GeoBasis Manual

Guidelines and sampling procedures for the geographical monitoring program of Nuuk Basic in Kobbefjord

Version 7. - May 2015

This edition of the GeoBasis Manual

Please notice that this manual is a preliminary edition. The GeoBasis program is subject to changes and improvements and therefore, the manual is continuously under construction. New updates will be implemented in the next edition.

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Acknowledgements

This GeoBasis manual are based on the guidelines and experiences given by the scientific consultants, fieldworkers, labworkers and managers who have been involved in the GeoBasis monitoring program throughout the last 7 years. In that aspect we would like to thank the following people:

Karl Martin Iversen, Ken Hill, Maria Burup, Stine Højlund Pedersen, Torben Røjle Christensen, Magnus Lund, Mikhail Mastepanov, Mikkel P. Tamstorf, Andreas Westergaard-Nielsen, Jens Gammeltoft, Mathias Madsen, Charlotte Sigsgaard, Maria Rask Pedersen, Lena Ström, Mikkel Fruergaard, Frans-Jan Parmentier and Bo Elberling.

Birger Ulf Hansen and Louise Holm Christensen

GeoBasis

1 Introduction

1.1 GeoBasis program

GeoBasis is a subprogram of the environmental monitoring program Greenland Ecosystem Monitoring (GEM), which is funded by the Danish Energy Agency, Environmental Protection Agency and the Government of Greenland. The primary objective of the GeoBasis monitoring program is to establish baseline knowledge on the dynamics of fundamental physical parameters within a low Arctic environment. Low Arctic landscapes are extremely vulnerable to even small changes in physical conditions and therefore they are sensitive indicators for environmental and climate changes. GeoBasis in Kobbefjord collect data of hydrological and terrestrial variables and parameters including; 1) Gas fluxes of carbon dioxide and methane, 2) Micrometeorology and energy balance, 3) Soil water chemistry, 4) Snow and lake/fiord ice, 5) River water electro chemistry, and 6) Vegetation greenness. Collected data will be used to improve current model predictions for future changes in the ecosystem and to quantify the feedback mechanisms from the ecosystem to the climate change. Monitoring was initiated in 2007 and based on the first year's experiences additional activities has been and will be incorporated into the program.

1.2 GeoBasis database

Data from the GeoBasis monitoring program are published in the 'NERO Annual Report' published by Danish Centre for Environment and Energy, Aarhus University. After internal secure all validated data from Nuuk Basic will be available from the internet homepage [www.nuuk-basic.dk]. Data collected by GeoBasis can be ordered from Asiaq, Louise Holm Christensen (lhc@asiaq.gl) and ClimateBasis data from Asiaq, Jakob Abermann (jab@asiaq.gl). All GeoBasis data are public domain. However, we would very much like to assist in any scientific evaluation that you may want to perform using GeoBasis data. All timestamps referred to in the database and in the daily diurnal are in West Greenlandic Winter Time (WGWT).

1.3 Links

- Nuuk Basic: www.nuuk-basic.dk
- 7th NERO Annual Report 2013: http://g-e-m.dk/fileadmin/Resources/DMU/GEM/GEM/NERO_7th_Annual_Report_2014.pdf
- Greenland Ecosystem Monitoring: www.g-e-m.dk
- Zackenberg Reasearch Station (ZERO): www.zackenberg.dk
- INTERACT: www.eu-interact.org/

1.4 Field season/period

Nuuk Basic does not have a defined field season. The field frequency of visits is never the less determined by the accessibility to the station. In 2013 and 2014 the fiord ice was completely gone 26/4 and 1/6. Prior to the breakup of ice the station is only accessible by skies or snow scooter. The frequency of visits decreases with the arrival of the first snow in October, but the fiord does normally not close up before December.

1.5 Getting around in the area

In order to protect the area in Kobbefjord and to minimize the impact on vegetation near the research sites and plots some rules must be respected. Please, study the site manual (found on the NuukBasic webpage) carefully for a description of the regulations in different zones of the valley. Staff from the monitoring program must be prepared to give an introduction to the nearest surroundings and a guided tour when new people arrive at the station.

- Follow trails and paths if possible
- Do not throw garbage at any kind not even apple core
- Use the toilet in the hut
- Do not make changes on the vegetation and the soil

1.5.1 Safety

Always follow the safety instructions from the Nuuk Basic Research Station when you work in its area. GeoBasis have two VHF radios (Channel 72) and share an Iridium satellite telephone with BioBasis (+881641482375). Riffles and first aid kit can be borrowed from the Research Station. GeoBasis have a signal pistol.

Other occupational risks are:

- Weather
    - The weather can change very rapidly. Therefore it is advisable to check the weather forecast and adapt the field activities to the weather.

- Falling down
    - Probably the greatest risk when working in Kobbefjord is tripping or falling down when walking around in the area. Always take care and reevaluate a chosen route. Bring a VHF radio and a first aid kit with you.

- Rock slides/loose rocks /rock avalanches
    - Look out for loose rocks. If you are two persons then spread out so that you don't push rocks down into each other. Some landscape elements are more prone to rock avalanches. Look out for terrain of fresh boulders

- Electric shock
    - The solar panels, battery bank and the 220V charge regulator can give electrical shock if short circuited. Be careful to turn off the current and check that all switches are off when working with cables and the power supply. The battery bank is always dangerous if tools short circuit. Double check (+) and (-) and color codes when working on the 12V supply

- Sailing with boat
    - The boatman is responsible for person safety when onboard the boat. Wear a safety west.

- Bear

- In 2008 -2014 a total of 9 polar bears were sited around Nuuk, in pairs (Mother and a young bear) primarily in the spring. So there is a small risk of encountering a bear in Kobbefjord.

1.6 GeoBasis staff Nuuk

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1.7 Scientific consultants

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1.9 Daily Journal

During the field season the following must be recorded in a GeoBasis daily journal:

- Details about work carried out and the time
- Weather report (temperature, clouds, precipitation, wind, fog)
- Condition of the Kobbefjord stream (water level, snow/ice, algae)
- Snow cover and ice condition and distribution
- Voltage on power stations
- Special events

It is also important to record relevant pictures by using the GeoBasis pocket camera.

1.10 Equipment

1.10.1 Hut

Inside the hut GeoBasis and BioBasis share most of the space and shelves. GeoBasis have:

- The shelves on the left side of the door (on the third shelve ClimateBasis have some equipment)
- Half of the shelves above the table
- 3 boxes under the table
- The inner right corner of the storage room under the hut

It is important that the GeoBasis equipment is always available and functioning; therefor under normal circumstances do not lend the equipment out to others, especially not the radios and safety equipment.

If you lend someone some GeoBasis equipment make sure to make agreement on:

- What it is used for
- When it will be back
- That they should replace it with new if something break

1.10.2 Asiaq

At Asiaq GeoBasis has equipment at tree places:

- Office: Two bookcases, closet under the high bookcases
- Workshop: Tre shelves next to HKM shelves
- Kold lager: The space under the shelves in the inner left corner

2 Overview of GeoBasis stations

The GeoBasis program has 19 monitoring stations at 9 sites in Kobbefjord. These stations gather a lot of separate parameters; see Appendix I. Apart from the methane, Eddy flux monitoring sites and manual measurements, all sites measure year round.

