Field season 2016

East GReenland Ice core Project (EGRIP) 2015-2020: Establishing the EGRIP drilling camp.

Prepared by Ice and Climate Group, NBI
for
The EGRIP project responsibles and participants and Danish and Greenlandic authorities.

Picture 1: The traverse has arrived at EGRIP on 27th May 2015.

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Copenhagen, 150416

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EGRIP 2016 introduction

This report provides international partners and Danish and Greenlandic authorities information on field activities in Greenland and it provides information to the participants on the conditions in Kangerlussuaq, and the field camp. It includes a summary of all individual travel dates and information on science programs. It also contains information and rules on environmental issues, work safety and disaster preparedness. All participants are assumed to be familiar with the content of this report.

In addition to general information, the report contains reference information of special interest for the Field Operation Managers and Field Leaders.

The authors wish to express sincere gratitude to the U.S. National Science Foundation and their logistical agent CH2MHill Polar Services and to the New York Air National Guard (109th) for their assistance and their supportive actions in 2015 in anticipation of the upcoming EGRIP field campaign. Without this foresight, little of what is planned for the 2016 season could be realized.

Copenhagen, April 8th, 2016

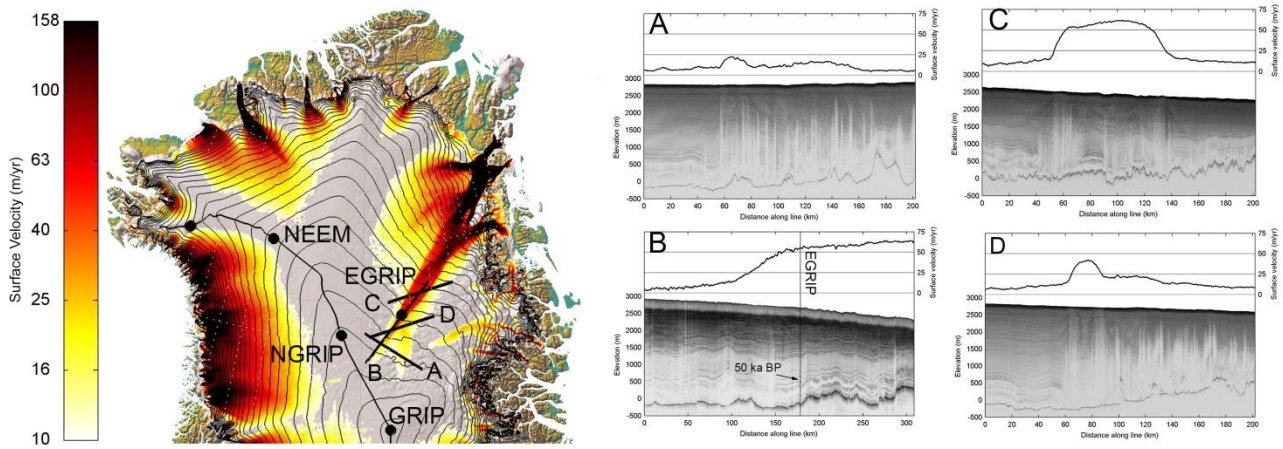
Lars Berg Larsen, Simon Sheldon, Dorthe Dahl-Jensen, Marie Kirk and J.P.Steffensen

The East Greenland Ice drilling Project (EGRIP)

EGRIP 2015-2020: Season 2016

Background:

The behavior of the fast flowing ice, ice streams through the Greenland ice sheet, is not well understood. The ice streams discharge ice into the ocean that accounts for half the loss of mass from the Greenland ice sheet and many ice streams have doubled their velocities during the last decade. There is a need to understand the processes of the ice streams before they properly can be included in ice sheet models which will enable predictions of future loss of mass from the ice streams and thus improve estimates of future sea level rise.



Map of Greenland and the North East Greenland Ice Stream (NEGIS). Velocities from RADARSAT synthetic aperture radar data are shown in color (Joughin, Journal of Glaciology, 2010) The deep drill sites and the main ice ridge are marked as well as the profiles (A-D) where radio echo sounding profiles have been recorded by aeroplane and surface velocities have been extracted from the map to the left. (B) Profile from University of Kansas 1999 (19990525_01_09, 19990525_01_10, 1990525_01_16) *showing that the ice thickness at the proposed drill site, EGRIP, is 2550 m and that climatic undisturbed layers are detected to 50.000 years before present. The surface velocity is 65 m/yr at the proposed drill site, EGRIP. (A,C,D) Profile from NASA Operation IceBridge 2013 using the University of Kansas depth penetrating radar across the ice stream clearly showing the margins disturbed by shear deformation (*profiles from 20120404_01_16 to 20120404_01_19 (A); *20130402_01_24 to 20130402_01_27 (C); 20130423_01_3 to 20130423_01_6 (D)) (figure produced by D.Dahl-Jensen)*

In North East Greenland, the biggest ice stream in Greenland begins right at the central ice divide and cuts through the ice sheet in a wedge shape to feed into the ocean through three large ice streams (Nioghalvfjerds isstrømmen, Zachariae isbræ and Storstrømmen). The onset of the ice stream on the ice divide is believed to be caused by strong melting at the base and the ice reaches velocities over 100 m/yr 200 km from the ice divide, but still 500 km from the coast where the ice is heavily crevassed. It is possible to find a site without crevasses, where the ice is flowing as an ice stream. Drilling an ice core through the 2550 m of ice reaching to the bedrock would allow us to reach the following goals:

-study the dynamics of the ice flow in an ice stream by ice rheology and deformation studies of the ice core.

-study the dynamics of the ice flow by borehole observations of basal sliding, borehole deformation, and basal water processes.

Besides from the ice dynamic goals the internal radio echos sounding layers traces layers that are more than 50.000 years old. The layers have been traced back to other deep ice cores in Greenland (P.Vallelonga et al, Preliminary glaciochemical and geophysical study of the Northeast Greenland Ice Stream (NEGIS), submitted to the Cryosphere). Climatic studies of this period and especially the present interglacial (the last 11.000 years), a period where records of high resolution chemistry and greenhouse gasses are not available from other Greenland ice cores a an important goal for the project:

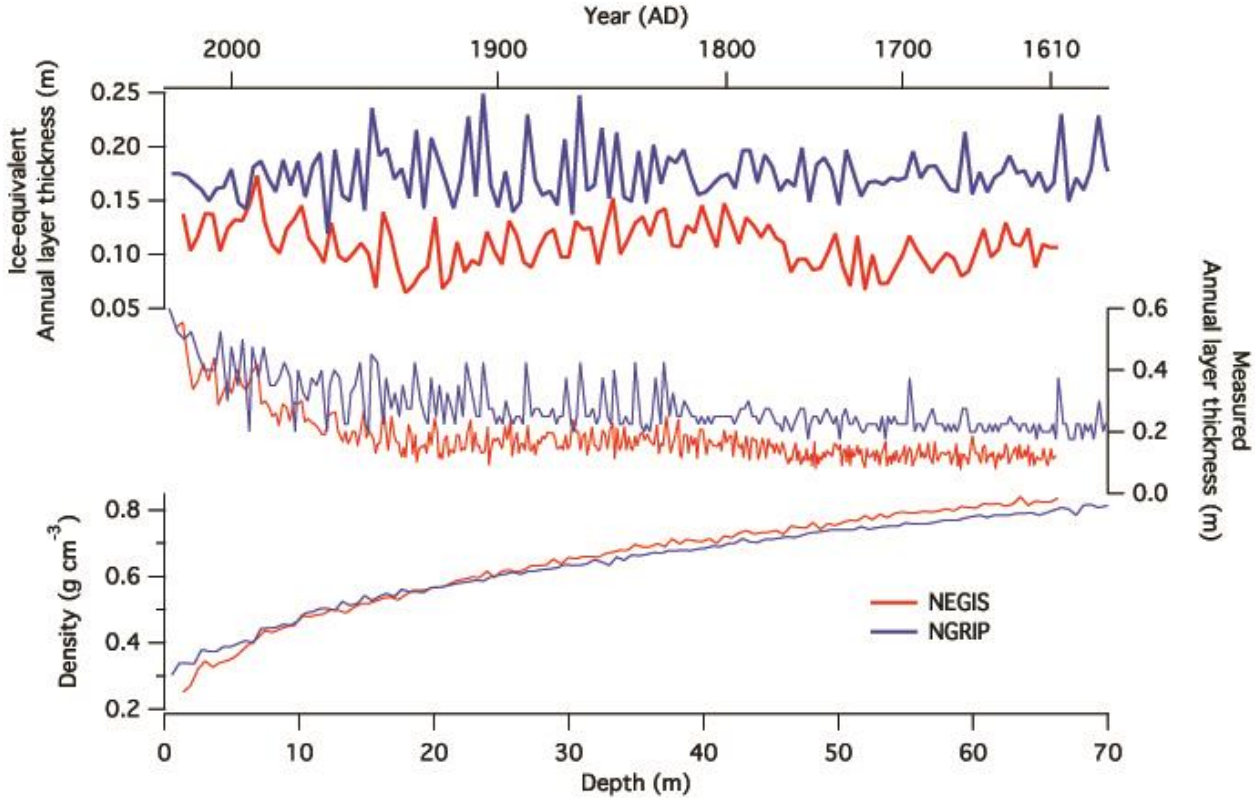
-high resolution climate records of greenhouse gasses, water isotopes and impurities through the last 25.000 years covering the onset of the present interglacial, the climatic optimum 8,000 years ago and the industrial period of the past two hundred years.

In 2012 a 67 m long pilot ice core was drilled in collaboration with researchers from the Alfred Wegener Institute (Germany) and the Penn State University (USA). The ice core properties are well preserved and the site is promising. The AWI ski equipped DC3 (Polar 6) supports the mission.

In 2012 a 67 m long pilot ice core was drilled from the proposed EGRIP drill site (75.6268N 35.9915W). The annual layer thickness is 11 cm and annual cycles are detected in water isotopes, dust and chemical impurities.

In 2012 detailed radio echo sounding and seismic work done by researchers from the Penn State University. The ice flows 65 m/yr horizontally to the north east at the selected site. The shear margins of the ice stream are observable on the surface but the bedrock topography does not show a trough in which the ice stream flows. The radio echo sounding and seismic measurements show zones with basal water and also zones with less water. Studies of the flow pattern from the internal layers and

from ice stream models could determine if the ice stream has been permanent or if it can switch on and off.



Reconstruction of the annual layer thickness from the 67 m shallow ice core from NEGIS. The accumulation rate is 0.11 m/yr and a significant increase of accumulation in the more recent warmer years is not observed. The results are compared with records from NGRIP. (P.Vallelonga et al, Preliminary glaciochemical and geophysical study of the Northeast Greenland Ice Stream (NEGIS), submitted to the Cryosphere)

The deep drilling project is planned for the years 2015 to 2020. We imagine the project as an international collaboration between 4-6 nations. At present, national funding agencies in Denmark, Germany, Japan, Norway and the U.S. have committed themselves to support EGRIP, both financially and logistically. The in-kind support by U.S. NSF, by making ski equipped LC-130 available to the project and by sharing costs for flights and fuel and German in-kind support by ski equipped Basler (DC3) and vehicles is tremendously valuable to the project. At the EGRIP steering committee meeting in Copenhagen in the fall of 2015, Switzerland, France, China and Italy also announced their participation and there may well be additional partners that would supplement the EGRIP research plan well.

The main part of the equipment needed to establish the EGRIP camp was at the NEEM site. At NEEM in 2015 heavy sleds with cargo were excavated, the two garages were taken down and stowed everything was hauled 460 km by traverse train in May 2015. The main building, the Dome was put on skis in 2011 to enable surface transport to the new site. At EGRIP, the dome was parked on the ski,

the two garages were built and outfitted, while the rest of the cargo was stored on sledges. In 2016 the EGRIP camp will become fully equipped, and we plan to build trenches for deep drilling and ice core processing so that deep drilling and science can commerce in 2017. Besides from drilling and analyzing the 2550 m deep ice core, a suite of borehole logging equipment, both existing and newly developed, will be used to monitor the ice deformation, ice sliding and basal water system in the borehole penetrating to the bedrock.

Left: The main dome at its parking position at EGRIP in June 2015.The under carriage is covered by plywood before snow is packed around the base. Right: Photo from June 9 2015 just before the door is closed and crew leaves camp. Note the snow pack around the base.

Many of the deep drillings in Greenland have been made as collaborations between Denmark, US and other nations. We have a proud record of very efficient and successful projects. Part of our tradition is to bring science and scientists to the field camp. Many analyses are performed at the field camp on the fresh ice core and in a clean environment. At NEEM 270 individuals spent 12,500 man days in camp and we take pride in the man day distribution: 52 % young scientists, 26 % senior scientists and only 22 % logistics. The projects not only produced a deep ice core, but also provided education for young researchers and enhanced international collaboration.

We believe that the EGRIP project will give unique knowledge of the flow of the very important and unknown ice streams which will lead to improved predictions of sea level rise. The deep ice core drilling should be followed by additional studies of the NEGIS ice stream, and at the moment the research vessel Polarstern from AWI has a program planned in the ocean in front of the ice streams in 2015-2016 and the Penn State University research group is planning seismic work on the whole NEGIS ice stream and especially the onset zone of the ice stream in the center of the Greenland ice sheet to understand why the ice stream is here. We will work towards bringing further projects to the NEGIS ice stream and an EGRIP ice camp with infrastructure and an airfield for ski planes opens the gateway for additional projects.

Scientific plan for EGRIP 2015

Surface movement by GPS (Christine Hvidberg, Lars B. Larsen, Aslak Grinsted).

Surface velocity and strain rates will be measured by GPS in 2016 at EGRIP. The purpose is to provide 6 year long records 2015-2020 of surface movement at EGRIP and along NEGIS to validate satellite observations and reveal spatial and temporal variations of flow speed and elevation.

In 2015, a strain net of 17 GPS poles were established at EGRIP and their 3D positions were measured (latitude, longitude, height). These poles will be re-measured in 2016. See figure. A permanent GPS pole was established in 2015 at EGRIP. The station is planned as part of a survey along the NEGIS ice stream from the ice divide to the coast done in collaboration with DTU-Space, and the station will be monitored continuously. The station will be maintained and checked in 2016. More permanent poles are planned to be established in 2016, both upstream and downstream from EGRIP. Additional detailed surveys of surface movement are planned in 2016 in particular regions near EGRIP using a combination of surface GPS and drones.

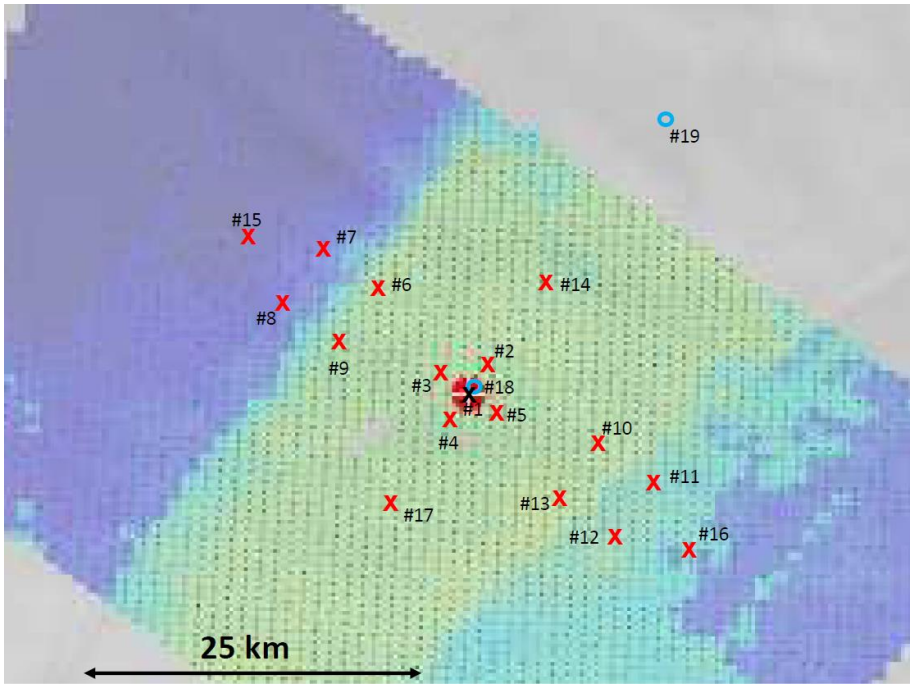


Figure: Map of the strain net at EGRIP showing the 17 poles established in 2015 (red crosses) and the two permanent GPS stations (blue circles). Only the permanent station close to the EGRIP camp as established in 2015. The EGRIP camp is indicated by the black cross. The background shows surface velocity derived from an optical IV method (Imgraft/Grinsted).

Airborne radar measurements at EGRIP and in NE Greenland (Daniel Steinhage, AWI).

The AWI crew will be using EGRIP camp as base for operations of the AWI Basler (DC3) carrying German radar and survey equipment. For this purpose, three extra LC-130 flights with fuel for the Basler is scheduled. Flight crew and scientists will be staying at EGRIP during operations.

EGRIP surface processes program

Main responsible: Hans Christian Steen-Larsen (hanschr@gfy.ku.dk), Sepp Kipfstuhl (Sepp.Kipfstuhl@awi.de), and Christoph Schaller (christoph.schaller@awi.de)
Manning: 1-2 people on average. (For sampling of drill and science trench - up to 3 people)

Snow-air water vapor exchange

Purpose:

To characterize and parameterize the water vapor isotopic exchange between the snow pack and the atmosphere in order to understand the post-depositional processes affecting the snowpack water isotopic composition

Measurements:

Continuous water vapor isotope measurements at multiple levels
Eddy-covariance
PROMICE weather station including atmospheric temperature, wind, and humidity, snow surface temperature, snow pack temperature, snow height variations, incoming and outgoing radiation. See http://www.geus.dk/DK/publications/geol-survey-dk-gl-bull/33/Documents/nr33_p69-72.pdf
Surface sampling along 100 m transect multiple times daily, for isotopic analysis. The top 30 cm will be sampled in high resolution.

Snow surface and snow pack properties

Purpose:

To characterize and parameterize the post-depositional processes influencing the structure and spatial variability in the snow surface and snow pack properties

Measurements:

Specific Surface Area of top 2.5 cm along a 100-300 m transect daily.
A specific experiment with 'painted' water will be carried out in the top 2 meters of the snow pack to characterize the snow-pack isotope post-depositional processes.

Snow-firn transition processes

Purpose:

To characterize and parameterize the transition in the seasonal signal of the snow isotope and snow impurities.

Measurements:

The walls of the drill and science trench will be sampled using carbon-liners tubes from the surface and down to 8 meters (if possible). The snow cores will be collected during excavation of the drill and science trench. The snow cores will be collected with an increasing spatial resolution between 1.25 and 5 meters.
DEP will be measured on the cores in the field.

CT-scanning measurements will be performed at AWI.
The cores will be measured on the CFA system for impurities and water isotopes

Accumulation and precipitation isotope studies

Purpose:

To establish a dataset to be used for benchmarking of regional and general circulation model in the area around EGRIP

Measurements:

Bamboo stake 'forest' will be measured daily to constrain accumulation and sublimation rates.
Snow height lasers will be installed scanning surface structures variability.
Go-Pro cameras will take pictures of sky and snow surface structures. '
Precipitation samples will be collected on tables lifted above the snow surface on event and sub-event resolution for sub-sequent isotopic analysis.

Studies of recent precipitation by shallow cores and in snow pits (Japannese, DK scientists).

his study will be conducted in a period of three weeks during the field season close to EGRIP camp.

Associated projects at EGRIP:

Earthquake station at EGRIP (Trine Dahl-Jensen and Tine B. Larsen, GEUS)

Starting in 2000, the seismological groups at KMS and GEUS – now all at GEUS – have placed earthquake seismic stations at over 20 sites in Greenland, both on the coast and on the ice sheet. We record globally occurring earthquakes, and use the data to investigate the local structure beneath and between the stations. A station was placed placed at EGRIP in a garage tent in 2015, and in 2016 the station will be moved to the newly constructed trenches. The station is solar/battery powered and collects data onto a memory chip. Once a year the memory chip is exchanged and the station is maintained.

PARCA AWS station system maintenance (Koni Steffen, ETH Zürich, CIRES Colorado)

During the annual maintenance of the Automated Weather Stations in N-Greenland, the EGRIP camp will be re-fuelling station and base for the PARCA team for several days in May. PARCA uses a Twin Otter air craft.

Geophysical Constraints on the Crust and Upper-Mantle Structure of Greenland
(PI: Meredith Nettles, LDEO Columbia Uni.)

This study aims to characterize the seismic velocity structure of Greenland's crust and upper mantle in three dimensions; and to integrate these results with gravity and heat-flow data, laboratory estimates of material properties, and petrological data to map variations in temperature, composition, and heat flux. The project makes use of seismic data from the NSF- and internationally

funded GLISN seismic network, supplemented by targeted collection of data at seven temporary seismic stations. The research will lead to an improved understanding of the crust and mantle structure of Greenland, the way this structure has evolved with time, and its influence on modern-day geophysical processes in the cryosphere and solid Earth. The results of the study will provide inputs for ice-sheet models and models of glacial isostatic adjustment. The accuracy of both types of models is critical for accurate predictions of sea-level rise. The findings of this study will also be relevant for understanding continental assembly and preservation worldwide. The seismological models derived in this project will also allow improved estimates of source parameters for tectonic and glacial earthquakes.

During summer, 2016, we will be demobilizing the seven temporary seismic stations, which we deployed in summer, 2014. Six of these stations are located on the northern part of the Greenland Ice Sheet, distributed approximately evenly around the EGRIP location near the onset of the Northeast Greenland Ice Stream. We plan to access these six stations by Twin Otter, using the EGRIP camp and skiway as a base.

Remote sensing reference station at EGRIP (Waleed Abdalati, CIRES Colorado).
This group visited EGRIP last year and setup surface equipment 1 km SE of EGRIP. The equipment measures surface snow properties with the aim to obtain ground truth readings for satellite observations. This year they will visit EGRIP again, but only for a few hours.

GLISN seismic network. (The GLISN project)
The GLISN network operates several permanent seismic stations on the Greenland ice sheet, e.g. at Summit and at the NEEM site. During the annual maintenance of the sites, the team will use EGRIP as a re-fuelling stop.

Logistic plan for EGRIP 2016

The overall logistical goal is to complete construction of a fully operational deep drilling camp with ice core storage facilities, science trench, drill trench, workshops, warm laboratories and housing for 35 people. The drillers will install deep drilling equipment in the drill trench and will proceed to drill the first 100 m of the EGRIP deep core. The science trench will be outfitted with tables and equipment, and tests of an active cooling system in the ice core extraction area will be carried out.

To accomplish the overall goals, the campaign can be broken down into the following steps:

1. Open and re-activate EGRIP camp and skiway.
2. Excavate science trench, tunnels and core storage using new snow blower for Pistenbully.
3. Construct roof over trenches, and tunnels and elevator shaft by using the balloon snow casting system.
4. In approx. 4 days pick up two tanks and two heavy sleds from a point 135 km from EGRIP.

5. Excavate drill trench, stair well and access ramp by excavation and subsequent roofing using balloon technique.
6. Lay out an electrical power grid to all future weather port and garage sites in camp.
7. Support the PARCA project, the Nettles project, the AWI radar project, the Abdalati project and GLISN.
8. Receive weatherports, beds, garages, tools, shelves, generators and spareparts. To complete the EGRIP camp so it may house 35-45 people.
9. Outfit science trench and drill trench with workshops, laboratories, control cabin, power.
10. Excavate inclined trench and install winch and tower for deep drill.
11. Host a DV visit for 4 days and a school student visit in in July.
12. Close down the EGRIP camp and leave.
13. Support of science during the campaign.

Ad.2: EGRIP has purchased a 4.6 m wide 130 kW snow blower which mounts in front of a Pistenbully 300 instead of the dozer blade. With this snow blower and two additional Yanmar snow blowers, we will excavate trenches.

Ad.3: A full set of balloons has been purchased. For drill and science trenches, we use a 5m diameter and 35 m long balloon. For core storage one 10 m by 4.6 m diameter balloon and one 9m by 3.6 m diameter balloon. For vertical shafts, we use 9 m by 3.6 m diameter balloons, for tunnels 12 m by 3 m diameter and for access ramp a 41 m by 2.5 m diameter balloon.

Ad.4: As the traverse in 2015 was low on fuel, we needed to abandon two heavy sleds and two empty fuel tanks some 135 km from EGRIP. This will be picked up by a group of three people in mid-May.

Ad.7: The demand for fuel for supporting PARCA, Nettles project and AWI Basler operations (50,000 liter) require 5 extra LC-130 flights to EGRIP than needed by EGRIP. The total number of flights to EGRIP in 2016 will be 16 – 18, depending on the state of the skiway.

Publications and out-reach.

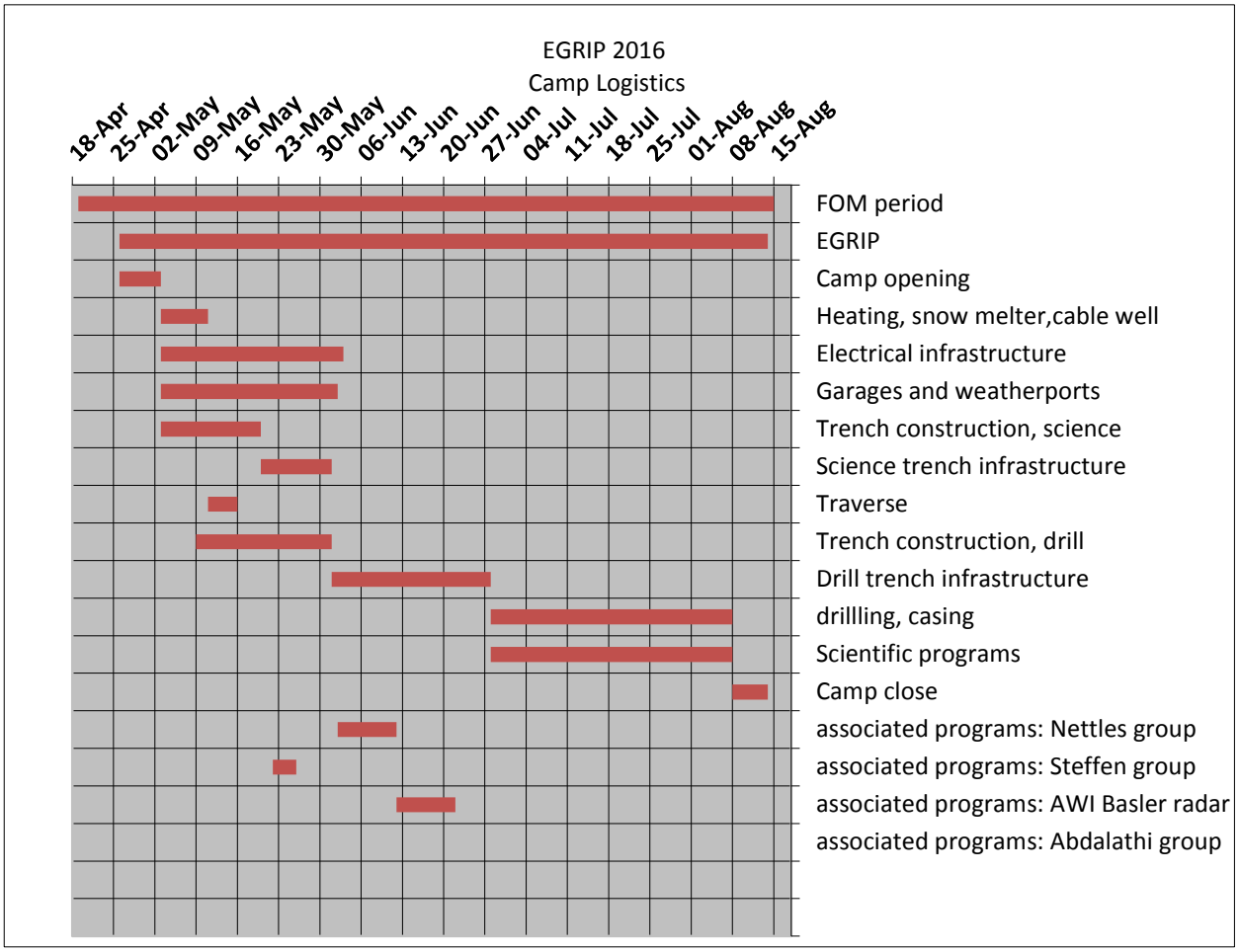
To enhance public interest in our work, EGRIP will have a web diary where the public may follow the progress on a day-to-day basis.

