

Combination of CP & CSA



D2.3 - A catalogue with descriptions of ‘Terrestrial field sites for environmental research in the Arctic’

Project No.262693– INTERACT

FP7-INFRASTRUCTURES-2010-1

Start date of project: 2011/01/01

Duration: 48 months

Due date of deliverable: 2012/03/31 (M15)

Actual Submission date: 2012/03/30

Lead partner for deliverable: AWI

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Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the Consortium (including the Commission Services)	
CO	Confidential, only for members of the Consortium (including the Commission Services)	

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Publishable Executive Summary

This report is the first deliverable of Work Package 2 (WP2) – The Station Managers’ Forum and hence has been one of the focus areas in the early phase of the INTERACT project. It documents the development of a catalogue with descriptions of ‘Terrestrial field sites for environmental research in the Arctic’ (33 INTERACT and the eleven Observer Stations).

The INTERACT Station Catalogue is a one-stop shop for researchers, policy makers, projects and scientific networks for the identification of suitable study sites for their arctic research. It contains a variety of information about all individual INTERACT Field Stations, including facts about the environment, facilities and services provided at the stations and demonstrates the uniqueness of each station as well as the large diversity of the entire INTERACT network.

The Station Catalogue includes all relevant information (general, location, climate, physical setting, station facilities, logistics, scientific equipment and services, access and transport information, as well as the main science disciplines performed at each station) provided by the station managers in the form of fact sheets, descriptive texts, photos of the station and its surroundings, and activities. The information acquired has been checked for consistency, standardised, edited, and prepared for publication.

The INTERACT Station Catalogue is published as a book (printed and available in PDF-format). The INTERACT Station Catalogue will also be hosted on an interactive web-portal (WebGIS).

1. Introduction

In 2001, a small group of nine research stations in the European Arctic came together to share experiences in research station management and administration, and to develop a more efficient framework for observation and research. This SCANNET network was financed by the European Commission's 5th Framework Programme. Together with new stations and some research institutions outside the Arctic, a new collaborative project was proposed to the European Commission's 7th Framework Programme in 2010. This was the start of INTERACT (2011-2014, International Network for Terrestrial Research and Monitoring in the Arctic).

INTERACT is a circum-arctic network of 33 terrestrial field bases in northern Europe, Russia, US, Canada, Greenland, Iceland, the Faroe Islands and Scotland. Since the start of INTERACT, a further eleven observer stations in Russia, Switzerland, Austria, Poland, the Czech Republic, Canada and Svalbard have joined the network (and more applications are pending). Its main objective is to build capacity for identifying, understanding, predicting, and responding to diverse environmental changes throughout the wide environmental and land-use envelopes of the Arctic.

We see INTERACT as a one-stop shop for contacts to terrestrial research stations in the Arctic and also to alpine areas of Eurasia. Together, the INTERACT Stations host many thousands of scientists from around the world working in multiple disciplines and INTERACT collaborates with many research consortia and international research and monitoring networks.

INTERACT Field Stations have a lot to offer and in this catalogue of INTERACT and Observer Field Stations it is possible to read about the individual stations, and find facts about the environment, facilities and services provided at the stations. This will enable researchers, projects, programmes, scientific networks and other stakeholders to identify research stations that offer conditions that best suit their needs.

The catalogue has also been produced as a booklet (printed and available in PDF-format) and it will be hosted on an interactive web-portal where stations are shown together with environmental background maps of the readers' choice.

2. Task description

The station catalogue is a collection of information concerning the environmental and logistic conditions and the service provided at each INTERACT infrastructure (general information, location, climate, physical setting, station facilities, logistics, scientific equipment and services, access and transport information, as well as the main science disciplines performed at each station). This knowledge as a catalogue is important for use by scientists for choosing the most appropriate site for their arctic research. The data collection has been expanded to include all

eleven stations with observer status. The current catalogue contains the information of all 33 interact and 11 observer stations.

The data for the Station Catalogue was collected within an Excel questionnaire template. In addition, we asked the station managers to provide short and interesting texts as “appetizers” and photos of the stations, their research and the surrounding area for the book. Layout examples are shown in section 5.1. A new flyer announcing the INTERACT Station Catalogue is attached and was distributed at the IPY conference in Montreal (April 2012).

To maximize the outreach of the data catalogue, we will create a web-based database for the catalogue. This will be hosted at the Arctic Portal (www.arcticportal.org) that provides an interactive map (WebGIS) for the visualisation of the INTERACT Station Catalogue. Examples are shown in section 5.2.

The last step will be the update of the INTERACT website using the newly acquired infrastructure information of the 33 INTERACT and the 11 Observer stations within the INTERACT network.

3. Catalogue data acquisition

3.1. Process of developing the content and the format of the catalogue

The station catalogue should present capabilities of INTERACT stations. The first task was to identify what information should be presented for the individual stations and in which format.

The preparatory work for the INTERACT Description of Work, accepted by the EU, included details on the possible contents of the station catalogue. These suggested topics were brought to the first Station Managers’ Forum meeting held 18 January 2011 in Abisko, Sweden, where it was discussed and revised by participating stations and institutions. Further refinement was done during a task kick-off meeting and continuous dialogue of people responsible for tasks under WP2. A suggested template was presented at the second Station Managers’ forum meeting held 10-13 October, 2011 in Hvalsø, Denmark, together with a draft layout of the catalogue. Comments from participants were incorporated and the template was sent out to all stations to be filled in. The templates gave examples for each field in the fact sheet and also for each section of the text element (see Figure 2).

Status and inconsistencies in data format were discussed at the third Station Managers’ Forum meeting held 28-29 February 2012 in Svanhovd, Norway, and final adjustments were made.

The information provided by the stations included:

- a fact sheet about the station and surrounding environment (Excel)
- a text description
- photos of the stations, activities, landscape and environment
- a logo for the station/institution

The contents, layout and structure of the report have been finalised by the Task leader (Alfred Wegener Institute for Polar and Marine Research, Research Unit Potsdam; AWI) with input from the Station Managers' Forum Task leader (Department of Bioscience, Aarhus University).

One major aim for the development of the Excel fact sheet was its integration into a database with potential search options for the user. To minimize post-data processing, like the correction of typing errors and case-sensitive inconsistencies, only pre-defined answers were possible to enter in many fields of the fact sheet. In addition, the station managers were asked not to enter units after numbers. Additional lines for comments were given at the end of each category.