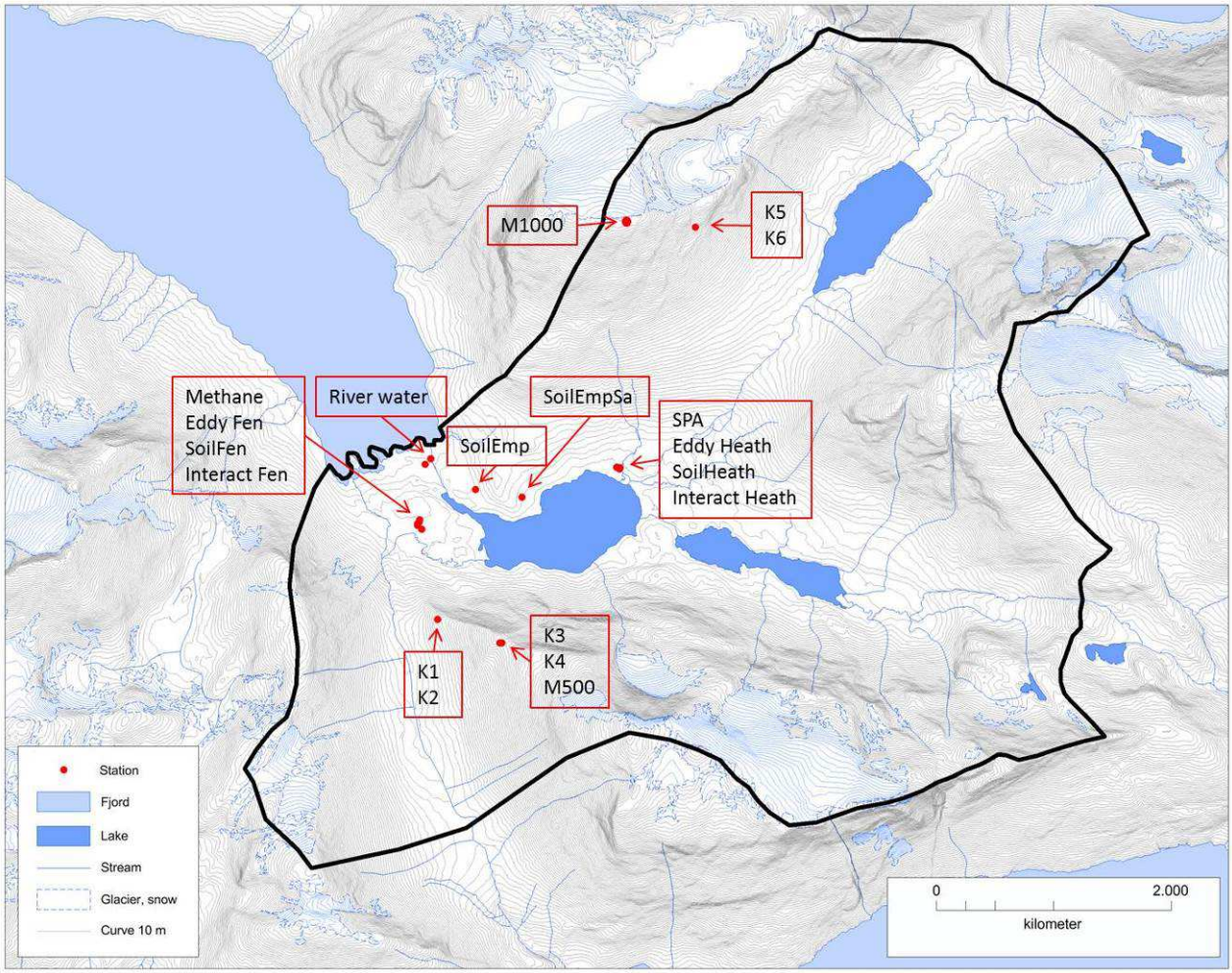


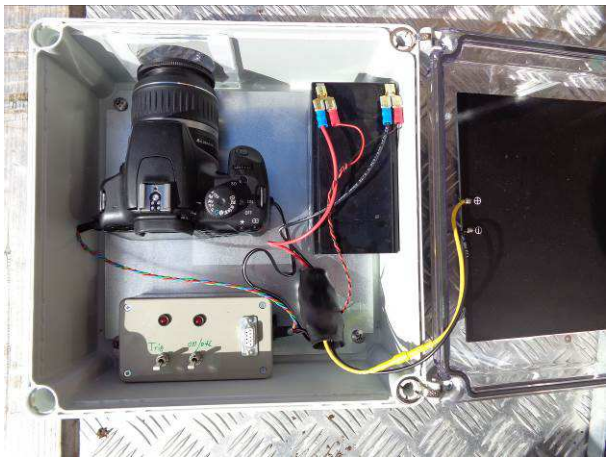
Figure 1 GeoBasis installations in Kobbefjord.

Table 1 List of the geographical coordinates of the GeoBasis installations in Kobbefjord, WGS 84.

Station	Station ID	UTM, 22 W		Lat-long, degree, min, sec		Elevation
		N	E	N	V	meter
K1		7110911.00	481363.67	64° 7'27.14"	51°22'57.83"	295
K2		7110849.33	481414.33	64° 7'25.15"	51°22'54.04"	307
K3		7110732.00	481883.00	64° 7'21.46"	51°22'19.31"	546
K4		7110739.75	481919.25	64° 7'21.69"	51°22'16.66"	533
K5		7113965.00	483153.00	64° 9'6.14"	51°20'46.73"	757
K6		7113965.00	483153.00	64° 9'6.14"	51°20'46.73"	757
M500	GB01	7110716.67	481885.33	64° 7'20.95"	51°22'19.16"	548
M1000	GB02	7114187.91	482943.82	64° 9'13.30"	51°21'2.30"	970
SoilFen	GB03	7111631.44	481236.10	64° 7'50.39"	51°23'7.54"	40
SoilEmp	GB04	7111968.61	481691.05	64° 8'1.37"	51°22'34.04"	33
SoilEmpSa	GB05	7111955.70	482106.95	64° 8'1.04"	51°22'3.28"	40
SoilHeath	GB06	7112134.81	482898.24	64° 8'6.97"	51°21'4.83"	26
Interact Fen	I5 Nf	7111669.79	481197.29	64° 7'51.60"	51°23'10.45"	40
Interact Heath	I6 Nh	7112138.33	482919.19	64° 8'7.07"	51°21'3.30"	26
Methan		7111690.52	481214.60	64° 7'52.28"	51°23'9.20"	40
Eddy Fen		7111655.02	481207.91	64° 7'51.15"	51°23'9.63"	40
Eddy Heath		7112130.64	482919.98	64° 8'6.81"	51°21'3.30"	26
SPA		7112103.35	482918.56	64° 8'5.94"	51°21'3.36"	25
River water		7112227.24	481301.53	64° 8'9.65"	51°23'3.00"	9
Power Fen		7112153.74	482380.02	64° 7'52.93"	51°23'9.13"	51
Power Heath		7112114.81	482921.25	64° 8'6.32"	51°21'3.12"	25
Hut		7112182.44	481264.11	64° 8'8.19"	51°23'5.72"	16

3 Camera monitoring, K1, K2, K3, K4, K5 and K6

K1_300



K1_300

K2_300

K2_300

K3_500

K3_500

K4_500

K4_500

K5_800

K5_800

K6_800

K6_800

3.1.1 Introduction

Six automatic digital cameras are installed in Kobbefjord, they run all year. The purpose is primarily to monitor the vegetation greenness, snow cover, fjord ice, lake ice and the glaciers. In 2009 all camera sites except K2_300 were repositioned because snow built up around the cameras the two previous winters.

K1 and K2 takes pictures:
10:00 Marts to October
13:00 All year
16:00 Marts to October

K3, K4, K5, K6 takes pictures:
13:00 All year

3.1.2 Camera systems /history

System 1: 2GB Hp Photosmart E427 6.9mm camera that is controlled by a Time Guard timer (EL11). Powered by two a 4V 10h Cyclon battery charged by a small solar panel

System 2: CameraBox invented by Bo Holm Rasmussen with a Canon EOS camera, triggerbox, two sets of batteries and 16 GB SD card. System 2 had a lot of problems.

System 3: Invented by Jens Gammeltoft with a Canon EOS camera, triggerbox, Panasonic 3,4 Ampere battery, solarpanels and 16 GB SD card. Triggerbox controlled via the program: *cambox control*

	System 1	**System 2**	**System 3**
K1	2007-2011	2011-2013	2013-
K2	2007-2012	2012-2013	2013-
K3	2007-		
K4	2007-		
K5	2007-2014		2014-
K6	2007-		

3.1.3 Frequency

K1_300, K2_300, K3_500 and K4_500 are visited every 28 days in the field season and occasionally during winter.

K5_800 and K6_800 are visited at least once per year or more frequent if possible.

3.1.4 Field guide

See appendix 2

3.1.5 Data handling at the office

1. Check if all pictures are there
2. Check all pictures for sharpness and zoom
3. Copy pictures to their respective station folders at the office PC: *P:\B53_Nuuk_Basic\b53-06 GeoBasis\GeoBasis Stations\KX_XXX*

4. The notes from Field chart 3 are written into a digital scheme and the hardcopies of the field chart are archived in the respective station portfolio.

5. If anyone ask for the pictures put them at the ftp-server *nuukbasic (\\Asiaq001) (T:)* in a limited period (the pictures takes up a lot of space on the ftp server). Send an email with these information to the receiver:

   Brugeren skal indtaste følgende på sin foretrukne browser eller ftp-klient:
   ftp://194.177.225.130
   Brugernavn: nuukbasic
   Adgangskode: AsiaqNuukBasic

3.1.6 Setting up a camera to system 3

Here are the settings that the camera should have when it is installed in the field:

- Installed non-protected SD memory card with the card cover firmly closed
- Lens focus mode switch = MF (manual focus)
- Lens image stabilizer switch = OFF (if available on the lens)
- Power switch = ON
- Mode dial = Av
- White balance = Auto (press 

next to display and choose auto)
- ISO = Auto (press 

next to on/off and choose auto)
- Metering mode = Evaluative metering (press )
- Quality = RAW (under MENU)
- Beep = OFF (under MENU)
- Review time = OFF (under MENU)
- Color space = sRGB (under MENU)
- Auto power off time = 30 sec (under MENU)
- Time and date = [same as TriggerBox] (under MENU)
- Flash control → Flash firing = Disable (under MENU)

Set the Mode dial to Landscape mode () and use manual focus to adjust sharpness in the center of the image frame. Press the shutter half way down to allow the camera to find a suitable aperture (f-value). Set the Mode dial back to Av, and use the scroll wheel (in between the ISO selector and shutter) to select the same aperture as the camera suggested in Landscape mode. This maneuver results in an optimal sharpness for landscape imagery. The Av mode has automatic shutter speeds compensating for the fixed aperture.

4 M500 (GB01)

4.1.1 Introduction

M500 is one of the 5 micro climate stations. It is placed on the same mountaintop as K3 and K4 in 500 meters high. The work includes collecting data, data quality checks, maintaining sensors, protecting the installations and administering station meta data (present and historic sensors, what program has been running when).

4.1.2 History

M500 has been running since 2007.

4.1.3 Frequency

M500 is visited once every 28 days.

4.1.4 Station check

At every station visit the sensors are visually inspected (sensor in level, firmly installed, damaged, condition of wires, enclosure, solar panel and mast).

What to bring and how to go there see **appendix 2 Camera guide**

Data download see **appendix 4 Data Download CR1000 guide**

5 M1000 (GB02)

5.1.1 Introduction

M1000 is one of the 5 micro climate stations. It is placed on the same mountain as K5 and K6 in 1000 meters high. Where the station is placed there are some very harsh conditions with wind and icing, therefor only AT, RH and surface temperature is measured (the wind sensor and radiometer sensor at the picture is broken). The work includes collecting data, data quality checks, maintaining sensors, protecting the installations and administering station meta data (present and historic sensors, what program has been running when).