Flight and cargo considerations 2016.

We have planned for 18 LC-130 missions this year. 5 of these are pure fuel flights in support of associated projects. In our cargo schedule we have planned for an average load per flight of 12,000 – 15,000 lbs. It is our hope that with a good skiway and good refuelling possibilities we may negotiate a slightly higher payload with the pilots. However, as the schedule now looks, we have to ask all participants to be aware of the importance of keeping weights low.

Timeline for EGRIP.

The project is planned to take place from 26th April to 14th August 2016 on the ice. Thus we plan for more than 16 weeks of work on the ice.



Important: Sudden changes in manning plan due unforeseen issues.

Please keep in mind, that being on the manning plan for 2016 is not a guarantee that you will go to EGRIP and stay there for the scheduled time. In this line of work, even small incidents may have large consequences. Even though we are scientists, we also share a treat with sea-men – we are superstitious. Therefore we hesitate to mention specific incidents as it could become self-fulfilling. So, at this time let us just say, that a broken vital part with a long delivery time may cause severe delays.

THEREFORE: PEOPLE WHO ARE SCHEDULED TO GO TO EGRIP SHOULD PREPARE THEMSELVES OF THE POSSIBILITY OF HAVING TO LEAVE CAMP EARLIER THAN PLANNED, LATER THAN PLANNED OR TO HAVE THEIR STAY CANCELLED. PLEASE FOLLOW THE DEVELOPMENTS ON THE EGRIP HOME PAGE BEFORE YOU LEAVE FOR GREENLAND.

EGRIP 2016 *schedule*

		Camp activity headlines.
19/04/2016	Tuesday	FOM's arrive. Setup radio, comm. Register vehicles.
26/04/2016	Tuesday	Mission 1. EGRIP put-in. Camp opening.
30/04/2016	Saturday	Mission 2.
01/05/2016	Sunday	Mission 3.
03/05/2016	Tuesday	Mission 3a. PARCA fuel (Placeholder)
16/05/2016	Monday	Traverse begins. Abdalathi group T.O.
21/05/2016	Saturday	traverse ends
22/05/2016	Sunday	PARCA Twin Otter arrives
26/05/2016	Thursday	PARCA Twin Otter leaves
02/06/2016	Thursday	Mission 4
04/06/2016	Saturday	Nettles Twin Otter arrives
05/06/2016	Sunday	Mission 4a. Basler fuel. And Mission 4 b. Basler fuel.
06/06/2016	Monday	Mission 5a. Nettles fuel
08/06/2016	Wednesday	Mission 5b. Basler fuel.
09/06/2016	Thursday	Mission 6.
12/06/2016	Sunday	Nettles Twin Otter departs. Awi Basler arrives
17/06/2016	Friday	Ship cargo?
22/06/2016	Wednesday	AWI Basler departs
23/06/2016	Thursday	Ship cargo!
25/06/2016	Saturday	Mission 7
26/06/2016	Sunday	Mission 8
27/06/2016	Monday	Mission 5 (NOTE moved from June 7.)
28/06/2016	Tuesday	Mission 9
17/07/2016	Sunday	Mission 10
21/07/2016	Thursday	Mission 11
07/08/2016	Sunday	Mission 12
11/08/2016	Thursday	Mission 12a. Placeholder
14/08/2016	Sunday	Mission 13
18/08/2016	Thursday	Rowing club dinner
20/08/2016	Saturday	FOMs leave Kangerlussuaq

EGRIP Manning 2016

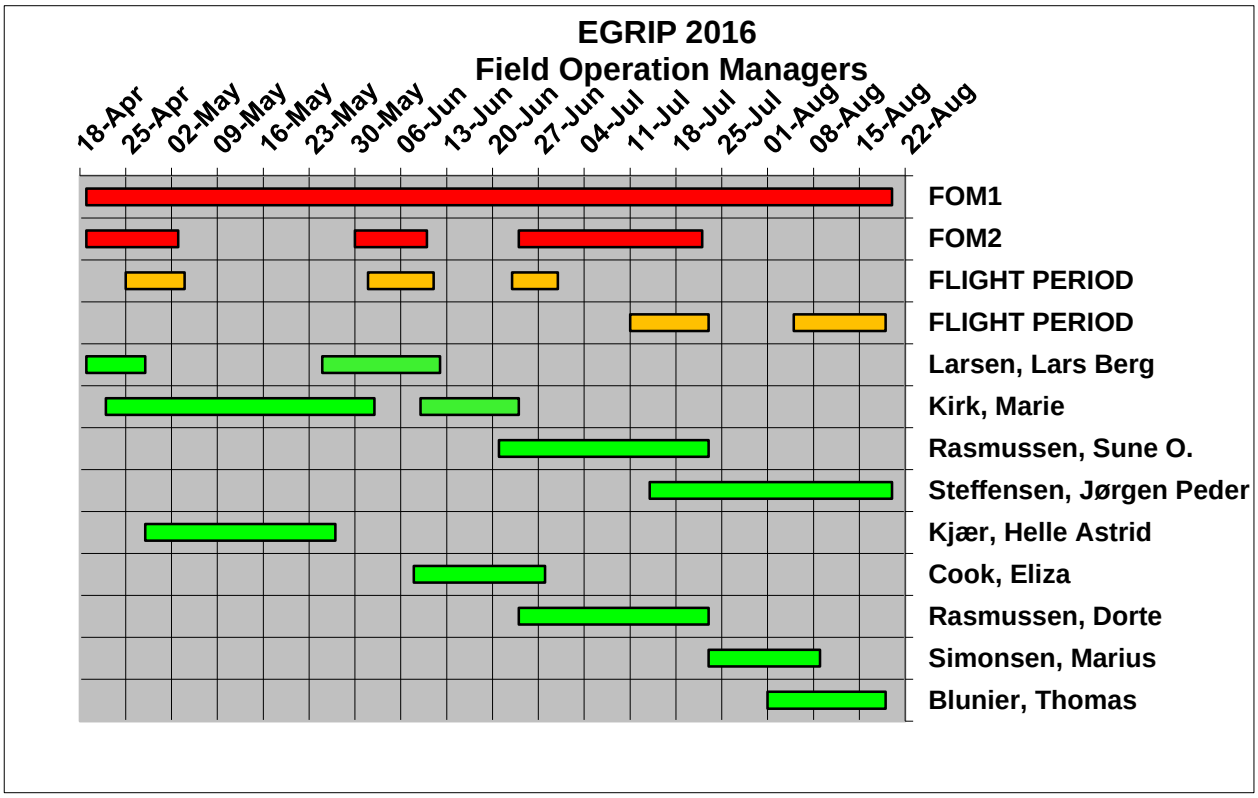
Driller	Alemany, Olivier	F	16-Jul	17-Jul	07-Aug	09-Aug
egg	Bagshaw, Elizabeth	UK	24-Jun	25-Jun	28-Jun	30-Jun
Doctor	Bech, Jan	DK	08-Jun	09-Jun	28-Jun	30-Jun
Surface Science	Berben, Sarah	N	27-Jun	28-Jun	17-Jul	19-Jul
FOM	Blunier, Thomas	DK	01-Aug			19-Aug
Drill Mechanic	Bo Hansen, Steffen	DK	16-Jul	17-Jul	07-Aug	09-Aug
electronics	Boisen, Aksel	DK	16-Jul	17-Jul	07-Aug	09-Aug
Carpenter	Bovet, Christian	DK	02-May	03-May	09-Jun	11-Jun
FIELD ASSISTANT	Capron, Emilie	DK/F	16-Jul	17-Jul	07-Aug	09-Aug
COOK	Christensen, Josefine Dahlerup	DK	24-Jun	25-Jun	07-Aug	09-Aug
FOM	Cook, Eliza	DK/UK	08-Jun			28-Jun
Surface Science	Cook, Eliza	DK/UK	27-Jun	28-Jun	17-Jul	19-Jul
Surface Science	Cook, Eliza	DK/UK		28-Jun	17-Jul	19-Jul
FIELD LEADER	Dahl-Jensen, Dorthe	DK	25-Jun	26-Jun	14-Aug	16-Aug
satellite	Emperion	DK	24-Jun	25-Jun	28-Jun	30-Jun
COOK	Ernst, Kim	GRL	06-Aug	07-Aug	14-Aug	16-Aug
Carpenter	Fløisdorf, Thomas	DK	08-Jun	09-Jun	17-Jul	19-Jul
Doctor	Florian, Hans Chr.	GRL	25-Apr	26-Apr	02-Jun	04-Jun
Surface Science	Grindsted, Aslak	DK	16-Jul	17-Jul	07-Aug	09-Aug
COOK	Harvey, Sarah	US	25-Apr	26-Apr	28-Jun	30-Jun
Doctor	Helms, Lydia V.	GRL	01-Jun	02-Jun	09-Jun	11-Jun
IT and comms	Hillerup, Jens Christian	DK	24-Jun	25-Jun	28-Jun	30-Jun
MECHANIC	Hilmarsson, Sverrir Æ.	IS	16-Jul	17-Jul	14-Aug	16-Aug
FIELD ASSISTANT	Høier, Kristian	DK	08-Jun	09-Jun	28-Jun	30-Jun
FIELD ASSISTANT	Holme, Christian	DK	25-Jun	26-Jun	17-Jul	19-Jul
MECHANIC	IVECO overhaul mech.	DK	16-Jul	17-Jul	21-Jul	23-Jul
MECHANIC	Jacobs, Chris	UK	25-Apr	26-Apr	11-May	
MECHANIC	Jacobs, Chris	UK		16-May	17-Jul	19-Jul
Traverse	Jacobs, Chris	UK	11-May	16-May		
FIELD ASSISTANT	Jensen, Camilla Marie	DK	27-Jun	28-Jun	21-Jul	23-Jul
Surface Science	Jensen, Mari F.	N	20-Jul	21-Jul	14-Aug	16-Aug
Carpenter	Jørgensen, Nicolai	DK	16-Jul	17-Jul	08-Aug	10-Aug
Associated Programs	Karlsson, Nanna	D/DK	11-Jun	12-Jun	28-Jun	30-Jun
FIELD ASSISTANT	Keegan,Kaitlin	DK/US	25-Apr	26-Apr	02-Jun	04-Jun
FIELD ASSISTANT	Kipfstuhl, Sepp	D	25-Apr	26-Apr	06-Jun	08-Jun
FOM	Kirk, Marie	DK	22-Apr			02-Jun
FOM	Kirk, Marie	DK	09-Jun			24-Jun
FIELD ASSISTANT	Kirk, Marie	DK	01-Jun	02-Jun	09-Jun	11-Jun
FOM	Kjær, Helle Astrid	DK	28-Apr			27-May
FIELD ASSISTANT	Koldtoft, Iben	DK	07-Jun	08-Jun	28-Jun	30-Jun
FIELD ASSISTANT	Lanzky, Mika	DK	16-Jul	17-Jul	07-Aug	09-Aug

FOM	Larsen, Lars Berg	DK	19-Apr			28-Apr
FOM	Larsen, Lars Berg	DK	25-May			12-Jun
Surface Science	Larsen, Lars Berg	DK	20-Jul	21-Jul	14-Aug	16-Aug
Surface Science	Madsen, Martin Vindbæk	DK	25-Jun	26-Jun	21-Jul	23-Jul
FIELD ASSISTANT	Maffezzoli, Nicolo	I/DK	01-Jun	02-Jun	26-Jun	28-Jun
electronics	Marending, Samuel	CH	01-Jun	02-Jun	26-Jun	28-Jun
FIELD ASSISTANT	Mikkelsen, Troels	DK	20-Jul	21-Jul	14-Aug	16-Aug
DV and Media	N.N.	?	16-Jul	17-Jul	21-Jul	23-Jul
Associated Programs	N.N. AWI 2	D	11-Jun	12-Jun	22-Jun	24-Jun
Associated Programs	N.N. AWI 3	D	11-Jun	12-Jun	22-Jun	24-Jun
Associated Programs	N.N. AWI 4	D	11-Jun	12-Jun	22-Jun	24-Jun
AP Crew	N.N. Basler 1	CAN	11-Jun	12-Jun	22-Jun	24-Jun
AP Crew	N.N. Basler 2	CAN	11-Jun	12-Jun	22-Jun	24-Jun
AP Crew	N.N. Basler 3	CAN	11-Jun	12-Jun	22-Jun	24-Jun
AP Crew	N.N. Nettles 1	IS	03-Jun	04-Jun	12-Jun	14-Jun
Associated Programs	N.N. Nettles 1	US	01-Jun	02-Jun	12-Jun	14-Jun
AP Crew	N.N. Nettles 2	IS	03-Jun	04-Jun	12-Jun	14-Jun
Associated Programs	N.N. Nettles 2	US	01-Jun	02-Jun	12-Jun	14-Jun
Associated Programs	N.N. Nettles 3	US	01-Jun	02-Jun	12-Jun	14-Jun
Associated Programs	N.N. Nettles 4	US	01-Jun	02-Jun	12-Jun	14-Jun
AP Crew	N.N. PARCA1	IS	21-May	22-May	26-May	28-May
Associated Programs	N.N. PARCA1	US	21-May	22-May	26-May	28-May
AP Crew	N.N. PARCA2	IS	21-May	22-May	26-May	28-May
Associated Programs	N.N. PARCA2	US	21-May	22-May	26-May	28-May
Associated Programs	N.N. PARCA3	US	21-May	22-May	26-May	28-May
Associated Programs	N.N. PARCA4	US	21-May	22-May	26-May	28-May
Surface Science	Nagatsuka, Naoko	J	25-Jun	26-Jun	17-Jul	19-Jul
Surface Science	Nakazawa, Fumiko	J	25-Jun	26-Jun	17-Jul	19-Jul
Doctor	Nielsen, Randi Keinicke	DK	20-Jul	21-Jul	14-Aug	16-Aug
FIELD ASSISTANT	Nisancioglu, Kerim	N	07-Jun	08-Jun	26-Jun	28-Jun
FIELD ASSISTANT	Pedro, Joel	DK/AUS	25-Apr	26-Apr	11-May	
FIELD ASSISTANT	Pedro, Joel	DK/AUS		16-May	02-Jun	04-Jun
Traverse	Pedro, Joel	DK/AUS	11-May	16-May		
FIELD ASSISTANT	Pedro, Joel	DK/AUS		16-May	02-Jun	04-Jun
Surface Science	Pillar, Helen	UK/DK	07-Jun	08-Jun	28-Jun	30-Jun
Driller	Popp, Trevor	DK/US	01-Jun	02-Jun	26-Jun	28-Jun
Driller	Popp, Trevor	DK/US	16-Jul	17-Jul	14-Aug	16-Aug
Doctor	Preisler, Henrik Park	DK	27-Jun	28-Jun	21-Jul	23-Jul
FOM	Rasmussen, Dorte	DK	24-Jun			23-Jul
FOM	Rasmussen, Sune O.	DK	21-Jun			23-Jul
FIELD ASSISTANT	Rasmussen, Sune O.	DK	25-Apr	26-Apr	03-May	05-May
FIELD ASSISTANT	Rathman,Nicholas	DK	27-Jun	28-Jun	21-Jul	23-Jul
Surface Science	Schaller, Christoph	D	29-Apr	30-Apr	06-Jun	08-Jun
electronics	Schwander, Jakob	CH	01-Jun	02-Jun	26-Jun	28-Jun

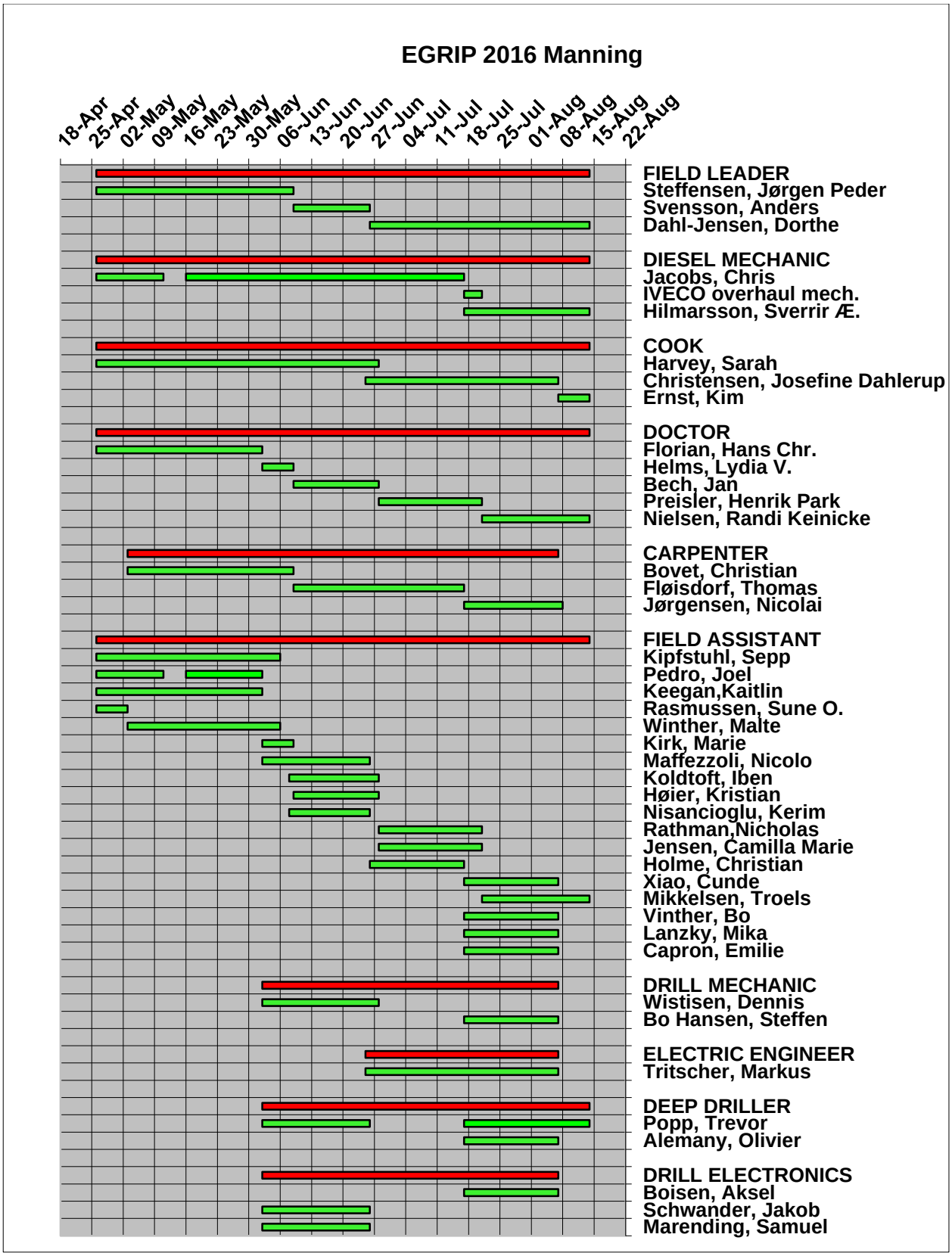
FOM	Simonsen, Marius	DK	23-Jul			09-Aug
Surface Science	Steen-Larsen, H.C.	DK	27-Apr	28-Apr	03-May	05-May
Surface Science	Steen-Larsen, H.C.	DK	07-Jun	08-Jun	26-Jun	28-Jun
FOM	Steffensen, Jørgen Peder	DK	14-Jul			20-Aug
FIELD LEADER	Steffensen, Jørgen Peder	DK	22-Apr	26-Apr	09-Jun	11-Jun
FIELD LEADER	Svensson, Anders	DK	08-Jun	09-Jun	26-Jun	28-Jun
Electric Engineer	Tritscher, Markus	AUT/DK	24-Jun	25-Jun	07-Aug	09-Aug
FIELD ASSISTANT	Vinther, Bo	DK	16-Jul	17-Jul	07-Aug	09-Aug
Surface Science	Vladimirova, Diana	DK/RUS	16-Jul	17-Jul	14-Aug	16-Aug
FIELD ASSISTANT	Winther, Malte	DK	02-May	03-May	06-Jun	08-Jun
Drill Mechanic	Wistisen, Dennis	DK	01-Jun	02-Jun	28-Jun	30-Jun
FIELD ASSISTANT	Xiao, Cunde	CHN	16-Jul	17-Jul	07-Aug	09-Aug

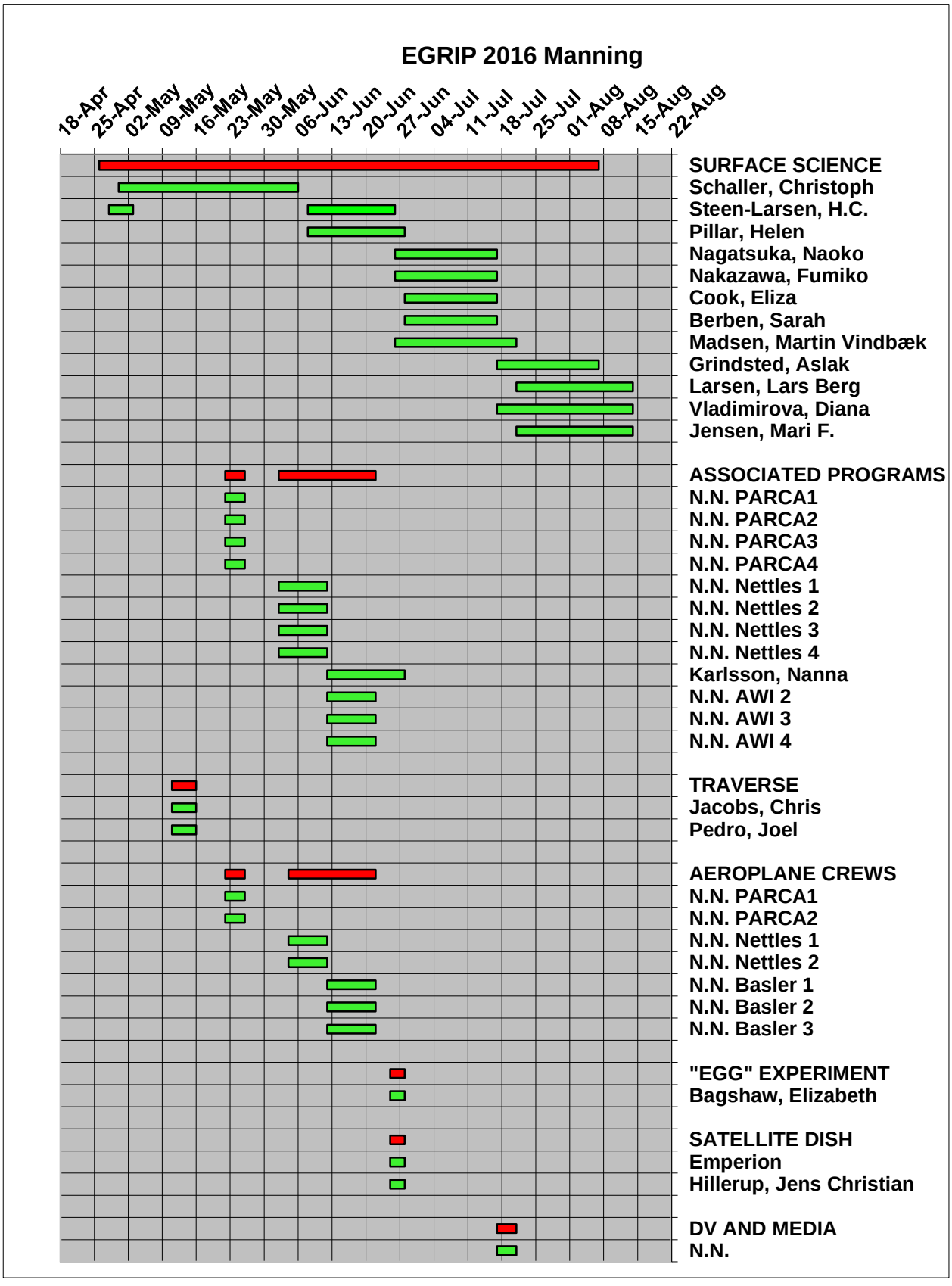
EGRIP GANNT sheets.

FOM's:



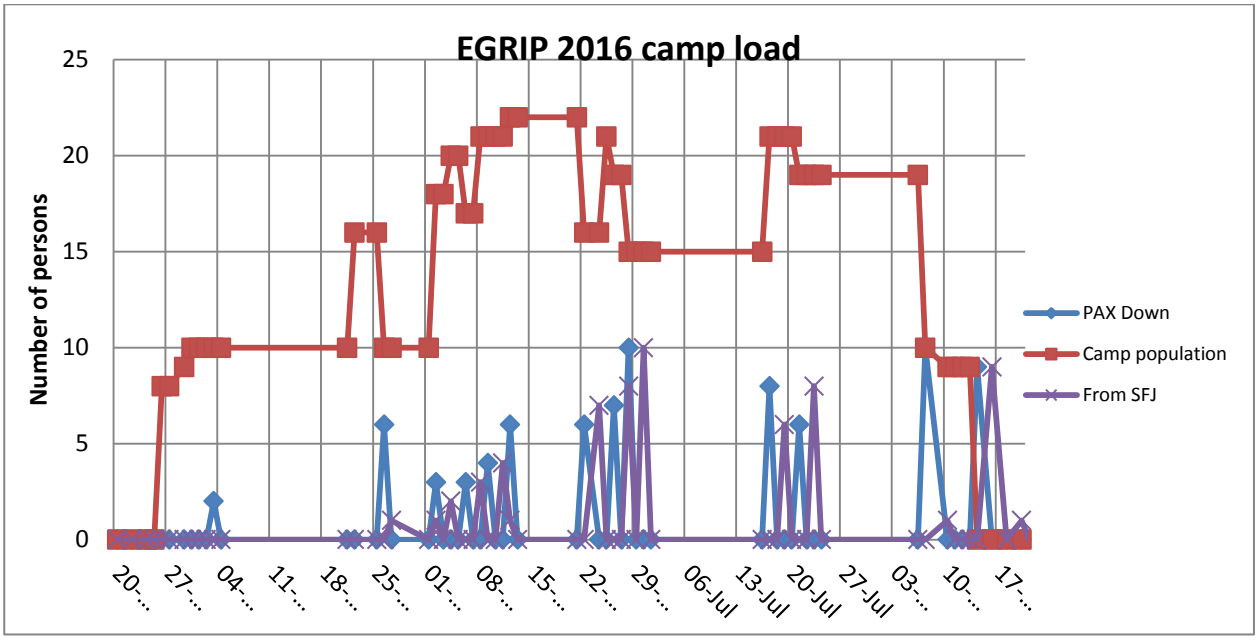
EGRIP manning:




EGRIP 2016 Manning
18-Apr
25-Apr
02-May
09-May
16-May
23-May
30-May
06-Jun
13-Jun
20-Jun
27-Jun
04-Jul
11-Jul
18-Jul
25-Jul
01-Aug
08-Aug
15-Aug
22-Aug
SURFACE SCIENCE
Schaller, Christoph
Steen-Larsen, H.C.
Pillar, Helen
Nagatsuka, Naoko
Nakazawa, Fumiko
Cook, Eliza
Berben, Sarah
Madsen, Martin Vindbæk
Grindsted, Aslak
Larsen, Lars Berg
Vladimirova, Diana
Jensen, Mari F.
ASSOCIATED PROGRAMS
N.N. PARCA1
N.N. PARCA2
N.N. PARCA3
N.N. PARCA4
N.N. Nettles 1
N.N. Nettles 2
N.N. Nettles 3
N.N. Nettles 4
Karlsson, Nanna
N.N. AWI 2
N.N. AWI 3
N.N. AWI 4
TRAVERSE
Jacobs, Chris
Pedro, Joel
AEROPLANE CREWS
N.N. PARCA1
N.N. PARCA2
N.N. Nettles 1
N.N. Nettles 2
N.N. Basler 1
N.N. Basler 2
N.N. Basler 3
"EGG" EXPERIMENT
Bagshaw, Elizabeth
SATELLITE DISH
Emperion
Hillerup, Jens Christian
DV AND MEDIA
N.N.

