

Shackleton Bjerg Expedition 2002

DPC Ref No: 532-422

Logistics Report

Summary

The Shackleton Bjerg Expedition 2002 was in N.E. Greenland from 29th July until 28th August. Access to the icecap was obtained by means of inflatable boat from Mesters Vig: to Narwhal Sund, Kempes Fjord and so to the head of Dickson Fjord. The group reached the icecap at Concordia Plads, having ascended the Langenthaler Glacier and crossed the ice-free area by the Buri Søer. Shackleton Bjerg was then reached by ski with sledges and climbed on 11th August. Some other peaks were climbed in the area, including Verena Horn before returning to Mesters Vig by the same route. 29 days were spent away from Mesters Vig in the field. The weather conditions were reasonable with a couple of days of strong winds and some poor visibility while climbing the higher mountains. The group collected botanical samples from the ice-free areas adjacent to the icecap at 1350 m in accordance with the terms of the permit. The group was well equipped with food, camping and boating equipment, survival suits, heavy calibre revolver, satellite phone, HF radio and ELT beacon. There were no accidents or safety incidents. All waste was returned to Mesters Vig for disposal.



Shackleton Bjerg from the bottom of the Verena Glacier

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Date: December 2002



Concordia Plads from the Buri Søer

The outward route goes to the right of the crevasse field and then out to the centre of the picture before turning right towards the Verena Horn.

Members of the Expedition

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Occupation: Project Manager

6 prior expeditions to NE
Greenland: 3 to Stauning
Alper, 3 in Fjord region.
One to Arctic Norway, one
to Svalbard.



L to R: Mal, Katie, Ian & John

Malcolm John McMillan, Department of Mathematics, University of Edinburgh.
UK Citizen, DoB 11 Oct 1980 Extensive mountaineering experience in UK,
Norway and European Alps – climbing to AD+, teaching alpine skills. British
Association of Ski Patrollers Mountain 1st Aid certificate.

Katherine Eirian Steen, 48 Mill Way, Grantchester, Cambridge CB3 9NB. UK
Citizen, DoB 17 May 1982 Medical student, University of Edinburgh.
Extensive mountaineering experience in UK, European Alps and Himalayas.
Mountain leader training. Extensive ski experience in European Alps.

Ian Campbell Steen, 48 Mill Way, Grantchester, Cambridge CB3 9NB. UK Citizen,
DoB 20 October 1945 Extensive ski-mountaineering and rock climbing
experience in Sweden, Norway, UK, European Alps Expeditions to Himalaya
(1978), NE Greenland 1976. First Aid & Mountain leader certificates

Access to Area of Operation

The expedition members availed themselves of the DPC charter arrangements to fly to and from Mesters Vig. Three flew from London and John Thorogood from Stavanger, via Oslo. Meeting at Keflavik and thence by AirIceland scheduled flight to Akureyri. The group flew to Mesters Vig via Constable Pynt.

Expedition Activities

After assembling the airfreight equipment and retrieving boats from storage in Expeditions Hus and preparing fuel for the journey, the Group were transported by DPC lorry to Nyhavn, where the boat was assembled and the group set off to Dickson Fjord on July 30th.

Details of the daily activities of the expedition are given in Appendix A. Weather observations were taken twice daily, in the morning and evening. The readings of pressure, temperature, wind and cloud conditions at the different locations and altitudes are presented in Appendix B. Katabatic winds were encountered in the

region of Shackleton Bjerg, these featured strong winds at camp level with less strong winds high on the mountain.



Langenthaler Base Camp

The camp is to the left of the river and the route onto the glacier angles up and left towards the skyline, 350m above the fjord.

The area of operation was as follows:

- Departed Nyhavn for Dickson Fjord on 30th July, 2002.
- Boated at an average speed of 6 kts up Kong Oscar's Fjord, Narwhal Sund, Kempes Fjord and to the head of Dickson Fjord by 1st August; with overnight stops at Kirschdalen and Kap Hedlund.
- Prepared equipment at bottom of Langenthaler Glacier and carried gear onto the glacier in two loads.
- Traversed the Langenthaler Col in indifferent weather. Camped in the ice-free area by the Buri Søer and carried gear to the edge of Concordia Plads on two loads.
- Commenced the sledge journey across Concordia Plads on 7th August, camping near Appenzeller Nunatak, on the Hissinger and Verena Glaciers, reaching the foot of Shackleton Bjerg on 10th August.
- Climbed Shackleton Bjerg on 11th August.
- Climbed other peaks locally during the following four days, including Verena Horn on 16th August.
- Departed Verena Gl on 16th August, camping on Hissinger Gl and Concordia Plads, reaching the edge of the ice on 18th August.
- Carried gear to Langenthaler Gl in two loads. Traversed back over Langenthaler glacier, with a stop for a short ski tour on the col in poor weather. Reaching the fjord on 22nd August.
- Collected second load of equipment from the glacier, sorted equipment and packed boats. Departed the base camp on 23rd August.
- Stopped overnight at Kap Hedlund and spent a day hill walking at Kirschdalen on 25th August.
- Boated back to Mesters Vig with overnight stop at Kap Pedersen
- Reached Mesters Vig on 27th August. Sorted out, washed and cleaned boating equipment. Packed away in Expeditions Hus. Prepared kit for return to UK
- Departed Mesters Vig on 29th August by direct flight to Reykjavik.
- The party returned to the UK on 30th August.



Dickson Fjord

The group travelled in the area of operation on foot or by boat. The total distance travelled on foot or ski was about 200km. The total boat distance travelled was 173 nautical miles for a total fuel consumption of 220 L of fuel. Average speed was 6 kts while towing a Metzler Maya inflatable boat. The log of the boat trips is attached at Appendix C. The total distance travelled on foot or ski was about 200km.