5.1.2 History

M1000 has been running since 2008. In 2009 the station was moved about 100 m and had a new construction. In a period the station was under ClimateBasis but in 2013 it was hand over to GeoBasis again.

5.1.3 Frequency

M1000 is visited as often as possible maybe once a year.

5.1.4 Station check

It is difficult to visit the station but there are three ways: Walk up from K5 and K6. Walk up from Kobbefjord and up to the glacier and there from to M1000 or go there by helicopter. The best thing is to join ClimateBasis when they have monitoring on the glacier.

At every station visit the sensors are visually inspected (sensor in level, firmly installed, damaged, condition of wires, enclosure, solar panel and mast).

Data download see **appendix 4 Data Download CR1000**

6 SoilFen (GB03)

6.1.1 Introduction

SoilFen is one of the 3 automatic soil and micro climate stations. SoilFen is placed in the Fen, it consist of an automatic station and a soil water station. The work includes collecting data, data quality checks, maintaining sensors, protecting the installations and administering station meta data (present and historic sensors, what program has been running when), soil water collection.

Soil water is collected at 10 cm (3 replica) and 80 cm (3 replica) depths, using soil water samplers (suction cup lysimeters) from Prenart. The suction sampler used in Nuuk is 'Prenart Super Quartz' which is made of porous PTFE (teflon) and quartz.

6.1.2 History

SoilFen has been running since 2007. In 2008 the station was redesigned because it was flooded. In 2008 the soil water was implemented. In 2012 the boardwalk was build.

6.1.3 Frequency

SoilFen is visited once every 14 days, soil water is collected every 14 days if possible else every third week.

6.1.4 Station check

At every station visit the sensors are visually inspected (sensor in level, firmly installed, damaged, condition of wires, enclosure, solar panel and mast). Especially at the soil stations it is important to notice if the fox has been digging or there are any other signs that the buried sensors may be physically damaged. Take very much care of the vegetation and do not step on the soil profile where the sensors are buried.

Collection of soil water see **appendix 3 Soil water guide**

Data download see **appendix 4 Data Download CR1000 guide**

6.1.5 Data handling

Field Chart 4 is completed with the laboratory results. And the data are computerized using these spread sheets:

P:\B53_Nuuk_Basic\b53-06 GeoBasis\GeoBasis Stations\SoilFen\Soil Water Chemistry

P:\B53_Nuuk_Basic\b53-06 GeoBasis\GeoBasis Stations\SoilHeath\Soil Water Chemistry

Table 2 Parameters analyzed in the GeoBasis program

Is analyzed where	*Parameter*
GEOBASIS	pH
GEOBASIS	Conductivity
GEOBASIS	Alkalinity
GEOCENTER	Chloride (Cl-)*
GEOCENTER	Nitrate (NO3-)*
GEOCENTER	Sulfate (SO42-)*
GEOCENTER	Calcium (Ca2+)
GEOCENTER	Magnesium (Mg2+)
GEOCENTER	Potassium (K+)
GEOCENTER	Sodium (Na+)
GEOCENTER	Iron (Fe2+)
GEOCENTER	Aluminum (Al3+)
GEOCENTER	Manganese (Mn2+)
BIOBASIS (Department of Biology, University of Copenhagen)	Dissolved organic carbon (DOC)*
BIOBASIS (Department of Biology, University of Copenhagen)	Ammonia (NH4+-N) *
BIOBASIS (Department of Biology, University of Copenhagen)	Dissolved total nitrogen (DTN)*
*The only parameters found in soilwater samples in Kobbefjord	

6.1.6 Replacement of suction probes

Suction probes can work for years without any problems but clogging and bad hydraulic contact may cause problems and require replacement. In that case follow the procedure for installation given by Prenart Equipment ApS. Installation dates are noted in the GeoBasis Field journal.

6.1.7 Labels

Example: GB01-20140804-80-6 (Soil water station in fen, collected 4/8-2014 from depth 80 cm, sample no. 6).

If you need more lables, they are find at Asiaq: P:\B53_Nuuk_Basic\b53-06 GeoBasis\Misc\Field charts\Lables til soil water.doc. **Remember** when you print chose “print from **magasin 5”** and use the label paper with 24 labels **no. 57159.** Place the paper with the back side upward.

7 SoilEmp (GB04)

7.1.1 Introduction

SoilEmp is one of the 3 automatic soil and micro climate stations. SoilEmp is placed on empetrum (crowberry/revling) vegetation on the eastern side of the river. SoilEmp consist of an automatic station. The work includes collecting data, data quality checks, maintaining sensors, protecting the installations and administering station meta data (present and historic sensors, what program has been running when).

7.1.2 History

SoilEmp has been running since 2008. The station was constructed with soil water in 2008 but in 2013 the soil water part was removed because the site was too dry.

7.1.3 Frequency

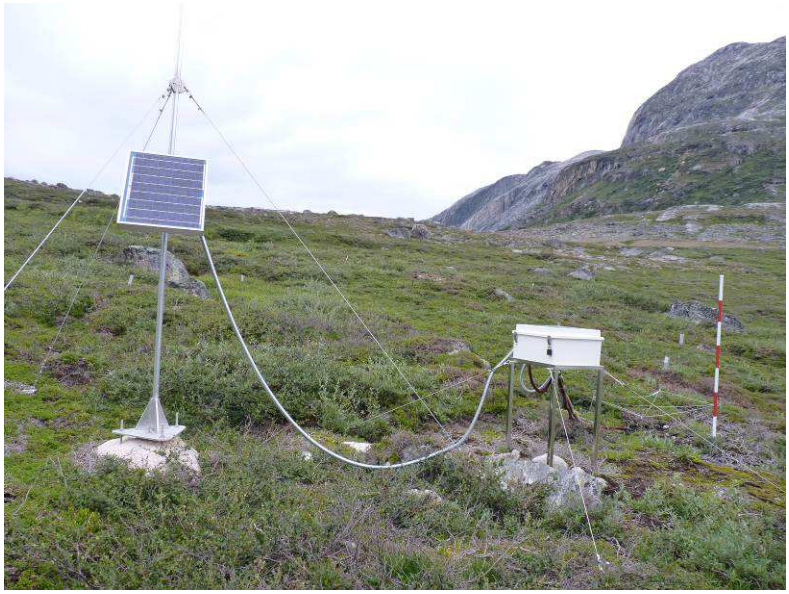
SoilEmp is visited once every 14 days.

7.1.4 Station check

At every station visit the sensors are visually inspected (sensor in level, firmly installed, damaged, condition of wires, enclosure, solar panel and mast). Especially at the soil stations it is important to notice if the fox has been digging or there are any other signs that the buried sensors may be physically damaged. Take very much care of the vegetation and do not step on the soil profile where the sensors are buried.

Data download see **appendix 4 Data Download CR1000 guide**

8 SoilEmpSa (GB05)



8.1.1 Introduction

SoilEmpSa is one of the 3 automatic soil and micro climate stations. SoilEmpSa is placed on empetrum (crowberry/revling) vegetation and Salix (willow/pil) vegetation on the eastern side of the river. SoilEmpSa consist of an automatic station. The work includes collecting data, data quality checks, maintaining sensors, protecting the installations and administering station meta data (present and historic sensors, what program has been running when).

8.1.2 History

SoilEmpSa has been running since 2008.

8.1.3 Frequency

SoilEmpSa is visited once every 14 days.

8.1.4 Station check

At every station visit the sensors are visually inspected (sensor in level, firmly installed, damaged, condition of wires, enclosure, solar panel and mast). Especially at the soil stations it is important to notice if the fox has been digging or there are any other signs that the buried sensors may be physically damaged. Take very much care of the vegetation and do not step on the soil profile where the sensors are buried.

Data download see **appendix 4 Data Download CR1000 guide**

9 SoilHeath (GB06)

9.1.1 Introduction

SoilHeath is one of the 2 soil water stations and consist only of soil water. SoilHeath is placed on the Heath site east of Badesø. The work includes protecting the installations and soil water collection. Soil water is collected at 10 cm (2 replica) and 50 cm (2 replica) depths, using soil water samplers (suction cup lysimeters) from Prenart. The suction sampler used in Nuuk is 'Prenart Super Quartz' which is made of porous PTFE (teflon) and quartz.

9.1.2 History

SoilHeath was constructed in 2011.

9.1.3 Frequency

SoilHeath soil water is collected every 14 days if possible else every third week.

9.1.4 Station check

At every station visit the sensors are visually inspected, it is important to notice if the fox has been digging or there are any other signs that the buried sensors may be physically damaged. Take very much care of the vegetation and do not step on the soil profile where the sensors are buried.

Collection of soil water see **appendix 3 Soil water guide**

9.1.5 Season start

Clean the soil water bottles, lids and tubing in clean water and with a sponge and paper. Remove alges and other dirt, be careful when cleaning inside the bottle, do not use the same sponge inside the bottles use instead clean paper and rinse with clean water afterwards. Empty the gray tubes for water.