Camp population

The diagram below gives an overview on the population in camp.



Personnel Transport 2016

The field participants will deploy to Kangerlussuaq, Greenland via either Scotia AB (from the U.S.) or Copenhagen. The transport to and from EGRIP camp will be direct from/to Kangerlussuaq with a U.S. air force LC130. One doctor exchange will happen with PARCA Twin Otter.

During the stay in **Kangerlussuaq**, people will be billeted in Kangerlussuaq International Science Support (KISS). At KISS, all participants will be provided with bed linen but are responsible for cleaning their room.

Unless otherwise arranged, each nation takes care of tickets to/from Greenland for their participants. If trouble arises at making ticket reservations we should be notified. The increasing number of tourists travelling to Greenland results in a long waiting list, so please make the reservations as early as possible.

Note, unless arranged otherwise, each nation must take care of tickets and insurances of their own people. EGRIP have a general financial guarantee for extraordinary Search and Rescue operations.

People directly employed by EGRIP receive a per diem to cover the cost of living according to Danish rules. In SFJ, the per diem, which can be charged to the project, is 477 DK Kr per day. On the ice, the per diem is 119 DK Kr per day. The actual per diem paid to the participants should to follow the rules in each country, and the physical payment will be taken care of by each nation unless arranged otherwise.

Personal field equipment

All participants, except for those who have special arrangements with EGRIP operations, are expected to provide their own polar field equipment and personal clothing, including normal winter garments, towels, toiletries, soap, facecloth, etc. A typical polar field bag should contain:

Polar Survival Kit

2 Woolen underwear, terry cloth, trousers and jacket
1 Fleeced trousers and jacket
1 Overall trousers
1 Polar boots, including extra liners, preferably 2 pairs.
3 thick woolen polar socks
1 polar parka coat
1 Insulated work leather gloves
1 Thin inner gloves
1 Insulated leather gloves, or ski type gloves
1 *Mittens. Optional*
1 Dark sunglasses
1 Sleeping bag, -10 degC or lower
1 Fleece liner for sleeping bag
1 fleece or woolen cap or hat, preferably of the balaclava type
1 Ear gear, fleece or rubber.
1 Face mask, *optional, only for those involved in snowmobile traverses.*
1 Personal medicine (pls inform the doctor)

Please bring also

1 Neck Tie or Dress
1 Solid hiking boots
1 A sturdy cup for coffee or tea
1 Your favourite cooking book
1 Your favourite music on IPOD
1 Your favourite game
1 Your favorite instrument - if it allows for transportation
1 A good portion of good humor

The polar field bag must follow the individual on the flight from Kangerlussuaq to the camp. It is not permitted to board aircraft or engage in traverses without a suitable survival kit. Please expect your luggage to be stowed on a pallet for transportation to camp, and like on commercial air lines, only one small carry-on bag is normally allowed. In special cases, like put-in missions, you will be allowed also to keep ONE sea bag with survival equipment with you in the LC-130.

NOTE: Please read carefully the next 6 pages

Welcome to the EGRIP Camp (Rules and information)

EGRIP camp main street 1st June 2015 with Main dome and two garages. The drill site and weatherports will be built to the right (photo: JPS).

The living conditions on the ice cap are quite different from those back home, therefore we would like to tell you some simple rules to follow. Some of them are even new for old-timers.

- The ski-way area and apron are **off limits** unless approved by the Field Leader.
- When an aeroplane is expected, the Field Leader has assigned a person in charge of the apron activities. You are obliged to act as instructed by this person.
- Never leave the camp without informing somebody, the weather can change very quickly. If you go more than 2 km away from camp, the field leader should be informed. And remember to bring a PLB (Personal Locator Beacon) and Iridium phone or VHF radio. The Field Leader will hand out PLB, phone and radio.
- The eating hours are (please be in time, to make is easy for the cook).
    - Breakfast is individual (normally between 7:00 and 8:00),
    - Lunch is at noon (13:00 on Sundays),
    - Dinner is at 19:00. While eating outside of lunch and dinner hours, make sure that all plates, etc. are cleaned after use.
- Heavy vehicles and snow blowers are only operated by few people assigned by the Field Leader.
- Skidoos –
    - Everybody can use the skidoos when not in specific use, but please make sure that:
        - Drive slowly in camp, and never use 2nd gear.
        - Park the scooters with the gear in non-engaged position
        - Skidoos can only be removed from the camp area after an agreement with the Field Leader.
        - When attaching a sledge to a skidoo, always use the hook. Only connect the sledge with a rope if no other option exists, and keep the rope as short as possible.

  - Make sure the main drive belt is not frozen by shaking the skidoo from side to side before start.
  - Skidoos are not toys - only drive skidoos when necessary.
  - Do not drive in the clean zone, South and West of camp unless permitted by the Field Leader.

- NEVER operate vehicles and machinery under the influence of alcohol. Offenders will immediately be expelled from camp.

- Never leave any cargo at the surface without marking it with a bamboo pole, otherwise it may be lost due to snow drift overnight. Roll up cargo straps and put them in designated piles.
- If you remove marked items on the snow, then also remove the bamboo marker in order to avoid disorder and digging for nothing.
- Drinking water originates from a marked area. So never drive or walk through this area or contaminate it with any bodily fluid. Just keep out of the marked area.
- Drinking water will be produced in the cooks snow melter. Refill it with snow from the marked area when there is room in the pot to keep a steady water supply in the camp.
- In order to keep the camp clean there are only a few bamboo poles where you are allowed to take a leak. The poles are close to the outhouse tents.
- During blizzards visibility goes down. If visibility becomes so poor, that you cannot see adjacent tents or buildings from where you are, there is a serious risk of getting lost. **Stay inside where you are until you are picked up by a team member from the main dome.**

Booze and Drugs (rules updated Nov 2014)

You can bring the following tax free to Greenland: 200 cigarettes or 100 cigarillos and 50 ml perfume or 250 ml Eau de toilette are allowed.

1 liter strong alcohol, 2 liter beer (typical six-pack) and 2.25 liter wine (typical 3 bottles) are allowed. If you are caught with excess tobacco, perfume or alcoholic beverages on arrival, it will be confiscated and you will be fined around 1,200 DKK

You cannot import goods in excess of the allowance and declare it. You'll have to buy it in Kangerlussuaq.

In case you have not purchased the allowed duty free items in Copenhagen, you can do it in Kangerlussuaq on arrival, showing the boarding pass, and before you leave the secure area.

You can buy alcoholic beverages and tobacco in the local store in Kangerlussuaq. The price of one beer in Greenland is approximately 20 DKK, one litre hard liqueur costs approximately 500 DKK.

People can bring their own prescription medicine. If prescription medicine is needed, make sure camp physician is informed. In case of illness, necessary drugs will be supplied by the camp physician. Greenland law forbids any import and consumption of drugs, such as cannabis, morphine and designer drugs. Any person who attempts to bring in or use illegal drugs in Greenland will be expelled from camp immediately and FOMs and Field Leader will contact Greenland police.

Policy for use and handling of pictures/recordings

Prepared for the NEEM-SC meeting by Sune Olander Rasmussen, Copenhagen, olander@gfy.ku.dk. Final version adopted by the NEEM-SC February 1, 2009.

All persons, including visitors, going to Greenland as part of the EGRIP field campaign implicitly give their consent to the following use of pictures/recordings by accepting to participate in the field campaign. Additional rules or limitations may be enforced by the field leader in special cases.

Participants appearing on pictures and in recordings:

The EGRIP field work participant approves use of digital and analogue pictures, filmed material, and sound recordings made during the EGRIP campaign (defined here as the period from arrival in Greenland until departure from Greenland) in which the participant appears.
The approved use comprises, but is not limited to, use on the internet, in print, in television broadcasts, but only applies to material depicting field participants during work and daily life situations.

Any field member may withdraw this consent for any given photo or film sequence without further explanation.

Pictures/recordings depicting participants in situations not mentioned above should never be made public without explicit consent from all recognizable persons on the pictures/recordings. Field members taking pictures or making film and/or sound recordings must accept to delete pictures/recordings if requested to do so by a participant that appears in the material.

Rights of use

When material is shared with other field participants or uploaded to field computers, the photographer by doing so gives permission for the material to be used by the EGRIP project. Photographers wanting personal acknowledgment must make sure that their pictures are named with the photographer's name as the last part of the file name, e.g. "EGRIP-main-dome-4-July-2017-John-Doe.jpg"

Material produced as part of the field campaign or obtained from participants can be used by all EGRIP collaborators crediting the EGRIP project as a community: "Photo/Source: EGRIP ice core drilling project, www.eastgrip.dk". For media files containing the name of the photographer, use the credit line with the name of the photographer included, e.g. "Photo/Source: John-Doe, EGRIP ice core drilling project, www.eastgrip.dk".

The original photographer retains the rights to any other use of the material, including any commercial use.

Declaration of liability release for EastGRIP field participants

The EastGRIP project aims to have qualified medical staff in the camp at all times, and is prepared to arrange medical evacuation of field participants or visitors if deemed necessary by the medical staff and field leader. However, participation in the EastGRIP field work or visits to the EastGRIP camp are performed at your own risk, and each participant (or his/her institution) is responsible for obtaining medical clearance and insurance.

By joining the Eastgrip fieldwork, each participant waive any rights to hold University of Copenhagen, the EastGRIP project, or any project staff members liable for any non-deliberate injury or damage caused e.g. by accidents, failure of equipment, or during medical treatment.
Each participant will have to sign a declaration that he/she understands that is it the responsibility of himself/herself or his/her home institution to arrange appropriate insurance cover for personal injury or liability.

Evacuation from the camp to a medical facility will as a general rule be arranged by and covered by the project.

By signing the declaration, each participant also expresses understanding that it is the responsibility of himself/herself or his/her home institution to cover the costs of medical treatment and repatriation, and/or arrange appropriate insurance cover.
By signature, each participant also confirms that he/she will follow the safety guidelines outlined in the field plan and follow instructions given by the field operations manager, the field leader, and flight crews.

The declaration is signed before deployment and will be kept in the field operations office in Kangerlussuaq.

Assigned Duties

Everybody in camp will be assigned extra duties on a rotary basis. These duties include:

Cooking. Although there will be a cook, Saturday night dinners are prepared by the camp crew. Sunday morning breakfast is self-service. If you skip meals, please inform the cook(s) in advance.

The field Leader will make a roster with rotating duties on the following:

Dishwashing. We expect all to help keeping the dishwashing an easy duty.

Snow melter. Although one person is assigned, everybody has the duty to keep the snow melter full. Check the water level before and after you have taken a shower and after doing laundry.

Drinking water snow melter.

Each day one person is assigned to be responsible for keeping the drinking water snowmelter full. Use ONLY the assigned buckets and showels and take ONLY snow at the assigned spot. Hygiene is very important.

House mouse duty.

One person will be assigned to keep toilets and common areas in the main dome (EGRIP) or toilets and kitchen tent at Renland clean.

Terms of reference for the EGRIP 2016 Field Season (formal control and command)

During the field season J.P. Steffensen, Anders Svensson and Dorthe Dahl-Jensen will be Field Leaders at EGRIP having formal command & responsibility of operations in camp. All field participants must follow all instructions from the Field Leaders (The Field Leader role is similar to the role of a captain of a ship at sea).

In Kangerlussuaq, Lars Berg Larsen, Marie Kirk, Sune O. Rasmussen and J.P. Steffensen will be field Operations Managers (FOMs). The FOM is the official spokesperson for EGRIP and the FOM has control of all EGRIP assets in Kangerlussuaq, such as the office, cars, bicycles etc. The FOM is the only formal liason between EGRIP and U.S. logistics (CPS), New York Air National Guard and Greenland authorities. The FOM has final say on composition of cargo and on passenger lists for all flights to and from EGRIP.

Dangerous goods (HAZMAT) Lithium batteries.

While certification of dangerous goods and the packing thereof rests with qualified personnel, Lars Berg Larsen and Marie Kirk have IATA, DOT (49 CFR) and U.S.Air Force certification (AFMAN 24-204), we want to point out some new important regulations,

Under normal circumstances people travelling do not carry HAZMAT in amounts that require certification and declaration. As there have been a series of incidents involving fires on aircraft from shorted lithium batteries, you must take special care.

All modern electronics: Cell phones, GPS, MP3 players, laptops, cameras etc. contain lithium batteries. Most of these batteries are considered “small” in the new regulations, except for laptop batteries with extended life time. They are considered “medium”. And for “medium” batteries the following apply:

Quote from IATA regulations 2.3.3.2 Lithium Ion Batteries:
“Lithium ion batteries exceeding a watt-hour rating of 100 Wh but not exceeding 160 Wh may be carried as spare batteries in carry on baggage, or in equipment in either checked or carry on baggage. No more than two individually protected spare batteries per person may be carried.”

As long as the batteries are installed in the appropriate equipment, they are not considered HAZMAT, but loose spare batteries have to be packed in such a manner that shortening is impossible by e.g.

covering the poles with tape. The quoted IATA regulation says, that you may not put medium sized spare batteries into your checked baggage. You can have two spares in your carry on.

When travelling with the 109th to and from EGRIP keep all your batteries in your carry on. Do not put spare batteries in your luggage (suitcase or duffelbag).

For all scientists that ship lithium batteries by cargo, please note that Lithium batteries are now Dangerous Goods and have to be packed and certified by authorized companies. It is still possible to pack a laptop in a zarges box, but be careful with spare batteries. If in doubt consult us or your local HAZMAT company.

Note: There is a huge distinction between "lithium batteries" and "lithium ion batteries".

"lithium batteries" are non-rechargeable high-power cells that work very well in the cold. They are always HAZMAT. In size they vary from button cells in remote controls to car battery size. Automatic defilibrators contain Lithium batteries.

"lithium ion batteries" are rechargeable batteries that are in almost any computer, cell phone or GPS. They are only HAZMAT under the regulations mentioned above.

Personal Locator Beacon (PLB).

A personal locator beacon, PLB, will be issued to everyone who have to leave camp. It is a unit with the size of a hand held radio. The unit is registered at the radio authority of Greenland. When activated, the unit contacts a satellite with a distress signal. The unit transmits its identity code and GPS position (it has a built in GPS). The radio authority will contact the FOM in Kangerlussuaq with specifics of identity and position.

If you're interested, it is possible to buy a SPOT device on the web. A SPOT device can be set to transmit your position at a fixed time each day by e-mail to your family.

Accidents and Illness

There will be a doctor at EGRIP this field season. Also, the doctor will have a hot line to doctors in Denmark. In case of illness the camps will be able to treat a patient with a wide selection of drugs. In case of accidents, the patients will first be given First Aid and if evacuation is needed an aeroplane will be called in from either Kangerlussuaq, East Greenland, Thule, Summit, Station Nord, etc. to transport the patient(s) to a suitable emergency site/hospital.

Good communication (Iridium handheld, Iridium OpenPort, BGAN, Radio, personal locator beacons) and navigation equipment (GPS) should ensure fast evacuation if needed. Under most circumstances, we can move a patient to a hospital within 24 hours.

Handling of Waste and environmentally hazardous chemicals

EGRIP has been imposed with strict environmental conditions on EGRIP camp operations by the Greenland government. As EGRIP camp is located in a pristine area of the Greenland ice sheet (inside the NE-Greenland National Park), the camp is constructed to reduce the environmental impact as much as possible, e.g. by using wood and snow as primary construction materials and by using temporary tent structures to maximum extent.

In EGRIP camp strict guidelines of waste management will be enforced.

LITTERING IS NOT ALLOWED. It is the duty of everybody to pick up any litter encountered.
Any traffic outside the general camp area has to be sanctioned by the Field Leader.
All waste will have to be sorted into the following categories:

- Natural combustible (e.g. wood, card board)
- Kitchen Waste
- Glasware
- Metal (e.g. cans, nails and screws).
- Hazardous solids (e.g. batteries, PVC)
- Hazardous fluids (e.g. fuel, hydraulic fluid, drill fluid).

All glassware, metal and hazardous material and kitchen waste will be retrograded to Kangerlussuaq for further processing.
To limit possible spills of fuel, only authorized personnel is allowed to operate pumps for fuel transfer.
All spills of hazardous fluids to the snow have to be excavated and the polluted snow has to be deposited in a salvage drum.
Use only designated toilets. Urination is only allowed at designated spots (pee-poles).

Special rules apply for fuel handlers, heavy vehicle operators and mechanics: A daily check on fuel tanks, pump system, hydraulics and hazardous chemical storage is necessary to insure no leakage to the environment.

Fire hazards

Camp structures are spaced so that an accidental fire will not spread to other structures. Carbon dioxide extinguishers and fire blankets will be placed at all locations where fuel is handled, at EGRIP in the kitchen and on the first floor of the main dome.
Only one of the three main fuel tanks will be in camp at any time. The other two tanks will be at the apron on in the cargo line.

An emergency response plan for spills and fire has been made for EGRIP camp. This plan is available in the main dome kitchen (Evacuation Zone A) and the Field leader office and in the carpenters garage (Evacuation Zone B). Camp personnel should know the contents of this plan.

Power Supply

Within all operations during 2016, 230 Volts, 50Hz will be the standard supply. The camp will be powered by diesel generators. For projects away from camp, such as firn air pumping and shallow coring, we will also use diesel generators where possible to limit the use of gasoline.

EGRIP:

Diesel			
1 – Iveco	125KVA	3 x 230V (400V/50Hz)	Main generator.
1 – SDMO	40KVA	3 x 230V (400V/50Hz)	Backup arriving in june 2016
1 – Mase	16KVA	3 x 230V (400V/50Hz)	2nd backup
1 – SDMO	15KVA	3 x 230V (400V/50Hz)	1st backup
1 – Hatz	5 KVA	1 x 230V / 50Hz	available
MoGas			
1 – Honda	4.5KVA	1 x 230V / 50Hz	
1 – Robin	4KVA	1 x 230V / 50Hz	

Reserves in Kangerlussuaq:

Diesel		
3-SDMO	12KVA	1 x 230V/50Hz
MoGas		
1 – Honda	4KVA	1 x 230V / 50Hz

Please help to conserve fuel by conserving power.

EGRIP 2016 – Address and useful numbers

Official address: EGRIP 2016
Box 12
DK-3910 Kangerlussuaq
Greenland
Phone +299 84 11 51; FOM cell +299 52 41 25
FOM Iridium +8816 234 95044; Iridium data: +8816 929 48570
fax +299 84 12 27; e-mail: fom@egrip.camp

This is the address of the Field Operations Manager (FOM) office in Kangerlussuaq

During the field season contact to the participants at the EGRIP site can be made as described below:

Iridium OpenPort telephone to EGRIP Camp

+8816 234 92110

This number may change. Please ask the Field Operations Manager which number is current.

Cost examples to or from OpenPort or Iridium handheld

Land line or Cell phone	$1.20 per minute + line operator, up to $10/minute
Iridium or Thuraya Voice	$4.40 per minute
Global Star	$6.26 per minute
Iridium to Iridium	$0.60 per minute
Iridium to VSAT	$12.00 per minute

Iridium Satellite handheld telephones

Voice	Data	Telephone Name	Location
+ 8816 234 93272	+ 8816 929 49576	EGRIP 1 (FL)	EGRIP
+ 8816 234 95066	+ 8816 929 49618	EGRIP 2	EGRIP
+ 8816 234 94868	+ 8816 929 10405	EGRIP 3	EGRIP

Only some of these numbers will be available at any given time. Please ask the Field Operations Manager (FOM) which number is current.

Initially **NO** external bell will be connected to the phones so arriving calls are not always heard.

Good times to call are during

Lunch	15:00 – 16:00 GMT
Evening dinner	21:00 – 22:00 GMT

The Iridium systems (OpenPort and hand-held) should be operational 24 hours. By February 2009 the Inmarsat satellites have been relocated, the system is not so reliable, but we have a BGAN system in camp as back up.

EMAIL:

The Field Operations Manager will check arriving E-mail at least once a day on the following email:

fom@egrip.camp

Don't forward large attached files.

On the ice we use the Iridium OpenPort system to send & receive E-mails. We will have special computers set up for personal use for text messages. And we will be able to send & receive any E-mail via the address:

For Field leader at EGRIP : fl@egrip.camp

BUT at a high cost! PLEASE Remember to avoid surfing on the internet with a lot of banners and pictures, and avoid attaching image files. The field leader will send images for the NEEM diary on the NEEM home page every day on behalf of everybody.

Iridium OpenPort system

EGRIP camp will utilize the Iridium OpenPort system. This system consists of an array of antennae and receivers that multiplex to obtain two ingoing phone lines and internet connection. This system was very stable in previous years. At EGRIP there is a complete backup OpenPort system. While the Field Leader has unrestricted access to telephones and the internet, camp personnel are in general restricted from surfing on the internet.

Internet Connection

At EGRIP, we have leased a satellite communication system, VSAT, which is connected to a TELSTAR satellite. This system will be set up and tested at EGRIP, and if successful, it will be employed by EGRIP in the coming years.

Please Note
Using the internet is paid for per MBit. If unlimited, unnecessary uploads & downloads of software updates, large email attachments, images, movies, etc. by EGRIP participants will very quickly cost the EGRIP budget a fortune! Please, turn off all automatic downloads and all banners and pictures on your browser before connecting. Communication costs for NEEM 2010: 360,000 DKK

EGRIP official communications:

SITREP

The two Field Leaders will Sunday night prepare a **SIT**uation **REP**ort "SITREP", i.e. a report on the preceding week's field activity. This report will be transmitted by E-mail to the Copenhagen office. From here, it will be retyped and put on the EGRIP home page for download and sent by e-mail on Monday the EGRIP project group and the relevant Greenlandic and Danish authorities.

The Sitrep follows the following format:

1. Number, date and time
2. Passenger movements
3. Cargo movements
4. Camp activities
5. Sub programmes
6. Drill depth and time
7. Status for drilling
8. Other info
9. Signature of the Field Operations Manager

Daily report on the web (www.icecores.dk)

Daily a short “What we have done today” report and stories from the traverse & camps will be placed on the web. Information will be sent from the EGRIP camp to the Field Operations Manager office in Kangerlussuaq who, in turn, will take care of the home page. The Field Operations Manager (fom@egrip.camp) will coordinate this activity.

Description of EGRIP camp

Quartering and buildings

NEEM camp June 2010.

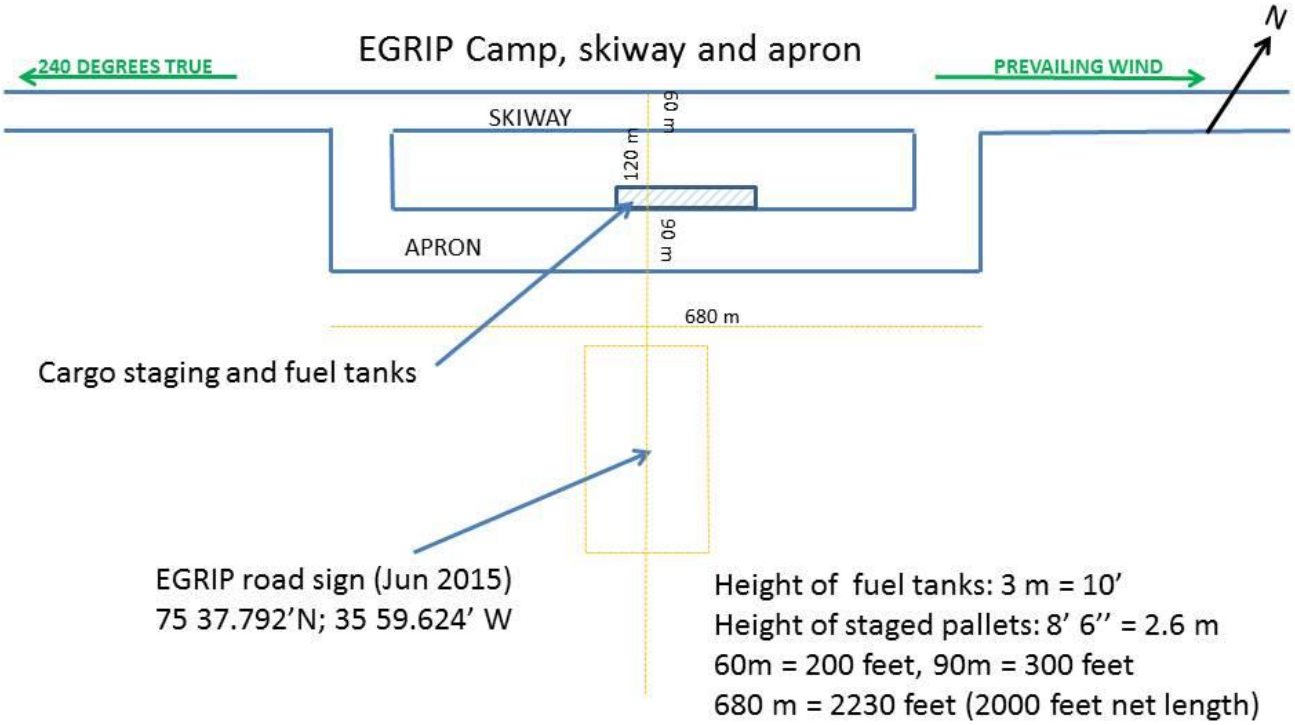
EGRIP until June 25:	PAX normal	Max.PAX	
Kitchen/office	4	10	40’ wooden dome
Big tomato	1	2	Fiberglass hut
Small tomato	1	1	Fiberglass hut
Flexmobil	0	1	Cabin
Flexmobil	0	1	Cabin
New Pistenbully	0	1	Cabin
Garage, mechanic			26’ x 40’ Weatherport
Garage, carpenter			26’ x 40’ Weatherport
Quarter (WP 1)	(2)	(4)	10’ x 15’ Weatherport
Quarter (WP 9)	(2)	(4)	10’ x 15’ Weatherport
Quarter (WP 8)	(3)	(6)	12’ x 20’ Weatherport
Quarter (WP 2)	(3)	(6)	12’ x 20’ Weatherport
Total	6 (16)	16(36)	

Numbers in parenthesis valid after weather ports have been constructed.