Food Supplies

The team took 32 days of food of which 23 were lightweight rations for use while away from the boats. Dehydrated main meals were obtained from specialist mountain food suppliers. The remainder of the food: cereal, tinned fish, chocolate, nuts and beverages were purchased from supermarkets in the UK and packed into 60L plastic barrels obtained from Kaiser and Kraft, Watford UK. Typical rations consisted of muesli each day for breakfast with a hot drink: tea or chocolate. Lunch was of a snack: tinned fish, nuts, dried fruit and a chocolate bar. Evening meal consisted of a soup, meat and pasta or de-hi main dish and a dessert of dried apple and custard to finish. Calorific value of the ration was about 3600kcal per day.

Personal Equipment

The team took with them normal personal wear and camping equipment for winter mountain conditions, anticipating generally dry weather, with occasional rain and snow and temperatures from +5 to -15 degC. Cooking was performed on one MSR-Dragonfly pressure stoves powered by kerosene. It was also used to melt snow for water. On average, 11 to 12 litres of water were melted per day once on the icecap and the fuel consumption totalled 7.5L of which, 6L were used over 12 days of melting ice and 1.5L during the seven days where water was available.

The lightweight tents were equipped with valences and were easily secured with rocks or snow blocks against high winds. Near Shackleton Bjerg wind walls were built to protect the tent during windy conditions.

Standard ski-mountaineering equipment was taken. One person used Nordic steel edged waxless skis with Volle three-pin cable bindings and Asolo telemark boots. The others used touring skis, with skins, Berwin Sherpa plastic bindings and plastic or leather alpine climbing boots. Two 50m 9mm climbing ropes, harnesses, ice screws, pullies and prusik loops were taken for crevasse rescue, together with crampons and ice axes.

Sledges were Fjellpulken or Snowsled one 1.5m long and three around 1.2m long, each with shafts. All were equipped with rigid shafts. One member employed a purpose-made harness to pull the sledge, the others hooked the shafts to their climbing harness or rucksack,

Boating Equipment

The expedition employed a Bombard Commando C5 inflatable boat with Yamaha 30hp and 4.5 hp (emergency) outboard motors. The emergency engine was tested on both legs of the journey.

Fuel was un-leaded motor fuel obtained from Iceland in 200L drums mixed 50:1 with 2-stroke oil, of which 70L was ready-mixed, being left over from the 2000 season. 270L of fuel was carried in 11x22L plastic cans plus a 25L boat tank. Depots of jerry cans were made at Kirschdalen and Kap Hedlund, with an equal number of full and empty Jerry cans to minimise the load and space taken up in the boat.



There was insufficient space in the C5 with four people to carry all the food equipment and fuel. A Metzler Maya inflatable boat was borrowed from the British North East Greenland Project. This was towed by the C5 and was used to carry the sledges, skis, boat rollers and three or four plastic jerry cans. Trial and error showed that the safest and most efficient way of travelling was at about 5.5 to 6.5kt with the Maya on a short towrope, about 2m.

At the end of the expedition the engines were winterised and stored with the boat in the Expedition Hus at Mesters Vig with permission from Sirius.

Each member of the team was equipped with a helicopter survival suit and a life jacket.

Radio Equipment

The expedition was granted a permit for and took a Yaesu HF90 HF lightweight radio for listening in to the daily Sirius radio calls. The radio was powered with rechargeable NiCd batteries that were kept topped up with a solar panel. For emergency use they took a McMurdo Fastfind personal emergency locator beacon that radiates on 406MHz and which was registered both with the Danish Radio Administration as well as the UK EPIRB database. They also took an Icom IC2 air band transceiver. In addition, the team had a Motorola Iridium Satellite telephone to keep in touch with the UK and Mestersvig in emergency. This unit was re-charged with a Uni-Solar 5W solar cell. Re-charging took about 4 hours on a sunny day but proved problematical during cloudy periods.

Due to its weight and poor performance at sea level, the HF radio, aerials and batteries were not taken onto the icecap. The team preferred to rely upon the satellite telephone. This proved to be a disadvantage since the group from the University of Cambridge attempted get into contact to seek guidance as to the best route off the ice at Concordia Plads and were unable to do so.

Equipment Weights

A full weighing of all the equipment was not carried out. It is known that in addition to each person's 20kg baggage allowance, 303kg were freighted in and 161kg returned to the UK. This difference would correspond with the 142 kg of food – 4 people for 31 days.

Item	Weight (kg)
4 expedition members	300.0
Outboard motor - 30hp	54.0
Emergency outboard - 4.5hp	20.0
Food – 4 people, 32 days	142.0
Camping, cooking, climbing	55.0
Personal Equipment	80.0
Skis, sledges	109.0
Bombard C5 boat	116.5
Metzler Maya (approx)	50.0
Boat equipment	20.0
270L Boat fuel + 19L kero	210.0
Total Weight – start	1156.5
Total Weight – end	849.0

Firearms

The expedition leader has a permit to carry a Smith and Wesson 629 model .44 Magnum revolver. There were no occasions requiring its use other than basic familiarisation and practice at the start of the expedition. Transfer of the weapon from Oslo to Mesters Vig was without incident.

The Customs at Keflavik arranged for its transport to Akureyri and the same happened on the way back.

Health and Safety and Rescue

There was no illness reported by any of the expedition members. There were no safety incidents encountered during the boating, sledging or climbing activities. Insurance cover was obtained through the British Mountaineering Council.

Climbing Report

The summit ridge of Shackleton Bjerg.

On 11th August 2002 we made what is believed to be the first unsupported ascent from sea level of Shackleton Bjerg (72deg 53 min 46.41 sec N, 28 deg 46min 44.51 sec W, height 2940m map, 2803m GPS), by its southwest ridge.



Having skied to the bottom of the snow slope, which led onto the southwest ridge, we donned crampons and set off until we reached the crest of the ridge. After an initial steep icy section, which we bypassed on the right, the ridge eased in angle and we made steady progress over snow and scree. Nearing the summit pyramid, we could see wisps of cloud capping the final slopes as a strong icy wind tore in from the north.

Ahead the ridge became steeper and narrowed to a final snowy arête, which led onto the summit. Breaks in the cloud gave spectacular views of the surrounding peaks and out over the ice cap. We descended by the same route to pick up our skis.