9.1.6 Data handling

Field Chart 4 is completed with the laboratory results. And the data are computerized using these spread sheets:

P:\B53_Nuuk_Basic\b53-06 GeoBasis\GeoBasis Stations\SoilFen\Soil Water Chemistry

P:\B53_Nuuk_Basic\b53-06 GeoBasis\GeoBasis Stations\SoilHeath\Soil Water Chemistry

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GEOCENTER	Calcium (Ca2+)
GEOCENTER	Magnesium (Mg2+)
GEOCENTER	Potassium (K+)
GEOCENTER	Sodium (Na+)
GEOCENTER	Iron (Fe2+)
GEOCENTER	Aluminum (Al3+)
GEOCENTER	Manganese (Mn2+)
BIOBASIS (Department of Biology, University of Copenhagen)	Dissolved organic carbon (DOC)*
BIOBASIS (Department of Biology, University of Copenhagen)	Ammonia (NH4+-N) *
BIOBASIS (Department of Biology, University of Copenhagen)	Dissolved total nitrogen (DTN)*
*The only parameters found in soilwater samples in Kobbefjord	

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Suction probes can work for years without any problems but clogging and bad hydraulic contact may cause problems and require replacement. In that case follow the procedure for installation given by Prenart Equipment ApS. Installation dates are noted in the GeoBasis Field journal.

9.1.8 Labels

Example: GB01-20140804-80-6 (SoilFen, collected 4/8-2014 from depth 80 cm, sample no. 6).
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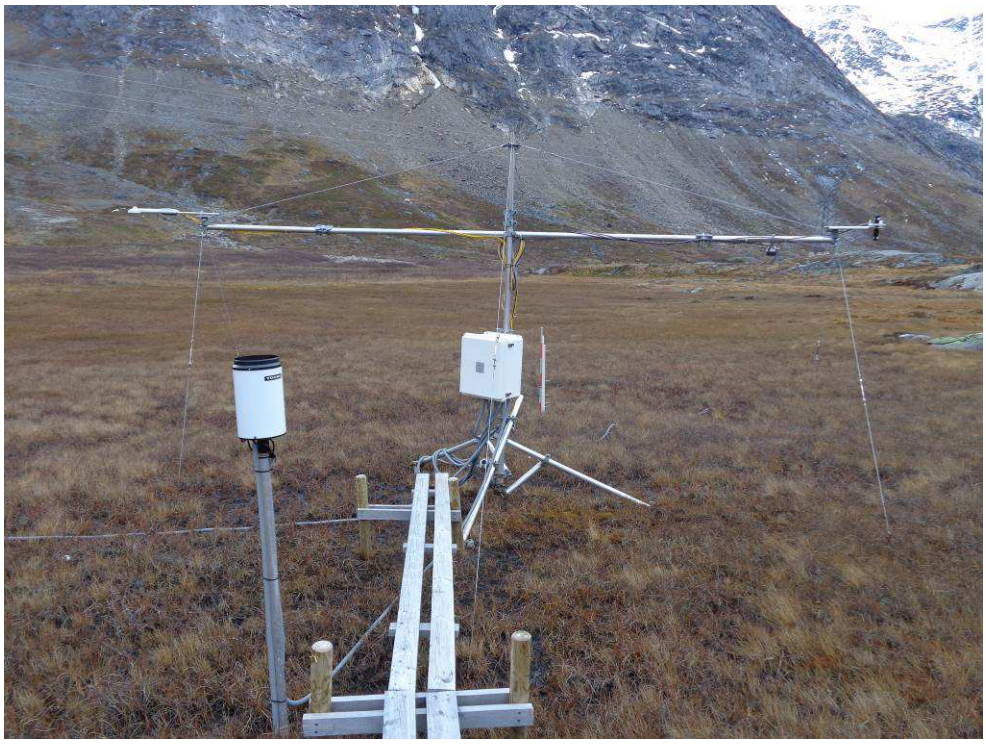
10 Interact Fen (I5 Nf)



10.1.1 Introduction

Interact Fen is one of the 2 automatic energy balance stations that was setup in 2011 by Interact where Torben Røjle Christensen is project leader. The stations are a part of a network of similar stations; in Nuuk we have station no. 5 and 6. GeoBasis take care of the daily checks and updates. Interact Fen is placed in the Fen where it is very wet. Be very careful when you walk outside the boardwalk, the vegetation is very easily damaged. Take some wood and walk on that, and be extra careful under the sensors.The work includes collecting data, data quality checks, maintaining sensors, protecting the installations and administering station meta data (present and historic sensors, what program has been running when).

10.1.2 History

Intereact Fen has been running since 2011. In 2013 the logger enclosure and program was changed.

10.1.3 Frequency

Intereact Fen is visited once every 14 days.

10.1.4 Station check

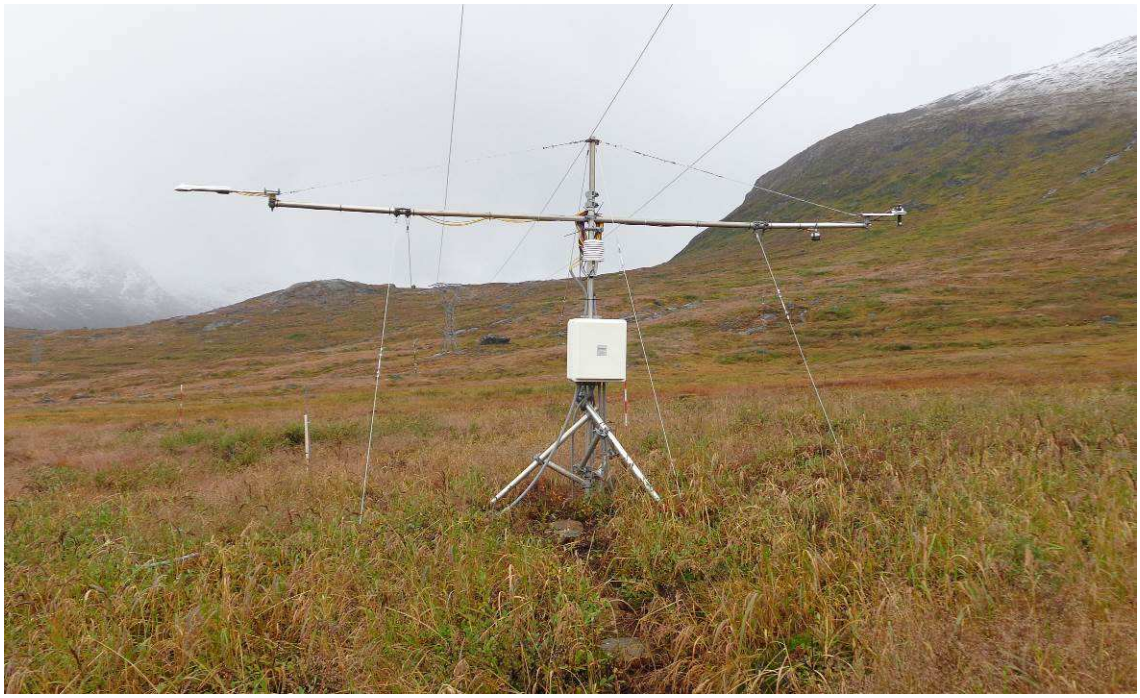
At every other station visit the sensors are visually inspected (sensor in level (twice a year), firmly installed, damaged, condition of wires, enclosure and mast). Especially the soil sensors is important to notice if the fox has been digging or there are any other signs that the buried sensors may be physically damaged. Take very much care of the vegetation and do not step on the soil profile where the sensors are buried.

Data download see **appendix 4 Data Download CR1000 guide**

Pyranometer (incoming and outgoing short and long wave radiation)

Left: SR50 Snow Depth sensor, Right: NDVI sensor (Vegetation greenness)

11 Interact Heath (I6 Nh)



11.1.1 Introduction

Interact Fen is one of the 2 automatic energy balance stations that was setup in 2011 by Interact where Torben Røjle Christensen is project leader. The stations are a part of a network of similar stations; in Nuuk we have station no. 5 and 6. GeoBasis take care of the daily checks and updates. Interact Heath is placed on the heath. The vegetation is VERY easily damaged especially the Empetrum plants, therefor only walk on the footpaths and enter the area along the stream. Be extra careful under the sensors. The work includes collecting data, data quality checks, maintaining sensors, protecting the installations and administering station meta data (present and historic sensors, what program has been running when).

11.1.2 History

Intereact Heath has been running since 2011. In 2012 the station was moved 20 m closer to the stream because the vegetation was damaged underneath the sensors. The anemometer (WS, WD) was removed because Eddy Fen has an anemometer. In 2013 the logger enclosure and program was changed.

11.1.3 Frequency

Intereact Heath is visited once every 14 days.

11.1.4 Station check

At every other station visit the sensors are visually inspected (sensor in level (twice a year), firmly installed, damaged, condition of wires, enclosure and mast). Especially the soil sensors is important to notice if the fox has been digging or there are any other signs that the buried sensors may be physically damaged. Take very much care of the vegetation and do not step on the soil profile where the sensors are buried.

Data download see **appendix 4 Data Download CR1000 guide**

12 Methane station

12.1.1 Introduction

The Methane station measures methane flux measurement during the field season (end of May until mid-October). Methane is not very important with respect to the carbon budget compared to CO_2 but it is a very potent greenhouse gas. Methane is produced by anaerobe microbial combustion of organic matter. The station is placed in the fen, where it is very wet and has at some places more than 1 m of peat. These conditions are in favor of methane production.

The measurement system has its own extensive operator's manual (by Mikhail Mastepanov), it is found in the folder in the LGR shelter. The system consists of six automatic cambers that opens and closes. When a chamber closes an analyzer monitors the CO_2 and CH_4 concentration within the closed chamber.

12.1.2 History

Methane station has been running since 2007. Since 2009 the analyzer is placed in a permanent shelter and all wires are installed in protective hosing. In 2014 chamber 3 and 4 were relocated to new spots. In 2015 the chambers will have new lids.