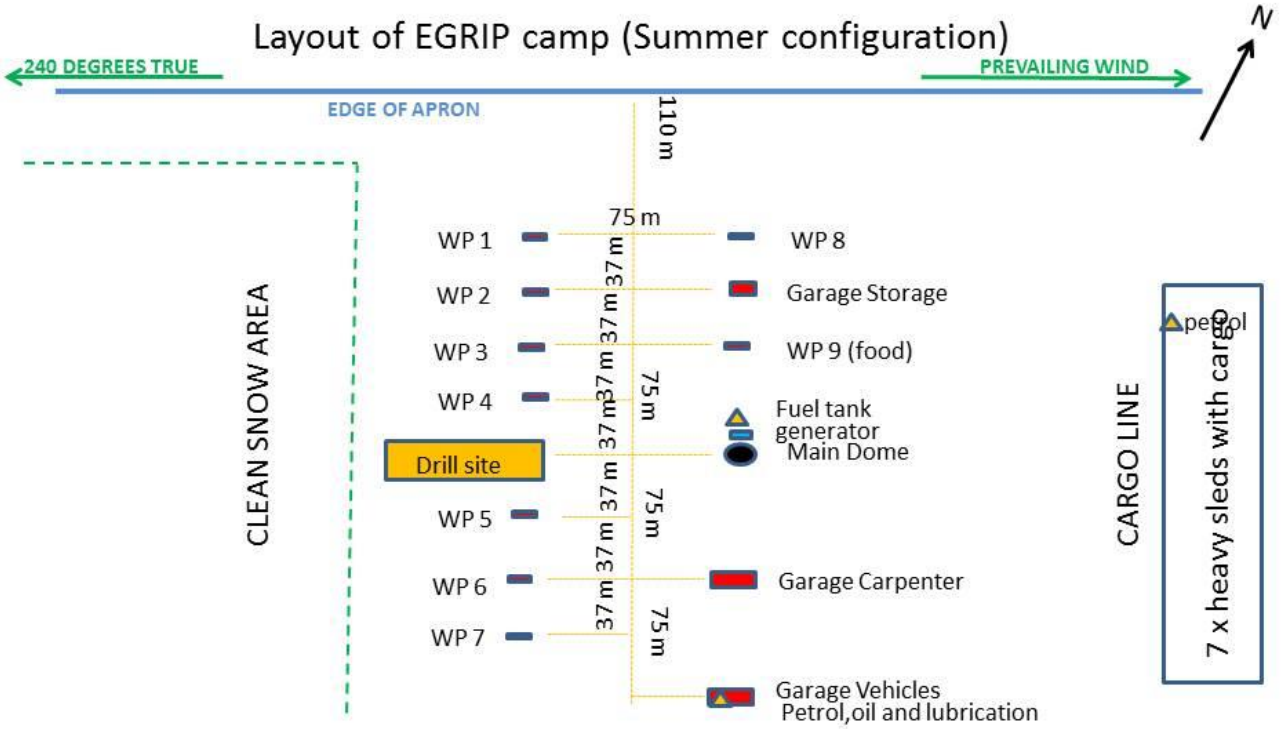
EGRIP after June 25:			
Kitchen/office	4	10	40’ wooden dome
Big tomato	1	2	Fiberglass hut
Small tomato	1	1	Fiberglass hut
Flexmobil	0	1	Cabin
Flexmobil	0	1	Cabin
New Pistenbully	0	1	Cabin
Garage, mechanic			26’ x 40’ Weatherport
Garage, carpenter			26’ x 40’ Weatherport
Garage, storage			24’ x 28’ Weatherport
Freshie shack (WP 9)			12’ x 20’ Weatherport
New quarter (WP 8)	3	6	12’ x 20’ Weatherport
New quarter (WP 4)	3	6	12’ x 20’ Weatherport
Quarter (WP 2)	3	6	12’ x 20’ Weatherport
Quarter (WP 3)	3	6	12’ x 20’ Weatherport
Quarter (WP 1)	2	4	10’ x 15’ Weatherport
Quarter (WP 5)	2	4	10’ x 15’ Weatherport
Quarter (WP 7)	1	2	10’ x 10’ Weatherport
New quarter (WP 6)	1	2	12’ x 10’ Weatherport
Total	24	52	

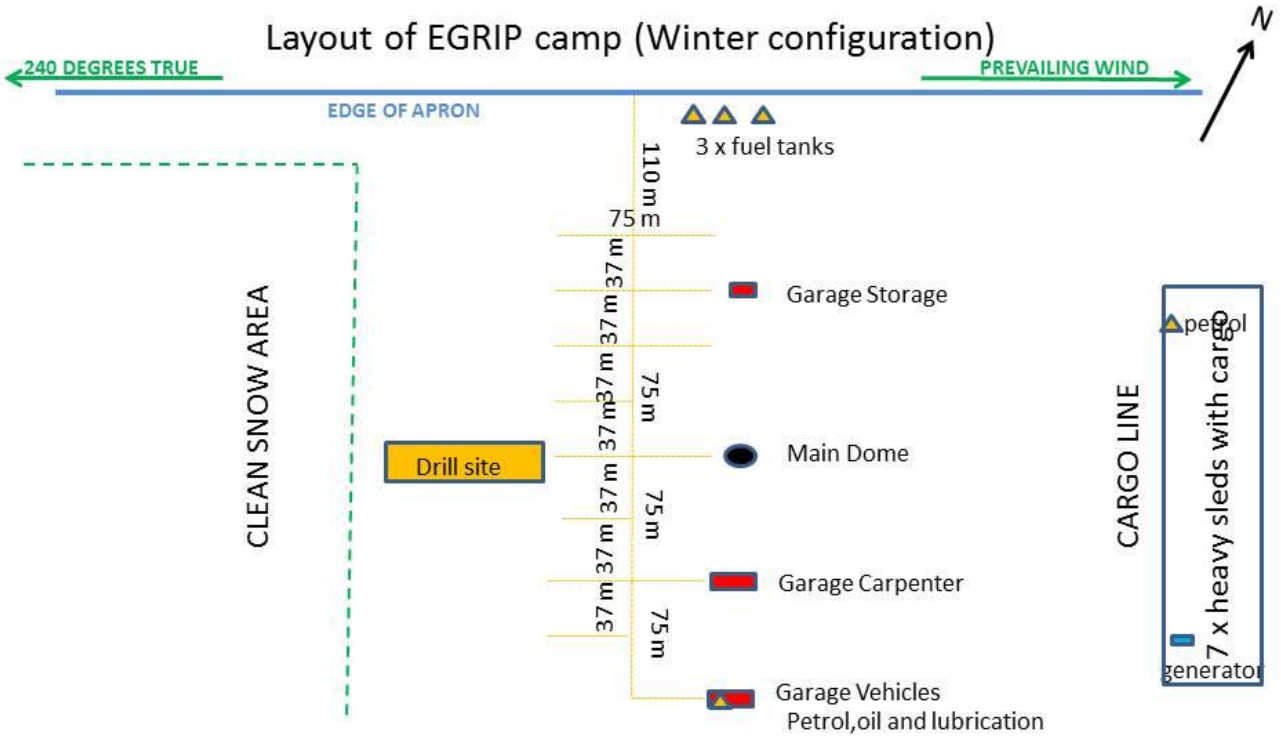
Maps of the EGRIP camp area.

On the following three pages are maps of the EGRIP camp and Science areas in different scales.

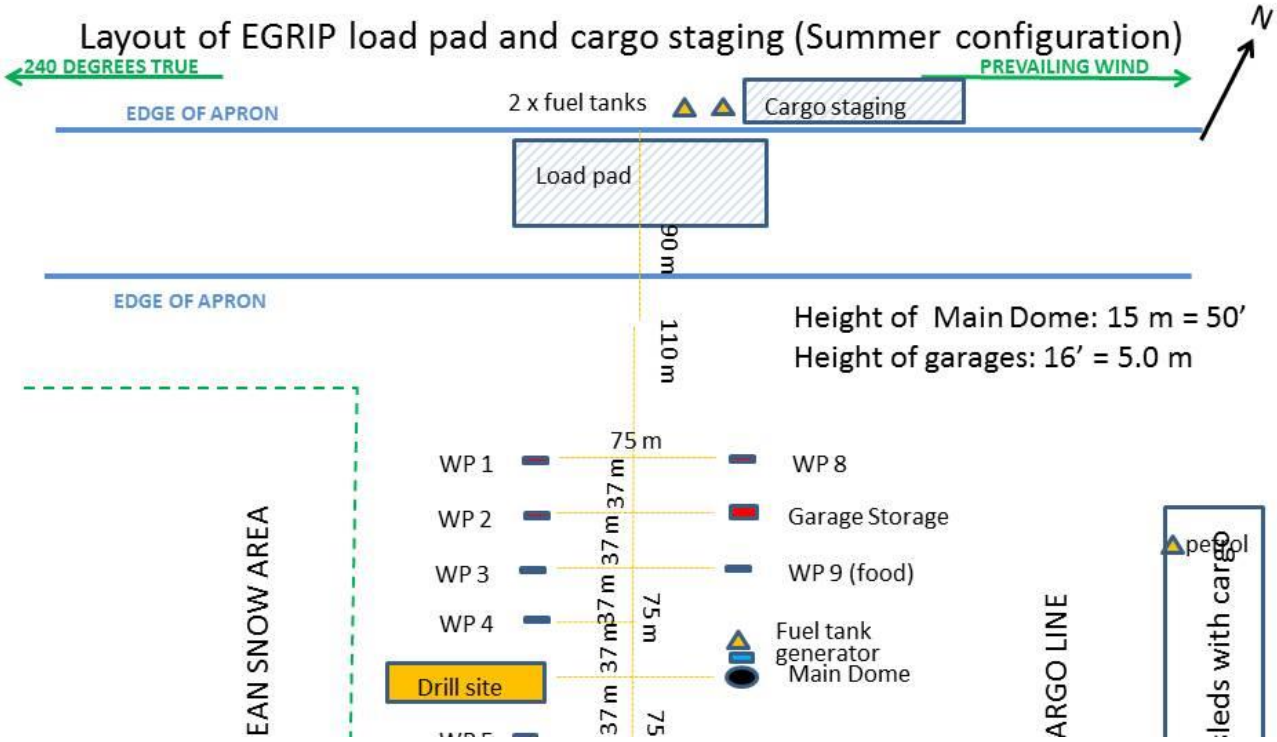


Camp, skiway and apron layout.



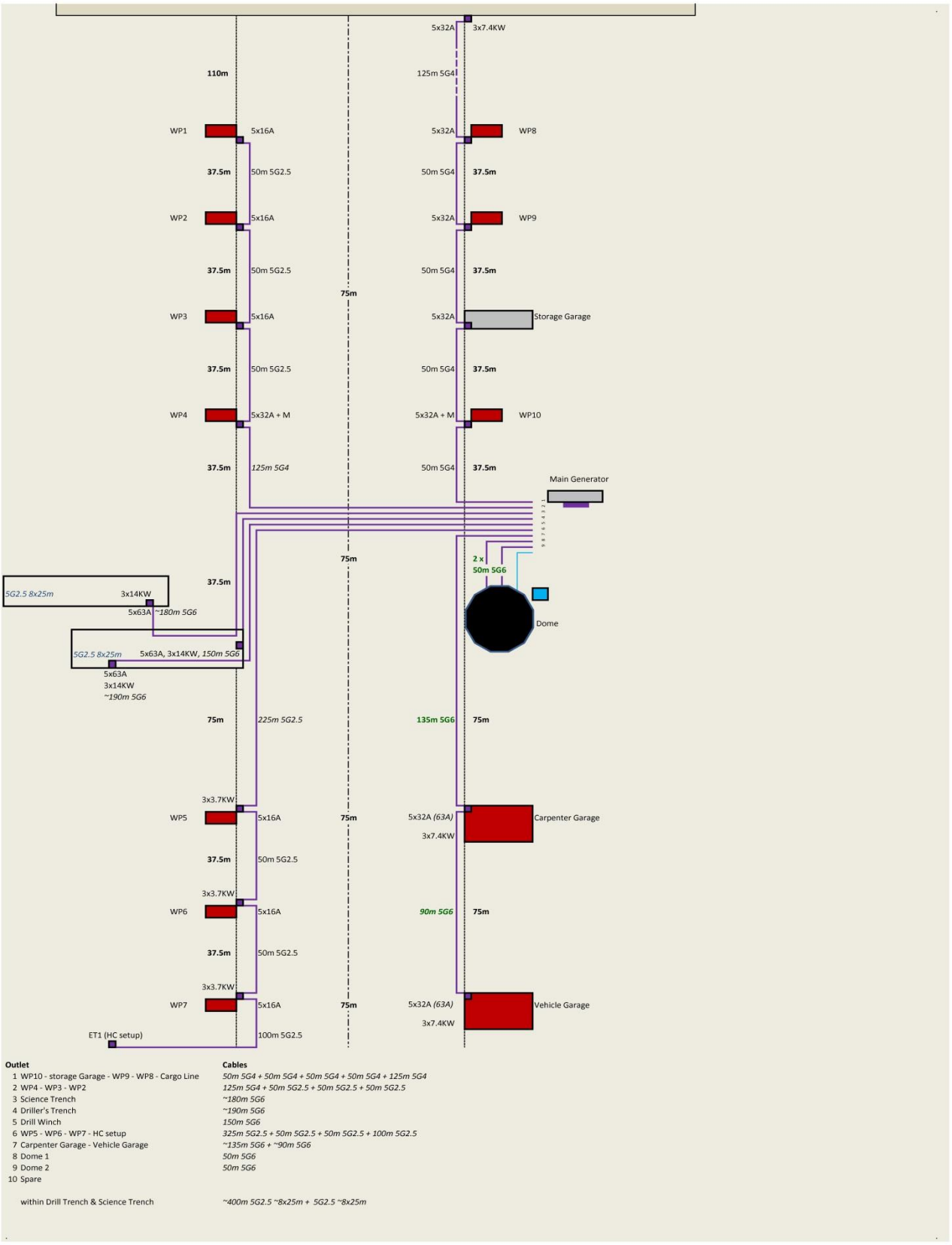


Map of future camp: Garage Carpenter and Garage Vehicles were built in 2015. The Weatherports (WPs), drill site and Storage garage will be added in 2016. Due to a wish from the 109th to always park into the wind, we had to move the fuel at the apron and the cargo staging to the opposite side of the apron. The change can be seen on the next page.



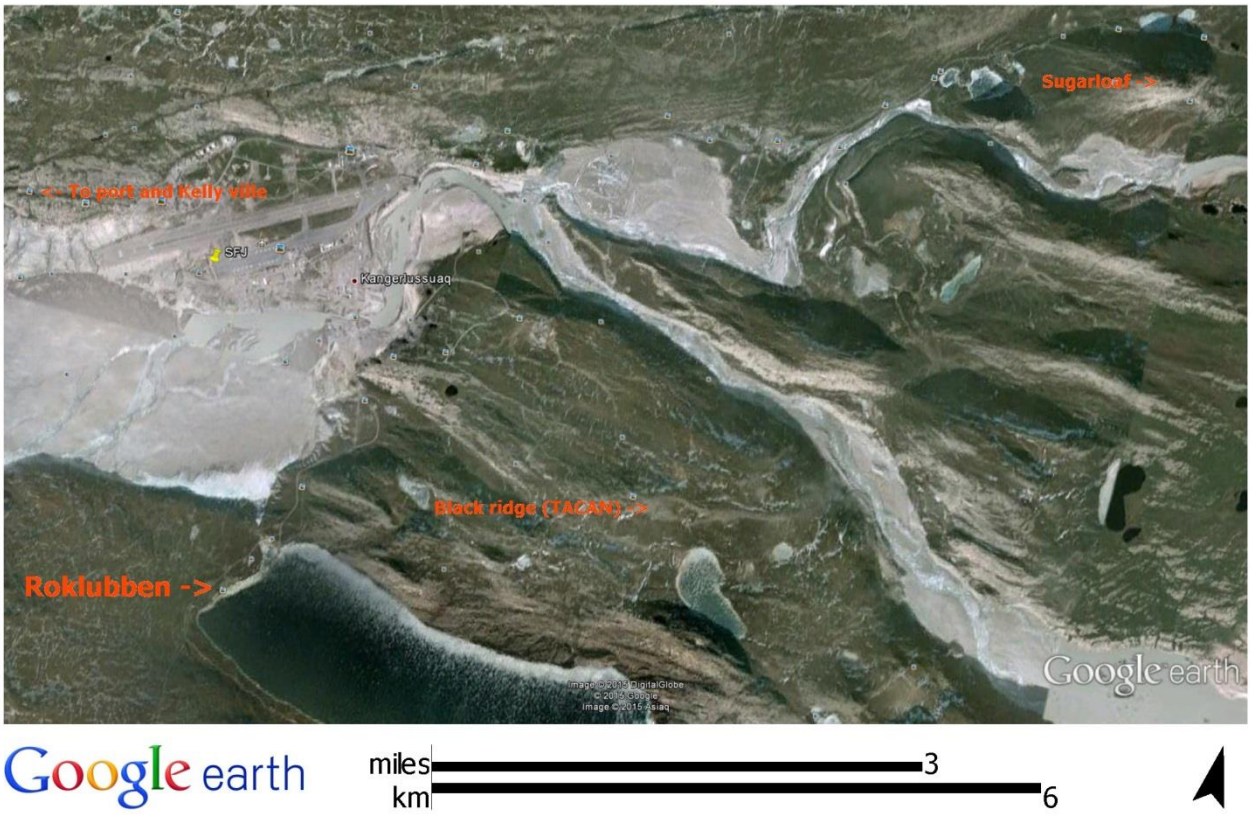
This new proposal was negotiated with the109th to meet with their desire to park the air craft into the wind. Bcause of the location of the fuel point on the starboard side of the plane, the fuel tanks have to be on the skiway side of the apron. The advanteage is that passengers leaving and entering the plane can walk straight to/from camp.

Electrical cabelling of EGRIP camp.



Outlet	Cables
1 WP10 - storage Garage - WP9 - WP8 - Cargo Line	*50m 5G4 + 50m 5G4 + 50m 5G4 + 50m 5G4 + 125m 5G4*
2 WP4 - WP3 - WP2	*125m 5G4 + 50m 5G2.5 + 50m 5G2.5 + 50m 5G2.5*
3 Science Trench	*~180m 5G6*
4 Driller's Trench	*~190m 5G6*
5 Drill Winch	*150m 5G6*
6 WP5 - WP6 - WP7 - HC setup	*325m 5G2.5 + 50m 5G2.5 + 50m 5G2.5 + 100m 5G2.5*
7 Carpenter Garage - Vehicle Garage	*~135m 5G6 + ~90m 5G6*
8 Dome 1	*50m 5G6*
9 Dome 2	*50m 5G6*
10 Spare	
within Drill Trench & Science Trench	*~400m 5G2.5 ~8x25m + 5G2.5 ~8x25m*

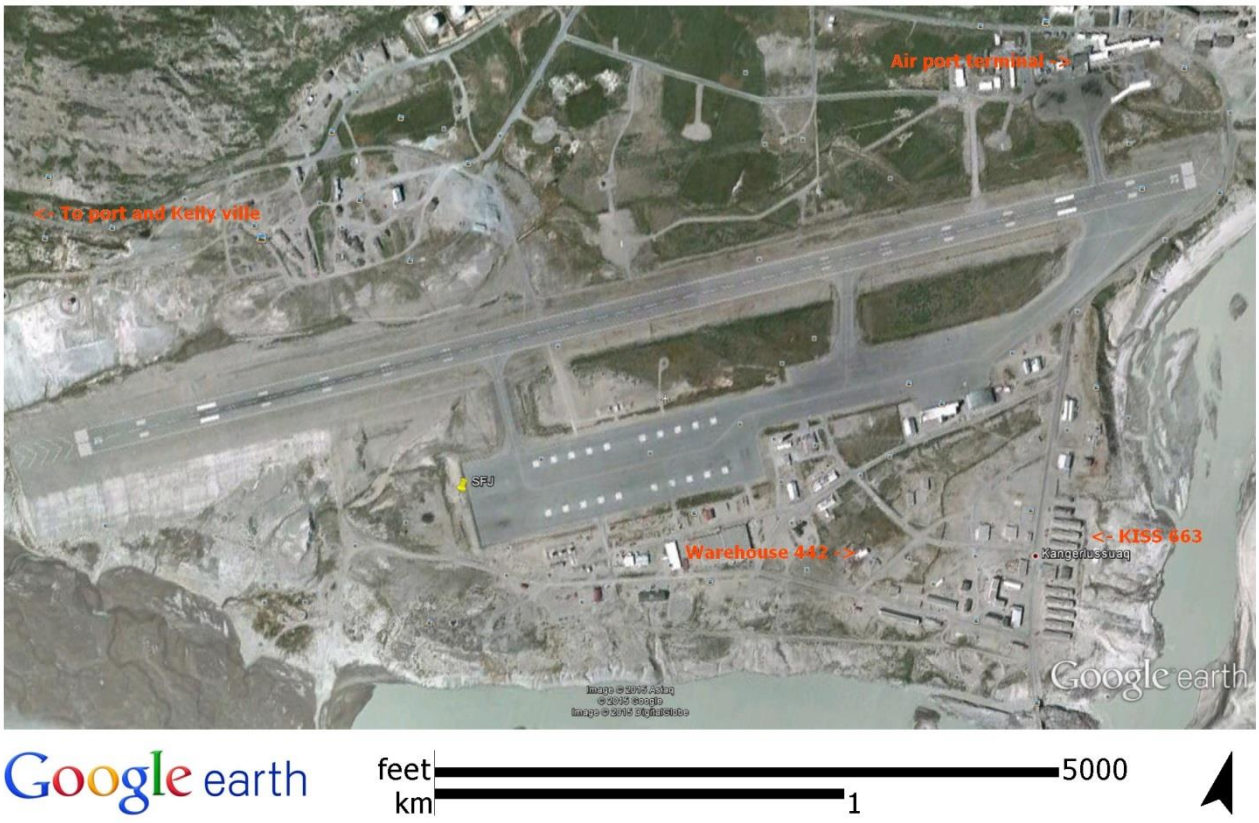
Description of Kangerlussuaq and Surrounding Area



In terms of complexity, Kangerlussuaq (Søndre Strømfjord or SFJ) is unique. Originally there was no native village. The first settlement was the US base Blue West Eight during World War II. The base was closed October 1, 1992, and all facilities handed over to the Greenland Airport Administration. Due to its US origin, the main electrical supply in Kangerlussuaq is 60 Hz, and you may encounter both 115V and 208V US type sockets, as well as 230V Danish sockets.

The population is approximately 650 including many kids. The terminal area is composed of several businesses: Met office, (Flight Information Center “FIC” has moved to Nuuk) Air Greenland, local supermarket “Pilersuisoq”, some souvenir shops, a road side grill, Air Greenland and Statoil. The terminal side includes private housing, a combination of Air Greenland terminal and Hotel Kangerlussuaq, which also houses the GLAIR offices and an ATM in DK Kroner. There are also buildings to the west of the terminal which house the Airport Administration and Air Cargo terminal (where outgoing and incoming cargo between Denmark and points in Greenland can be sent and received). The Greenlandic Post Office is located next to the local supermarket.

On the South side of the runway is the old U.S. Base. Here EGRIP office and quarters will be in KISS (Building 662). The project warehouse is building 442.



Weather: The climate is continental and quite xeric with an annual precipitation averaging 120mm.; winter temperatures reach down to -50°C and the summer temperature increases to above +20°C. In project planning for fieldwork in or around Kangerlussuaq, it is always best to prepare for the worst. The weather in Kangerlussuaq can be cold in May, and snow is always a possibility. June, July and August are normally fairly temperate with temperatures ranging from 5-21°C. Rain is rare in these months, but given the right conditions, it can still be quite cool.
Field clothing should include windbreaker, rain wear, work boots, warm hats and gloves, woollen shirts, sweaters and trousers. Given the wide range of temperatures during summer months, the use of layered clothing offers the greatest flexibility.

Another important consideration is the insect season, normally from first week of June to late July. During this period, large, voracious Arctic mosquitoes are abundant.

Kangerlussuaq is the main hub for air traffic to and within Greenland with regular direct international connections to and from Copenhagen (Denmark) and occasionally Keflavik (Iceland).

In Kangerlussuaq you can buy regular, canned or freeze-dried foods, fuels (jet fuel/kerosene, gasoline, and field stove alcohol). There is also a post office, an airport hotel with cafeteria, a gym centre with swimming pool, a tennis-, badminton-, racket ball- and soft ball court, a golf course - and also a small museum with exhibitions about the history of Kangerlussuaq. Check **www.greenland-guide.gl** for information.

There are a few alternative dining and drinking establishments in Kangerlussuaq. The Roklub at Lake Ferguson is sometimes open in summertime and offers informal dinners at reasonable prices although the quality is varying. In the old dining hall, 100 m from KISS there is a small shop, a bar and

fast food place. Dining is available at the terminal. There is a cafeteria where the price of a typical meal is DK Kr.75. In summertime restaurant "Roklubben" is mostly open for the public. This lakeside restaurant, some 5 km from Kangerlussuaq, offers a splendid view while dining on Greenland specialities.

BASE FOR SCIENCE

Kangerlussuaq has a long tradition as an important base for field geophysical and glaciological research projects, but so far the region has had only limited activities within the disciplines of life science. The area lies at the edge of the Polar Cap Zone and the Aurora Zone. It is therefore of particular interest to science studies related to the ionosphere and the magnetosphere as well as to the lower and upper atmosphere.

The Kangerlussuaq region is within the low Arctic eco zone with diverse habitats like salt lakes, dune systems, mountain tundra and steppes with caribou and musk ox populations etc. Reindeer are indigenous but muskoxen were introduced from Northeast Greenland forty years ago. Muskox and reindeer are hunted and in season meat can be purchased at authorized butchers.

The plant growing season is long, featuring 150 days without snow cover, 80 continuously frost-free days, and 150 consecutive days with maximum air temperature continuously above freezing; (the numbers given are average values). The climate is very stable and with low rate of rainy days. The monthly mean is 241 sun hours in May through August.

The Kangerlussuaq region is a well exposed high grade basement terrain forming the southern border zone of the Nagssugtoqidian orogen. The region has a glacial landscape dating back 8,000 years. The town is sitting on uplifted fjord sediments that popped up due to isostatic rebound after the last glacial. You may find proto-fossilized fish in the sediments west of town. Please note: It has become illegal to take large amount of fossils and rocks out of Greenland. As a rule of thumb, you are allowed to take out what you can have in a closed fist.

The proximity of the Inland Ice has a significant effect on the climatic regime for the living resources and further it presents unique logistic opportunities for studies on the Ice Sheet proper, the edge zone, and periglacial geomorphology.

The KISS (Kangerlussuaq International Science Support) facility

Scientists and students who plan to work in Greenland have facilities available in Kangerlussuaq. KISS offers an array of modern facilities and possibilities to rent equipment and goods for use in the field or at the labs of the KISS building.

KISS (bldg. 662 in the map) is owned by the Home Rule Government and operated by the Kangerlussuaq Airport Management. The use of KISS is reserved exclusively for researchers and research projects registered by the Greenland Authorities after submission of project plans.

It is important to realise that KISS is a year-round facility and that the Kangerlussuaq region offers obvious research opportunities and potentials during the 8 winter months. This applies both to projects in biology and geophysics and the presence of KISS now greatly improves the logistics for performing field operations during winter time

The KISS facility, and the other facilities in Kangerlussuaq offer unique possibilities for performing science based at Kangerlussuaq. Please contact the NEEM FOM office for more information.