3.2.Documentation of data acquisition

The Excel templates for the Station fact sheets and the template for text elements including the guidelines (documented in Figure 1 and Figure 2) were sent out to the station managers after the last refinement during the second Station Managers' Forum. At the same time, the station managers were asked to send 10-15 representative photos of their station, activities, landscape and environment to the task leader.

The completed templates were sent back by the station managers in the beginning of 2012. The last information was, however, submitted only after the third Station Managers' Forum. This was because it was decided there to collect additional climatological data (mean temperatures for February and July) which is more representative than the absolute minimum and maximum values requested beforehand.

Category	Sub-Category	Units	Your station
Research facility	Name of research facility	Name	
Country	Country	Name	
Opening year	Opening year	yyyy	
Operational period	Operational period	operating period (potentially early and extended season can be written in brackets. e.g. (March-April), May-September, (October-November)	
Website	Website	www....	
Permitting issues categories	Permits required for access to the station	Yes/No, please choose from list	
	Permits required for studies	Yes/No, please choose from list	
	Visa required	Yes/No, please choose from list	
	Contact (permit issues)	State e-mail address for permit enquiries	
	Comments to permits and visa	text	
Facility owner and manager	Name of the facility owner	Name of Institution	
	Owner status	(Government, NGO, private)	
	Institution responsible to run the station	Name	
	Contact (access to station)	State e-mail address for enquiries regarding access to the station	
	Website (institution)	www. ...	
Other institutions	Name	Name other institutions responsible for the run of the station (if any)	
	Country	Name the country of above institutions (if any)	
Location	Climate zone	please choose from list (High Arctic (average July temperature < 5°C); Low Arctic (average July temperature 5-10°C); Sub-Arctic (average July temperature >10°C); Alpine (lower latitudes above treeline); other (describe in next line)	
	Permafrost	if chosen "other climate zone": please describe or add features please choose from list: Continuous (>90%); Discontinuous (10-90%); Sporadic (<10%); Palsas; None	
	Geographical Coordinates: longitude (WGS 84)	xx,xxxxx (decimal degree: please give at least 5 decimal digits) or deg°min'sec"	
	Geographical Coordinates: latitude (decimal degree, WGS 84)	yy,yyyyy (decimal degree: please give at least 5 decimal digits) or deg°min'sec"	
	Altitude of station (m asl)	Number	
	Min Altitude within study area (m asl)	Number	
	Max Altitude within study area (m asl)	Number	
	Name of nearest town/settlement	text	
	Distance to nearest town/settlement (km)	Number	
	Size of nearest town/settlement (no. of inhabitants)	state approximate number of inhabitants	
	Map	State types of maps (e.g. resolution 1:250 000, Aerial image, Satellite image, Google Earth with low resolution)	
Features within study area	Ice cap	Yes/No (study area is defined by the station as an area with regular activities, catchment area, reference area protected against disturbances, etc.)	
	Permanent snowpatches	Yes/No, please choose from list	
	Mountain	Yes/No, please choose from list	
	Valley	Yes/No, please choose from list	
	Shoreline	Yes/No, please choose from list	
	Tundra	Yes/No, please choose from list	
	Tree line	Yes/No, please choose from list	
	Other	State which	
Climate	year/s measured and other comments	e.g. "minimum temp from monthly or daily averages"	
	Mean annual (°C)	number	
	Minimum annual (°C)	number	
	Maximum annual (°C)	number	
	Mean temperature in February (°C)	number	
	Mean temperature in July (°C)	number	
	Mean annual wind speed (m/s)	number	
	Minimum wind speed (m/s)	number	
	Maximum wind speed (m/s)	number	
	Dominant wind direction	please choose from list	
	Total annual precipitation (mm)	mm	
	Precipitation type	(rain, hails, snow)	
	Ice break up	Lakes: Approximate onset date / month Sea: Approximate onset date / month	
Station facilities	Area under roof (m ²)	m ²	
	Scientific laboratories (m ²)	m ²	
	Logistic (m ²)	m ²	
	Number of beds	number	
	Number of rooms (total)	text	
	Number of staff on station (peak season)	Number	
	Number of staff on station (off season)	number	
	Max. number of visitors at a time	number	
	Showers	Yes/No, please choose from list	
	Laundry facilities	Yes/No, please choose from list	
Workshop facilities	Metal workshop	Yes/No, please choose from list	
	Wood workshop	Yes/No, please choose from list	
	Plexiglas workshop	Yes/No, please choose from list	
	Staff available to assist with constructions	Yes/No, please choose from list	