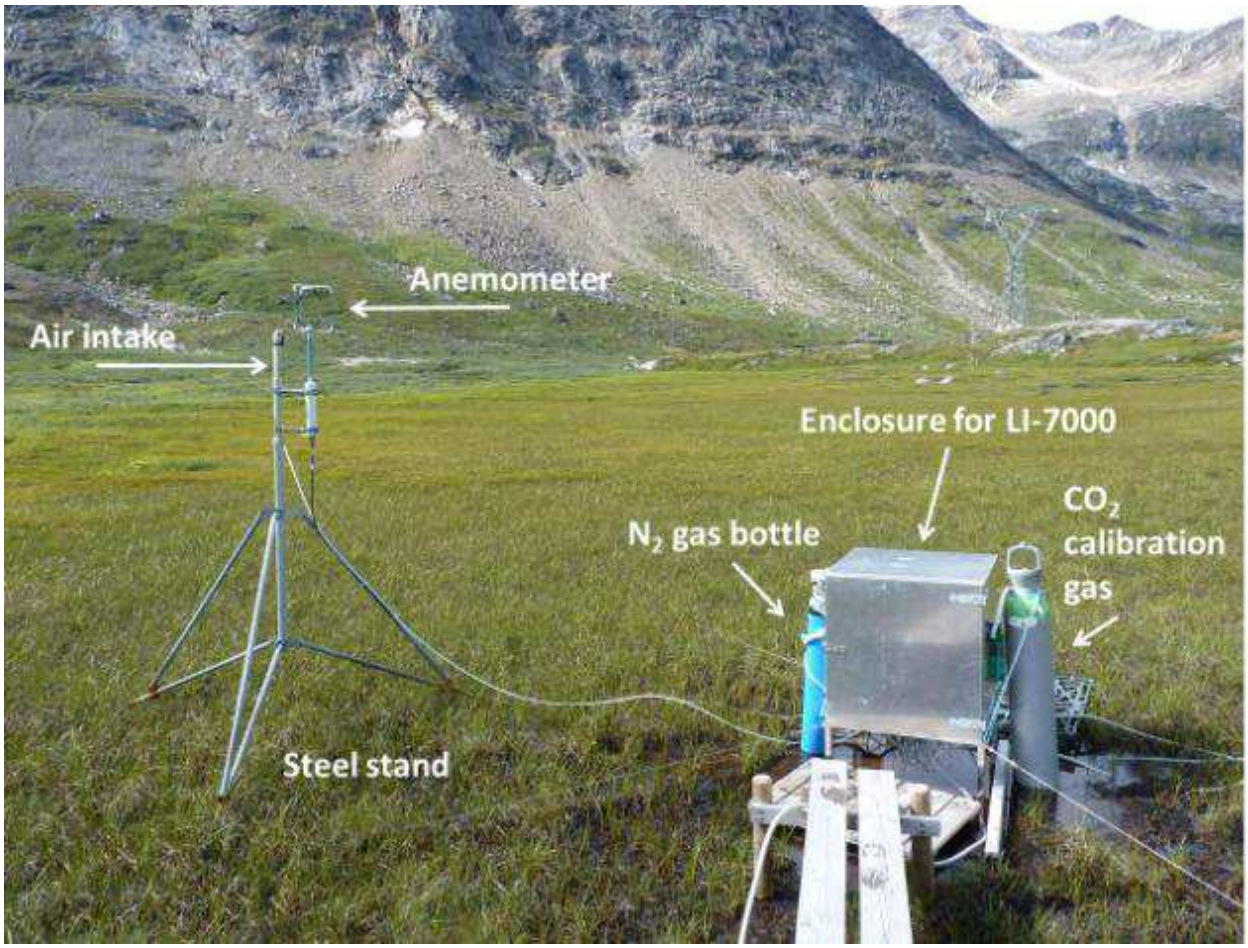
12.1.3 Frequency

Methane station is visited at almost every visit in Kobbefjord.

12.1.4 Station check

At every station visit fieldchart 2 is filled out, at least once a week everything is filled out. **See appendix 9**

13 Eddy Fen



13.1.1 Introduction

The Eddy Fen station measures carbon dioxide fluxes via eddy covariance method in the wet fen site. In order to describe the inter-annual variability of the seasonal carbon balance, net ecosystem exchange (NEE) of carbon dioxide (CO_2) is measured by applying the eddy covariance method. Staff is needed to maintain these measurements and data are therefore only collected in the field season. Data collecting and processing is based on Edisol software (Moncrieff et al, 1997).

13.1.2 History

Eddy Fen has been running since 2007.

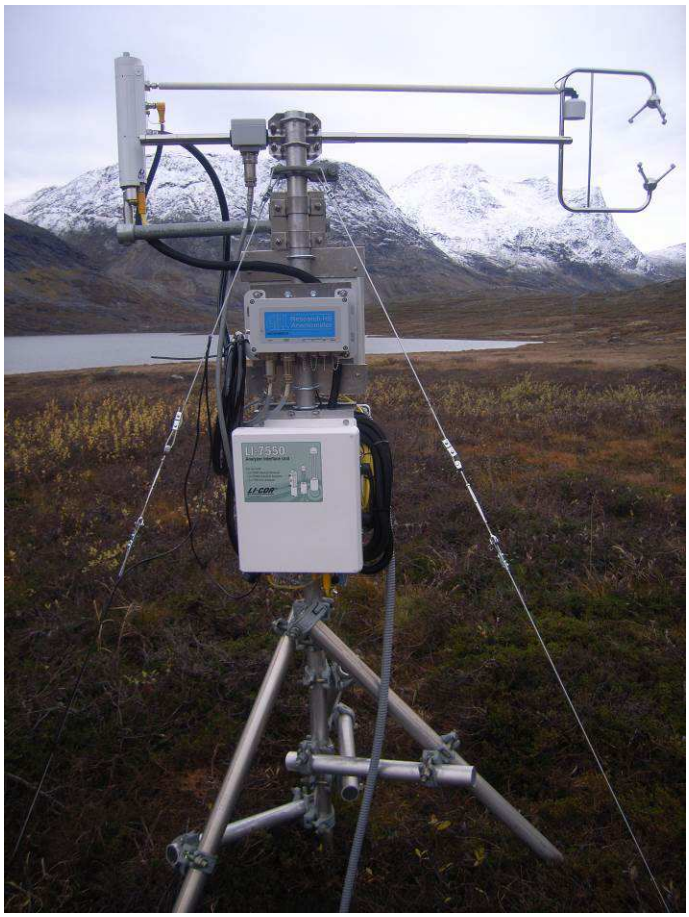
13.1.3 Frequency

Eddy Fen station is visited at almost every visit in Kobbefjord.

13.1.4 Station check

At every station visit fieldchart 1 is filled out, at least once a week everything is filled out. **See appendix 6**

14 Eddy Heath



14.1.1 Introduction

The Eddy Fen station measures carbon dioxide fluxes via eddy covariance method on the heath site. In order to describe the inter-annual variability of the seasonal carbon balance, net ecosystem exchange (NEE) of carbon dioxide (CO_2) is measured by applying the eddy covariance method. The station uses a lot of power and in the winter the power supply is too small therefore data is only collected in the field season.

14.1.2 History

Eddy Heath has been running since 2012.

14.1.3 Frequency

Eddy Heath station is visited every 14 days Kobbefjord.

14.1.4 Station check

At every station visit fieldchart 7 is filled out. **See appendix 7**

14.1.5 Internal chemicals and mirror cleaning

The internal chemicals should be changed every second a year (preferably in spring when the housing temperature is changed). If values start to look very strange, it could be that the mirror needs cleaning, see the licor7200 manual ('Li-7200, CO2/H2O analyser, Instruction manual') for details. A high

AGC value indicates how clean the mirrors in the cell are, thus AGC would go up if dirt enters the cell. AGC value should not be above 62. Contact Magnus Lund if the AGC value suddenly increases. Mirror is cleaned every year at season start.

14.1.6 Calibration

This section has to be updated. Until then use Zackenberg manual p. 102-105.
Kalibrering 1 gang pr år

15 SPA (Snow Pack Analyzer)

15.1.1 Introduction

The SPA station measures snow depth, snow weight, snow type at heath site. Similar stations are found at serval other stations. The work includes collecting data, data quality checks, maintaining sensors, protecting the installations and administering station meta data (present and historic sensors, what program has been running when).

15.1.2 History

Eddy Fen has been running since 2013. In 2014 we had problems to download data.

15.1.3 Frequency

Eddy Fen station is visited every other week in Kobbefjord.

15.1.4 Station check

See appendix 6

16 River Water

16.1.1 Introduction

The river water in Kobbefjord by the research station is very dilute and carries very little suspended material. GeoBasis monitors seasonal variations in the river water electro chemistry by measuring the river's pH, temperature and conductivity.

16.1.2 History

Measurements in the river have been done since 2009. In 2012 we stopped taking water samples from the river because there were no minerals of sediments in the river.

16.1.3 Frequency

The river water electrochemistry is measured every day you are in the Kobbefjord during the field season and occasionally during winter.