On 12th August we made a ski-ascent of a small snowy peak to the south of Shackleton Bjerg in bad weather. Pt 2400 on the map, location 72 deg 51 min 36.78 sec N, 28 deg 46 min 31.90 sec W, GPS height 2340m Poor visibility, strong winds and alternating patches of ice and powder made for interesting skiing for the less experienced members of the party!

On 13th August we made what is believed to be the second ascent of a peak to the East of Shackleton's Bjerg. Leaving late in the morning after a spell of bad weather, we skied for an hour to reach the base of the south ridge. We then swapped skis for crampons and headed up the ridge through freshly fallen powder. The rocky summit gave superb views of Shackleton Bjerg. We descended by the same route. With no height marked on the map, this peak was located at 72 deg 54 min 21.63 sec N and 28 deg 39 min 57.16 sec W, GPS height 2554m.

On 14th August we skied for two hours to reach the Gultinderne, a collection of peaks to the southeast of Shackleton Bjerg. Initially we attempted a ridge that led to a fine rocky peak, only to be thwarted by the severe wind chill, which made it too cold to tackle the rocky sections without gloves on. We then turned our attention to the easternmost peak, which sported an impressive rock wall. Skiing round to the far side of this peak revealed easier angled snow slopes. These led straightforwardly to the summit where we were again rewarded with beautiful views. Again, with no height marked, this peak was located at 72 deg 52 min 27.28 sec N, 28 deg 35 min 13.04 sec W, GPS altitude 2394m.



Verena Horn from NE

On 16th August we made what is believed to be the first unsupported ascent from sea level of the Verena Horn. We climbed the peak via its eastern flank – a concave icy slope that culminated in a rocky section near the summit. Unfortunately low cloud spoiled what would have been excellent views out over the ice cap. We descended by the same route. Marked, ambiguously, as 2400m, we recorded the position as: 72 deg 45 min 38.03 sec N, 28 deg 44min 2.91 sec W, GPS height 2320m.

Remarks on Mapping

We took maps and aerial photographs; see pages 11 and 12 below. Both were obtained from the KMS (Royal Danish Mapping Agency) in Copenhagen. The aerial photographs gave good detail on the ice but indicated a much lower snow level that

we actually encountered. They did reveal a large melt feature flowing southeast from the Verena Horn. When we reached the area we found that it, indeed, was a large melt stream that would have been all but un-crossable during the height of the summer melt. However, at the time that we crossed it, in both directions, it was well frozen and drifted over with snow.



Opposite: the rock pillar of Kap Robert in Dickson Fjord is 1497m high.

The detail of the nunataks and inland ice on the 1:250,000 maps, principally 72Ø3 was very inaccurate. For example, the Appenzeller Nunatak was found to be over 5km in error and the positions of the peaks round Shackleton Bjerg were all about 2 to 3 km out. These errors are not surprising since they were based on surveys made in the 1930s and have not been updated since the advent of satellite navigations systems. A ground-truth baseline was established in this region in the late 1980s using the Transit satellite system; these constitute the basis of the new interactive map of Denmark at a scale of 1:500,000 as well as current aeronautical charts such as those found in the Jeppesen FliteStar software.

Botanical Collection

No vascular plants were found on any of the ice-free nunataks or rocks of the Shackleton Bjerg, Verena Horn, Gultinderne or Appenzeller Nunatak. Plants were collected, in compliance with the regulations stipulated in the permit granted to the expedition, in surrounds of Buri Søer 72°40'N 27°48'W 1350m. Geoffrey Halliday subsequently identified the plants, as follows:

- *Cardamine bellidifolia*
- *Cerastium arcticum* vac, vestitum
- *Draba arctica*
- *Festuca brachyphylla*
- *Lazula confusa*
- *Melandrium affine*
- *Papaver radicatum*
- *Phippsia algida*
- *Poa arctica*
- *P. glauca*
- *Potentilla hookeriana* subsp. *chamissonis*
- *Saxifraga cernua*
- *S. nivalis*
- *S. oppositifolia*

Not collected were: *Salix arctica* and *Campanula gieseckiana*. It is notable that *Phippsia algida* was found at its altitudinal limit.

Remarks on Fauna

No bear were seen. An arctic hare was seen at the foot of the Langenthaler. Few birds were seen in the ice-free area: a raven, one ptarmigan and a number of snow buntings.

Collection and Disposal of Waste

Human waste was buried. All other packaging and food waste was collected and returned to Mesters Vig for disposal. Tins and glass being sorted and placed in separate containers located at the base.

Historical Sites

No historical sites were visited except for the winter dwellings at Kap Lagerberg.

Recommendations

Some safety shakedown hours were missed. We assumed that we were all very experienced - which was true, but exercises to practice as a team would have been very useful. This could take the form of a crevasse rescue exercise on a suitable boulder or crevasse. Also we could have had more discussion on team management on the ice including precisely who had what bit of equipment for emergency sledge and ski repairs and how we should agree on detailed route finding over complex ground.

We did discuss various safety issues - including general first aid and cold injuries. Once on snow, we did discuss on how to pack and then use an ice axe both for walking and stopping a slip.