Figure 1 Documentation of the Excel template for the station fact sheet

Landing facilities	Airstrip	Yes/No, please choose from list		
	Lake	Yes/No, please choose from list		
	Airstrip length (m)	number		
	Airstrip width (m)	number		
	Airstrip surface	Tarmac, gravel, snow, etc.		
	Helipad	yes/no/not relevant: please choose from list		
	Flight assistance equipment	yes/no/not relevant: please choose from list		
	Landing assistant	yes/no/not relevant: please choose from list		
	Landing assistant type	Name of type/description (e.g. Radar reflector, Light, Flarepots, Beacon (Frq./ID/Range)		
	Ground assistant	yes/no/not relevant: please choose from list		
Ground assistant type	Name of type/description (e.g. ground power, heater, fuel)			
Comments to landing facilities	text			
Ship landing facilities	Port	yes/no/not relevant: please choose from list		
	Landing wharf	yes/no/not relevant: please choose from list		
	Pier	yes/no/not relevant: please choose from list		
	Pontoon	yes/no/not relevant: please choose from list		
	Sledges	yes/no/not relevant: please choose from list		
	Comments to ship landing facilities	text		
Means of transport at station	Sea	yes/no/not relevant: please choose from list		
	Type of transport	Ship (length or tonnage in brackets), motor boat, kayak, etc.		
	Land	yes/no/not relevant: please choose from list		
	Type of transport	Car/pick-up, ATV, Snowscooter, bicycles, etc.		
Transport and freight	Transport to station	Plane/ship/boat/car/hike (name more than one if necessary)		
	Number of ship visits per year	Number		
	Period	Approximate dates or months (if relevant)		
	Number of flight visits per year	Number		
	Period	Approximate dates or months (if relevant)		
	Number of road-track visits per year	Number		
	Period	Approximate dates or months (if relevant)		
	Comments to transport and freight	text		
Communication	Telephone	Yes/No, please choose from list		
	Satellite phone	Yes/No, please choose from list		
	VHF	Yes/No, please choose from list		
	E-mail	Yes/No, please choose from list		
	Internet	Yes/No, please choose from list		
	Computer	Yes/No, please choose from list		
	Printer	Yes/No, please choose from list		
	Scanner	Yes/No, please choose from list		
	Fax	Yes/No, please choose from list		
	Comments to communication facilities	text		
Power supply	Type	Volt (and type, e.g. eurAsian two/three-pin plug or Northamerican two/three-pin plug. http://users.telenet.be/worldstandards/electricity.htm#plugs)		
	Hours per day	describe hours in operation (e.g. 06-09 and 16-22)		
Medical facilities and safety equipment	Medical facilities	Well equipped/standard/basic/none		
	Specification of medical facilities (if necessary)			
	Medical suite	Yes/No, please choose from list		
	No of staff with basic medical training or doctor	Number		
	Distance to hospital	km		
	Estimated time for evacuation to hospital	text		
	Compulsory safety equipment	List		
	Recommended safety equipment	List		
Main science disciplines	Anthropology, Sociology, Archaeology	Yes/No, please choose from list		
	Astrophysics	Yes/No, please choose from list		
	Atmospheric chemistry and physics	Yes/No, please choose from list		
	Isotopic chemistry	Yes/No, please choose from list		
	Climatology climate change	Yes/No, please choose from list		
	Environmental sciences - Pollution	Yes/No, please choose from list		
	Geodesy	Yes/No, please choose from list		
	Geology and sedimentology	Yes/No, please choose from list		
	Geophysics	Yes/No, please choose from list		
	Glaciology	Yes/No, please choose from list		
	Geocryology and geomorphology	Yes/No, please choose from list		
	Soil Science	Yes/No, please choose from list		
	Human biology medicine	Yes/No, please choose from list		
	Mapping - GIS	Yes/No, please choose from list		
	Marine biology	Yes/No, please choose from list		
	Oceanography and fishery	Yes/No, please choose from list		
	Microbiology	Yes/No, please choose from list		
	Hydrology	Yes/No, please choose from list		
	Terrestrial biology, ecology	Yes/No, please choose from list		
	Paleolimnology	Yes/No, please choose from list		
	Paleoecology	Yes/No, please choose from list		
	Limnology	Yes/No, please choose from list		
	Scientific equipment	Specific device	List types (keep brief)	
		Scientific services offered	List (keep brief)	

Figure 1: continued.

Guidelines for filling in text elements of the INTERACT Station Catalogue – WP2

(Examples have been modified slightly from the INTERACT web-site)

Station name and owner

Name station and owner

Example (Spasskaya Pad):

Spasskaya Pad Scientific Forest Station,
Institute for Biological Problems of Cryolithozone, Russian Academy of Science

Location

Describe (in max. 75 words):

- General area.
- Protection status of area (e.g. national park, protected area, scientific reference area, public land).
- The location in relation to larger landscape features (fiord, valley, mountain, river, lake) and settlements.

Example (Zackenberq):

Zackenberq Station is located on the north side of Young Sund – Tyrolerfjord complex in Northeast Greenland. The station is situated in the southern part of the National Park of North and East Greenland, the largest national park in the world (ca. 1 mio. km²). Nearest settlement is the military outpost Daneborg (with a marine research facility) 20 km southeast of the station, and nearest town is Iltoqqortoormiit, 450 km south of the station.

Biodiversity and natural environment

Describe in general terms climate and environment and supplement with description of charismatic features and species (in max. 100 words).

Example (Svanhovd):

The Pasvik area is a part of the western distribution limit of the Russian taiga. The area is recognized by a mixture zone of eastern and western species of flora and fauna. The area includes old growth pine forest, wetlands, lakes, and rivers. The fauna and flora has a strong eastern influence, with many species not found in other places of Europe, e.g. a very interesting flora of aquatic plants. Other ecosystems, such as mountain birch forest and tundra, seashore and fjords are easily accessible from Svanhovd by car.

(Feel free to include permafrost info and specific charismatic species (e.g. bears, moose, musk ox, reindeer/caribou, etc.) or other features of interest.)

History and facilities

Describe the history of the station including year of establishment, facilities (max number of visitors, type of rooms, catering) and shops (in max. 100 words)

Example (Barrow):

Barrow has a long heritage of research starting with the First International Polar Year station in 1882-1883. The Arctic Research Laboratory was formed in 1947 and has supported a vast number of atmospheric, ocean and terrestrial research activities. Present facilities include access to modern laboratories, high speed internet, local accommodations and cafeteria or self catering facilities for upwards of 100 visiting researchers in double rooms. Several well equipped stores can be found in Barrow town.

Figure 2: Documentation of the Word template for describing text section

General research and databases
Describe main research fields at the station and existing databases (in max. 100 words)

Example (Abisko):
Research focuses on plant ecology, geomorphology and meteorology. The main objectives of the ecological projects are to study the dynamics of plant populations, to identify the controlling factors at species latitudinal and altitudinal limits, to understand ecosystem structure and function and to predict impacts of global environmental change. The meteorological projects deal with recent climate changes in the region and local variations of the microclimate. The geomorphology research focuses on the mass wasting of mountains and sediment transport.

Existing databases includes bibliography of publications arising from research at the station, climate records, biological and physical parameters modelling.

Human dimension
Describe the nearest local community including name, distance from station, ethnic origin of inhabitants, main livelihoods, etc. (in max. 100 words)

Example (Sermilik):
The town Tasilaq, with its approx. 1700 inhabitants of a total population in East Greenland of about 3000, is located 20 km south of The Sermilik Research Station. The traditional Inuit culture still plays a major role in daily life, but Tasilaq is also a modern community with a well functioning infrastructure, shops, telecommunications, etc. Fishing and hunting is important to local residents, but also tourism and service industries play an important role in the local economy. The Ammassalik Island and valleys behind the town have a unique flora and is a popular place for hiking.

Example (Whapmagoostui-Kuujuarapik):
The Whapmagoostui-Kuujuarapik community represents the ancestral limit of the Cree and Inuit territories. It is both the northernmost Cree community and the southernmost Inuit community in Quebec. The Hudson Bay Company established the first fur trade post here in 1750. In 1940-50, the establishment of a military base and a radar station at this site was the foundation for settlement of the two cultural groups.

Access
Describe transport to station (incl. time from main airport) and local transport to field locations (in max. 75 words)

Example (Whapmagoostui-Kuujuarapik):
Plane and boat (summer only) commercial services. Regular flights available from Radisson and Montreal (1-2 hours). CEN can also make arrangements for aircraft rentals. Local Transportation: CEN offers logistical support to researchers working on site and in the area in a radius of about 350 km. Snowmobiles, ATVs and boats (rowboat and zodiac) are available for rent at the station. 4X4 trucks are available for rent in the community.