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N.N.	DK	
N.N.	DK	
N.N. AWI 2	D	
N.N. AWI 3	D	
N.N. AWI 4	D	
N.N. Basler 1	CAN	
N.N. Basler 2	CAN	
N.N. Basler 3	CAN	
N.N. Nettles 1	US	
N.N. Nettles 1	IS	
N.N. Nettles 2	US	
N.N. Nettles 2	IS	
N.N. Nettles 3	US	
N.N. Nettles 4	US	
N.N. PARCA1	US	
N.N. PARCA1	IS	
N.N. PARCA2	US	
N.N. PARCA2	IS	
N.N. PARCA3	US	
N.N. PARCA4	US	
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Xiao, Cunde	CHN	cdxiao@lzb.ac.cn

Address of the 109th:

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New York Air National Guard
Stratton Air National Guard Base,
1 Air National Guard Rd.
Scotia, New York 12302-9752

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NEEM FOM (Field Operations Manager) telephone	+299 84 11 51
FOM mobile	+299 52 41 25
Fax	+299 84 12 27
FOM satellite phone	+8816 234 95044
e-mail	fom@egrip.camp

Iridium Satellite handheld telephones to EGRIP camp.

Voice	Data	Telephone Name	Location
+ 8816 234 93272	+ 8816 929 49576	EGRIP 1 (FL)	EGRIP
+ 8816 234 95066	+ 8816 929 49618	EGRIP 2	EGRIP
+ 8816 234 94868	+ 8816 929 10405	EGRIP 3	EGRIP

Only some of these numbers will be available at any given time. Please ask the Field Operations Manager (FOM) which number is current.

Iridium OpenPort system (EGRIP only)

+8816 234 92110

Kangerlussuaq

While participants are in Kangerlussuaq they can be reached by:

Fixed line:	+299 84 11 51
EGRIP FOM Cell :	+299 52 41 25

CPS POLAR FIELD SERVICES, Kangerlussuaq

Office:	+299 84 15 98
Fax	+299 84 15 99

Mobile:	+299 52 42 18 (primary)
	299 52 42 81 (secondary)
E-mail:	cpskangerops@polarfield.com (Jessy Jenkins)
	kyli@polarfield.com (Kyli Cosper)
	robin@polarfield.com (Robin Abbott)
Air Greenland Cargo	+299 84 12 87
Tickets	+299 84 13 63
Statoil	+299 52 42 22
NYANG	+299 84 13 89
Met Office tel.:	+299 84 10 22
e-mail:	139ravenops@gmail.com

New numbers after move to Nuuk from SFJ.

FIC: telephone:	+299 36 33 53 (sector north)
FIC e-mail	fic@naviair.dk
Notam & com centre	+299 36 33 04
Rescue and Coordination Centre (RCC)	+299 36 33 18
e-mail:	rcc@naviair.dk
KISS:	+299 84 13 00
	+299 84 14 87
	+299 84 11 07
fax:	+299 84 14 72
email	sciencesupport@mit.gl

Summit camp

Iridium sat. Tel.:		+8816 314 59738
HF radio on	8093 MHz	(Summit Camp, daily at 08:45)

MEDICAL ADVISORY GROUP

Rigshospitalet (Phone +45 3545 3545)

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	Cell	+45 6128 1107	
	Private	+45 3940 3107	
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	Cell	+45 2465 5006	

Cargo shipments to Greenland

EGRIP/RECAP will have a Field Operations Manager in Kangerlussuaq most of the time, and a Field operations manager in Constable Pynt at all times this season. It is essential that all shipments are labelled correctly, and that EGRIP/RECAP is informed about every shipment. In addition, we can expect delays in the Air Greenland transport from Copenhagen to Kangerlussuaq although Air Greenland has increased the number of flights in summer.

Cargo to Kangerlussuaq should be labelled:

EGRIP Operations 2016
Box 12
DK-3910 Kangerlussuaq
Phone +299 84 11 51. Mobile +299 52 41 25 Fax +299 84 12 27
Greenland

The international designation of Kangerlussuaq is **SFJ** (Søndre Strømfjord)

We would like following information about each collo:
Weight
Dimensions
Volume.

Additional information and labeling
Non Freeze
Hold in Kangerlussuaq
Hazardous Material

Information on shipments and **Air Way Bill # (AWB)** should be emailed to:
fom@egrip.camp

We urge people to ship cargo as early as possible. Based on our experience and this year available air cargo space to Greenland we as a minimum recommend following:

SHIPPING DEADLINES:

Shipping by air to EGRIP from/via Europe:
Cargo for EGRIP April 26, **Must arrive** Kangerlussuaq (SFJ) latest **APRIL 20**
Cargo for EGRIP June 1 – June 7, **Must arrive** Kangerlussuaq (SFJ) latest **MAY 28.**

By Boat:
Delivery deadline for the ship in Aalborg is May 26 (normal cargo) to May 31 (full 20' containers) for arrival SFJ 11. June 2016. The cargo will most likely be available June 20.

Shipping to NEEM from the United States/Canada

CPS POLAR FIELD SERVICES and the EGRIP FOM must be notified of all cargo shipments, including commercial air in order to arrange for the receipt and transportation of cargo to the appropriate location in Greenland.

PLEASE NOTE: Be sure to mark your cargo with "EGRIP 2016" to avoid your cargo ending up at Summit!
CPS POLAR FIELD SERVICES contacts: Jessy Jenkins (jessy@polarfield.com) and Earl Vaughn (Earl.Vaughn@gmail.com)

It is necessary for you to enter your shipment into the CPS cargo tracking system (CTS). Robin Abbott or Jessy Jenkins (robin or jessy@polarfield.com will provide you with a password and login. You will receive an email from us when we have received your cargo in good order in Kangerlussuaq.

Below are the instructions provided to us by CPS Polar Field Services (http://www.polar.ch2m.com).

U.S. Shipping and CUSTOMS INFORMATION – 2016

CH2MHILL Polar Services

2016 Greenland ANG Shipping Requirements

Due to heightened security and military shipping requirements at both Stratton ANGB NYANG 109th AW LC-130 and Stewart ANGB NYANG 105th AW C-17, it is imperative that all cargo transiting to Greenland by this method meet the required delivery timelines outlined below.

*****All cargo must be received at Stratton/Stewart Air Bases no later than 10 days prior to the planned flight date. *Cargo will NOT be accepted on the day of an ANG flight******

Please ensure your cargo arrives in NY in time to process and ship to Greenland when it is needed. Cargo delivered the day of an ANG flight will be delayed due to customs and military processing requirements.

CUSTOMS

All cargo shipped to Stratton & Stewart Air Bases for delivery to Greenland must be **registered** (examined and certified) with U.S. Customs & Border Patrol (CBP) before it can leave the country. Registration options are:

1) Self-registration (Required for Newburgh shipments)
Completed by the researcher or a representative at home institution prior to shipping to CPS. If self-registering, ship cargo so that it arrives at Stratton/Stewart at least **10 days** prior to the scheduled ANG departure flight.

2) CPS registration (Available only for Stratton shipments)
CPS arranges CBP to register the shipment once cargo on-site at Stratton. Shipper must provide 3 copies of CBP-4455 to CPS NY Office. Cargo must be received **3 weeks** prior to the scheduled ANG departure flight.

See "*2016 ANG Shipping, Customs Instructions*" for more detailed information.

HAZARDOUS CARGO

All hazardous Cargo shipped via the NYANG to Greenland MUST be registered by CPS. CPS cargo representatives must be provided with advance notice, and cargo must arrive at least **3 weeks** prior to ANG flight date.

For more information on customs and hazardous cargo registration, see the Greenland Guide.

SHIPPING ADDRESSES

C-17, Newburgh NY	**C-130, Scotia NY**
Arrive no later than 10 days prior to ANG flight.	Arrive no later than 10 days prior to ANG flight.
Dino Guthrie, CPS C/O OWEN WHITE, NYANG 105th Air Terminal Stewart ANGB One Maguire Way Newburgh NY 12550-5075 Phone: 845-563-1318 Fax 845-563-1321	109th Small Air Terminal, Bldg. 20 1 Air National Guard Rd. Scotia, NY 12302-9752 Attn: Dino Guthrie Phone: 518.364.6975

CONTACTS

Daniel "Dino" Guthrie, Phone 518.364.6975, dino@polarfield.com
Earl Vaughn, Phone 518.605.0979, earl.vaughn@gmail.com

The CPS Greenland Team looks forward to working with you this season. Please do not hesitate to contact us with any questions regarding cargo, hazardous materials shipping, or customs documentation.

CH2MHILL Polar Services

2016 ANG Shipping, Customs Instructions

Sending Cargo to Greenland via ANG

STEP 1: COMPLETE CUSTOMS FORMS

A Certificate of Registration (form CBP-4455) is **required** when shipping your cargo to Greenland via the 109th Air National Guard.

US Customs & Border Protection website: http://www.cbp.gov/xp/cgov/toolbox/forms/

- From the "FORMS" page, select "CBP form 4455."
- Complete CBP-4455. Include the following information:
    - **Carrier:** 109th Air National Guard (C130) or 105th Air National Guard (C17)
    - **Date:** [Insert Current Date]
    - **Name, address and zip code:** You, the shipper
    - **Articles exported for:** "Other - science use in Greenland"
    - **Number packages:** [Include total number of items] Item number must be identifiable on each package.
    - **Kind of packages:** Examples: Hardiggs, steel boxes, aluminum poles, wooden crate
    - **Description:** Type "See following (#) pages."
        - Attach a packing list to each CBP-4455 Form.
        - The numbered of items should match the information presented on the packing list information.
        - You do **NOT** need a separate Certificate for each item; one CBP-4455 Certificate will cover all items listed in the shipment.
        - You do not need to certify personal clothing or food.
    - **Sign and date.**

Complete CBP-4457 for shipment of personal gear. This form eliminates any questions or problems with personal equipment such as computers, electronic gadgets, etc.

STEP 2: CARGO INSPECTED BY CUSTOMS

The CBP-4455 Certificate MUST be signed by a customs agent to be valid.

A customs agent will inspect the contents of a shipment and check the corresponding packing list for accuracy. Cargo traveling to Greenland via the Air National Guard can be inspected in 1 of 2 ways:

- **OPTION 1– Self-registration (Required for Newburgh shipments)**
    - Cargo is inspected at local Customs and Border Patrol Office BEFORE shipment to NY
    - Schedule an appointment with your local Customs and Border Protection Office (airports, harbors) to have them inspect and certify cargo for shipment to Greenland.
    - Prepare CBP-4455 and packing list as noted in Step 1.
    - Following the inspection, the CBP officer will sign the CBP-4455 form and stamp ALL copies of registration and packing lists.
    - CBP will retain a copy for their records.
    - Include one copy of signed/stamped CBP-4455 and packing list with your cargo shipment to NY.
    - Send 2 copies to CPS NY Office

- Retain a copy for your records. Approved CBP-4455 forms will be needed when cargo is returned to the U.S.

**** *A signed/stamped Certificate of Registration, CBP-4455 is valid for one year* ****

- **OPTION 2 – CPS Registration (Available only for cargo sent to 109th ANG Base Scotia NY)**
  - Cargo MUST arrive at least two weeks prior to your scheduled ANG flight.
  - Send **3 copies** of completed and signed Certificates of Registration and corresponding packing lists to:
    Dino Guthrie/ CH2M HILL Polar Services
    Stratton Air Base
    1 Air National Guard Rd., Bldg 20
    Scotia, NY 12302
    cell: 518-364-6975 or office: 518-344-2635 dino@polarfield.com
  - Pick up your approved CBP-4455 from CPS NY Office when transiting through NY.
  - If not flying with the ANG, make arrangements for CPS NY Office to send a copy of the approved forms. Approved CBP-4455 forms will be needed when cargo is returned to the U.S.

**** *A signed/stamped Certificate of Registration, CBP-4455 is valid for one year* ****

Returning Cargo to the U.S. from Greenland via ANG

Contact your local CPS support office in Kangerlussuaq or at Thule AB with questions regarding customs forms for retro cargo. If not traveling with your cargo, you will need to complete additional customs forms to be compliant.

The export signed/stamped Certificate of Registration, CBP-4455, and packing list provides proof that the cargo originated in the U.S. A copy of your outbound approved CBP-4455 will be required to bring cargo back into the U.S. via the ANG.

Prohibited and Restricted Items

Some items, including samples, may be prohibited or require a special permit to import into the U.S.

Review CBP's website for a list of Prohibited/Restricted items:
http://www.cbp.gov/xp/cgov/travel/vacation/kbyg/prohibited_restricted.xml

Sending Cargo to/from Greenland via Carrier OTHER than ANG

Check with your local Customs and Border Patrol office if cargo will originate or return via a Port of Entry other than NY ANG. There my be additional requirements to process your cargo, and your local customs office is the best resource for all non-ANG shipments.

For additional Customs information, refer to the U.S. CBP service online brochure "Know Before You Go." available on the official CBP site, http://www.cbp.gov/travel/us-citizens/know-before-you-go

Contact CBP directly at http://www.cbp.gov/ or via telephone at (518) 431-0200.

Site Cargo Offices

New York Office: Dino Guthrie at dino@polarfield.com
Kangerlussuaq Office: Geoff Miller at miller@polarfield.com

Useful tables
for planners, field leaders, Field Operation Managers, drillers and other interested parties.

Positions of NEEM and EGRIP camps and 2015 traverse route.

EGRIP position: 75.63N, 35.99W (decimal degrees), 2708 m a.s.l. (8885 feet)

Start of route is approx. 2 km N of NGRIP camp.

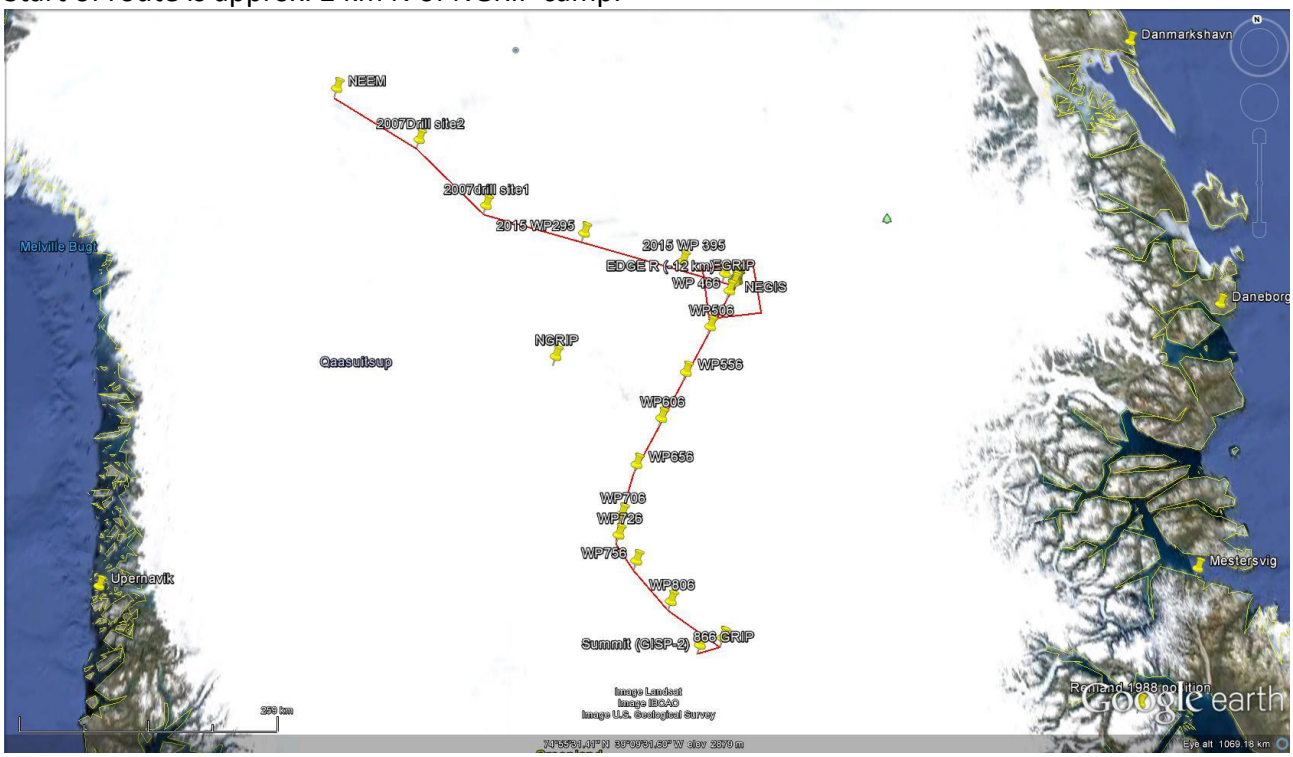


Fig. 5 1 The red line shows the 2015 route from NEEM to EGRIP and on to Summit.

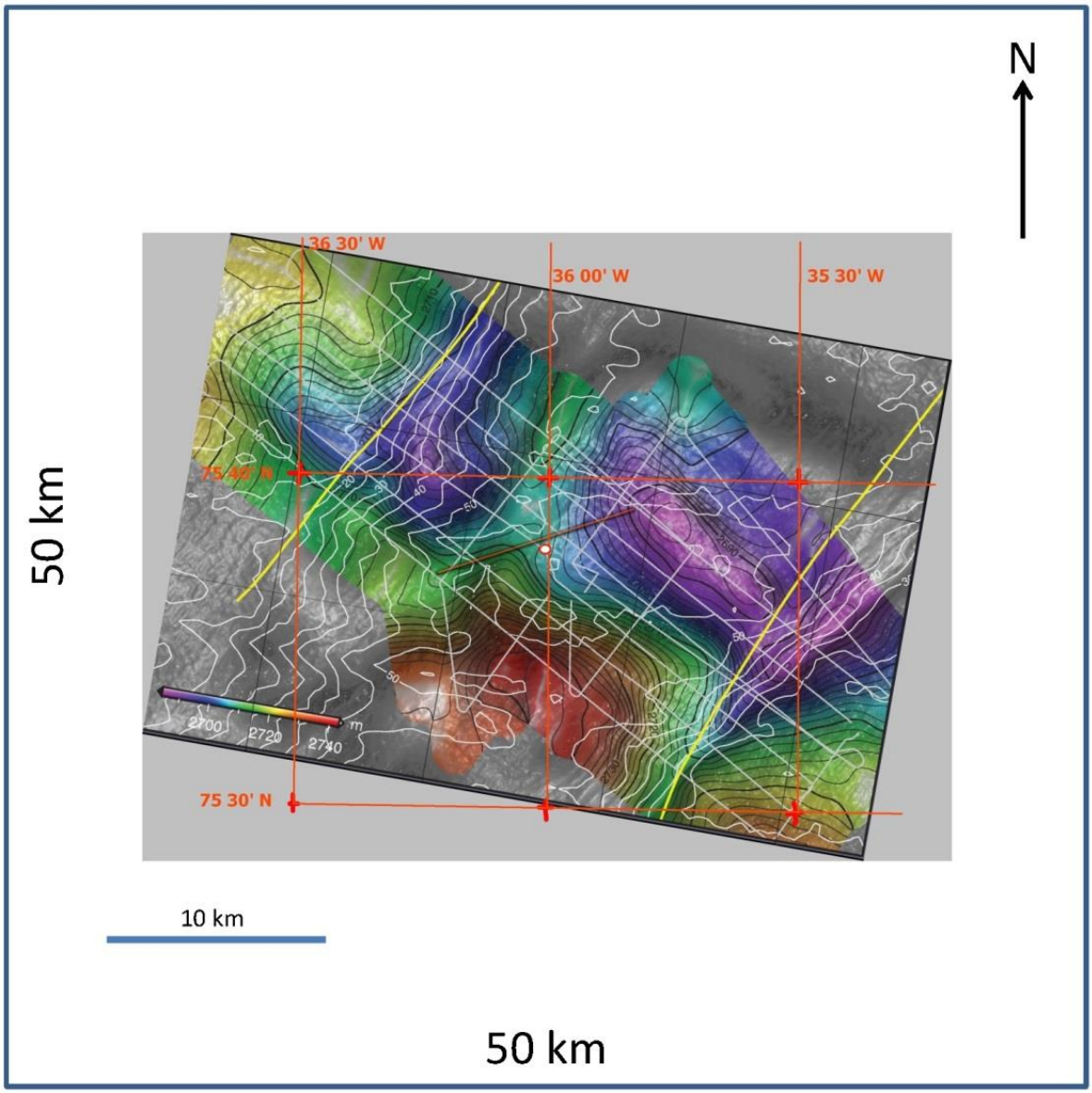
Positions of EGRIP skiway (official):

NorthEast end: N 75 degrees 38.542 min, W 35 degrees 56.780 min, alt. 2705 m

SouthWest end: N 75 degrees 37.556 min, W 36 degrees 3.647 min, alt. 2712 m

Skiways runs 240 and 060 degrees true.

Official (109th) altitude: 8,885 ft



Map on the vicinity of EGRIP camp with camp and skiway (240 degrees true). Data has been compiled by Knut Christiansson, Penn. State. The entire frame is 50 km by 50 km and represents the area allotment requested for EGRIP at Greenland authorities.

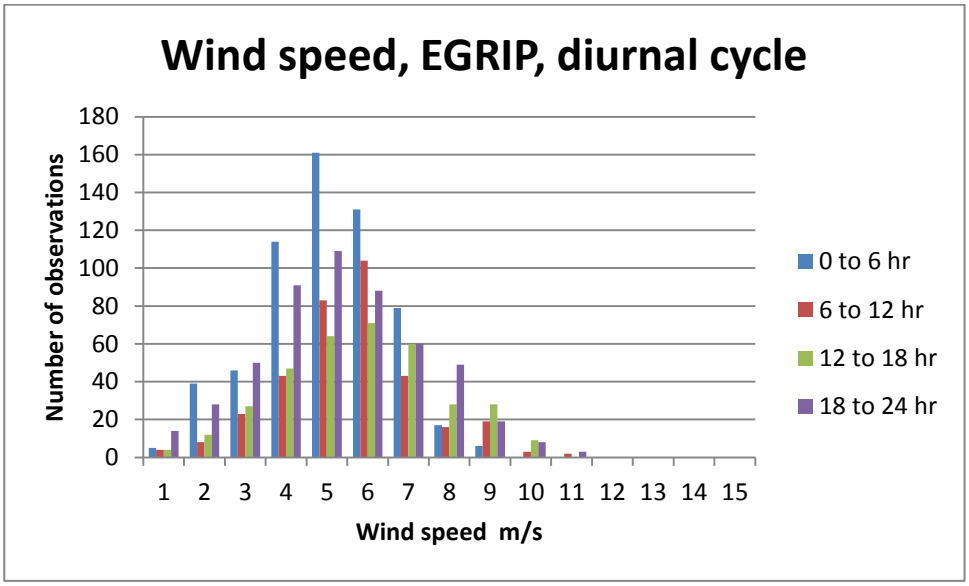
List of waypoints of 2015 traverse

Waypoint	route distance km	lat. dec. Deg	long. dec.deg	altitude m	deg	min	sec	deg	min	sec
1	**NEEM**	**77.45**	**-51.06**	**2484**	**77**	**27**	**0**	**51**	**3**	**36**
2	0 (6.6 km from NEEM)	77.461	-50.817	2453.9	77	27	40	50	49	1
3	10	77.413	-50.468	2472.1	77	24	47	50	28	5
4	20	77.367	-50.114	2490.1	77	22	1	50	6	50
5	30	77.321	-49.759	2508.1	77	19	16	49	45	32
6	40	77.277	-49.405	2525.5	77	16	37	49	24	18
7	50	77.232	-49.051	2542.9	77	13	55	49	3	4
8	60	77.187	-48.699	2560.1	77	11	13	48	41	56
9	70	77.142	-48.349	2577.1	77	8	31	48	20	56
10	80	77.097	-47.999	2594.1	77	5	49	47	59	56
11	90	77.052	-47.651	2611.1	77	3	7	47	39	4
12	**95 (Drilling 2 (265))**	**77.029**	**-47.479**	**2619.5**	**77**	**1**	**44**	**47**	**28**	**44**
13	100	77.006	-47.308	2627.8	77	0	22	47	18	29
14	110	76.96	-46.965	2644.5	76	57	36	46	57	54
15	120	76.913	-46.624	2661.1	76	54	47	46	37	26
16	130	76.867	-46.284	2677.2	76	52	1	46	17	2
17	140	76.821	-45.944	2693.4	76	49	16	45	56	38
18	150	76.772	-45.616	2709	76	46	19	45	36	58
19	160	76.721	-45.291	2724.7	76	43	16	45	17	28
20	170	76.66	-45.004	2740.3	76	39	36	45	0	14
21	180	76.581	-44.834	2754.2	76	34	52	44	50	2
22	190	76.493	-44.765	2766.1	76	29	35	44	45	54
23	**195 (Drilling 1 (165))**	**76.448**	**-44.771**	**2771**	**76**	**26**	**53**	**44**	**46**	**16**
24	295 (100 km)	76.1783	-41.1561	2760 est	76	10	42	41	9	22
25	395 (200 km)	75.8594	-37.6958	2730 est	75	51	34	37	41	45
26	437.5 (Edge)	75.7094	-36.2742	2701	75	42	34	36	16	27
27	449.1 (Fix N)	75.6667	-35.8833	2698	75	40	0	35	53	0
28	452.8 (Fix E)	75.6333	-35.8833	2694	75	38	0	35	53	0
29	**456 (EGRIP)**	**75.629900**	**-35.986700**		**75**	**37**	**48**	**35**	**59**	**12**
30	466	75.554848	-36.206372		75	33	17	36	12	23
31	476	75.479595	-36.423818		75	28	47	36	25	26
32	486	75.404144	-36.639067		75	24	15	36	38	21
33	496	75.341118	-36.816783		75	20	28	36	49	0
34	506	75.265311	-37.028077		75	15	55	37	1	41
35	516	75.189314	-37.237253		75	11	22	37	14	14
36	526	75.113131	-37.444339		75	6	47	37	26	40
37	536	75.036763	-37.649360		75	2	12	37	38	58
38	546	74.972985	-37.818654		74	58	23	37	49	7
39	556	74.896287	-38.019961		74	53	47	38	1	12
40	566	74.819413	-38.219279		74	49	10	38	13	9
41	576	74.742366	-38.416632		74	44	33	38	25	0
42	586	74.678029	-38.579612		74	40	41	38	34	47
43	596	74.600670	-38.773431		74	36	2	38	46	24
44	606	74.523145	-38.965357		74	31	23	38	57	55
45	616	74.445457	-39.155415		74	26	44	39	9	19
46	626	74.367607	-39.343628		74	22	3	39	20	37

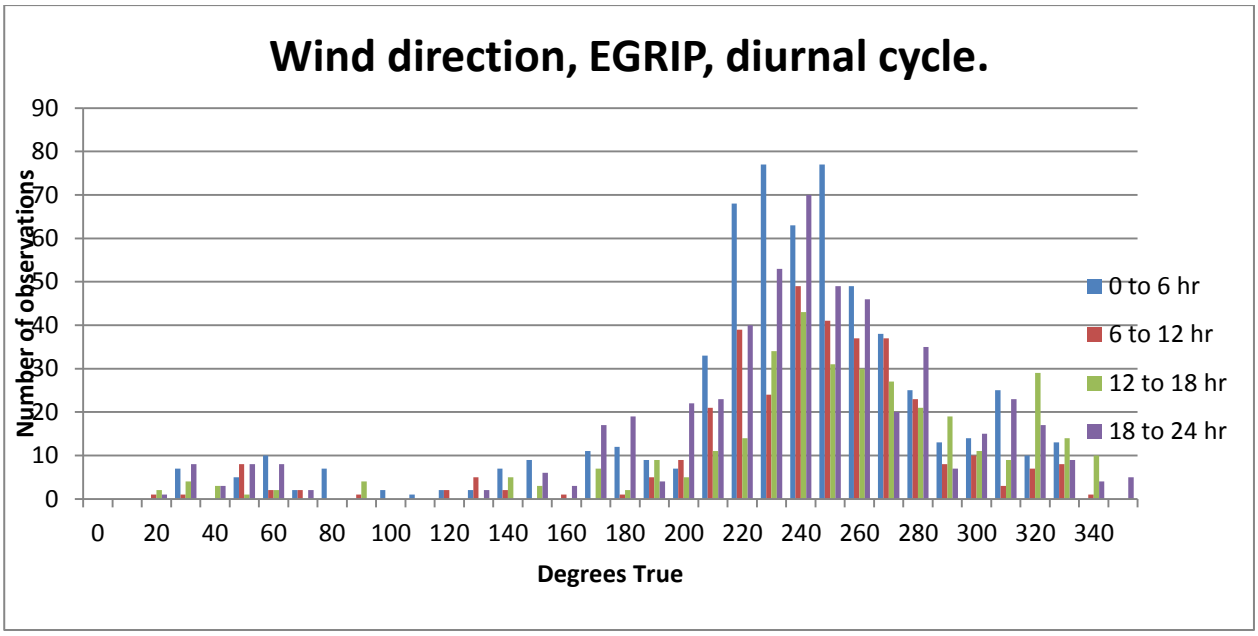
47		636	74.302610	-39.499080		74	18	9	39	29	57
48		646	74.224471	-39.683972		74	13	28	39	41	2
49		656	74.146177	-39.867087		74	8	46	39	52	2
50		666	74.067731	-40.048445		74	4	4	40	2	54
51		676	73.993497	-40.205827		73	59	37	40	12	21
52		686	73.906012	-40.281126		73	54	22	40	16	52
53		696	73.818500	-40.355632		73	49	7	40	21	20
54		706	73.730963	-40.429358		73	43	51	40	25	46
55		716	73.643401	-40.502316		73	38	36	40	30	8
56		726	73.560108	-40.563919		73	33	36	40	33	50
57		736	73.472239	-40.430987		73	28	20	40	25	52
58		746	73.401909	-40.257650		73	24	7	40	15	28
59		756	73.331506	-40.085393		73	19	53	40	5	7
60		766	73.252076	-39.893592		73	15	7	39	53	37
61		776	73.181208	-39.725133		73	10	52	39	43	30
62		786	73.110509	-39.557000		73	6	38	39	33	25
63		796	73.030682	-39.369698		73	1	50	39	22	11
64		806	72.968086	-39.169340		72	58	5	39	10	10
65		816	72.912809	-38.945014		72	54	46	38	56	42
66		826	72.850315	-38.694376		72	51	1	38	41	40
67		836	72.794496	-38.473498		72	47	40	38	28	25
68		846	72.738430	-38.253637		72	44	18	38	15	13
69		856	72.674986	-38.008189		72	40	30	38	0	29
70	**866 (GRIP)**		**72.618183**	**-37.792072**	**3232**	**72**	**37**	**5**	**37**	**47**	**31**
71	**896 (Summit Camp)**		**72.5797**	**-38.4556**	**3220**	**72**	**34**	**47**	**38**	**27**	**20**

Traverse route NEEM -> NGRIP until “drilling 1” and then on to EGRIP. From EGRIP up along the flow line of NEGIS to main NS ice ridge and then S to GRIP/Summit.