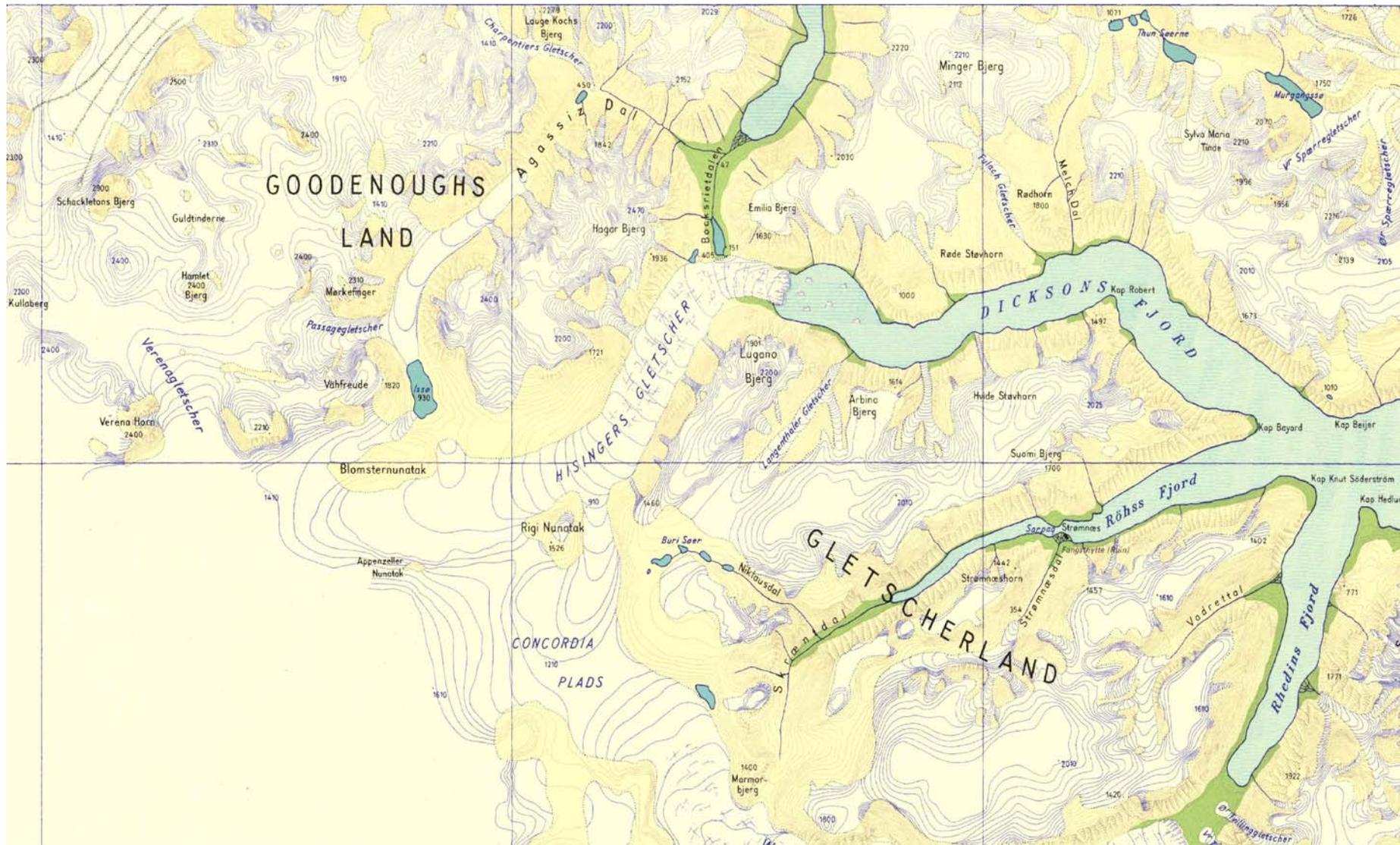
This sort of exercise and discussion can seem patronising to those who have been doing it for a long time, but protocols change as we become more safety conscious, ideas develop and equipment improves. For example ice axe protocol taught on mountaineering courses has changed in many respects over recent years, so it is useful to exchange experiences on what is now thought to be the best technique.

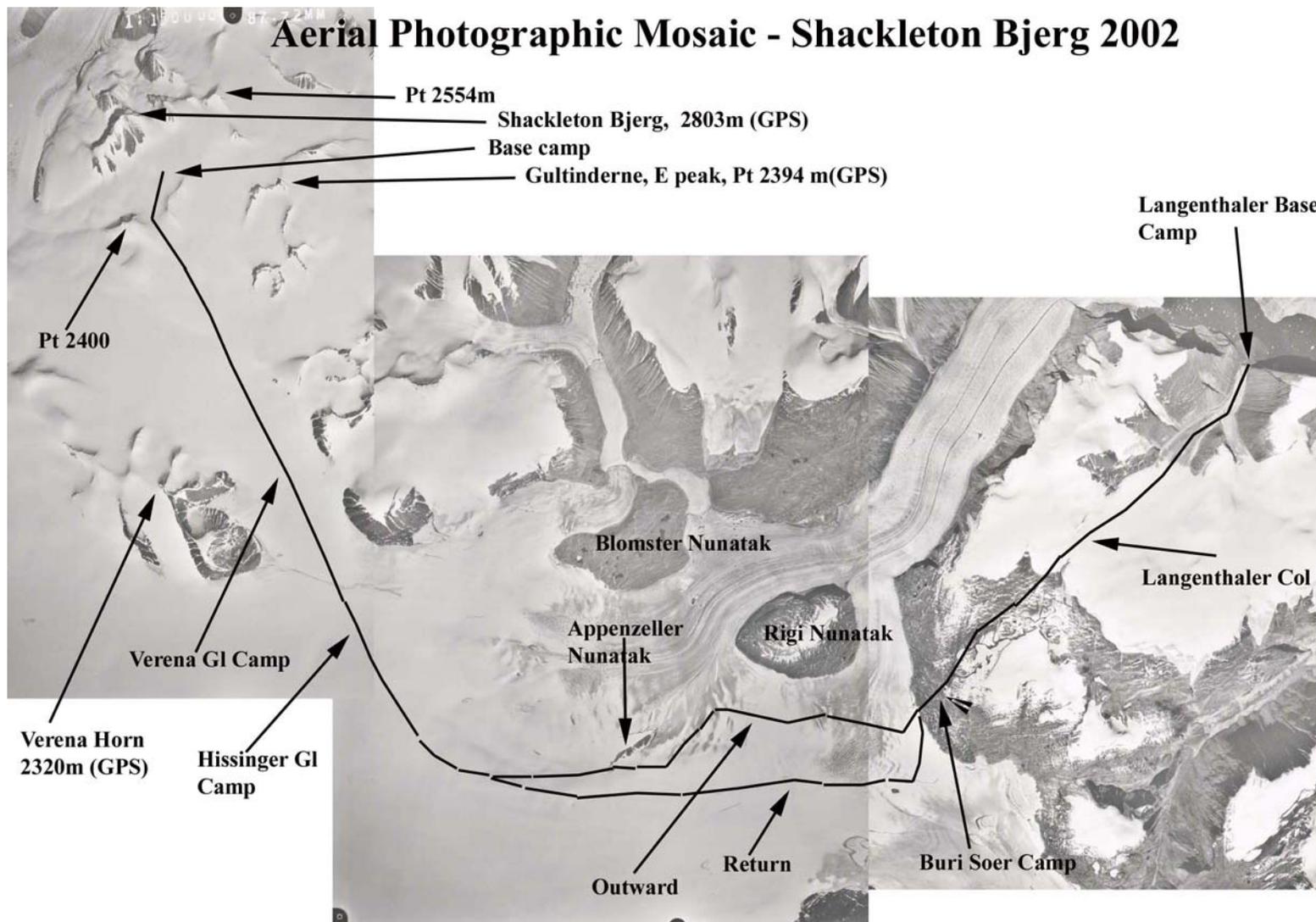
Other lessons include:

- Always use fresh supplies of kerosene. Those that have been in storage, especially in plastic containers, for any period will cause deposits to build up in MSR stoves
- Yeti gaiters, even with plastic boots would have been helpful to keep feet warm while skiing on the edge of the icecap, even in August. Even at that time of year, exposed skin gets very cold very quickly at altitudes of 1,600m.
- Have a plentiful supply of zinc-oxide tape for foot care.

Acknowledgements

The expedition thanks Mike Lea and the BNEGP for the loan of their Maya inflatable boat without which the journey would have been impossible. The Expedition thanks the members of Sirius and the DPC Logistics Platform at Mesters Vig for their assistance with loading and transporting the equipment between Mesters Vig and Nyhavn. The expedition would also like to thank Rab Carrington Ltd for their support in the provision of items of clothing and equipment.





Appendix A - Daily Log

Date	Location	Activity
28 July	Oslo-Keflavik	Travel to Iceland, stay in Akureyri at Hotel Bjorg
29 July	Akureyri-Hyhavn	Fly Akureyri - Constable Pynt - Mesters Vig. Sorted air freight equipment, prepared boat fuel, recovered boats and motors from Expeditions Hus. Transported equipment to Nyhavn. Camped at Nyhavn.
30 July	Nyhavn-Kirschdalen	Up at 07:00. Sorted food and equipment all morning. Made boat ready, loaded and away by 15:45 hrs. Arrived Kirschdalen at 19:45. Unloaded boats.
31 July	Kirschdalen-Kap Hedlund	Up at 07:00. Boats packed and sailing by 10:30. Good conditions, little current. Passed Polheimsdal by 13:30, reaching Kap Albert by 15:15. Short stop and then on to Kap Hedlund, arriving at 18:15. Lee shore landing, swamped the boats. Camped and dried out.
1 Aug	Kap Hedlund-Langenlthaler Base	Up at 07:00, underway by 10:00. Good calm conditions in Dickson Fjord. Reached Langenthaler camp by 14:00. Sorted out and cleaned boating equipment. Worked on mountain equipment.
2-Aug	Langenthaler Gl Carry No 1	Up at 07:00. Loaded up gear for first carry up the hill. Loads were very heavy, on the limits of safe carrying. Reached 890m altitude at 4.6 km up the glacier. Dumped the equipment, returned with the sledges. One lost ski pole, one broken ski tip and problems with sledge traces.
3-Aug	Langenthaler Base to Camp 1	Up at 07:00. Packed up and secured the boats and boating equipment. Carried final mountain load to the ice. Loaded sledges, adjusted sledge traces. Reached the dump at 13:45. Away again after 45 min, steeply up the glacier. Camped at 18:15 at 1260m on ice.
4-Aug	Langenthaler camp 1 to camp 2	Up at 07:00. A grey and cloudy day., Away by 09:35. One hour to cross a melt stream. Poor visibility, camped at 15:00. Worked on repairs to sledge traces and broken ski.
5-Aug	Langenthaler camp 2 to Buri Soer camp.	Snow overnight and during the morning. Finished work on sledge traces, away by 14:20. Off the ice at 15:30. Sorted out equipment for carrying. Made a dump with the sledges. 6.8km over rough ground. Reached a campsite by 19:15. Weather clearing slowly, occasional snow showers.
6-Aug	Buri Soer Carry	Up at 07:30, away by 09:10 for a reconnaissance of Concordia Plads. Away to recover the rest of the equipment by 10:00. Reached the dump at 11:45. Quick lunch and back to the lake by 15:00. Made a quick reconnaissance of the route down to the ice. Took one load of equipment down to the ice edge.
7-Aug	Buri Soer Camp to Appenzeller camp	Up at 07:00, away by 09:40 with final loads. At the sledges by 10:30 and away onto the ice by 11:30. Made slow progress over very hummocky ice below a large crevasse field. After lunch managed to make approx 2 km/hr towards the Appenzeller Nunatak. Clear sky. Stopped at 18:05 after 13.1 km.
8-Aug	Appenzeller camp to Hissinging Gl	Up at 07:00, away by 09:40. Hard work with crampons. Reached the top (SW) end of Appenzeller Nunatak at 13:00, 1540m elevation. Carried on west into a large snow bowl with minor crevasses before turning NW towards Verena Horn and then NNW directly towards Shackleton Bjerg. Camped at 18:15, 13.4 km. Spent 3 hrs melting snow for water.
9-Aug	Hissinging Gl to Verena	Woke at 07:00. -5degC, 15kt wind, -20 degC wind chill. Wind dropped, got up at 11:30, away by 13:05. Crossed the large Verena Gl melt