Example (Nymto Park):
NPS is located near a small village which can be reached by helicopter and 4WD car. Nearest airports are in Surgut: 200 km by normal road and 100 km by dirt road. In winter NPS is easier to reach by winter roads. From the international airport Khanty-Mansiysk the distance by helicopter is 260 km, by road 250 km more than from Surgut.

Figure 2: continued.

3.3.Data standardisation and processing

The incoming data needed a quality control which included, beside the correction of spelling and grammatical errors, a general consistency check of all fact sheets and texts. The verification of the information given was done by internet research and also in direct communication with the respective station manager. The text elements for many stations required major editing, especially regarding the publication of the printed version and its broad distribution. The editorial work was, done by the D-2.3 task leader, the leader of the Station Managers Forum, and the WP2 leader.

For the printed version of the station catalogue, the fact sheet experienced several changes to increase the readability of the catalogue information. This was the merging of categories (e.g. power supply → station facilities, ship landing facilities → sub-category of landing facilities), the drop of fields (e.g. minimum wind speed, number of road track visits per year, and several more). Figure 1 shows an example of the resulting station fact sheet which has been used for the printed catalogue version, and is also part of the submitted deliverable D 2.3. The original data is being used for the web-based database (see section **Error! Reference source not found.**)

4. Results

4.1. Overview of INTERACT and Observer Stations

The INTERACT network with its 33 INTERACT and 11 Observer Stations provide a real circum-arctic network with stations in northern Europe, Russia, the US (Alaska), Canada, Greenland, Iceland, the Faroe Islands, and the UK (Scotland). The stations are located in different climate zones (HighArctic, LowArctic, sub-Arctic, Alpine), north and south of the Arctic circle, in the mountains and the lowlands, they are located in different permafrost zones or have no permafrost at all, some can be reached by boat, others only by plane or helicopter. The main science disciplines performed at the stations include anthropology, sociology, medicine, climatology, astrophysics, all kinds of marine and terrestrial geo-sciences, biology, cryology, astrophysics and environmental sciences.

INTERACT Stations					
No	Station name	Location	Latitude	Longitude	Owner Country
1	Finse	Norway	60°36' N	07°30' E	Norway
2	Svanhovd	Norway	69°27' N	30°03' E	Norway
3	Sverdrup, Ny-Ålesund	Svalbard	78°55' N	11°56' E	Norway
4	Tarfala	Sweden	67°55' N	18°35' E	Sweden
5	Abisko	Sweden	68°21' N	18°49' E	Sweden
6	Kilpisjärvi	Finland	69°03' N	20°50' E	Finland
7	Kolari	Finland	67°21' N	23°50' E	Finland
8	Kevo	Finland	69°45' N	27°01' E	Finland
9	Oulanka	Finland	66°22' N	29°19' E	Finland
10	Khibiny	Russia	67°38' N	33°44' E	Russia
11	Mukhrino Field Station	Russia	60°54' N	68°42' E	Russia
12	Numto Park Station	Russia	63°42' N	70°54' E	Russia
13	Samoylov	Russia	72°22' N	126°28' E	Russia/Germany
14	Spasskaya Pad	Russia	62°14' N	129°37' E	Russia

15	Chokurdakh	Russia	70°49' N	147°29' E	Russia
16	Barrow	USA	71°18' N	156°35' W	USA
17	Toolik	USA	68°38' N	149°36' W	USA
18	Kluane Lake	Canada	61°02' N	138°25' W	Canada
19	Radisson	Canada	53°47' N	77°37' W	Canada
20	Whapmagoostui-Kuujuarapik	Canada	55°17' N	77°45' W	Canada
21	Clearwater Lake	Canada	56°20' N	74°27' W	Canada
22	Umiujaq	Canada	56°33' N	76°33' W	Canada
23	Boniface River	Canada	57°45' N	76°10' W	Canada
24	Salluit	Canada	62°12' N	75°38' W	Canada
25	Bylot Island	Canada	73°09' N	79°58' W	Canada
26	Ward Hunt Island	Canada	83°06' N	74°10' W	Canada
27	Arctic Station	Greenland	69°15' N	53°34' W	Denmark
28	Greenland Institute Of Natural Resources	Greenland	64°11' N	51°41' W	Greenland
29	Sermilik	Greenland	65°40' N	38°10' W	Denmark
30	Zackenbergl Research Station	Greenland	74°28' N	20°34' W	Greenland
31	LitlaSkard	Iceland	64°44' N	21°38' W	Iceland
32	Faroe Islands Nature Investigation (FINI)	Faroe Islands	62°04' N	06°58' W	Faroe Islands
33	Cairngorm	United Kingdom	57°07' N	03°49' W	United Kingdom

Table 1: List of the circum-arctic INTERACT Research Stations including their location and the owner country, Numbers refer to the number given in the map (see Figure 3)

Stations with Observer Status					
No	Station Name	Location	Latitude	Longitude	Owner Country
A	NERC Arctic Research Station	Svalbard	78°58' N	11°58' E	United Kingdom
B	Netherlands Arctic Station	Svalbard	78°55' N	11°56' E	The Netherlands
C	Hornsund	Svalbard	77°00' N	15°33' E	Poland
D	Petuniabukta	Svalbard	78°40' N	16°23' E	Czech Republic
E	Alpfor	Switzerland	46°35' N	08°25' E	Switzerland
F	Sonnblick Observatory	Austria	47°03' N	12°57' E	Austria
G	Krkonoše/Karkonosze Mountains National Park	Czech Republic/ Poland	50°44' N	15°44' E	Czech Republic/ Poland
H	Labytnangi Ecological Research Station	Russia	66°40' N	66°25' E	Russia
I	Igarka Geocryology Laboratory	Russia	67°27' N	86°32' E	Russia
J	Aktru Scientific Research Station	Russia	50°06' N	87°40' E	Russia

K	Igloolik	Canada	69°22N	81°48W	Canada
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Table 2: Overview of the Stations with Observer Status, their location and the name of the owner country, Numbers refer to the number on the map (see Figure 3).



Figure 3: Location map of INTERACT (red circles) and Observer Stations (yellow circles). The numbers refer to the INTERACT station overview table (Table 1) and the letters to the Observer Station table (Table 2). The dashed blue line indicates the Arctic Circle at 66.5° N.