EGRIP weather 2014 from PARCA AWS



Wind speeds are in m/s. The ordinate is number of observations



When compared, it becomes clear that the wind is much more localized at EGRIP than at NEEM. Therefore a EGRIP skiway of 240 degrees true is within 20 degrees of the wind more than 60 % of the time. EGRIP is slightly colder than NEEM, but there are fewer cases with high winds. Finally, the annual accumulation of 11 cm ice eq. (30 cm snow) is less than half of NEEM.

Shipping boxes

The type of shipping box is very critical for both the protection of the cargo, and for efficient air transport. In Kangerlussuaq, the boxes will be stored on the cargo line which is exposed to snow, rain, sand and wind. On the ice, drifting snow will creep through any openings. The off loading from the aircraft at Summit is in the form of drifting cargo: The pallets are slid down the rear ramp of the aircraft while the aircraft is taxiing. In order to obtain the full payload and prevent the aircraft from cubing out before reaching maximum weight, the boxes should be stackable on an Air Force pallet. Also, wooden boxes with nails sticking out are dangerous to handle. By experience, we have found the following series of boxes to satisfy all the requirements:

Zarges aluminium box, type K-470. The following sizes are preferred:

order nr	Internal dimens (L*W*H)	Outside dimens	Weight
40678	550*350*310	600*400*340	5,0
40564	550*350*380	600*400*410	5,3
40565	750*550*380	800*600*410	10,0
40566	750*550*580	800*600*610	12,0
40580	1150*750*480	1200*800*510	20,0

The boxes should be lined with a shock absorbing layer. We have found a 27mm layer of Dow Chemical EDPM foam, 35kg/m^3, to provide the needed protection for even fragile material. Finally, in order to seal the box, all seams (bottom inside and outside, two vertical seams) should be sealed with Loctite 290 penetrating sealing compound.

We propose that, whenever possible, all participants use these or compatible boxes for their cargo. In order to be compatible, a box should have the same outside dimensions, and the same type of inter-box locking mechanism. The boxes should be equipped with handles.

The costs of transporting boxes are considered to be part of the field expenses.

Useful container data

Standard containers

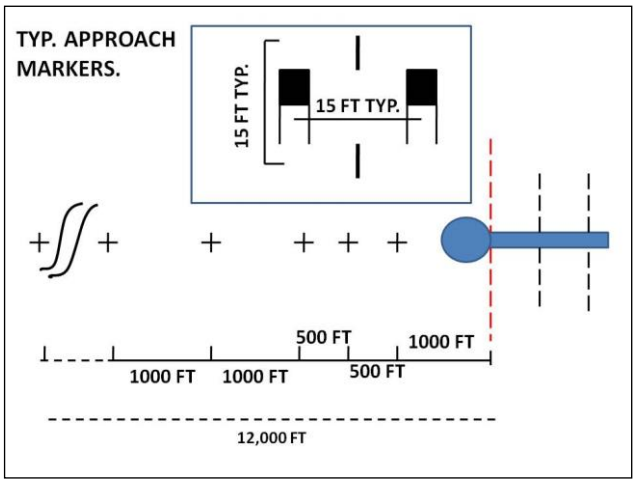
The following table shows the weights and dimensions of the three most common types of containers worldwide. The weights and dimensions quoted below are averages, different manufacture series of the same type of container may vary slightly in actual size and weight.

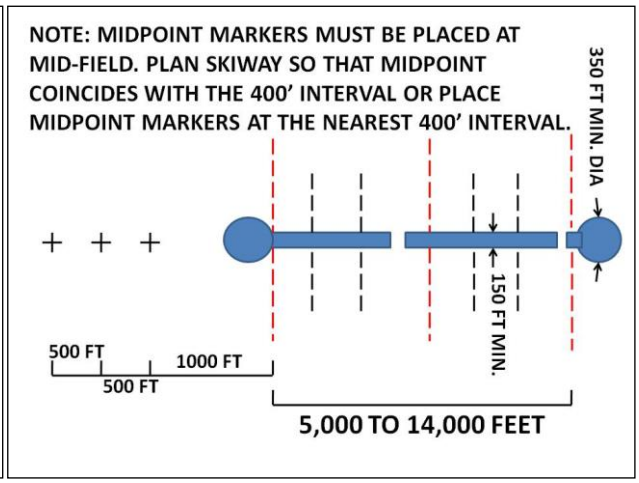
		20′ container		40′ container		45′ high-cube container	
		imperial	**metric**	**imperial**	**metric**	**imperial**	**metric**
external dimensions	**length**	19' 10½"	6.058 m	40′ 0″	12.192 m	45′ 0″	13.716 m
	width	8′ 0″	2.438 m	8′ 0″	2.438 m	8′ 0″	2.438 m
	height	8′ 6″	2.591 m	8′ 6″	2.591 m	9′ 6″	2.896 m
interior dimensions	**length**	18′ 10 $^{5}/_{16}$″	5.758 m	39′ 5 $^{45}/_{64}$″	12.032 m	44′ 4″	13.556 m
	width	7′ 8 $^{19}/_{32}$″	2.352 m	7′ 8 $^{19}/_{32}$″	2.352 m	7′ 8 $^{19}/_{32}$″	2.352 m
	height	7′ 9 $^{57}/_{64}$″	2.385 m	7′ 9 $^{57}/_{64}$″	2.385 m	8′ 9 $^{15}/_{16}$″	2.698 m
door aperture	**width**	7′ 8 ⅛″	2.343 m	7′ 8 ⅛″	2.343 m	7′ 8 ⅛″	2.343 m
	height	7′ 5 ¾″	2.280 m	7′ 5 ¾″	2.280 m	8′ 5 $^{49}/_{64}$″	2.585 m
volume		1,169 ft³	33.1 m³	2,385 ft³	67.5 m³	3,040 ft³	86.1 m³
maximum gross mass		52,910 lb	24,000 kg	67,200 lb	30,480 kg	67,200 lb	30,480 kg
empty weight		4,850 lb	2,200 kg	8,380 lb	3,800 kg	10,580 lb	4,800 kg
net load		48,060 lb	21,600 kg	58,820 lb	26,500 kg	56,620 lb	25,680 kg

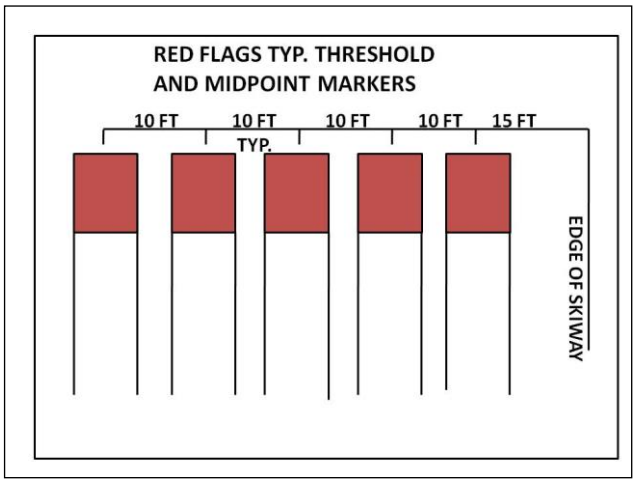
20-ft, "heavy tested" containers are available for heavy goods (e.g. heavy machinery). These containers allow a maximum weight of 67,200 lb (30,480 kg), an empty weight of 5,290 lb (2,400 kg), and a net load of 61,910 lb (28,080 kg).

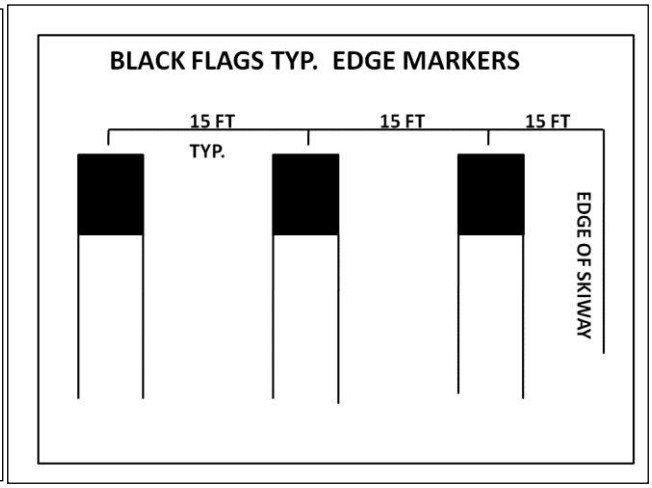
Skiway Marking:

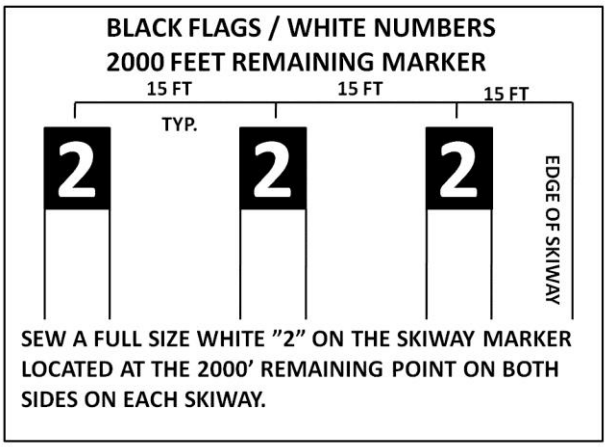
EGRIP ski way is 200’ x 12.000’ (Feet) – (choice of length 5,000’ – 16,000’, width 150’ – 400’)
Skiway design from AFI 13 – 217, 10.MAY 2007





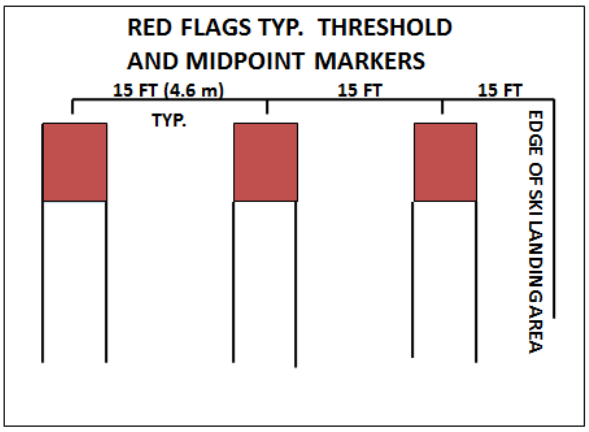


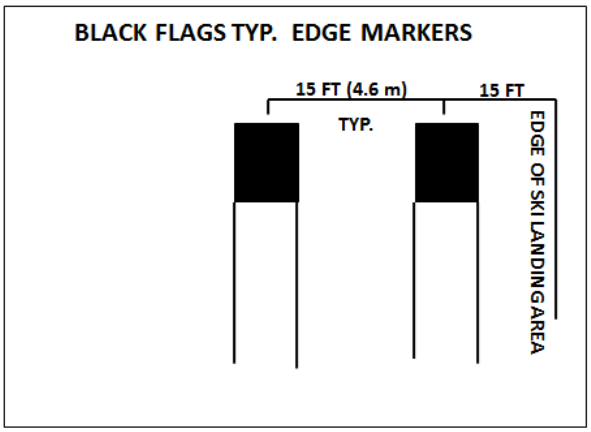


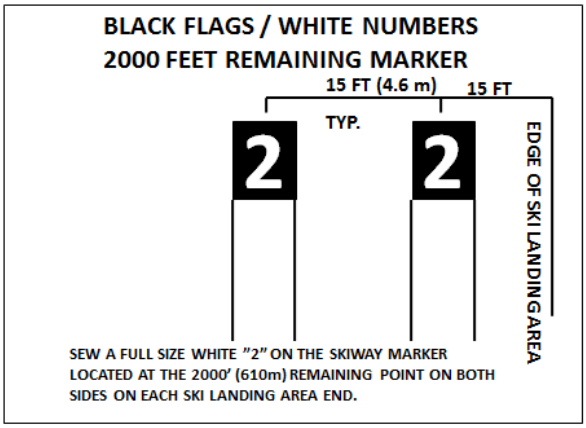


Ski Landing Area Marking (temporary skiway, last used at NEEM):

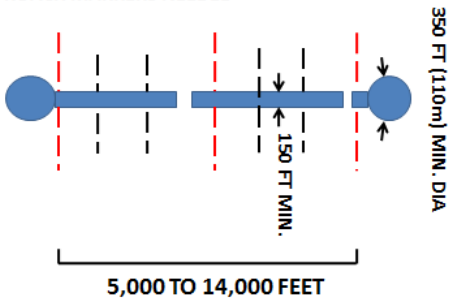
NEEM ski landing area will be 200' x 12.000' (Feet) – (choice of length 5,000' – 16,000', width 150' – 400'). Landing Area design from AFI 13 – 217, 10.MAY 2007







NOTE: MIDPOINT MARKERS MUST BE PLACED AT MID-FIELD. PLAN SKI LANDING AREA SO THAT MIDPOINT COINCIDES WITH THE 500' (152.4m) INTERVAL OR PLACE MIDPOINT MARKERS AT THE NEAREST 500' INTERVAL.
NO APPROACH MARKERS NEEDED

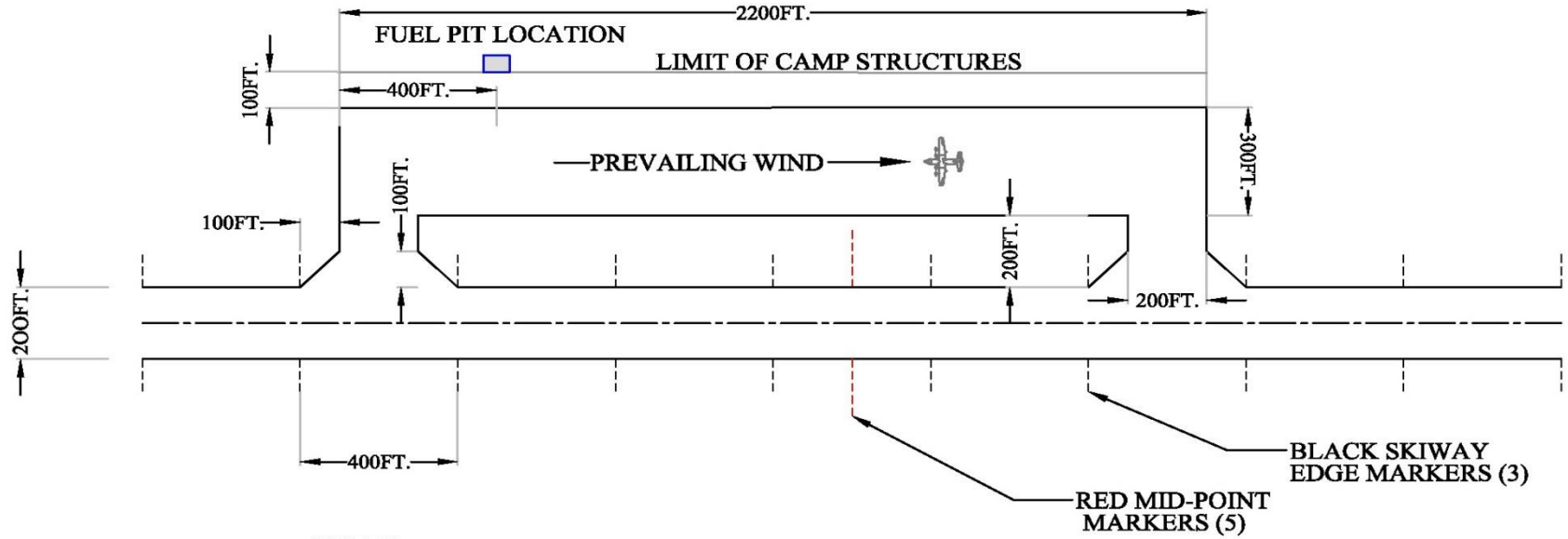


TYPICAL DIMENSIONS FOR MARKER BAMBOO:
2.4 m (94") x 2.5 cm (1 ")DIAMETER

SKIWAY:
NO OF MARKERS NEEDED (12,000 FEET X 200 FEET) (3660 m X 61 m):
30 RED AND 12 BLACK WITH "2" AND 268 BLACK (INCLUDING APPROACHES).
APRON AND TAXIWAYS: 30 GREEN.

SKI LANDING AREA :
NO OF MARKERS NEEDED (12,000 FEET X 200 FEET):
18 RED AND 8 BLACK WITH "2" AND 80 BLACK
APRON AND TAXIWAYS: 30 GREEN.

SKIWAY APRON LAYOUT
(CARGO OFFLOAD / ONLOAD AREA)



NOTES:
1. DIMENSIONS AS NOTED.
2. ACTUAL LOCATION OF SKIWAY APRON IN RELATIONSHIP TO SKIWAY MAY CHANGE DEPENDING ON CAMP LOCATION.
3. MARK APRON CORNERS WITH DOUBLE GREEN FLAGS, APRON LIMITS WITH SINGLE GREEN FLAGS.
4. MARKERS ENLARGED FOR CLARITY.

LC-130 AIRPLANE DESCRIPTION
WINGSPAN...132' 7"
LENGTH...97' 9"
HEIGHT...38' 6"

JCS 2011

Skiway official survey document:

DATE: May 29, 2015 **SURVEYOR**: Jorgen Peder Steffensen

NOTE:
1. ALL ELEVATIONS REFERENCE MEAN SEA LEVEL IN FEET (METRIC)
2. LATITUDES/LONGITUDES AND AZIMUTHS EXPRESSED IN DEGRESS-MINUTES-SECONDS FORMAT
3. ALL DISTANCES IN FEET (METRIC)
4. DUE TO ICE FLOW, EGRIP SKIWAY IS MOVING 150 FEET PER YEAR, BEARING 040

EGRIP CAMP

AIRFIELD REFERENCE POINT (ARP): CENTERLINE STATION 1640 (500 meter)
LATITUDE: 75-38-02.82 N LONGITUDE: 36-00-12.96 W
ELEVATION: 8885 (2708 meter)
DISTANCE SKIWAY CENTERLINE POINT TO THRESHOLD:
APPROACH: 6000
DEPARTURE: 6000

MAIN SKIWAY (200 ft. x 12000 ft.)
APPROACH (24)
LATITUDE: 75-38-32.52 N LONGITUDE: 35-56-46.80 W
ELEVATION: 8871 (2704 meter)
DEPARTURE (06)
LATITUDE: 75-37-33.36 N LONGITUDE: 36-03-38.82 W
ELEVATION: 8898 (2712 meter)
MAIN SKIWAY GRADIENT: 0.22%

SKIWAY AZIMUTHS from Approach True 24
True: 237 24'
Grid: unknown (mag. Declination Jan 2016: 28 42')

MAIN DOME (HIGHEST STRUCTURE)
LATITUDE: 75-37-47.52 N LONGITUDE: 35-59-37.44 W
ELEVATION: 8925 (top of structure) (2720 meter)
AGL:
DISTANCE TO SKIWAY CENTERLINE: 1640 (500 m)
DISTANCE SKIWAY CENTERLINE POINT TO THRESHOLD:
APPROACH 24 : 6000 (1829 meter)
DEPARTURE 06 : 6000 (1829 meter)

Typical specifications for Twin Otter and Basler:

Actual specs depend on the aircraft used, its equipment, fuel type etc.

	De Havilland DHC-6, Twin Otter:	**Basler (modern DC-3), Polar 6:**
Weight empty [kg]	3456	8900
Max take off weight [kg]	5682	13068
Weight of ski	250	544
Empty weight with ski	3706	9444
Max load [kg]	1976	4008
Fuel consumption [kg/hr]	270(330l/hr)	470 (570l/hour)
Speed without ski [km/hr]	250(135 kn)	380 (205 kn)
Speed with ski) [km/hr]	230 (125 kn)	300 (160kn)
Max range [km]	556	3225
Max altitude [ft]	30,000	25,000
With pax	10,000	25,000
Fuel load [kg]	1100	4008
Loading data:		
Cargo hatch [m*m]	2.0*1.9	2.15 *(1.9 front – 1.6 rear)
Cargo compartment		
Length, incl rear cabin etc [m]	8.1	12.85
Width 1,1m, max	1.2	2.34
Height 1,3m, max	1.4	2.0
Pay load		
Normal with full fuel load [kg]	990	2500 (with fuel for 3 hours)
Maximum	1260	1500 (with fuel for 5 hours)

Twin Otter:
In order for the cargo to fit through the cargo door, if the cargo is:

5.5m long, it must not be more than 0.2m thick
4.0m long, it must not be more than 0.35m thick
2.5m long, it must not be more than 0.65m thick
1.3m long, it must not be more than 1.2m thick

Basler:
In order for the cargo to fit through the cargo door, if the cargo is:

6.0m long, it must not be more than 0.6 m thick

Typical LC-130 specifications:

(all specs for info only, depends on aircraft etc)

An empty LC-130 is [lbs]	91000
Tank capacity:[lbs]	61000
Max touch down weight open snow [lbs]	125000
Max take off weight [lbs]	155000
Max landing weight [lbs]	155000
Max landing weight on prepared skiway [lbs]	135000
Fuel capacity [lbs]	62000
Fuel consumption [lbs/hr]	5000
Nominal speed [kn]	290
Flight time SFJ-NGRIP-SFJ (1020 nm)	4.4 hours
Flight time SFJ-NEEM-SFJ (1260 nm)	5.4 hours
Range with max payload [miles]	2364
Max air hours [h]	10
Cargo room max 41*10.3*9’ [m]	12.50*3.14*2.74
Physical door width 116" [m]	2.94
Cargo deck to ceiling 9' 1" [m]	2.76
Max weight for one pallet, pos 1-4 [lbs]	10000
Max weight of one pallet, pos 5 [lbs]	8500
Max weight of ramp pallet [lbs]	4664
Nominal empty weight of pallet and nets [lbs]	355
Max weight multplie pallet for combat offload [lbs]	12000
Pallet outside dimensions 88"*108" [m]	2.23*2.75
Pallet inside dimensions 84"*104"*2.25" [m]	2.13*2.64
Max height normal pallet, 96" [m]	2.44
Normal height of pallet, snow and combat [m]	2.28
Max height ramp pallet for combat offload [m]	1.75
Max height dual or tripple pallet [m]	1.75
Max vol per pallet [m^3]	13.7
Max vol ramp pallet [m^3]	8.75
Width wheel well area 123" [m]	3.12
Width ramp without rails 114" [m]	2.89
Width outboard rails 105 5/8" [m]	2.68
Ramp height 44" to 49" [m]	1.12 to 1.25
Ramp length 10' [m]	3.05
No of pax without using pallet space	4
1 pallet equals [pax]	8
2 pallet equals [pax]	14

Note: Pallet heights are measured from top of pallet.
Max weight for pallet on 931B forks is 2200 lbs

Small table of values and conversions:

1 foot =	0.3048 m
1 lbs =	0.4536 kg
1 US gallon =	3.7854 l
1 knot =	0.514 m/s

Max dimension of cabin luggage:	55*40*23 cm, 8 kg
Density of Jet A1	805 kg/m^3
Density of mogas	720 kg/m^3
200 l drum of JET A1 or D60	178 kg
Empty standard drum	15 kg
Firn density for stop of water flow:	720 kg/m^3

CINA equation for the relation between pressure and altitude:

$$p[hPa] = p_0 \left(\frac{288 - 6.5 \cdot 10^{-3} \cdot h\,[m]}{288} \right)^{5.256}$$

where p_o=1013.25 hPa, 288K standard air temperature at sea level (15 ^{o}C) and 6.5*10^{-3} the standard lapse rate in the troposphere [^{o}C/m]. Use this equation to obtain the sea level pressure when the altitude is known, i.e. for aviation weather reports.