Date	Location	Activity
10-Aug	Verena Gl to Shackleton Bjerg Base Camp	feature. Well frozen and partially drifted over. Good progress on excellent snow. Stopped at 19:00 on the Verena Gl at 1800m after 12km. Woke at 07:00, snow and low cloud. Up at 09:30, away by 11:45. Made 11.9km with ascent to a col at 2200m. Good progress on good snow. Camped at 18:00 hrs beneath Shackleton Bjerg.
11-Aug	Climbed Shackleton Bjerg	Awake at 07:00, away by 09:15. Skied to bottom of SW ridge. Ascended SW ridge, crossed 3 boulder fields. Steep snow and arrived at the summit at 14:00. Descended by the same route. Arrived at the tents by 17:15 just as the worsening weather turned into a storm. Build wind walls from snow blocks round the tent, inside by 18:15.
12-Aug	Climbed Pt 2400 to SSW of S'Bjerg	Awake at 07:00. Initially, a day of sunshine and snow showers. Set off at noon to ski to Pt 2400 during the afternoon. Whiteout at top, GPS developed a fault. Back to camp by compass and dead reckoning. Further snow & low cloud returned later.
13-Aug	Climbed Pt 2554 to E of S'Bjerg	Woke at 08:00, weather still foul. Considered courses of action. Weather cleared at 11:00. Set off after lunch, at 13:00. Skied to climb a peak to the E of Shackleton Bjerg. Climbed Pt 2554 by snowy south ridge. Fine ascent, cloudless day but cold NNW wind, 11km for the day.
14-Aug	Climbed Pt 2394 On the Gultinderne	Woke at 07:00, off by 10:00. Another cloudless day. Skied to Gultinderne. Climbed the easternmost summit, Pt 2394. Back to camp by 18:00, 12km for the day.
15-Aug	From S'Bjerg base to Verena Gl	Woke at 07:00, dug out half buried tents. Struck camp and away by 11:00. Very cold and strong NNW wind. Lunch at 13:00, good sledging downhill. Crossed the tracks of the Cambridge Expedition. Slow progress across the flat section of the glacier to the bottom of the Verena Horn. Arrived at campsite by 15:15 after 11.3km.
16-Aug	Climbed Verena Horn, to Hissingner Gl	Woke at 07:00, away up Verena Horn by 09:45. Skied up into the steep E-facing snow bowl to the top of the snow and then a short scramble up the remaining scree to the summit by 11:00. Weather indifferent with cloud just above the summit elevation, flat light and poor visibility. An entertaining ski back down the snow bowl and back to the camp by noon. Away from camp by 12:45 after lunch. Sledged until 18:00 after 14.1 km.
17-Aug	Hissingner Gl to Concordia Plads	Up at 07:00, away by 09:20. Headed due south to a turning point in the big snow bowl, then contoured past the Appenzeller Nunatak. Continued straight for the small ice cap at the head of Skraentdal. Numerous small crevasses intersecting our track. Camped at 17:00 after 19.1 km.
18-Aug	Concordia Plads to Buri Soer camp	Up at 07:15, very cold NNW wind. Away by 09:30. The last 5km of ice was hard going. Very hummocky and numerous frozen melt streams. Off the ice by 12:35. Brew. Set off up the hill with the first load at 14:30. Met up with the Cambridge Expedition at the campsite. Went down to the ice edge and recovered the 3 second load. Camped and briefed the Cambridge team on route down Langenthaler Gl.
19-Aug	Buri Soer camp & carry 1.	Up at 07:15, away by 09:30 and to the edge of the Langenthaler Gl by 12:30. Lunch and returned to camp by 14:45. Took the rest of the day botanising, sorting equipment, repairing and cleaning kit.
20-Aug	Buri Soer carry 2 to Langenthaler Col	Up at 07:15, struck camp and away by 09:45. Reached the ice edge by 12:00. Overcast day. Had lunch. Set off up the ice at 12:35, very steep and hard work. Reached the col by 14:00. Pitched camp. Three go for a short ski tour to the east. On remains in camp cleaning stove and melting water.
21-Aug	At Langenthaler col, local ski tour	Overcast most of the day. Occasional breaks in the cloud at noon and 4pm, light snow during the afternoon. Skied up onto the ridge to the west overlooking the Hissingner Gl, vague glimpses through the mist.

Date	Location	Activity
22-Aug	Langenthaler Col to Base Camp	Slow clearance of the cloud during the day. Up at 08:00, camp struck by 10:15. Good progress downhill turned slow after 5km. Removed skis when it became too dangerous to ski with the loaded sledges, continued on foot steeply down the ice, through the icefall and down the lower section to the snout by 15:45. Roped sledges off the ice. Made a dump and took one load down to the camp. Boats in good condition.
23-Aug	Langenthaler Base to Kap Hedlund	Up at 08:00, off by 08:15 for second load of equipment. Struck camp, sorted kit and packed boats. Off at 2pm and arrived at Kirshdalen at 17:30 after boating on calm water.
24-Aug	Kap Hedlund to Kirschdalen	Up at 07:30 and off at 09:45. Good run to Kap Albert with very light wind. Narwhal Sund was calm. Lunch at Kap Ritter Knoekten. Arrived Kirschdalen at 16:35. Cloudless day.
25-Aug	Hill walking near Kirschdalen	Up at 08:00, away by 10:00. To Pt 1153m and returned by circular route to SW, S and then Kap Lagerberg. 13.3km for the day.
26-Aug	Kirschdalen to Kap Pedersens	Up at 08:30, away by 11:10. Arrived at Kap Pedersen 12:35. Camped, local walks.
27-Aug	Kap Pedersens to Nyhavn & Mesters Vig	Up at 07:30, away by 10:10 from a barely sheltered lee shore. A choppy run down to Nyhavn, confused sea with a risk of swamping. Arrived at Nyhavn at 12:40. Lunch and unloaded boats. Had a brew and was picked up by the truck at 15:00. Washed the boats and sorted out gear in Expeditions Hus.
28-Aug	Equipment cleaning at Mesters Vig	Up at 07:45, folded boats, sorted out fuel, winterised the engines. Packed the kit in the store, tidied the store room. Prepared kit for return to the UK, packed same in blue barrels.
29-Aug	Packing and storage at Mesters Vig, fly to Reykjavik	Up at 07:00, completed final packing and storage lists for Forsvarets Vagt. Weighed kit. F50 arrived at 12:30. Take off at 13:40. Direct flight to Reykjavik, arrived at 15:45. Stayed at the Hotel Cabin, dinner at LA.
30-Aug	Fly from Reykjavik to Stavanger or London	Woke at 04:23. 05:00 airport bus. Left Reykjavik at 05:15, arrived KEF before 06:00. On time take off to Oslo at 07:35. Arrived 11:45 with 13:45 departure to Stavanger.