This catalogue demonstrates the uniqueness of each station as well as the large diversity of the entire INTERACT network. The careful development of the questionnaires and the standardisation of the data qualify the catalogue as a one-stop resource for information useful to scientists, policy makers and others.

The printed version of the Station Catalogue has a preface and an introduction with an overview map and station list, followed by two double pages for each INTERACT and Observer Station.

Layout and printing of the book has been done by Aarhus University. The catalogue was launched in early summer 2012 (2500 exemplars) and is also available as a PDF (www.eu-interact.org).



Figure 4: Example of the first page for the Greenland Institute of Natural Resources with the text elements.

Category	Sub-Category	Greenland Institute of Natural Resources (GINR) with field stations in Kobbefjord (KB) and Niaqornat (NQ)
Website		www.natur.gl, www.nauk-basic.dk
Country		Greenland
Opening year		GINR 1998 (KB 2010, NQ 2007)
Operational period		Year-round (KB: May-September)
Permitting issues category	Permits required for access to the station	–
	Permits required for studies	–
	Contact (permit issued)	–
Facility owner and manager	Name of the facility owner	Greenland Institute of Natural Resources
	Owner status	Government
	Institution responsible to run the station	Greenland Institute of Natural Resources
	Contact (access to station)	info@natur.gl, booking@natur.gl
	Website (institution)	www.natur.gl
Other institutions	Name	–
	Country	–
Location	Climate zone	Low Arctic
	Permafrost	Sporadic (NQ, Discontinuous)
	Geographical coordinates	64°11'00"N, 51°41'00"W (KB: 64°08'00"N, 51°23'00"W; NQ: 70°47'00"N, 53°40'00"W)
	Altitude of station	50 m a.s.l. (KB: 5 m a.s.l.; NQ: 30 m a.s.l.)
	Min. altitude within study area	0 m a.s.l.
	Max. altitude within study area	1600 m a.s.l.
	Nearest town/settlement	Nauk (16 000 inhabitants), NQ: Uummannaq (60 inhabitants) and Ilulissat (200 inhabitants)
	Distance to nearest settlement	Map (1:75 000), aerial image, satellite image, Google Earth
Climate	Years measured	1958-2010 (NQ: 1961-2006)
	Mean annual temperature	-0.9 °C (KB: -0.9 °C; NQ: -4.4 °C)
	Mean temperature in February	-7.8 °C (KB: -7.8 °C; NQ: -13.8 °C)
	Mean temperature in July	6.0 °C (KB: 6.0 °C; NQ: 8.1 °C)
	Mean annual wind speed	5.9 m/s (KB: 3.6 m/s; NQ: 3.7 m/s)
	Max. wind speed	36 m/s
	Dominant wind direction	N
	Total annual precipitation	782 mm (KB: 782 mm; NQ: 200 mm)
	Precipitation type	Rain, snow (NQ: snow, rain)
	Ice break up	Lakes: May/June; Fjord ice: May (KB); Sea: Open water at year round (NQ: June)
Station facilities	Area under roof	1800 m ² (KB: 55 m ² ; NQ: 69 m ²)
	Scientific laboratories	Ca. 250 m ² (KB: 15 m ² ; NQ: 90 m ²)
	Logistic	1500 m ² (KB: 40 m ² ; NQ: 69 m ²)
	Number of rooms (beds)	Nauk: 40 offices, 8 laboratories, 4 meeting rooms, 9 storage rooms, 13 rooms/apartments (21 beds), 1 canteen; KB: 1 room (4 beds), 1 lab; NQ: 2 rooms (4 beds), 1 living room
	Number of staff on station (peak / off season)	50 / 10 (KB: 4 / 6; NQ: 0 / 0)
	Max. number of visitors at a time	20-25 (KB: 4; plus tent; NQ: 7)
	Showers	Yes (KB: Yes; NQ: No)
	Laundry facilities	Yes (only in Nauk)
	Power supply (type)	Nauk and NQ: 230 V (European type plugs); KB: Fossil fuel generator (230 V)
	Power supply	24 hours per day
Scientific equipment	Specific device	Advanced laboratory equipment (only in Nauk and KB)
	Scientific services offered	Free technical support (Nauk); free access to extensive ecosystem baseline data (Nauk, KB)
Medical facilities	Medical facilities	Nauk: well equipped; KB: standard; NQ: basic
	Medical suite	Yes (only in Nauk)
	No. of staff with basic medical training or doctor	Nauk: Hospital with staff (KB, NQ: none)
	Distance to hospital (estimated time)	5 km, 5 min (KB: 20 km, 1 hour by boat; NQ: 60 km to Uummannaq, 1 hour by helicopter)
	Compulsory safety equipment	VHF radio
	Recommended safety equipment	First aid kit, satellite phone, weapon (in some cases)
Landing facilities	Airstrip (Length x Width)	950 x 18 m (only in Nauk; Airport is regular operated by "Greenland Airport")
	Airstrip surface	Asphalt
	Helipad	Yes (only in Nauk, KB: helicopter may land, but no helipad)
	Ship landing facilities	Nauk: port, landing wharf, pier, portroom; KB: dalgies; NQ: landing wharf
Vehicles at station	Sea transportation	Ship, motor boat, zodiac, smaller motor boat for KB and NQ
	Land transportation	Car (only Nauk), foot (KB, NQ), snowmobile, dog sled (NQ)
Transport and freight	Transport to station	Plane, Helicopter (Nauk, NQ), Boat (KB)
	Number of ship visits per year (period)	Nauk: ca. 55; KB: 2-3 weekly by small motorboat (May-Dec); NQ: 13 freight ships yearly (May-Dec)
	Number of flight visits per year (period)	Nauk: Several per day; KB: none; NQ: 1-2 per week (year-round)

Figure 5: Example of the second page for the Greenland Institute of Natural Resources. The information of the fact sheet is divided in two parts.

4.2. Example of station data used for the Station Catalogue

The standardised and processed data from the templates of all the stations has been used for the production of the Station Catalogue. All station data are presented in one Excel file that is uploaded as an additional deliverable (INTERACT_Deliverable_2-3.xls; available on demand). Within this Excel file, one spreadsheet is used to present facts for each station in the order of Table 1 and Table 2: First it is possible to find all INTERACT stations followed by the stations with Observer status. Figure shows an example of the fact sheet information for the Greenland Institute of Natural Resources, and Figure demonstrates the text elements for the same station. The complete data can be found in the printed catalogue booklet (see section 5.1).