16.1.4 Station check

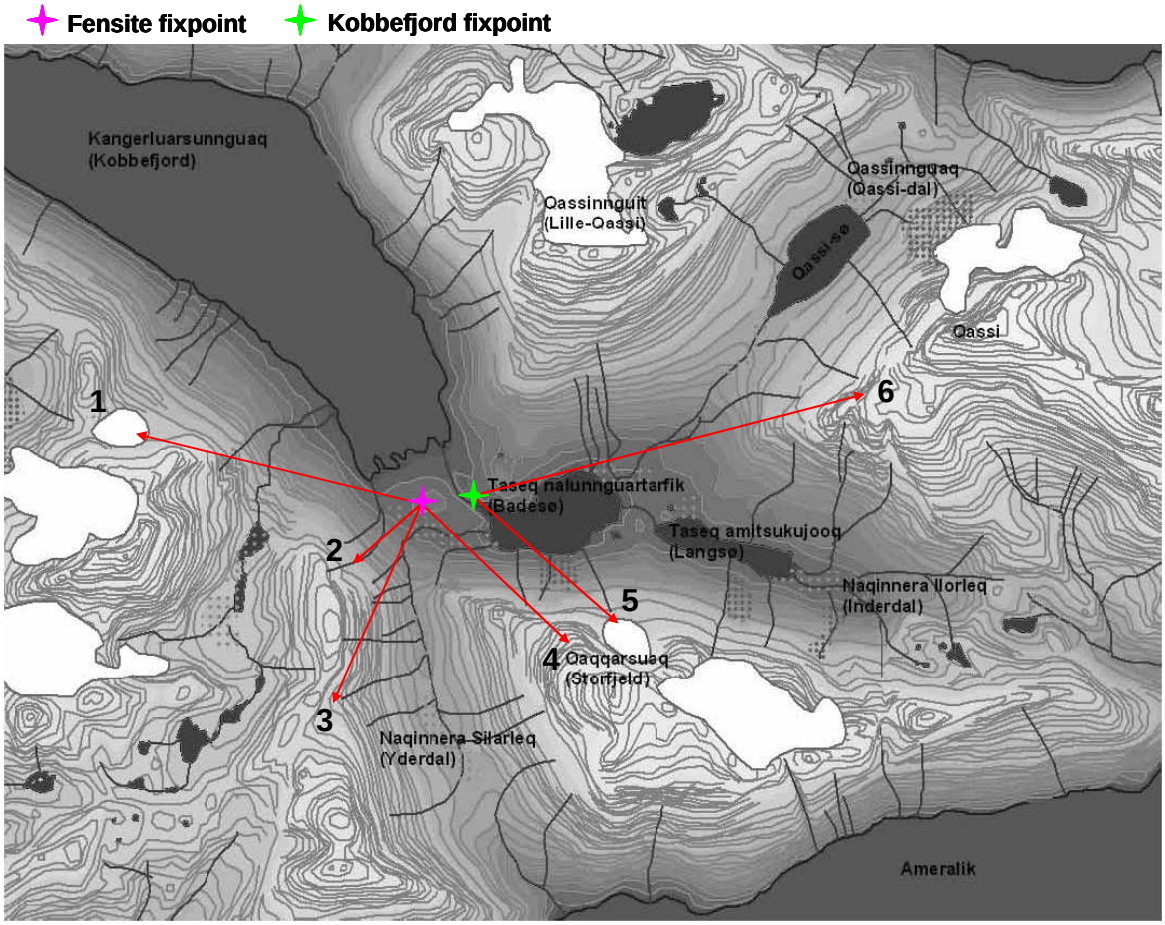
See **appendix 5** use **field chart 5**

16.1.5 Data handling

Data from field charts are written into a digital version located here:

P:\B53_Nuuk_Basic\b53-06 GeoBasis\GeoBasis Stations\E1 - river water chemistry\elektrokemi.xlsx

17 Photos of glaciers and snow patches



Overview of the glaciers and snow patches visible from the Fensite fixpoint and Kobbefjord fixpoint.

17.1.1 Introduction

Digital photos of the visible glaciers and snow patches are taken from the Fensite fixpoint (bench mark) and Kobbefjord fixpoint as close as possible to the date August, 11th (in clear weather if possible). The photos are taken with the GeoBasis digital camera. Take more than one picture of each object.

1: Glacier southwest from the hut
2: Snowpatch
3: Glacier in Yderdal
4: Snowpatch at Storfjeld
5: Glacier on Storfjeld
6: Snowpatch on Qassi

17.1.2 History

The photos have been taking since 2010.

17.1.3 Frequency

Once a year 11. August.

17.1.4 Data handling

The photos are uploaded at the office pc in the folders for each glacier or snow patch (1-6) (*P:\B53_Nuuk_Basic\b53-06 GeoBasis\GeoBasis Stations\Snowpatches photos*).

Kobbefjord fix point on the northern side of the river

Fen fix point next to the Methane station

18 Power Fen

18.1.1 Introduction

Power Fen supplies the Methane station, the Eddy Fen station and the Interact station. There are 6 solar panels and two wind generators and a cable to the generator hut where the generator can charge the batteries in the fen. In the big battery bank there are 8 100 A batteries and in the small battery bank there are 4 100 A batteries all connected.

18.1.2 History

The 6 solar panels and 8 100 A batteries was setup in 2008. In 2012 the batteries was replaced by new batteries. In 2014 the two wind generators was setup together with the extra 4 100 A batteries. In 2014 we also had a new generator.

18.1.3 Frequency

Power Fen is visited at every visit in the Fen.

18.1.4 Station check

Write down in the field journal:

- **SOC:** How many % the batteries at filled
- **BAT:** The voltage on the batteries have, when the generator is on the voltage will be high and around 13,8, note there for if the generator is on, the sun is shining and windmills running when you take the readings.
- **IN:** How much the solar panels produces.
- **OUT:** How much energy the stations uses. (Methane around 5 A, Eddy Fen around 4 A, Interact Fen around 0,3 A)

18.1.5 Batteries

The big battery bank consists of 12 * 100 Ah batteries, 12 V. Each battery weighs 32.5 kg. The voltage on the batteries should be around 12.5-13.5. If it gets under around 12.5 connect the station to the generator.

18.1.6 Winter

INTERACT mast in the fen is running through the winter. Only the wind generators are connected during the winter.

18.1.7 Solar panel

There are six 140W solar panels that charge the battery bank. In clear sky periods the system supports a consumption of 120 W from mid-June until the end of August. But outside this period and in overcast conditions the solar panels need to be supported by generator from the generator hut.

When starting up the station in spring, the snow's reflection of the sun can cause the solar panels to produce 200 W per solar panel. The system charge regulator Steca Tarom 245 is only designed to manage a 45 A current from the solar panels. Therefore it is advisable to connect only three of the six solar panels as long as the snow cover is present. Failure to do so will cause the regulator to periodically turn off the power outlet.

18.1.8 Start-up and shut-down off power supply and solar panels

Before shutting down the power supply and solar panels it is very important to make sure that the CO_2-station, methane station and INTERACT station are closed down.

To start up the equipment always start with the solar panels, then turn on the power supply. If any adjustments are needed to the system, always follow this order: Connect batteries to the regulator, first (+) then (-), turn on solar panels, first (+) then(-), set 'load on'. The other way: set 'load off' on the regulator, disconnect the solar panels, first (-) then (+) , disconnect the regulator from the batteries, first (-) then (+).

Starting up the solar panels

1. Open the white box beneath the battery box (**Error! Reference source not found.**).
2. Switch on (+).
3. Switch on (-).

Starting up the power supply

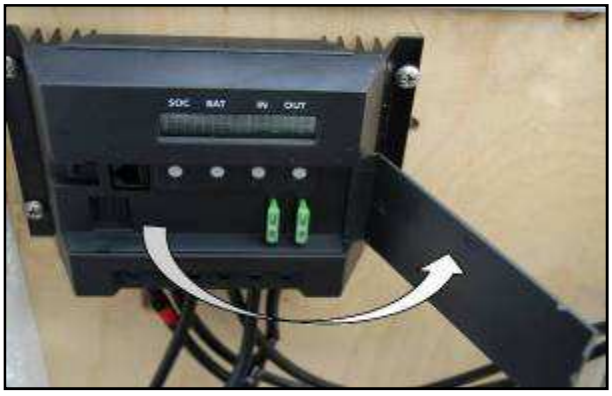
1. Open the Steca Tarom regulator (the black box) in the battery box (**Error! Reference source not found.**).
2. Push MENU and wait.
3. Select 'manu' with the arrow up button.
4. Push arrow up x 1 to 'manual discon' appear on the display.
5. Push OK.
6. Push arrow down x 1 to 'load on' appear on the display.
7. Push OK.
8. Push MENU.

Shutting down the power supply

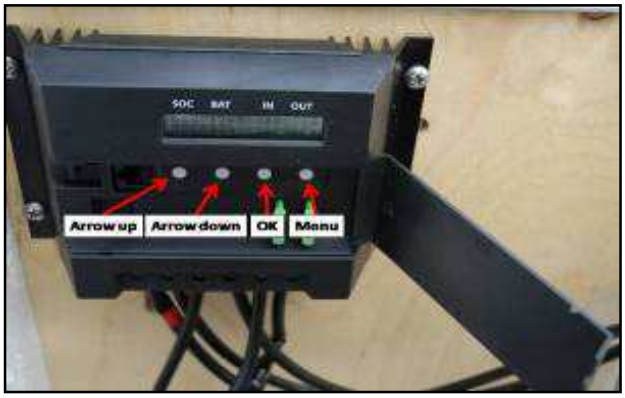
1. Open the Steca Tarom regulator (the black box) in the battery box (**Error! Reference source not found.**).
2. Push MENU and wait (**Error! Reference source not found.**).
3. Select 'manu' with the arrow up button.
4. Push arrow down x 2 to 'manual discon' appear on the display.
5. Push OK.
6. Push arrow down x 1 to 'load off' appear on the display.
7. Push OK.
8. Push MENU.