Appendix B - Weather Observations

Date	Time	Location	Elev m	Temp degC	Baro mB	Wind Kt/dir	Comments
29 Jul	23:00	Nyhavn	0	3.5	1020	5/SE	High cirrus, broken fog banks
30 Jul	09:00	Nyhavn	0	4.5	1024	Calm	High cirrus, broken fog banks
	21:00	Kirschdalen	5	6.7	1026	3/SE	High cirrus, mist round hills, slight rain
31 Jul	07:30	Kirschdalen	5	6.7	1028	3/SE	Solid stratus at 1000 ft, light rain
	20:45	Kap Hedlund	3	9.8	1028	5/NE	Clear sky, mist cleared at Kap Albert.
1 Aug	07:15	Kap Hedlund	3	9.6	1029	Calm	Isolated stratus, broken cirrus, hazy sun
	19:00	Langenthaler Base Camp	15	8.6	1026	Light & variable	Isolated cirrus, hazy sun
2 Aug	07:15	Langenthaler Base Camp	15	8.3	1030	Light & variable	Cloudless
	18:30	Langenthaler Base Camp	15	8.5	1032	5/SW	Isolated fair weather cumulus
3 Aug	07:30	Langenthaler Base Camp	15	9.5	1033	Calm	Thin high cirrus clouding over rapidly during morning.
	19:30	Langenthaler Camp 1	1260	2.0	1025	3/SW	Overcast 8/8/alto stratus
4 Aug	07:00	Langenthaler Camp 1	1260	1.7	1021	Calm	Overcast at 1500m, recent light snow.
	19:00	Langenthaler Col	1610	-0.7	1016	5/NE	Whiteout, occasional light snow.
5 Aug	07:15	Langenthaler Col	1610	-1.0	1010	5/NE	Whiteout, light snow, 4" overnight
	22:30	Buri SØ Camp	1351	0.8	1007	6/NE	Occasional snow showers, overcast with some breaks
6 Aug	08:30	Buri SØ Camp	1351	0.1	1008	3/S	Cloudless
	19:00	Buri SØ Camp	1351	3.8	1012	11/W	Cloudless
7 Aug	07:00	Buri SØ Camp	1351	-0.6	1017	5/S	Cloudless
	19:00	Concordia Plads	1285	0.8	1018	7/W	Cloudless
8 Aug	09:00	Concordia Plads	1285	-0.8	1020	5/SW	Cloudless
	21:00	Hissingner Gl Camp	1580	-2.4	1020	7/W	Broken cirrus to S & E. -5 degC at midnight
9 Aug	07:30	Hissingner Gl Camp	1580	-5.0	1019	15/NW	High overcast, -20 degC wind chill
	21:00	Verena Gl Camp	1805	-5.0	1017	7/NW	Depression to SE, broken cirrus
10 Aug	09:30	Verena Gl Camp	1805	-5.0	1015	11/NW	Recent light snow, broken cirrus
	19:30	Shackleton Bjerg Camp	2130	-5.1	1014	7/NNE	Recent snow, broken alto stratus, clear to SW
11 Aug	08:30	Shackleton Bjerg Camp	2130	-5.5	1015	6/NNE	Isolated cirrus, solar halo
	18:00	Shackleton Bjerg Camp	2130	-4.5	1016	12/NNE	Overcast, snow, blizzard. Whiteout later
12 Aug	09:00	Shackleton Bjerg Camp	2130	-4.0	1016	5/NNE	Overcast, misty, light snow. Sunshine and snow showers
	18:30	Shackleton Bjerg Camp	2130	-4.5	1016	12/E	Overcast, cloudy with snow.
13 Aug	08:00	Shackleton Bjerg Camp	2130	-4.5	1014	Calm	Low cloud and occasional snow. Cloudless by 11:00
	18:30	Shackleton Bjerg Camp	2130	-3.3	1013	Light & Variable	Cloudless, strong northerly at head of valley