Category	Sub-Category	Greenland Institute of Natural Resources (GINR) with field stations in Kobbefjord (KB) and Niaqornat (NQ)
Website	Website	www.natur.gl, www.nuuk-basic.dk
Country	Country	Greenland
Opening year	Opening year	GINR 1998 (KB 2010, NQ 2007)
Operational period	Operational period	Year-round (KB 5-10)
Permitting issues categories	Permits required for access to the station	-
	Permits required for studies	-
	Contact (permit issues)	-
Facility owner and manager	Name of the facility owner	Greenland Institute of Natural Resources
	Owner status	Government
	Institution responsible to run the station	Greenland Institute of Natural Resources
	Contact (access to station)	info@natur.gl, booking@natur.gl
	Website (institution)	www.natur.gl
Other institutions	Name	-
	Country	-
Location	Climate zone	Low Arctic
	Permafrost	Sporadic (NQ: Discontinuous)
	Geographical Coordinates	64°11'00" N, 51°41'00" W (KB: 64°08'00" N, 51°23'00" W; NQ: 70°47'00" N, 53°40'00" W)
	Altitude of station	50 m asl (KB 5 m, NQ 30 m asl)
	Min Altitude within study area	0
	Max Altitude within study area	1600
	Nearest town/settlement	Nuuk (16000 inhabitants); NQ: Uummannaq (60 inhabitants) and Ilulissat (200 inhabitants)
	Distance to nearest town/settlement	0 km (KB: 20 km, NQ: 60 and 200 km)
	Map	Map (1:75000), aerial image, satellite image, google earth
Climate	Years measured	1958-2010 (NQ: 1961-2006)
	Mean annual temperature	-0.9 °C (KB: -0.9 °C; NQ: -4.4 °C)
	Mean temperature in February	-7.8 °C (KB: -7.8 °C; NQ: -13.8 °C)
	Mean temperature in July	6.9 °C (KB: 6.9 °C; NQ: 8.1 °C)
	Mean annual wind speed	5.9 m/s (KB: 36 m/s; NQ: 3.7 m/s)
	Maximum wind speed	36
	Dominant wind direction	N
	Total annual precipitation	782 mm (KB: 782 mm; NQ: 200 mm)
	Precipitation type	Rain, snow (NQ: snow, rain)
	Ice break up	Lakes: May/June, Fjord: May (KB) Sea: Open water all year round (NQ: June)
Station facilities	Area under roof	1850 m ² (KB: 55 m ² ; NQ: 69 m ²)
	Scientific laboratories	Ca. 250 m ² (KB: 15 m ² ; NQ: 90 m ²)
	Logistic	1500 m ² (KB: 40 m ² ; NQ: 69 m ²)
	Number of rooms (beds)	Nuuk: 48 offices, 8 laboratories, 4 meeting rooms, 9 storage rooms, 13 rooms/apartments (21 beds), 1 canteen; KB: 1 room (4 beds), 1 lab; NQ: 2 rooms (4 beds), 1 living room
	Number of staff on station (peak/off season)	50 / 50 (KB: 4 / 0; NQ 0 / 0)
	Max. number of visitors at a time	20-25 (KB: 4, plus tents; NQ: 7)
	Showers	Yes (KB: Yes; NQ: -)
	Laundry facilities	Yes (only in Nuuk)
	Power supply (type)	Nuuk and NQ: 230 V (Eurasian type plugs); KB: Fossil fuel generator (230 V)
	Power supply	24 hours
Scientific equipment	Specific device	Advanced laboratory equipment (only in Nuuk and KB)
	Scientific services offered	Free technical support (Nuuk), Free access to extensive ecosystem baseline data (Nuuk, KB)
Medical facilities and safety equipment	Medical facilities	Nuuk: well equipped; KB: standard; NQ: basic
	Medical suite	Yes (only in Nuuk)
	No of staff with basic medical training or doctor	Nuuk Hospital with staff (KB, NQ: -)
	Distance to hospital	5 km, 5 min (KB: 20 km, 1 hour by boat; NQ: 60 km to Uummannaq, 1 hour by helicopter)

Figure 6: Station data for the Greenland Institute of Natural Resources (fact sheet).

	Compulsory safety equipment	VHF radio
	Recommended safety equipment	First aid kit, satellite phone, weapon (in some cases)
Landing facilities	Airstrip (Length x Width)	950 x 18 m (only in Nuuk: Airport is regular operated by "Greenland Airports")
	Airstrip surface	Asphalt
	Helipad	Yes (only in Nuuk, KB: helicopter may land, but no helipad)
	Ship landing facilities	Nuuk: port, langing wharf, pier, pontoon; KB: sledges; NQ: landing wharf
Vehicles at station	Sea transportation	Ship, motor boat, zodiac, smaller motor boat for KB and NQ
	Land transportation	Car (only Nuuk), foot (KB, NQ), snowscooter, dog sledge (NQ)
Transport and freight	Transport to station	Plane, Helicopter (Nuuk, NQ), Boat (KB)
	Number of ship visits per year (period)	Nuuk: ca. 55, KB: 2-3 weekly by small motorboat (May-Dec) NQ: 13 freight ships yearly (May-Dec)
	Number of flight visits per year (period)	Nuuk: Several per day; KB: -; NQ: 1-2 per week (year-round)

Features within study area	Ice cap or glacier	Yes
	Permanent snowpatches	No
	Mountain	Yes
	Valley	Yes
	Shoreline	Yes
	Tundra	Yes
	Tree line	No
	Other	
Main science disciplines	Anthropology, Sociology, Archaeology	Yes
	Astrophysics	No
	Atmospheric chemistry and physics	No
	Isotopic chemistry	Yes
	Climatology, climate change	Yes
	Environmental sciences - pollution	No
	Geodesy	Yes
	Geology and sedimentology	Yes
	Geophysics	No
	Glaciology	Yes
	Geocryology and geomorphology	No
	Soil science	Yes
	Human biology medicine	Yes
	Mapping - GIS	Yes
	Marine biology	Yes
	Oceanography and fishery	Yes
	Microbiology	Yes
	Hydrology	Yes
	Terrestrial biology, ecology	Yes
	Paleolimnology	Yes
	Paleoecology	No
	Limnology	Yes
Workshop facilities	Metal workshop	Yes
	Wood workshop	Yes
	Plexiglas workshop	No
	Staff available to assist with constructions	No
Communication	Telephone	Yes
	Satellite phone	Yes
	VHF	Yes
	E-mail	Yes
	Internet	Yes
	Computer	Yes
	Printer	Yes
	Scanner	Yes
	Fax	Yes

Figure 6 continued.