Shutting down the solar panels

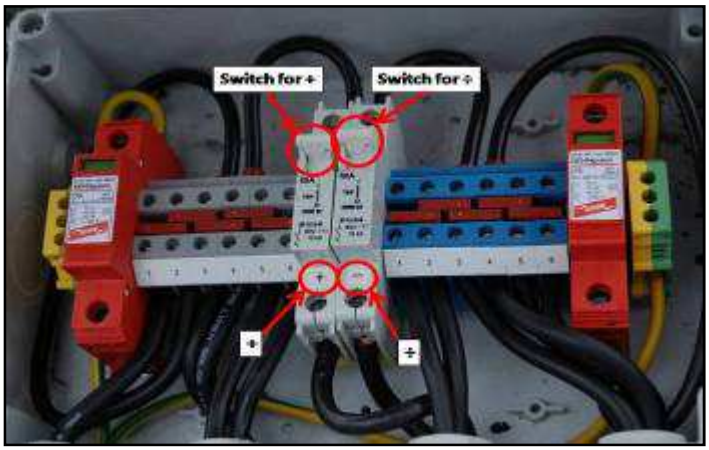
1. Open the white connector box on the side of the battery box (**Error! Reference source not found.**).
2. Switch off (-)
3. Switch off (+)



Tarom 245 with open lid



Menu commands



Connector box (Phaesun box) for the solar panels

18.1.9 Generators

In the generator hut are the generators stored. The GeoBasis generator with the green frame and external tank is used for charging the 12 batteries in the battery bank in the fensite. The generator is started upon

arrival in Kobbefjord and shot off when leaving again. Make sure that the dial in the charging box east of the battery bank always is on ‘I’ so that the batteries are charged the moment you turn on the generator.

Generator with external tank

The generator when it is running (now the generator has green frame!)

18.1.10 Starting the generator:

1. Place the generator just outside the generator hut on the left side of the door on the wooden terrace
2. Fill the fuel tank with petrol (benzin) from the red jerry cans; use a funnel (right wall inside the generator hut)
3. Switch the On/Off bottom to On (figure)
4. Open for the fuel by sliding the black tap to the right
5. Place the Choker halfway to the left
6. Start the generator by pulling the handle in the string a few times – if it doesn't start wait a minute (for the fuel to run into the generator) - then pull again
7. Move the choker to the right when the generator is started and the revolutions will increase
8. Let the generator run for a minute before plugging in the plug /cable for the hut (the cable is on the left side of the hut or under the wooden terrace to the left side)

18.1.11 Shutting down the generator:

1. Disconnect the cable for the hut
2. Close the fuel by sliding the black tap to the left
3. Switch the On/Off bottom to Off
4. Place the generator in the generator hut

19 Power Heath

19.1.1 Introduction

Power Heath supplies the Eddy Heath station, SPA and the Interact Heath station. There are 4 solar panels and one wind generators. In the battery bank consist of 8 100 A batteries divided into two boxes. Consumption: Eddy Heath around 4 A, Interact Fen and SPA around 0,3 A.

19.1.2 History

In 2011 the Heath site was build, and from 2011 to 2013 the power was delivered by an Efoy fuel cell. The system was very unstable and destroyed by frost. In 2013 the wind generator was setup together with the small solar panel charging 4 batteries. In 2014 the 4 big solar panels was setup and the extra 4 batteries was added to the battery bank.

19.1.3 Frequency

Power Heath is visited at every visit at the Heath.

19.1.4 Station check

Write down in the field journal:

- **Voltage:** on the batteries
- **Sun:** does the sun shine
- **Wind:** does the wind generator run
- **Changes:** If you do any changes and the status of the station

19.1.5 Batteries

The battery bank consists of 8 * 100 Ah batteries, 12 V. Each battery weighs 32.5 kg. The voltage on the batteries should be around 12.5-13.5. The batteries are the old one from Power Fen from 2008.

19.1.6 Winter

INTERACT mast and SPA is running through the winter. Both solarpanels and wind generators are connected during the winter.

20 Starting up in spring

20.1.1 SoilFen

Mount the Sunshine sensor by attaching it to the metal plate with the nut underneath the sensor. When the ice in the fen has thawed; push down the three large metal sticks inserted in the peat for holding the wires which are stabilizing the metal stand for the solar panel + logger box + sensors in order to tightening the wires. Make sure that the metal stand is in vertically level.

20.1.2 Soil water stations

Clean the soil water bottles, lids and tubing in clean water and with a sponge and paper. Remove alges and other dirt, be careful when cleaning inside the bottle, do not use the same sponge inside the bottles use instead clean paper and rinse with clean water afterwards. Empty the gray tubes for water.

20.1.3 Methane

See guide in operators manual

20.1.4 Eddy station in fen site

Indoor at ASIAQ office: Make a H_2O calibration use the appendix 6a as guide. Prepare a new .ini file for the Edisol-program on the computer that adjusts the file names and set the PC-time to exact WGWT.

Transport the following equipment out to the fensite: Gill 3D sonic sensor (1210R3) (ultrasonic anemometer) with interfaces; Mounts for the anemometer; LI-7000; Computer (Toughbook); Connectors (e.g. new bev-a-line quick connectors) and data communication cables; Tools (Strips, electric tape, Flat screwdriver, Star screwdriver, Pipe wrench, Wrench kit, Snow spade, Voltage meter, Tube cutter); Compass; Gas regulator for calibration, Field manuals and charts; fresh new filters.

The center of the anemometer is placed 2.2 m above ground. The distance between the anemometer and the snow surface must be monitored frequently during spring. There is a mark indicating north on the anemometer. Point this mark towards magnetic north. A precise orientation is very important.

Place the air intake (sampling tube) 2.2 m above ground. The intake should be placed in same height as the center of the anemometer and on the West side of the anemometer as this position will influence less on the anemometer as wind direction is mainly from South or North. Measure the total length of the air intake (distance between the anemometer and Li-7000).

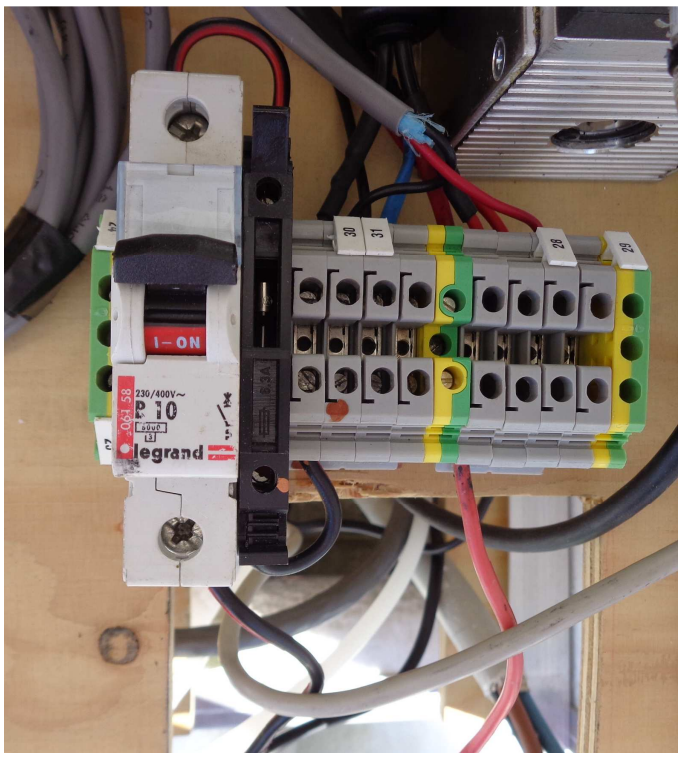
Use strips to secure lines, cables and tubes along the mast. The cable and air tube running from the mast to the analyzer must be either elevated or installed in protective hosing. Otherwise the foxes will bite the wiring/tubing.

Depending on snow conditions, it may be a good idea to elevate the steel enclosure by 0,5m higher than the steel stand. As the snow melts the water table can rise very high, because the melt water is trapped in the fen. The stand is marked with a ranging rod. Remove snow around the stand. Make sure there is enough space so that the doors can open.

The power cable (12 V) is fitted in a plastic bottle or bag on the ranking rod. Insert the power cable into the enclosure through the hole in the bottom together with all the cables from the mast. When all cables are inserted close the hole with foam material to prevent snow from entering the enclosure

Record the voltage of the batteries and the polarity of the wires before the power cable from the power outlet is connected.

Connect the powercables as shoven below.



Connect the power cables like this

Setup the N_2 calibration gas on the left side of the enclosure, place an o-ring between the regulator and the gas bottle and close VERY tight. Mount the tubing to the enclosure so the heavy protected tubing is not hanging in the plastic tubing and causes leakages.

Before connecting the N_2 gas to the Li7000, fully open the needle valve and the small red valve, close the big red valve. Then fully open the black valve on the gas bottle, now you can see the pressure on the regulator increases. A new bottle has 200 bar.

Put the end of the long tube into a bottle of water to check the flow.

Open slowly on the big valve (the two other valves still fully open), now the bubbles start coming out of the tube. Open until there are around 10 bubbles /sec. Keep the small red valve open.

Adjust the flow with the needle valve until 1,5 bubbles/sec. (Check the flow again after few hours).

Connect the N_2 gas to the Li7000 inlet A through a filter.

When the gas flow is running with around 1,5 bubble/sec check for leakages with the leakage spray by spraying on all valves and connectors. Keep a close eye on the gas pressure the first hours and days to check if the gas pressure decreases too quickly.