Date	Time	Location	Elev m	Temp degC	Baro mB	Wind Kt/dir	Comments
14 Aug	09:00	Shackleton Bjerg Camp	2130	-6.7	1015	Light & Variable	Cloudless, below -10deC at midnight
	18:30	Shackleton Bjerg Camp	2130	-4.6	1015	Light & Variable	Cloudless, isolated cirrus NNW
15 Aug	07:00	Shackleton Bjerg Camp	2130	-6.3	1015	Light & Variable	Scattered cirrus, occasional gusts at camp. (11:00: -6.3 degC, 18kt, -28 degC wind chill
	17:00	Verena Horn Camp	1920	-5.1	1018	10/NW	Scattered cirrus, brisk wind
16 Aug	08:00	Verena Horn Camp	1920	-3.5	1016	Calm	Overcast stratus at 2500m. Few breaks around noon
	18:15	Hissinger Gl Camp	1580	0.9	1012	Calm	Grey overcast, alto stratus at 2500.
17 Aug	07:30	Hissinger Gl Camp	1580	-1.8	1008	5/NW	Grey overcast, alto stratus at 2500. Clear to SW
	18:30	Concordia Plads	1340	1.0	1008	8/W	Broken overcast. Clear to W, cloud base 3000m
18 Aug	07:30	Concordia Plads	1340	-8.6	1003	11/W	Scattered cirrus, -22 degC wind chill
	18:30	Buri SØ Camp	1350	0.0	1004	Light & Variable	Broken alto-stratus, light snow.
19 Aug	07:15	Buri SØ Camp	1350	-0.4	1006	Calm	Broken cirrus
	18:30	Buri SØ Camp	1350	3.0	1011	5/NW	Scattered cirrus
20 Aug	07:15	Buri SØ Camp	1350	-2.5	1014	6/NW	Overcast cirrus
	18:15	Langenthaler Col	1625	-1.0	1015	Calm	Overcast alto-stratus, weak sun
21 Aug	07:30	Langenthaler Col	1625	-5.1	1016	Calm	Overcast, light snow, weak sun
	18:30	Langenthaler Col	1625	-3.2	1014	Calm	Overcast, light snow, occ. Sun
22 Aug	08:00	Langenthaler Col	1625	-4.6	1012	3/N	Thin cirrus overcast, clearing after recent snow.
	19:00	Langenthaler Base Camp	15	7.8	1017	Light & Variable	Broken alto stratus at 2000m
23 Aug	07:00	Langenthaler Base Camp	15	4.1	1021	Light & Variable	Overcast cirrus
	19:00	Kap Hedlund	2	8.6	1020	3/NE	Scattered cirrus
24 Aug	07:30	Kap Hedlund	2	7.6	1018	4/SW	Broken cirrus
	19:30	Kirschdalen	5	8.3	1012	4/SE	Cloudless
25 Aug	08:00	Kirschdalen	5	7.7	1011	Calm	Cloudless
	19:00	Kirschdalen	5	8.2	1011	6/SE	Isolated cirrus
26 Aug	08:30	Kirschdalen	5	7.9	1014	3/SE	Isolated cirrus
	19:00	Kap Pedersen	2	6.9	1013	6/SE	Broken cirrus
27 Aug	07:30	Kap Pedersen	2	5.4	1016	4/SE	Stratus at 800m
	21:00	Mesters Vig	15	4.7	1018	7/SE	Broken cirrus
28 Aug	08:00	Mesters Vig	15	4.7	1020	5/SE	Broken cirrus
	22:00	Mesters Vig	15	4.0	1018	Calm	High broken overcast
29 Aug	08:00	Mesters Vig	15	4.1	1018	Calm	High broken overcast

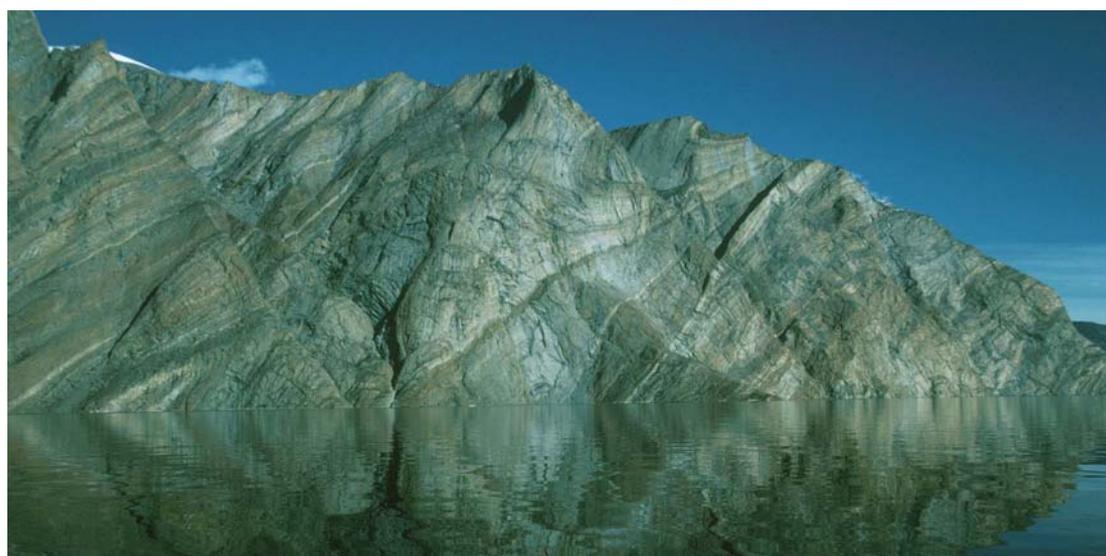
Appendix C - Boating Log

Date	From	To	Dist Naut – Mi Leg / Cum	Ave Spd Kts	Fuel Cons Litres	Notes Distances & speeds per GPS
30 Jul	Nyhavn	Kirschdalen	22.4 / 22.4	5 ½	35	Dep 15:45, arr 19:45. Attempted to plane, suffered high fuel consumption
31 Jul	Kirschdalen	Kap Hedlund	40.3 / 60.7	6	46	Dep 10:30, 20 min break at Kap Albert. Arr 18:15, lee shore
1 Aug	Kap Hedlund	Langenthaler Base	22.8 / 85.5	5 ½	23	Dep 10:00, arr 14:00. Chop across fjord, calm inside DF
23 Aug	Langenthaler Base	Kap Hedlund	22.7 / 108.2	6 ½	35	Dep 14:00, arr 17:30. Flat calm
24 Aug	Kap Hedlund	Kirschdalen	40.0 / 148.2	6 ½	46	Dep 09:45, arr 16:35. 40 min lunch stop. Generally calm, light wind.
26 Aug	Kirschdalen	Kap Pedersen	8.9 / 157.1	6 ½	15	Dep 11:10, arr 12:35. Smooth, dogleg round Akerbloms Ø to avoid shoals
27 Aug	Kap Pedersen	Nyhavn	16.2 / 173.3	6 ½	22	Dep 10:10, arr 12:40. Confused sea, risk of swamping
Totals			173.3		220	
			Fuel		1.23	litres per nautical mile
			Consumption			

Jerry Can Tally

29 Jul	1 x 25L boat tank & 11 x 22L red cans filled with 270L 50:1 petrol
30 Jul	1 ½ red cans emptied, cached at Kirschdalen with 1 full red can
31 Jul	2 red cans emptied, cached at Kap Hedlund with 2 full red cans
1 Aug	1 red can emptied into boat tank. Boat tank not quite full.

Half-way point: 4 ½ cans emptied, 7 cans cached.



Dickson Fjord - Recumbent Fold