Station name and owner

Greenland Institute of Natural Resources is owned by the Government of Greenland.

Location

The Greenland Institute of Natural Resources (GINR) with its main buildings, laboratories, and living quarters is located in Nuuk, Greenland (64°11'N 51°41'W). Additional facilities include field stations in Kobbefjord, Nuuk (64°08'N 51°23'W) and Niaqornat, Uummannaq (70°47'N 53°40'W).

Biodiversity and natural environment

Nuuk and the Kobbefjord field station provide access to low arctic ecosystem in West Greenland with different biotopes such as dwarf-shrub heaths, fens, grasslands, and lakes. The ecosystem in Niaqornat, Uummannaq is at the border between Low and High Arctic. Monitoring of a variety of parameters on vegetation, arthropods, mammals (both terrestrial and marine), birds, freshwater lakes and the marine environment has been carried out for several years.

History and facilities

GINR's main building of 3.000 m² houses all facilities necessary for the Institute's activities: offices, laboratories, deep-freeze room, storage room, conference room, and meeting rooms. Adjacent to the main building, there is an 850 m² annex with a large multi-room used for meetings and seminars. Furthermore, the annex contains 5 apartments and 8 rooms for visiting researchers, as well as a garage/ storage room. GINR has a third building near the city centre in Nuuk with furnished guest rooms for students, and visiting scientists. In addition to the buildings in Nuuk, GINR owns two field stations: one in Kobbefjord, near Nuuk and the other in Niaqornat, in the Uummannaq area in Northwest Greenland. These field stations function as bases for small research teams and accommodates four people each. GINR also owns two ships, Sanna and Paamiut, which are used for scientific investigations in both sheltered and open waters, as well as two small boats and three aluminium dinghies. For transport on land, GINR owns three cars and two snow scooters.

General research and databases

Research and monitoring activities focus on living marine resources (fish, shellfish, marine mammals and birds), land-based resources (land mammals and vegetation), as well as physical and chemical processes in the environment in relation to climate change and its impact on society. Population assessments and management advice are produced and reviewed in scientific committees under various international bodies where GINR is represented. GINR takes also part in the monitoring program "Greenland Ecosystem Monitoring" in the High Arctic at Zackenberg/ Daneborg in North East Greenland and in the Low Arctic at Nuuk, West Greenland. The latter is realised from GINR facilities. As an integrated part of the activities at the The Greenland Climate Research Centre, a long-term monitoring programme of the marine (since 2005) and terrestrial ecosystem (since 2008) is carried out. The objective is to provide long time data series of the natural innate oscillations and plasticity of a low Arctic ecosystem. This is accomplished through monitoring of selected biotic parameters and elements (BioBasis and MarineBasis) throughout the year on a long-term basis. These projects run parallel and in close coordination with the Zackenberg Basic programme. Data from the monitoring is provided free of charge.

Human dimension

GINR is located in Nuuk, the capital of Greenland, with ca. 16.000 inhabitants. The Niaqornat field station is located in a small settlement (with ca. 70 people) close to Uummannaq in Northwest Greenland. GINR actively communicates with users of the environment (fishermen, hunters, and recreational users) and with direct recipients of scientific advice (e.g. politicians). Users of the environment, and their comprehensive knowledge of the natural environment, are included during planning and implementation of the Institute's

Figure 7 Text elements for the Greenland Institute of Natural Resources

activities. Fishing and hunting is part of the traditional culture and is still practised professionally and for recreational purposes.

Access

Nuuk can be reached by plane either via Kangerlussuaq, West Greenland (www.airgreenland.com) or via Reykjavik, Iceland (www.airiceland.is). Transportation to the field station in Kobbefjord is by one of GINR's own smaller boats carrying up to 12 persons. The field station in Niaqornat can be reached twice a week by helicopter from Uummannaq.

Figure 7: continued.

5. Next steps

5.1. WebGIS and database

To increase the outreach of the INTERACT Station Catalogue and to facilitate the search within the catalogue, the catalogue fact sheet data will be integrated into a web-based database. It will be hosted at the Arctic Portal (www.arcticportal.org) and also embedded in the INTERACT website. The Arctic Portal is an organisation that provides a comprehensive Internet gateway to the Arctic, increases co-operation with other members of the Arctic Council and its working groups, permanent participants, Northern Forum, University of the Arctic, The Arctic Centre at the University of Lapland, The International Centre for Reindeer Husbandry, and others. It also hosts the official website of the International Permafrost Association (IPA, www.ipa.arcticportal.org) and has an IPY legacy. The website and database of the new EU-FP7 programme “page21 –Changing Permafrost in the Arctic and its Global Effects in the 21st Century”, lead by AWI, will also be hosted there (www.page21.eu).

The Interactive map on the Arctic Portal hosts a large WebGIS with many layers (e.g. topography, Arctic boundary lines, vegetation, polar bear distribution, and many more) which can be switched on and off by the user of the Arctic Portal's Interactive map. The INTERACT Station Catalogue is already one of their layers. Figure 4 gives an example for a circum-arctic map of the permafrost extent and the location of all INTERACT and Observer Stations relative to the permafrost. This preliminary data layer does not yet distinguish between the INTERACT and the Observer Stations.