Place a o-ring between the bottle and the regulator, Mount the tubing to the enclosure with a strip.

20.1.5 Eddy Heath

- Remove the foxnet and place it in the hut
- Make a calibration check (see Zackenberg manual p. 102-105)
- Clean window (see Li7200 manual)
- Change chemicals every other year (see Li7200 manual)

21 End of season

21.1.1 Shipping

Usually there is a lot of equipment there has to be send to Denmark every winter. Talk with Birger, Magnus and Mikhail about how much you should send.

- **Methan:** LGR in Zargesbox to Mikhail via Birger for calibration and check
- **Eddy Fen:** Li7000, with cables to Magnus via Birger for calibration and check
- **Soil water:** One -18 and one +5 insolated package is sendt to Birger

Shipping labels is found in the folder: *P:\B53_Nuuk_Basic\b53-06 GeoBasis\MISC\Div\Fragt\Shipping Labels*

The value on all the packages has to be around 1000 kr. and not more than 3999 kr, because then we have to pay taxes.

21.1.2 SoilFen

Remove the Sunshine sensor by simply loosening the screw underneath the sensor and leave the metal plate and mount. Detach the communication cable (between logger and sensor) from the sensor. Leave the cable at the mast over the winter and place the end of the cable with the plug in a plastic bottle and thoroughly close the bottle neck with tape to keep it water proof through the winter and attach the bottle underneath the solar panel to keep it a bit out of the wind.

21.1.3 Soil water stations

Leave the 1L plastic bottles at the site. In the beginning of a new field season, hot water can be poured into the bottle to release the bottle (Otherwise the box may be full of ice and bottles cannot fit in before the ice has melted).

21.1.4 Methane station

By the end of the field season the methane station is disassembled. The procedures regarding removal of the lids, fans, engines and analyzer are also described in the operator's manual. However there are a few other things to remember:

Before the fen site begins to freeze (around mid September) the tubes in protective hoses must be elevated at least 20 cm above the peat surface. Otherwise they will freeze in as ice builds on top of the peat. Also the chamber frames must be marked out with a range rod in front of each chamber so that the chambers can be located next spring. The shelter is left over winter.

Clean the lids (remove the white mark made by the sealing on the lid). The LGR analyzer are brought back to Nuuk. The lids, motors, fans and tubings are numbered (Chamber no.) and placed in the storage facility underneath the NuukBasic station (hut). The storm sensor is demounted and placed inside the hut on the GeoBasis shelves. Before storing or at least before spring start-up it is a good idea to rinse the tubes with compressed air.

21.1.5 Eddy Fen

At the end of the season, the CO_2-station is closed down (see **Error! Reference source not found.**for winter storage *P:\B53_Nuuk_Basic\b53-06 GeoBasis\MISC\plans for field work\closedown at the end of field season)*

Equipment to bring out to the site before closing down the CO_2-station: Foam (to cover the hole where wiring/tubes going into the silver box), ranging rod, plastic bottle or plastic bag, Tools (Strips, electric tape, Flat screwdriver, Star screwdriver, Pipe wrench, Wrench kit, Snow spade, Voltage meter).

1. Calibrate the LI-7000 to check that no drift have taken place.
2. Copy all data and all ini-files (the whole Edisol folder) from the computer hard disc and make a backup.
3. Shut down the system and switch off the power ('load off' at the charge regulator).
4. Disengage all sensors and put them back in their storage boxes. Make sure that all tubes are closed or connected on the back of the LI-7000 to prevent any open passage into the analyzer.
5. Put the fat 12 V into an upside-down plastic bottle and secure it to the ranking rod, the cable is still "hot" and gives power to Interact Fen.
6. If there are enough gas in the gas bottles for next year then leave them under the Methane hut, other vice bring them to Nuuk.
7. Place the metal enclosure inside the Methane hut.
8. Move all equipment back into the hut/Asiaq leave the steel stand for the tower and steel stand for enclosure at site.
9. Bring the computer, LI-7000 to Nuuk, Gill and cables to Nuuk.

Power cables still “hot” powering Interact Fen

Enclosure inside the Methane hut

Gas bottles under the Mathane hut

21.1.6 Eddy Heath

Turn off the station. Remember to protect the station with fox net so the foxes cannot destroy the cables in the winter when they can reach the cables due to 1 m snow.

22 Office routines

22.1.1 Introduction

The frequent field work in the GeoBasis program require disciplined office routines in order to organize data, meta data and to plan new field work. This section gives an overview of the GeoBasis office routines at Asiaq.

22.1.2 Station portfolio

Each of the GeoBasis stations has both a physical portfolio and a computer folder. The physical folder holds general information about the station:

1. General information [Map Coordinates, purpose, establishment dates, communication]
2. Field visits [Field Charts]
3. Map/Drawings [Especially buried installations]
4. Program [current and historic .Cr1-files and the associated .fls-files are located here]
5. Diagram [current and historic wiring diagram of the station]
6. Data check [analysis of data, graphs]
7. Sensors [calibration sheets, serial numbers of current and historic sensors]
8. Miscellaneous.

22.1.3 Station folder

The computer folders are located on this path: *P:\B53_Nuuk_Basic\b53-06 GeoBasis\GeoBasis Stations\...*

Each station folder has this structure:

1. Raw data [contains raw data]
    - Raw data from the dataloggers are stored in a csv and TOA5. The CSV files are named according to this convention: GBXXIDMMM_YYYY-DOY_YYYY-DOY.dat. The year and day numbers refer to the first and last record of the data file. The file is set to be write protected. It is very important that you name the files the same way as earlier.
2. Diagram/program [copies of current and historic .Cr1-files and .fsl-files]
    - When changing a program on a station it is important to keep record of the files and dates. When retrieving a program from a datalogger it is called: ANK_YYYYMMDD.cr1 When uploading a new program to a datalogger it is called: AFG_YYYYMMDD.cr1.
    - Each program that is uploaded has a corresponding .fls file which describes the headers of the comma separated array of numbers. (If changes to the output tables are needed, remember to update the .fsl file and the data exchange numbers in the WISKI database.)
    - Also the wiring diagram is associated with the program and it should always be updated. Remember to make a copy when changing the station setup.
3. Print screen
    - Every time data is downloaded the print screens are saved in this folder.

22.1.4 Pictures

The pictures from Kobbefjord are stored in the photo database *P:\B53_Nuuk_Basic\b53-06 GeoBasis\Photo database.* Each station have its own folder where pictures from that station is saved. Remember to delete bad pictures and turn the pictures the right way when uploading them to the database.

22.2 Data and field charts

Station	
K1	
K2	
K3	
K4	
K5	
K6	
M500	
M1000	
SoilFen	
SoilEmp	
SoilEmpSa	
SoilHeath	
Interact Fen	
Interact Heath	
Methan	
Eddy Fen	
Eddy Heath	
SPA	
River water	

22.2.1 WISKI database

This section has to be updated after Wiski 7 is implemented. Ask the staff a Asiaq HKM to help you.

Data from some of the stations are stored and edited in the WISKI database. Importing data to the database via the automatic data importer is relatively simple:

The updated .fsl file is placed in this folder: S:\wsp\grimport

The data file is edited so that its name is accurately the same as the .fsl file ('GB01ID5.dat' corresponds to 'GB01ID5.fsl').

Station	**Status**
M500	All data in the database
M1000	Data from M1000 is a mess, after a change in program the data series have been switched
SoilFen	All data in the database
SoilEmp	All data in the database
SoilEmpSa	All data in the database
Interact Fen	Is not in the database yet, but it should be when Wiski 7 is ready
Interact Heath	Data from a period is in the database, data after change in program has to be put in

22.2.2 Conversion from binary to CSV or TOA5 files

1. The data files on the removed card have a binary format that need to be translates into the format that we use: array csv-format or TOA5. This is done by using the *LoggerNet → Data → CardConvert*.

2. Setup the 'Destination File Options ' and 'Array CSV Options' as follows

3. Press 'Start Conversion'

The data files must have a file name that follows this convention:

'GBxxIDxxx_YYYY-DOYstart_YYYY-DOYend.dat'

GB01 = M500

GB02 = M1000 (From 2012 a part of ClimateBasis)

GB03 = SoilFen

GB04 = SoilEmpetrum(SoilEmp)

GB05 = SoilEmpetrumSalix(SoilEmpSa)

GB06 = SoilHeath

ID= data aggregation - see Table 1 *(ID360=6 timers data)*

4. Copy files from GeoBasis field laptop (*C:\Programmer\Campbellsci\LoggerNet\data*) to the local data base at the office PC: *P:\B53_Nuuk_Basic\b53-06 GeoBasis\GeoBasis Stations\...*

5. Apply write protection to the data files.

22.2.3 Update the field PC time:

Once per week the field PC time is synchronized with WGWT =UCT-3 hours via this home page:

[www.worldtimeserver.com/clocks/]

22.2.4 Field Charts

Once in a while the Field Charts are collected from Kobbefjord and digitized (values/information from field charts are written in Excel) in the office at Asiaq. The hardcopies of the field charts are stored in a portfolio

in the office. It is important that you check that you write in the field charts the same way as the previous years with same units and details – use the previous year as a template.

22.2.5 Weather check

Many of the field activities are weather dependent and a part of planning the field work is to follow weather development. This is done by looking at some of these web sites:
[www.visitarendt.dk/BETTERWETTER.htm]

[www.freemeteo.com/default.asp?pid=23&gid=3421319&la=1]

[www.yr.no/sted/Grønland/Vestgrønland/Nuuk/]

[www.dmi.dk/dmi/byvejr_gl.htm?by=4250]