Chill temperature:
This is the formula used for calculating wind-chill-temperatures:

$$\boldsymbol{t_{Chill}[\,^oC] = \left(\frac{10.45 + 10\sqrt{v} - v}{22.034} \right) \cdot (t - 33) + 33\ [\,^oC; m/s]}$$

Current capability of electrical cables:

Area [mm^2]	Resistance [Ohm,/100m]	Nom load [A]	Max load [A]
0,7	2.3	6	10
1,5	1.16	15	25
2,5	0.69	20	35
4,0	0.43	25	45
6,0	0.29	40	60
10	0.175	60	80
16	0.11	80	110
25	0.07	100	135

Connections to 5-conductor cable:

Yellow/green:	Protective ground
Black	L1
Blue	N
Brown	L2
Black	L3

Attenuation of coaxial cables:

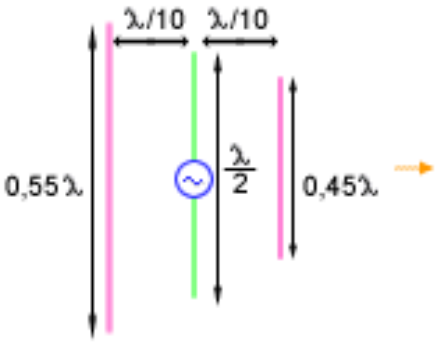
RG58/U attenuation per 30m:

10 MHz	1.5 dB at SWR 1.0.	+0.5 dB at SWR = 3
200 MHz	8.0 dB at SWR 1.0.	+1.2 dB at SWR = 3
1500 MHz	30 dB at SWR 1.0	+1.2 dB at SWR = 3

RG213/U attenuation per 30m:

10 MHz	0.7 dB at SWR 1.0	+0.4 dB at SWR = 3
200 Mhz	3.5 dB at SWR 1.0	+1.0 dB at SWR = 3
1500MHz	12 dB at SWR 1.0	+1.2 dB at SWR = 3

HF Radio Yagi-Uda Antenna:



From left to right, the elements mounted on the boom are called,

Reflector element, Driver element, Director element

The reflector is 5% longer than the driver element, and the director 5% shorter.

Typical dimensions for 3 element wide spaced 8093 kHz Yagi-Uda antenna:

Reflector length:	0.5*l	18.53m
Dipole length	0.475*l	17.60m
Director length	0.45*l	16.68m
Distance Reflector-Dipole	0.23*l	8.53m
Distance Dipole-Director	0.25*l	9.27m

With this length of the antenna the gain is expected to 7 dB, SWR<2

Coordination of LC-130 in Kangerlussuaq

Note regarding the coordination of CPS/EGRIP
and 109'th TAG activities in Kangerlussuaq.

This note is written to make the field coordination between CPS/CH2MHill, EGRIP and 109'th TAG as smooth and easy as possible by ensuring efficient ways of exchanging first hand information between the responsible Field Operations Managers (FOM's) for CPS and EGRIP and 109'th TAG personnel during periods with flights for the GISP and NEEM programmes.

Copies of this paper should be given to each Deployment Commander(DC) and the mission crew should be briefed on the contents before departure to Greenland. This will ensure that the FOM's and the 109'th personnel will operate along the same outlines throughout the field season.

In the following it is assumed that prior to the field activities of CPS and EGRIP in Greenland, plans and agreements have already been made between CPS/EGRIP and 109'th TAG regarding times of deployment in Kangerlussuaq, expected number of missions throughout the season, total cargo estimates, estimates on cargo straps, nets and pallets needed, ski-way marking, ski-way preparation, off load areas, radio frequencies etc.

Flight period:

After arrival of 109'th to Kangerlussuaq a meeting should be held between 109'th DC, 109'th cargo responsibles (Load masters and Aerial port) and the FOM's of CPS and EGRIP. Both FOM's need to be there since U.S. NSF activities and EGRIP project are independent and each FOM carry the financial responsibility regarding 109'th operations. At this meeting the FOM's will provide information on:

- Planned flights,
- Amount of cargo,
- Hazardous cargo,
- Number of PAX to be transported,
- Ski-way conditions in camp.
- Ski-way, taxiway and off-load area outlines relative to the camps,
- Updates on radio frequencies,
- Current weather and
- Communication radio frequencies & phone numbers.

The DC will provide information on the exact duration of the deployment, ground crew availability, aircraft availability and options in case of bad weather. The meeting will result in an operation schedule for the flight period in question. Both FOM's and the DC should consult each other in case of changes in this schedule.

Day to day operations:

The FOM's will normally organize that all cargo is palletized and strapped down. In cases of doubt the FOM's will consult the Aerial Port regarding palletizing. The FOM's will always consult the Aerial Port when married pallets are being built and when load vehicle (k-loader) is needed. The FOM's will

determine the weight and height of the pallets. The FOM's will indicate to Aerial Port which pallets are going on each flight and will indicate the position of any hazardous cargo on the pallets. Normally, transportation of pallets from the staging area to the planes and vice versa will be handled by Aerial Port using the Articulated front loaders(ATs) or other load vehicles. However, the FOM's will assist in the on- and off-loading of aircraft whenever needed using the EGRIP forklifts and trucks.

Cargo manifests, passenger manifests and shippers declarations of hazardous material will be prepared by each FOM office and delivered to Skier operations on the day before departure. In case of last minute changes (e.g. changes in passengers) the changes to the manifests will be passed on to Skier operations no later than two hours before departure. The FOM's will get aviation weather observations from the field camps on a one hour basis, starting at least 3 hours prior to scheduled departure.

Since each FOM is economical responsible to his/her program, the flight crew will request a clearance to go from the FOM just before brake release prior to take-off. In case the FOM has not been present at plane departure, the flight crew will call the appropriate FOM office (either CPS SONDE or GOC SONDE) by radio HF 8.093 MHz of VHF 122.8 MHz to obtain clearance to go.

During missions 8.093 MHz, Iridium phone and OpenPort phones will be monitored for updates on weather and mission progress from plane crews and field camps. NOTE: Both camps and FOM offices will have phone lines open 24 hours a day. The FOM offices will relay information on mission progress to Skier OPS. The Fom keeps a record of departure times and reported arrival times.

End of flight period:

At the end of deployment, before departure of the 109'th to the U.S. or, when there is a change of DC, a meeting should be held between the 109'th and the CPS and EGRIP FOM's in order for the FOMs and DC to sign the mission sheet, incl. the number of flight hours assigned to the different programs.

Updated, March 11, 2016 by J.P.Steffensen

AVIATION WEATHER REPORTS

The aviation weather reports should report the following in the sequence shown:

1. Time [local, here Sonde hours], use 24 hour format.
2. Ceiling Height to cloud base[100 feet, estimated or observed]. Type [SKC, FEW, SCT, BRK, OVC]
3. Visibility [nautical miles or fractions there off]
4. Temperature (Celsius). State centigrade.
5. Wind, Direction[10 deg resolution], State "true" or "magnetic" . And speed in knots
6. Pressure [hPa], reduced to zero elevation using 10700' for GRIP, 10600' for GISP, 9700' for NGRIP, 8140' for NEEM. This is called the **QNH** value.
7. Horizontal definition [good, fair, poor, nil]
8. Surface definition [good, fair, poor, nil]
9. Comments.

Example: 0630 local, Scattered, 2500 feet estimated, vis. 2 miles, temp: -15 degC, Wind 290 mag at 12 knots, QNH 1013 hPa, horizon: good, surface: fair, "skiway clear, fogbank SE of ski-way.".

Visibility: Nautical miles or fractions of miles. Any visibility problems less than 6 miles state obscuring phenomenon. Choices: Haze, snow, ice fog, ground fog, blowing snow, white out. Max visibility stated "unrestricted".

Pressure: Local pressure converted to sea level according to international aviation CINA standard atmosphere. State hPa. Note, that the elevation used is the agreed upon, canonized elevation in feet, not the actual elevation. hPa (or millibar; 1 hPa = 1 mb)

Ceiling type: **SKY CLEAR** (SKC, no cloud al all), **FEW** (a small cloud here and there <25 %), **SCATTERED** (SCT. Even coverage of clearly separated small clouds. 25% -60%), **BROKEN** (BRK, Even coverage of clear blue patches of sky between clouds. 60 % – 85 %). **OVERCAST** (OVC, even cloud cover, 100%). With OVC always state cloud base height.

Horizon definition: **Good:** Sharp horizon **Fair:** Identifiable
Poor: Barely discernable **Nil:** No horizon

Surface definition

GOOD: Snow surface features are easily identified by shadow. (Sun in obscured)
FAIR: Snow surface can be identified by contrast. No definite shadow exist. (Sun obscured).
POOR: Snow surface cannot be identified except close up. (Sun totally obscured).
NIL: Snow surface features cannot be identified. No shadow or contrast. Dark coloured objects seem to "float" in the air. Glare is equally bright from all directions.

Whiteout NIL surface, NIL horizon

Comments: Plain language comments, trends, changes : «Fog bank north", "Visibility decreasing." "Winds variable". "Barometer rising".

Conversion:

1mB	= 1 hPa	=0.0295300 in.Hg.
1 feet	= 0.3048 meter,	
1 nau.miles	= 1853 meter.	
1 m/s	= 1.943 knots	

Communication plan

Typical radio communication plan.

The major part of the communication is performed using Iridium OpenPort and Iridium satellite communication. However, most flight related communication is performed on the radio.

Call signs (Site Names): CPS Sonde, Summit Radio, East GRIP , GOC Sonde.

Short wave (or HF) Frequencies:

Primary	**8093 kHz**	Ice freq. For camp to FOM communication
Secondary	**4753 kHz**	Ice freq, Best for distances up to 400 km.
	3815 kHz	Optional frequency for local traverse, 3350 may also be used depending on distance and antenna
	4050 khz	Main east Greenland party line frequency.
	7995 khz	Ice freq, digital comms.

All frequencies use SSB, USB

VHF radio.
Camp communication with air craft is performed on Air band **122.8MHz** FM, Camp has also capability to transmit and receive on Maritime Channel 8 (156.400 MHz) to support SAR operations.

Schedule:
GOC Sonde will monitor 8093 on a routine basis. Main Sonde-Camp contact time is at 18:45 SFJ hours, but depends on CPS Polarfield Services use of the frequency and the camp activities.

If aircrafts are expected, weather reporting starts 3 hours prior to estimated take off time on a 30 min basis unless otherwise arranged. Reporting primarily on OpenPort e-mail with telephone and radio as backup unless agreed otherwise.

Summary of frequencies used in Greenland

HF Maritime:	2182	Emergency Call
HF Aircraft:	2950	NUUK FIC
	4724	Thule Airways
	5526	NUUK FIC
	6739	Main Aircraft frequency
	8945	NUUK FIC
	8968	Thule Airways
	10042	NUUK FIC
VHF radio.	118.1	CNP AFIS
	118.3	SFJ Approach
	121.3	NUUK FIC
	121.5	**Call, Emergency**
	122.8	Air to ground, EGRIP or RECAP, Summit
	126.2	SFJ Tower

Phonetic alphabet

A special way of saying letters and numbers that makes them less likely to be misunderstood when they are transmitted over radios.

A	Alpha	N	November	1	Wun
B	Bravo	O	Oscar	2	Too
C	Charley	P	Papa	3	Tree
D	Delta	Q	Quebec	4	Fower
E	Echo	R	Romeo	5	Fiwer
F	Foxtrot	S	Sierra	6	Six
G	Golf	T	Tango	7	Seven
H	Hotel	U	Uniform	8	Aight
I	India	V	Victor	9	Niner
J	Juliet	W	Whiskey	0	Zeeroh
K	Kilo	X	Xray		
L	Lima	Y	Yankee		
M	Mike	Z	Zulu		

In addition, numbers are usually spoken as individual digits. For example, 123 would be read as “wun too tree”.

Useful abbreviations for de-cyphering pilot talk on flight plans.

AC: Air craft.

ACL: Air Craft Load	= Total weight of aircraft (in kg or pounds)
GC: Centre of gravity	For balancing the Air Craft
FL: Flight Level	level of flight in nearest 100 feet
POB: Persons on board	= total number of souls (PAX and crew)
Endurance or FOB	= Total time of flight with current fuel load.
1000z	= 10.00 GMT (0800 AM West Greenland summer time)

Flightplan:

IDENT: C-GHGF TYPE: DC3T VFR M SHG/S
DEPART BGNM@1200 FL125 N0205
ROUTE: BGSF
EET 0330 FOB 0600 POB 5
For PIC E BENGTSSON
J.P.Steffensen, FL NEEM Camp
+8816 777 15686

Identity: Charlie-Golf Hotel Golf Foxtrot. Type: Turbo DC3 (Basler), Flying Visual Flight Rules. Safety equipment “M SHG/S” Departs NEEM at 1200z , flying at flight level 12500 feet, , route to Sondrestrom, Estimated flight time 03.30 hours, Fuel on board 06.00 hours. 5 Souls on board. Pilot in Charge: E Bengtsson.

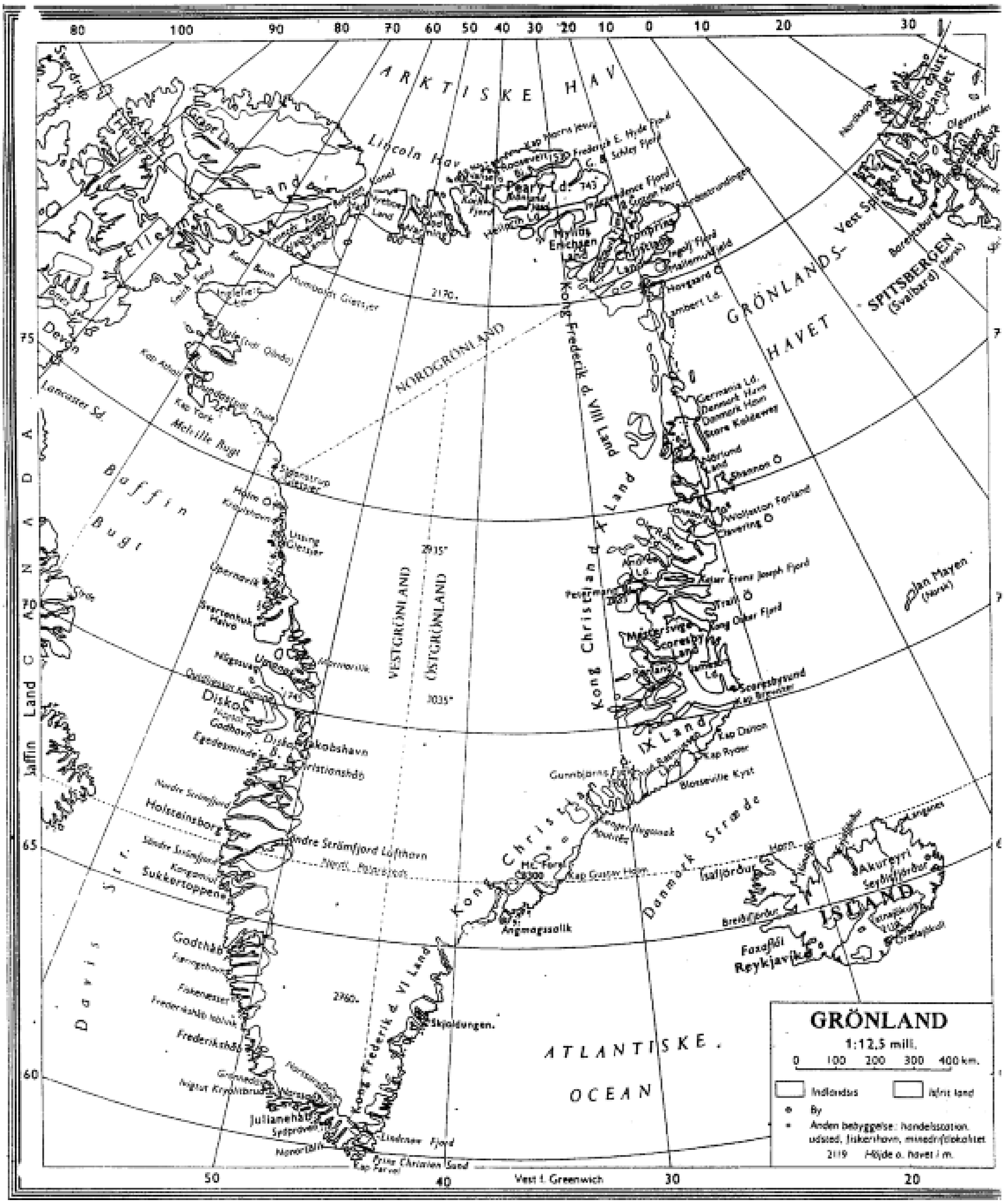
METAR and TAF:

METAR bgsf 111320z auto 08007kt 9999ndv ncd m30/m34 q0995=

METAR	METAR
Bgsf	Gældende for Kangerlussuaq/Sdr Strømfjord
111320z	Udstedt d. 11 i måneden kl. 10:20
auto	
08007kt	Vind fra 80°, 7 knob
9999ndv	Sigtbarhed > 10 km
ncd	
m30/m34	Temperatur -30 grader, dugpunktstemperatur -34 grader
q0995	Lufttryk 995 hektopascal

TAF-FT bgsf 111058z 1112/1123 06006kt 9999 bkn150 tempo 1113/1123 4500 -shsn bkn024=

TAF-FT	Lang TAF
Bgsf	Gældende for Kangerlussuaq/Sdr Strømfjord
111058z	Udstedt d. 11 i måneden kl. 07:58
1112/1123	Gældende fra kl. 09:00 og de næste 24 timer
06006kt	Vind fra 60°, 6 knob
9999	Sigtbarhed > 10 km
Bkn150	Skyet i 15000 fod
Tempo	Perioder med ændring
1113/1123	Mellem kl 10:00 og 20:00
4500	Sigtbarhed 4500 meter (4,5 km)
-shsn	Lette snebyger
bkn024	Skyet i 2400 fod


ARKTISKE HAV
GRÖNLANDS-HAVET
NORDGRÖNLAND
VESTGRÖNLAND
ÖSTGRÖNLAND
Baffin Bugt
Davis Str.
Danmark Stræde
ATLANTISKE OCEAN
SPITSBERGEN (Svalbard) (Norsk)
Jan Mayen (Norsk)
ISLAND
Akureyri
Reykjavik
Kong Frederik d. VIII Land
Kong Christian d. X Land
Kong Christian d. IX Land
Kong Frederik d. VI Land
Peary Ld.
Lincoln Hav
Holsteinsborg
Sukkertoppen
Godthåb
Frederikshåb
Julianehåb
Angmagssalik
Skjoldungen
Scoresbysund
Disko
Jakobshavn
Christianshåb
Egedesminde
Upernavik
Thule
Kap York
Melville Bugt
Søndre Strømfjord Lufthavn
Kap Farvel
Vest f. Greenwich
GRÖNLAND
1:12,5 mill.
0 100 200 300 400 km.
Indlandsis
Isfrit land
By
Anden bebyggelse: handelsstation, udsted, fiskerihavn, minedriftslokalitet
2119 Höjde o. havet i m.

Positions in Greenland

Positions in Greenland				
Site	N, deg	W, deg	N, deg, min	W, deg,min
Aasiaat, BGAA	68,7219	52,7847	68 43 19	52 47 05
AEY	65,65	18		
AWI 1995 depot	76,63	46,37	76 38	46 22
Camp Century, tower	77,1797	61,10975	77 10 46	61 06 35
Camp Century,upstream	77,22122	60,80012	77 13 16	60 48 00
CNP, BGCO	70,7417	22,6583	70 44 30	22 39 30
DMH	76,79	18,65		
Dye-2	66,485	46,298	66 29 06	46 17 54
Dye-3	65,15139	43,81722	65 09.05	43 49.02
GISP (Summit)	72,58833	38,4575	72 34.78	38 27.27
GRIP	72,58722	37,64222	72 34.74	37 37.92
HT, 95 Drill site	82,50556	37,47222	82 29.8	37 28.2
JAV, BGJN	69,2444	51,0622	69 14 40	51 03 44
Kangerlussuaq, BGSF	67,0111	50,725	67 00 40	50 43 30
Kulusuk, BGKK	65,5736	37,1236	65 34 25	37 07 25
Longyearbyen	78,25	15,5		
Narsarsuaq,BGBW	61,1611	45,42780	61 09 40	45 25 40
NEEM	77.4486	51.0556	77 26 54.93	51 03 19.89
NGRIP	75,1	42,30000	75 06	42 20
NGT23, B20	78,83333	36,50000	78 50 00.0	36 30 00.0
NGT27, B21	79,99925	41,13744	79 59 57.3	41 08 14.8
NGT30, B22	79,34142	45,91156	79 20 29.1	45 54 41.6
NGT33, B23	78,00000	44,00000	78 00 00.0	44 00 00.0
NGT37	77,25000	49,21667	77 15	49 13
NGT39	76,65000	46,48333	76 39	46 29
NGT42	76,00000	43,50000	76 00	43 30
NGT45	75,00000	42,00000	75 00	42 00
Nuuk, BGGH	64,1944	51,6806	64 11 40	51 40 50
Saddle North	66,43333	43,33333	66 26	43 20
STANOR	81,6	16,650	81 36	16 39
Storstr□mmen			77	22
T53. JJ			71 21.24	33 27.34
T61	72,2	32,3	72 12	32 18
Thule AB	76,53	68,7	76 32 00	68 42 00
Uummannaq, BGUQ	70,7342	52,6961	70 44 03	52 41 46

Relevant distances

From	To	km
AEY	NOR	1780
AEY	CNP	600
CNP	THU	1532
CNP	DMH	686
CNP	RENLAND	161
DMH	NGT33	627
DMH	NOR	539
EGRIP	DMH	480
EGRIP	CNP	695
EGRIP	SUMMIT	350
EGRIP	NEEM	440
EGRIP	NGRIP	190
MST	CNP	170
MST	RENLAND	141
NEEM	SFJ	1180
NEEM	THU	480
NEEM	UPERNAVIK	600
NEEM	NGRIP	365
NGRIP	CNP	799
NGRIP	GRIP	315
NOR	Longyearb	717
NOR	HT	335
SFJ	THU	1224
SFJ	JAV	245
SFJ	EGRIP	1088
SFJ	GRIP	796
THU	CC	205
THU	HT	887
THU	NGT33	625
THU	GRIP	1005
THU	NOR	1182

EGRIP Drilling Liquid Properties

A drilling liquid has been developed for NEEM based on ESTISOL 240 (coconut oil extract) mixed with COASOL. This liquid is non-polar, non-hazardous, no explosive risk, 'healthy', has a low environmental impact, and is available. BUT is twice the price of D-40/HCFC-141b and has 5 times the viscosity at -30'C. We have also included a new cold temperature version ESTISOL 140, which was tested and found suitable for Antarctic operations at Aurora basin in 2014, also as a one components fluid (see densities below). It has higher vapour pressure so it can be smelled and it dries out from clothing much faster.

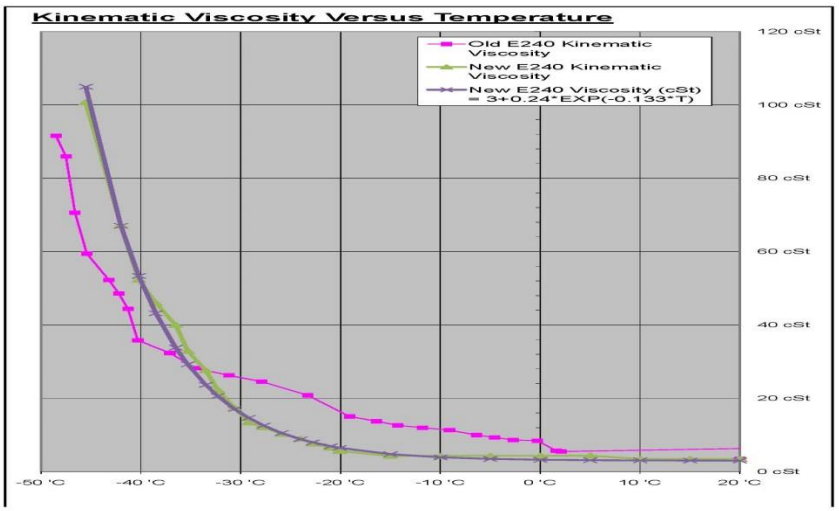
RECAP will utilize ESTISOL 140 in 2015 and EGRIP plans to use COASOL/ESTOSOL 240 in combination with ESTISOL 140 in the coming years.

TABLE .	**COASOL**	**ESTISOL 240**	**ESTISOL 140**
Manufacturer	DOW	DOW	DOW
Melting point	< - 60 ^{o}C	< -50 ^{o}C	<-89 ^{o}C
Boiling point	274 - 289 ^{o}C	255 - 290 ^{o}C	199 ^{o}C
Flash point	131 ^{o}C	136 ^{o}C	75 ^{o}C
Explosive limit	0.6 – 4.7 % (vol)	None	None
Vapour pressure (20^{o}C)	0.004 kPa		0.03 kPa
Density (20^{o}C)	960 kg/m^{3}	863 kg/m^{3}	865 kg/m3
Density (-30^{o}C)	995 kg/m^{3}	898 kg/m^{3}	915 kg/m3
Viscosity (20^{o}C)	5.3 cSt	3 cSt	1.0 cSt
Viscosity (-30^{o}C)	25 cSt	13 cSt	2.2 cSt
Auto ignition temperature	400 ^{o}C	None	270 ^{o}C
Bio-degradable	Yes	Yes	Yes
Fire fighting equipment	Water spray, foam, CO_2	Water spray, CO_2 foam, dry chemical	Water spray, CO_2, foam, dry chemical
Special protection	No	No	No
Hazardous material	No	No	No
Explosive risk	None	None	None
Max. Workplace air levels	None	None	None
Price US$ equiv. in Kg	5.50 $/Kg	4.60 $/Kg	4.5 $/kg
Data on ESTISOL 240, 256, EGDA, & COASOL are from safety tests according to EU Safety 91/155/EU, article 204020, 203989, 205698 & 204872 respectively			

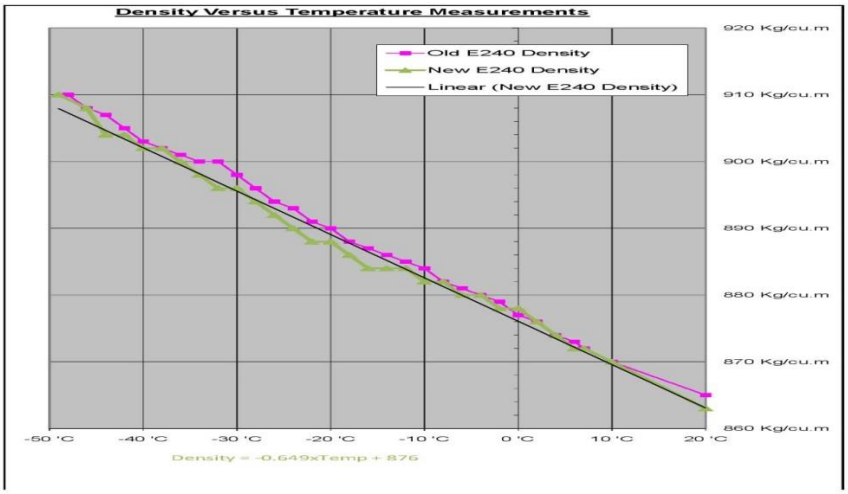
ESTISOL 240 was field tested as a drilling liquid at Flade Isblink, Greenland 2006 with a 4" diameter ice core drilled using the Hans Tausen electro-mechanical drill to a depth of 423.30m (260m of this core using the new liquid). The ice core quality was 'good', no problems encountered cleaning and processing the ice core, the mixture has a slippery feel with no discernable odour, and the liquid is very slippery when spilt on the smooth

wooden flooring. The Hans Tausen drill descents at speeds of 0.95m/s at drill liquid temperatures of -16 deg. C. By increasing the borehole diameter by 4mm (to 134mm) a 36% descent speed increase was achieved (1.28m/s). Further improvements can be achieved by adding a dead weight, reducing the pressure chamber diameter, or reducing the pressure chamber length.