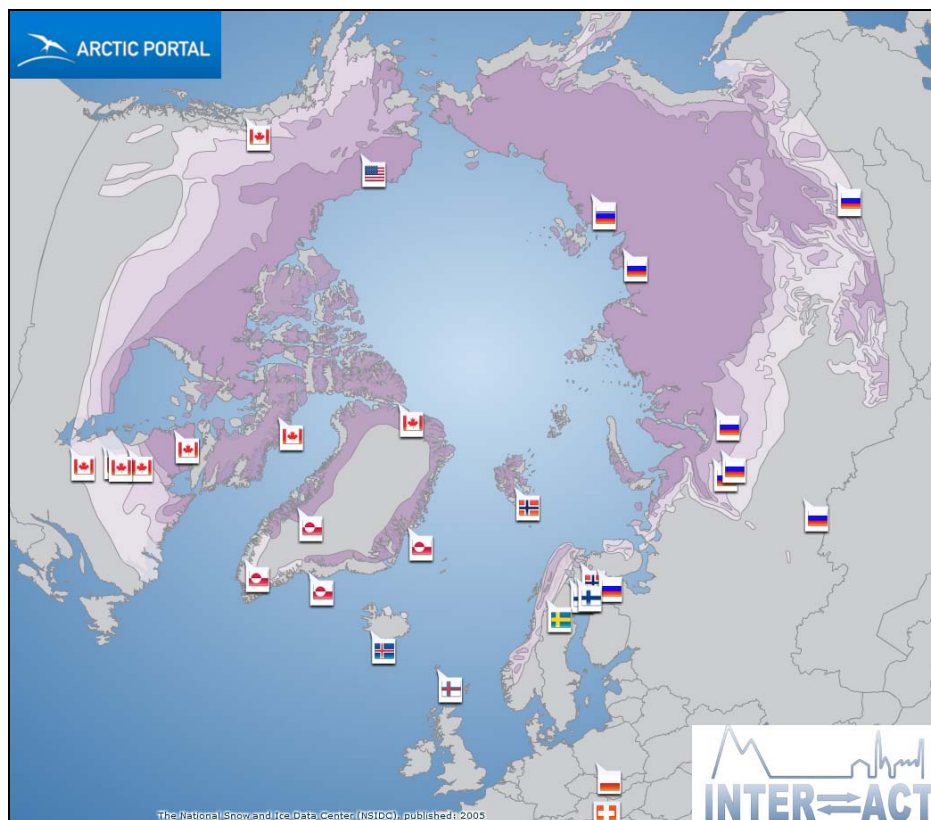


Figure 4: Example of the Interactive map at the Arctic Portal: The INTERACT and Observer Stations are displayed over permafrost zones.

Figure 5 gives an overview of another aspect of the functionality of the Interactive Map on the Arctic Portal. Figure 9 shows the location of the INTERACT Stations overlaying the Circum-Arctic Vegetation Map (CAVM). By clicking on one station's flag, an information window pops up giving detailed information on the specific INTERACT or Observer Station (Figure 9A). When you click on the “read more” button, you will be directed to the INTERACT website.

Figure 9B shows some of the eligible layers that can be used within the WebGIS. The transparency of each layer as well as the order of layers can be chosen by the user. Figure 9C demonstrates the potential search options of the database: Only INTERACT Stations situated in the High Arctic climate zone are displayed on the map. In addition, the names of the displayed stations are in the list below. The station name will also be linked to the INTERACT website

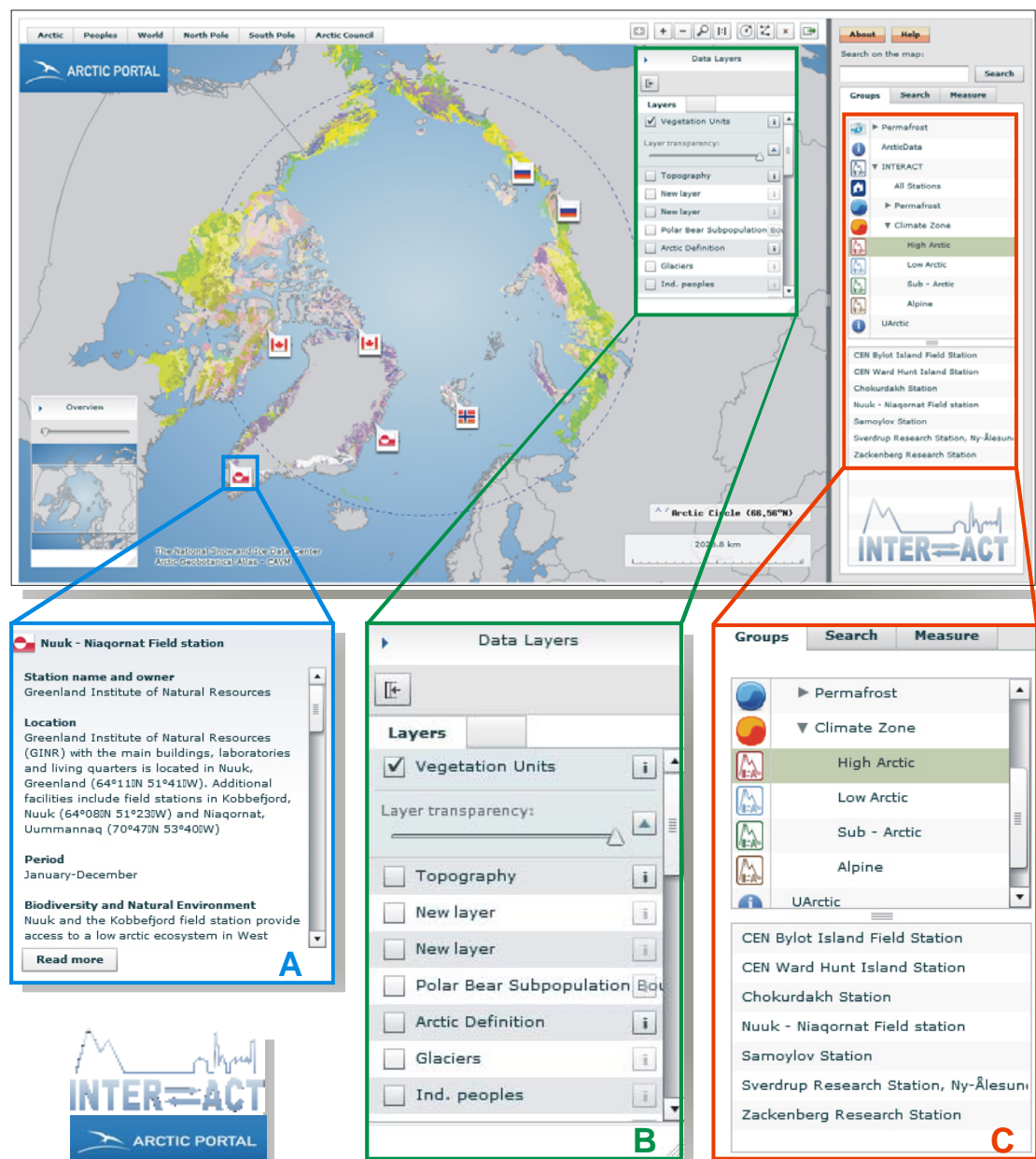


Figure 5: The possibilities of the Arctic Portal for INTERACT – An overview. See text for further information.

5.2.Update of INTERACT homepage

As a last step, the newly collected Station Catalogue data will be used to update the information on the INTERACT website in cooperation with the WP1 (“Management”) and WP8 (“Outreach”) partners.