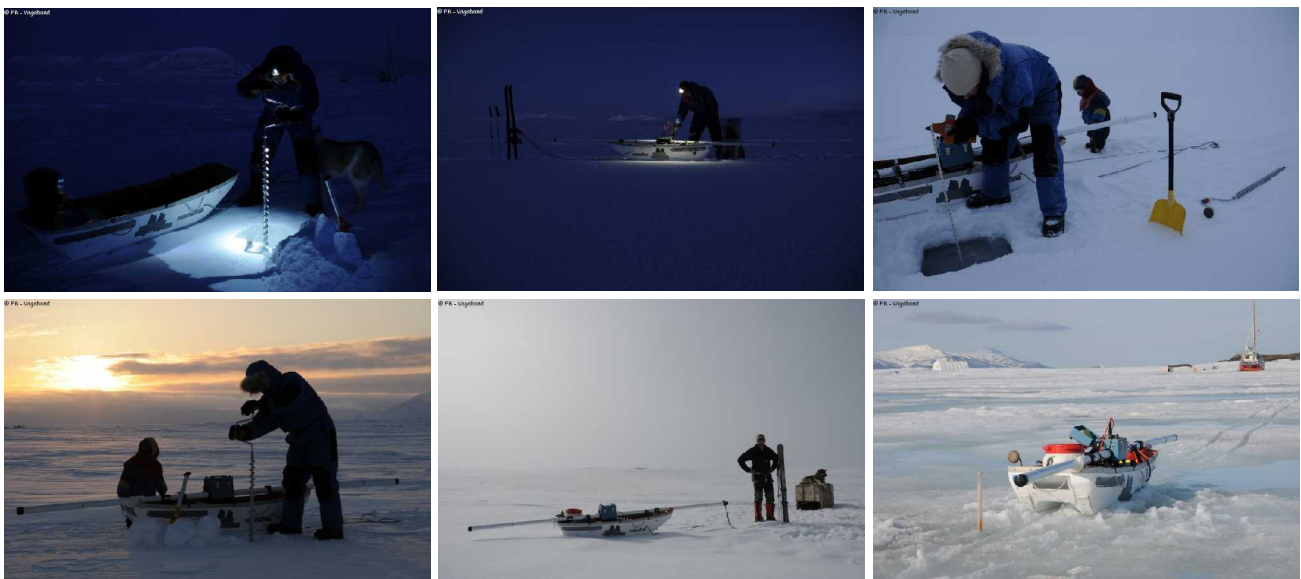
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Daily reports: weather reports have been done daily, and sent to Torgeir Mørk at Værtjenesten Svalbard Lufthavn in Longyearbyen (svalbard@met.no). He was then sending very useful local weather forecast to Vagabond.

Météo France station: an automatic weather station, MINOS nb 10, from Météo France, has been set up on board Vagabond in spring 2008. It is sending position, temperature and pressure : <http://www.shom.fr/cgi-bin/meteo/dataplotv.cgi?wmo=MINFR10&type=1&sns=ap> http://www.meteo.shom.fr/cgi-bin/meteo/dataplot_surfmar.cgi?wmo=MINFR10&type=1&sns=at

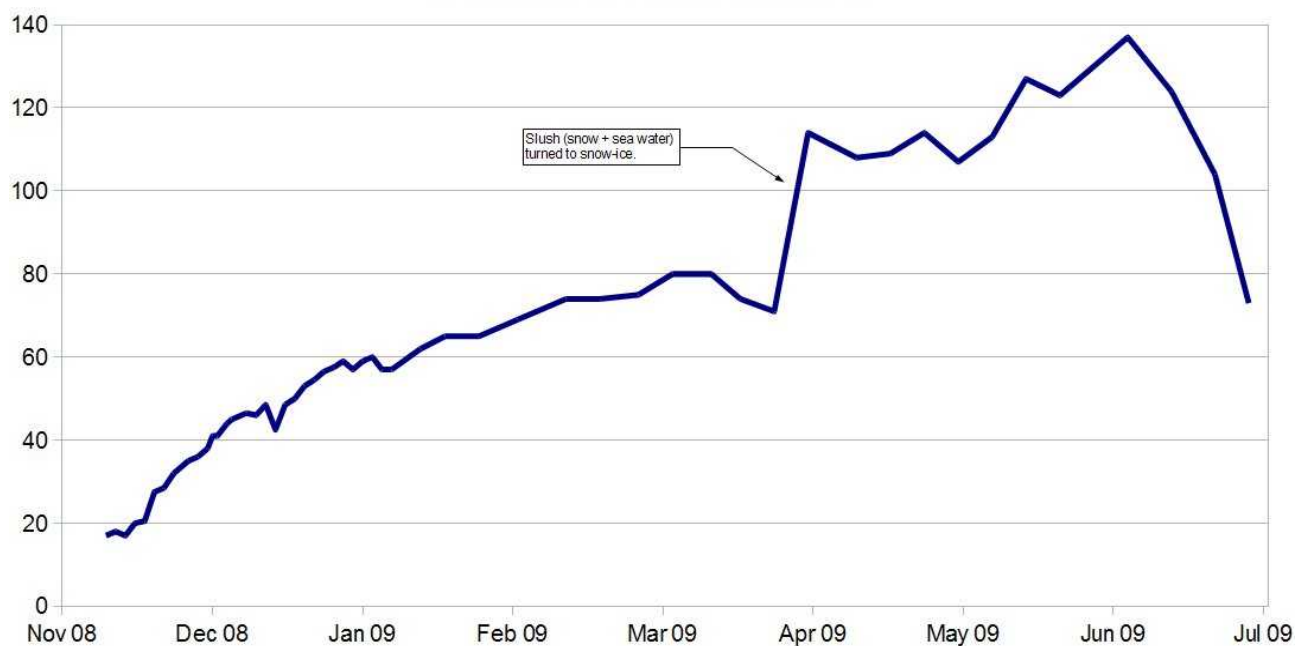
Ice thickness:

Sea ice thickness has been measured once to 3 times per week from 10th November 2008 to 4th July 2009, as well as snow thickness and ice free board. 2 profiles of 200 meters long were monitored all along the period, using an EM31 (electromagnetic sounder), and a 2" hand ice drill for calibration data. One profile was near Vagabond, the other one at 2 km from the boat, in the middle of Inglefieldbukta.



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Ice thickness at Vagabond (cm)



Radiometers, spectrometers and snow thickness:

Radiometers and a snow depth sensor have been set up on a mast, on pack ice, at about 100 meters from Vagabond, from 1st March to 8th July 2009:

- uplooking IR radiometer (PIR)
- uplooking spectral pyranometer (PSP)
- downlooking IR radiometer (PIR)
- downlooking spectral pyranometer (PSP)
- acoustic altimeter (SR50)
- uplooking NPI-TriOS spectrometer (from 15th April 2009)
- downlooking NPI-TriOS spectrometer (from 15th April 2009)
- under-ice uplooking NPI-TriOS spectrometer (from 7th May 2009)

Snow observations were done every few days for better understanding of radiometers data.



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Ice cores:

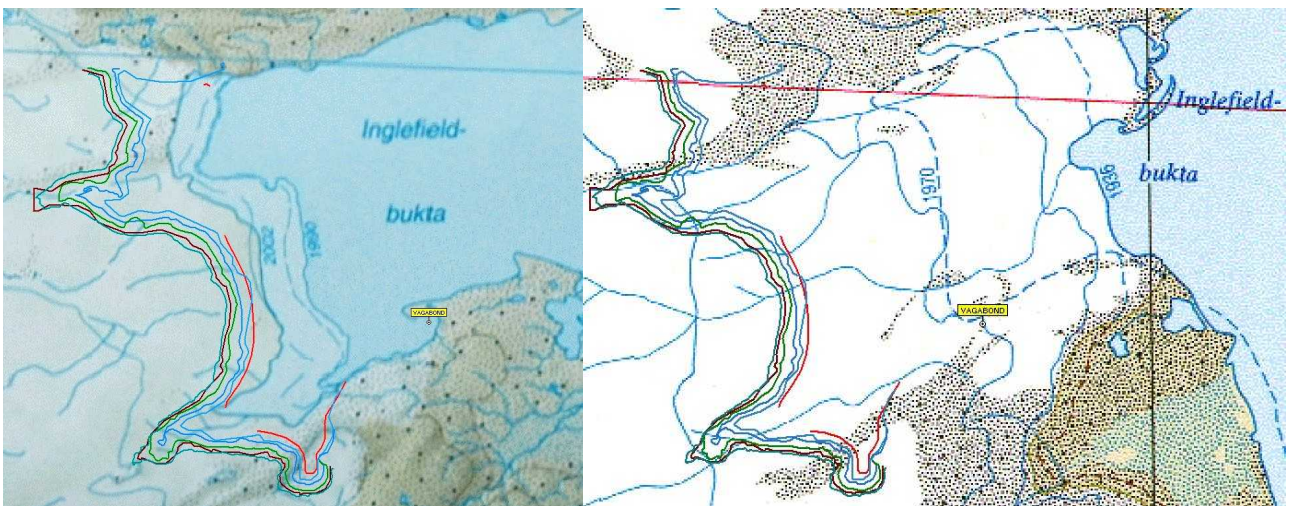
About 80 ice cores have been sampled from 23rd February to 27th June 2009. 10 to 15 cm of the bottom of each ice core (14 cm diameter) were sent to France for biomass studies.



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Glacier front:

Inglefield and Nordsyssel glaciers fronts have been surveyed in October 2004 (red line) and then every year in April from 2005 to 2009 (without request from any laboratory). The average retreat of the front is about 50 meters per year.



Map in the background : C10 Braganzavågen 2006 (left), C10 Braganzavågen 1983 (right) © Eric Brossier

Tides:

Tides could be monitored with pictures series. It appears that tides are about 40 minutes late on Kvalvågen tidetable, with a 50% higher range between low water and high water, up to 150 cm at spring tides.

Observations and experiments done with other scientists are not detailed in this report.

List of previous annual reports sent to the Governor:

- winter 2007-2008, 30/09/08, by Eric Brossier (report_gov_storfjord2007-2008.doc)
- winter 2006-2007, 10/02/08, by Eric Brossier (report_gov_storfjord2006-2007.doc)
- winter 2005-2006, 24/08/06, by Franck Delbart (report_gov_storfjord2005-2006.doc)
- winter 2004-2005, 22/09/05, by Franck Delbart (report_gov_storfjord2004-2005.doc)

Copy of this report sent to: Jean-Claude Gascard (LOCEAN / Damocles, Paris),
Franck Delbart (IPEV, Brest),
Jarl Pedersen (Norwegian Polar Institute, Longyearbyen)
Sebastian Gerland (Norwegian Polar Institute, Tromsø)



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See more pictures on www.vagabond.fr



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