The mix proportions for NEEM fluid , 2-3 litre ESTISOL 1 litre COASOL

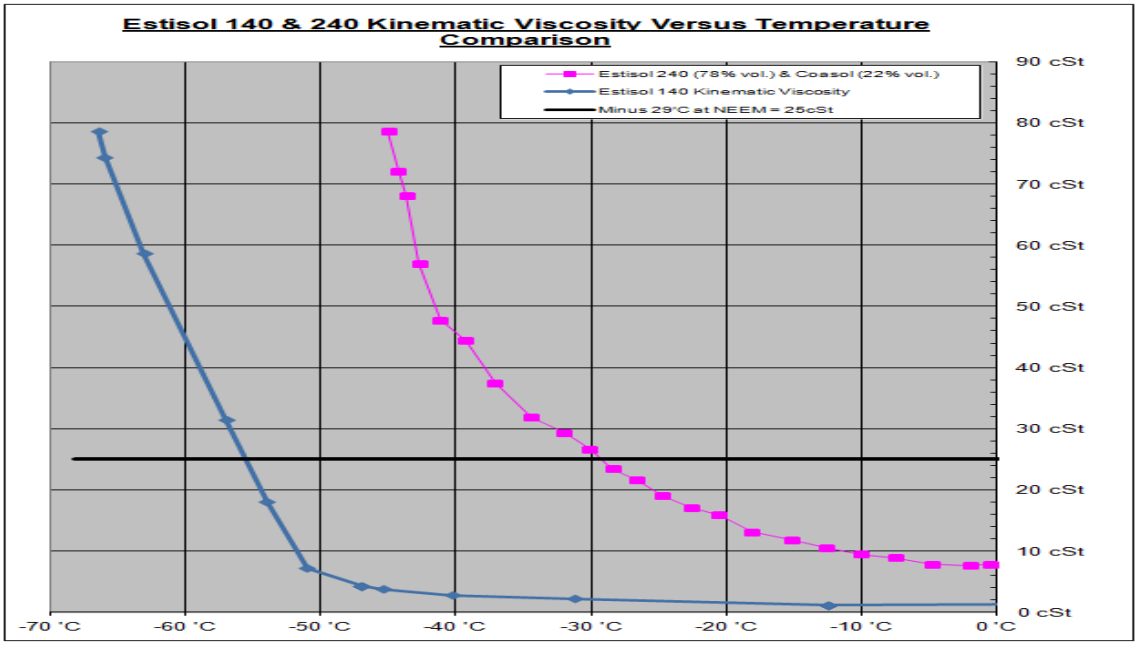


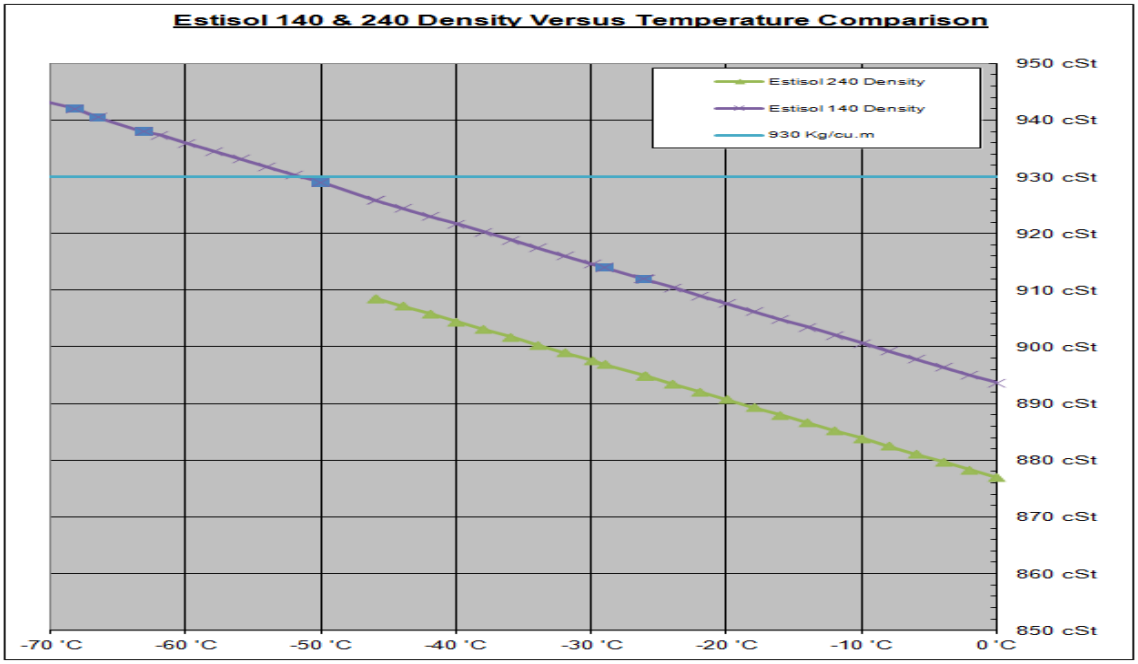
In February 2008, the supplier of Estisol 240 announced a change in specifications of the fluid due to a change in raw materials for the production (coconut oil has become too expensive) We therefore conducted a new set of measurements. As seen above, by cheer luck, this change has improved the fluid for our use. Purple: old Estisol 240; Green: New Estosol 240. Blue: simple model of kinematic viscosity vs. temperature.

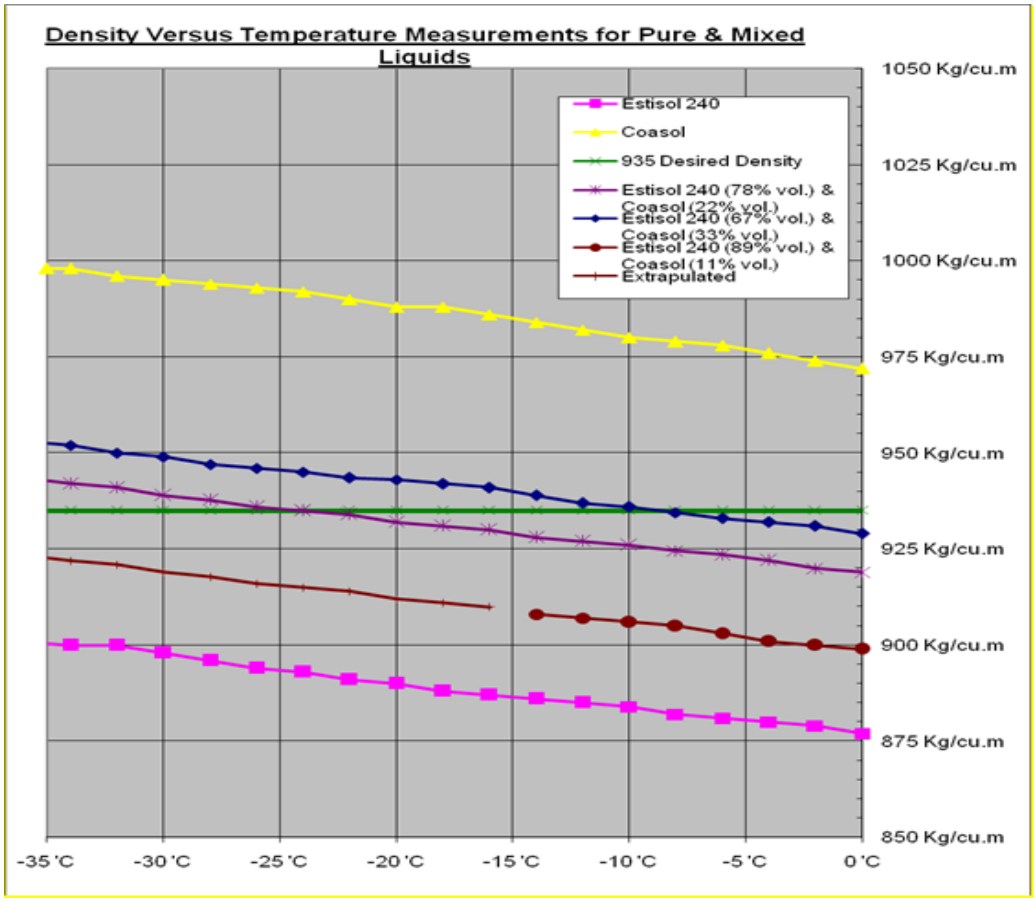


As seen above, the densities of new and old Estisol 240 are comparable.

Properties of ESTISOL 140.

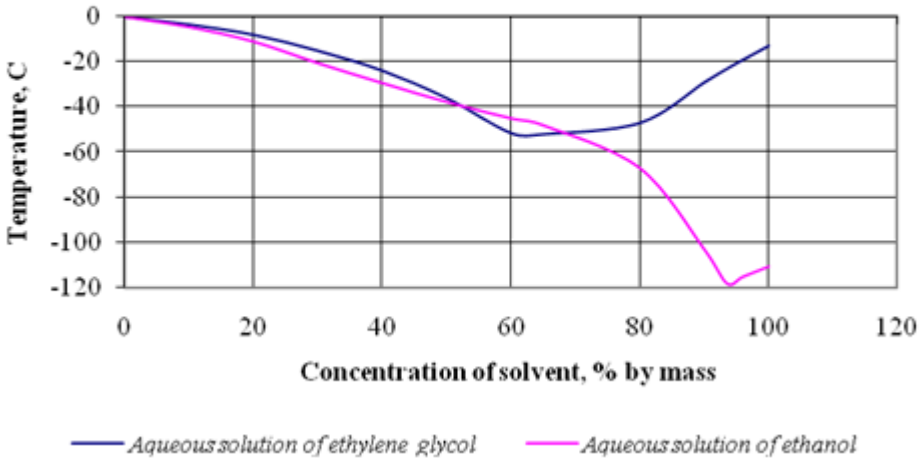




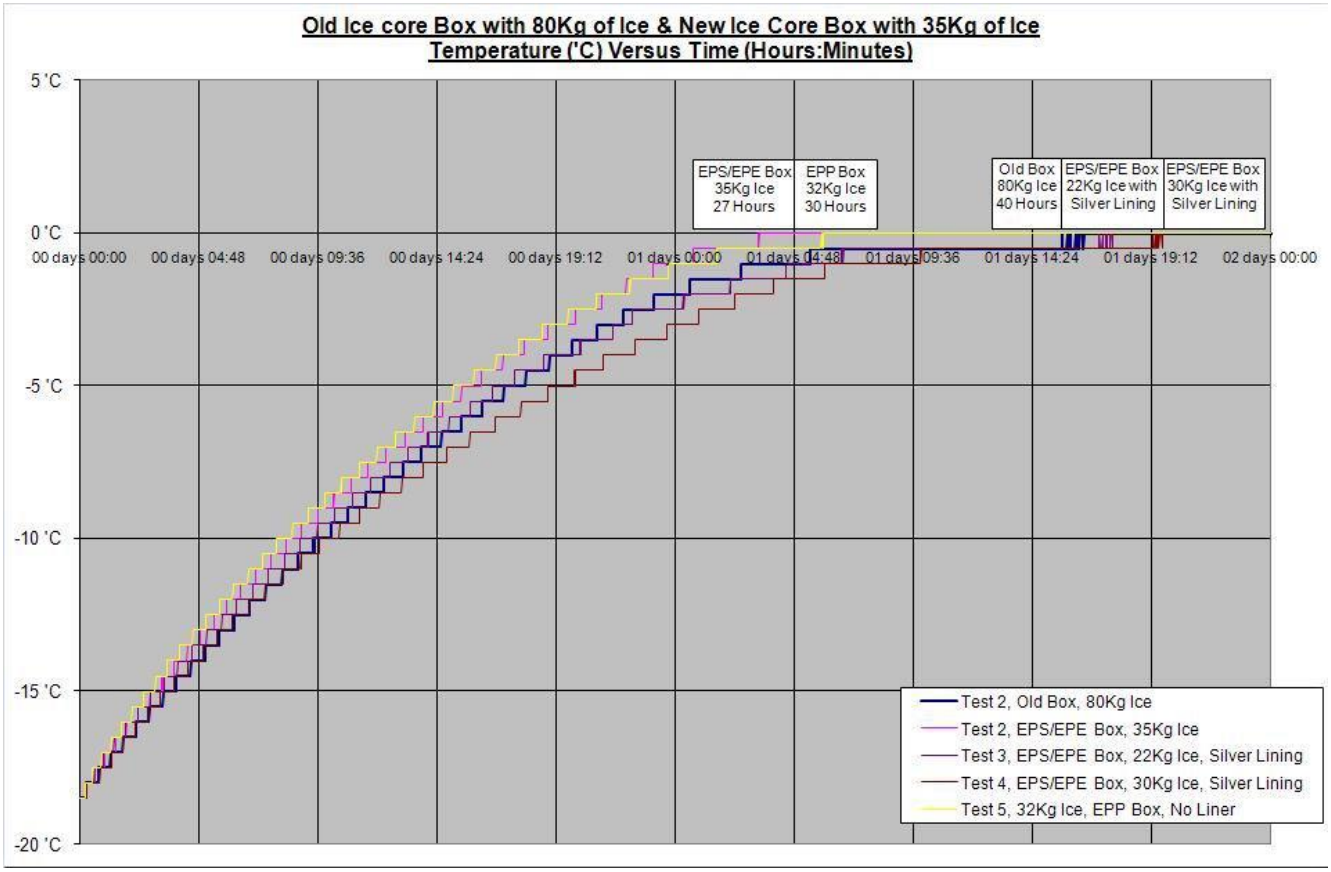


Above - density versus temperature of the drilling liquids in pure & in different mixes.

Fig. 1. Freezing points of alcohol aqueous solutions



Ice core boxes, temperature measurements:



Sun glasses

It is recommended to use sunglasses with UV-protection (Polaroid) to protect eyes from excessive ultraviolet radiation, primarily to avoid snow-blindness, but also to reduce long-term ocular damage such as cataracts. Be careful to wear glasses that also block the sunrays around the edges of the lenses.

Standards for sunglasses – see labelling on inside of the frame

Europe CE (EN 1836:2005)

0	insufficient UV protection
1	sufficient UV protection
2	good UV protection
3	full UV protection

US (ANSI Z80.3-1972)
A compliable lens should have a UVB (280 to 315nm) transmittance of no more than one per cent and a UVA (315 to 380nm) transmittance of no more than 0.5 times of the visual light transmittance.

Australia (AS 1067)

0	some UV protection
1	.
2	.
3	.
4	high level of UV protection

Acute mountain sickness - AMS

Symptoms/signs of acute mountain sickness:

- Headache
- Fatigue/nausea
- Difficulty in breathing
- Sleep disturbances (insomnia)

Symptoms of AMS usually start 6 to 8 hours after a rapid ascent and reach their greatest severity within 24 hours, subsiding over 72 hours. Rapid ascent, exercise, and continuing to ascent to higher altitudes greatly increases the chances of suffering from AMS and its symptoms.

Best way to reduce risk of AMS is to **avoid excessive alcohol consumption the night before flying into camp** and to keep well hydrated on water.

AMS is rarely serious and is usually self-limiting, but may lead to more serious high altitude cerebral edema or high altitude pulmonary edema.

How to operate the Gamow bag

The purpose of the Gamow bag is to provide temporary first aid treatment to victims suffering from varying degrees of acute mountain sickness (AMS) on location and on an emergency basis.

1. Place victim inside bag.
2. Pull the zipper close.
3. Pump the foot operated air pump to begin inflation.
4. Check to make sure that the nylon web retaining straps are not twisted and that they are in their proper locations
5. Inflate the Gamow bag to the desired pressure – see below.
6. A pump per minute rate of 10 to 20 must be maintained at all times to ensure adequate victim protection from excessive carbon dioxide concentrations. An electric oil free air-compressor with an output of at least 1 cubic foot per minute (cfm) may be used to presurize the Gamow bag (use chrome inlet).
7. Do not connect the bag to oxygen.

Ambient conditions			**Inside Gamow bag when pressurized to 2 psi (103 mmHg)**		
Meters	Feet	mmHg	Meters	Feet	mmHg
2400	7874	562	1054	3458	665
2700	8859	541	1310	4298	645
3000	9843	522	1555	5102	626
3300	10827	503	1805	5922	607
3600	11812	484	2053	6736	588

The Gamow bag should only be used on a temporary or emergency basis. The bag is not intended as a cure for AMS.

Treatment with oxygen greatly outweights the use of the Gamow bag, but must be maintained at a flow of 6-8 liters per minutes.

How to monitor blood pressure using the Omron electronic monitor

1. The subject sits down and rests their arm on a table so the brachial artery is level with the heart. Alternatively lie on your back and rest the arm across your stomac. This is important when monitoring blood pressure, as pressure is proportional to height. For example, if one measures the blood pressure at head height, the systolic/diastolic pressure readings will be approximately 35mmHg less compared to readings taken at heart level, whereas at ground height the pressure readings will be 100mmHg greater.
2. Wrap the sphygmomanometer cuff around the upper arm, just above the elbow. Place the tubings on the hollow of your elbow.
3. Press the **ON** button.
4. Press **START**.
5. The blood pressure monitor will automatically measure the blood pressure.
6. **NOTE:** Do not move the arm during monitoring.
7. Monitor displays the systolic blood pressure (the high value) and diastolic blood pressure (the low value) and heart rate.

Blood pressure	**Interpretation**	**Action**
SBT>180 mmHg or DBT>110 mmHG	Severe hypertension	Repeat the test; Contact physician
SBT>160 mmHg or DBT>100 mmHG	Moderate hypertension	Repeat the test; Contact physician
SBT>140 mmHg or DBT>90 mmHG	Mild/borderline	

SBT≈120 mmHg and DBT≈80 mmHG	Optimal
SBT<90 mmHg and DBT<60 mmHG	Hypotension

SBP= Systolic blood pressure

DBP= Diastolic blood pressure

How to monitor blood glucose

1. Wash your hands.
2. Prepare your lancing device.
3. Remove the test strip from its foil packet.
4. Insert the three black lines at the end of the test strip into the strip port.
5. Push the test strip in until it stops. The monitor turns on automatically.
6. Wait until the monitor displays the "Apply Blood message", which tells you that the monitor is ready for you to apply blood to the blood glucose test strip.
7. Use your lancing device to obtain a blood drop either from a finger or an ear lobe.
8. Before you obtain a blood sample from the fingertip or ear lobe, make sure the sample site is clean, dry, and warm. Avoid squeezing the puncture site.
9. Apply the blood sample to the test strip immediately.
10. Touch the blood drop to the white area at the end of the test strip. The blood is drawn into the test strip.
11. If the monitor shuts off before you apply blood to the test strip, remove the test strip from the monitor and try again.
12. Continue to touch the blood drop to the end of the test strip until the monitor begins the test. The monitor begins the test when you hear the beeper and/or the display window shows the status bar.
13. Then the display window shows the countdown. **Note: Do not** remove the test strip from the monitor or disturb the test strip during the countdown.

Result of blood glucose monitoring

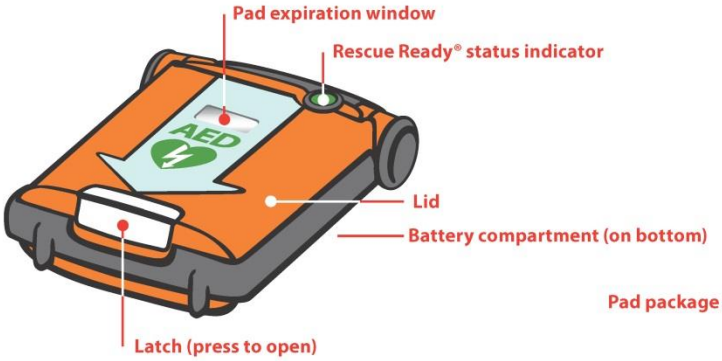
Blood glucose	**Interpretation**	**Action**
LO = low (<1.1 mmol/L or 20 mg/dL)	Extremely low	Repeat the test; Contact physician
<2.8 mmol/L (50 mg/dL)	Moderately low	Repeat the test; Contact physician
4.1-5.9 mmol/L (74-106 mg/dL)	Normal	
>11 mmol/L (200 mg/dL)	Moderately high	Repeat the test; Contact physician
HI = High (>27.8 mmol/L or 500 mf/dL)	Extremely high	Repeat the test; Contact physician

Error messages:
Error no 105 or 705: take out batteries, wait five seconds, insert batteries, and try again.

Calibration of new test strip lot:
Insert calibration strip into strip port. Wait until the monitor displays the lot number. Check number against packet.

Automated External Defibrillator (AED)

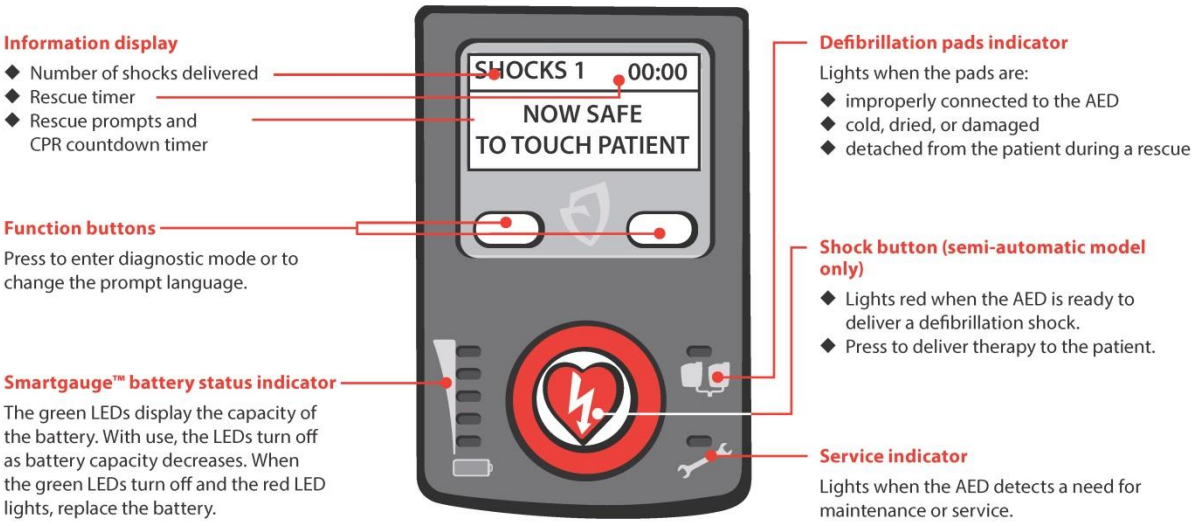
AED parts



AED is not Rescue Ready.

AED is Rescue Ready. Rescue Ready technology assesses the AED, battery, and pads to ensure they are ready to perform a rescue.

The display panel

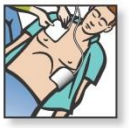


2 Steps to a Rescue

These are the general steps in performing a rescue:

1: Assess the patient (page 2-2)

2: Prepare the patient (page 2-2)



3: Place the defibrillation pads (page 2-2)

4: Analyse the patient's ECG (page 2-3)

5: Deliver a defibrillation shock (page 2-3)

6: Give CPR (page 2-4)

7: Prepare the AED for the next rescue (page 2-4)

1: Assess the patient

Determine that the patient is more than 8 years of age or weighs more than 25 kg (55 lbs) and is both:

- Unresponsive
- Not breathing or not breathing normally

DO NOT delay therapy to determine the patient's exact age or weight.

CALL EMERGENCY MEDICAL SERVICES!

Note: When the patient is 8 years of age or younger or weighs 25 kg (55 lbs) or less, use the AED with paediatric defibrillation pads, if available. See the directions for use accompanying paediatric pads to replace adult pads with paediatric pads.

2: Prepare the patient

1. Place the AED next to the patient.

Note: The normal use for the AED is with it lying horizontally.

2. Open the AED lid.
3. Remove clothing from the patient's chest.
4. Ensure that the patient's skin is clean and dry.
5. Dry the patient's chest and shave excessive hair if necessary.

3: Place pads

When the AED prompts…	Do this…
"Tear open white package across dotted line and remove pads."	1. Keeping the pads connected to the AED, tear open the package. 2. Remove the pads from the package. You can leave the package attached to the pad wires.
"Peel one of the white pads completely from blue plastic."	3. With a firm, steady pull, peel one pad away from the blue plastic liner. You can use either pad.
"Firmly place the pad without the blue plastic on patient's bare chest, exactly as shown on pads."	4. Place the pad in either location on the chest.
"Next, peel second white pad from the blue plastic. Firmly place the second pad on the other location exactly as shown on pads."	5. Pull the blue plastic from the second pad. 6. Place the pad on the other location on the chest.

Note: Cardiac Science's standard defibrillation pads are non-polarised and can be placed in either position as shown on the pad package. The package itself can be left attached to the defibrillation pads wires.

4: Analyse the ECG

When the AED prompts…	Do this…
"Do not touch the patient! Analysing heart rhythm. Please wait." The AED begins analysing the cardiac rhythm of the patient.	1. Do not touch the patient. 2. Wait for the next prompt.

During the analysis phase, you may hear one or more of these prompts:

If the AED prompts…	This is the problem…	Do this…
"Open lid to continue rescue"	The lid of the AED is closed.	Ensure that the lid is fully open.
"Press pads firmly to patient's bare chest"	The pads are not properly placed or are loose.	Ensure that pads are firmly placed on clean, dry skin.
"Make sure pad connector is plugged into AED"	The pads are disconnected from the AED.	Ensure that the connector is plugged properly into the AED.
"Analysis interrupted. Stop patient motion." The AED restarts the analysis.	The patient is excessively jostled or there is strong electromagnetic emitting equipment nearby (within 2 metres).	Remove the electronic device or stop the excessive motion.

5: Deliver a shock

When the AED prompts…	Do this…
"Shock advised. Do not touch the patient"	Ensure that no one is touching the patient.
Automatic model: "Shock will be delivered in Three, Two, One." The AED delivers the defibrillation shock automatically.	**Automatic model:** Ensure that no one is touching the patient.
Semi-automatic model: When the AED is ready to deliver a defibrillation shock, the Shock button flashes. "Press red flashing button to deliver shock."	**Semi-automatic model:** Press the Shock button. If you do not press the Shock button within 30 seconds of hearing the prompt, the AED disarms the charge and prompts you to start CPR.
After the AED delivers the defibrillation shock: "Shock delivered."	Wait for the next prompt.
"It is now safe to touch the patient. Give CPR as instructed"	Begin CPR.

When the AED is charged, it continues to analyse the patient's heart rhythm. If the rhythm changes and a shock is no longer needed, the AED prompts, "Rhythm Changed. Shock Cancelled."

6: Give CPR

After the AED delivers a shock or detects a non-shockable rhythm, it enters CPR mode.

When the AED prompts…	Do this…
"If needed, perform CPR as instructed."	Perform CPR according to the prompts. Follow the countdown timer on the text display.

Important: If the AED is not operating as expected, it is preferable to perform CPR without the aid of the AED than to delay providing CPR.

After the CPR time expires, the AED returns to the ECG analysis mode (see 4: ***Analyse the ECG*** on page 2-3).

If the patient is conscious and breathing normally, leave the pads on the patient's chest and connected to the AED. Make the patient as comfortable as possible and wait for emergency medical services (EMS) personnel to arrive.

Note: If the AED does not provide expected CPR coaching, the rescuer must conduct CPR as appropriate.

After transferring the patient to emergency medical personnel, close the lid of the AED to end the rescue session. Prepare the AED for the next rescue.

7: Prepare the AED for the next rescue

1. Open the lid.

2. Optional: Retrieve the rescue data stored in the internal memory of the AED. See the *AED Manager User's Guide* for details.

3. Connect a new adult pads package to the AED. See the *Defibrillation Pads Instructions for Use* for details.

4. Verify that the pad connection indicator is off. If the indicator is on, make sure that the pad connector is properly attached to the AED.

5. Verify that there is adequate charge (1) remaining in the battery. If the battery charge is low (2), replace the battery.


(1)

(2)

6. Verify that the service indicator is off.

7. Close the lid.

8. Verify that the Rescue Ready indicator is green.