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INTERACT

Building capacity for research and monitoring in the Arctic

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Kirsi Latola, PhD, WP4 Leader

Thule Institute, University of Oulu
on behalf of INTERACT Consortium

INTERACT as a project...



INFRA-2010-1.1.19: Research Infrastructures for Polar research
A project under this topic should aim at integrating the key research infrastructures for polar research: interdisciplinary observation and monitoring stations for atmospheric, terrestrial and/or marine studies.

- Total EU contribution 7.3 M€ for 2011-2014
- Need to **monitor** and **understand** rapid changes and their multiple consequences in Arctic Ecosystems and Biodiversity
- Based on SCANNET –a network of field stations established in 2001

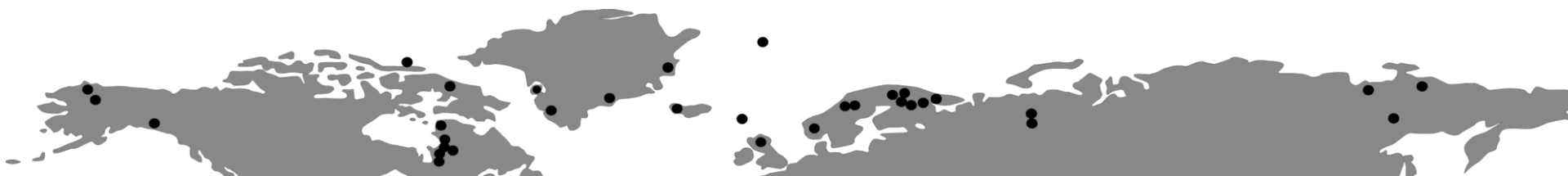


INTERACT Consortium

- 33 Partners from 14 countries, including all Arctic countries
- Coordinator prof. Terry Callaghan, KVA, and project office at Lund University (SWE)

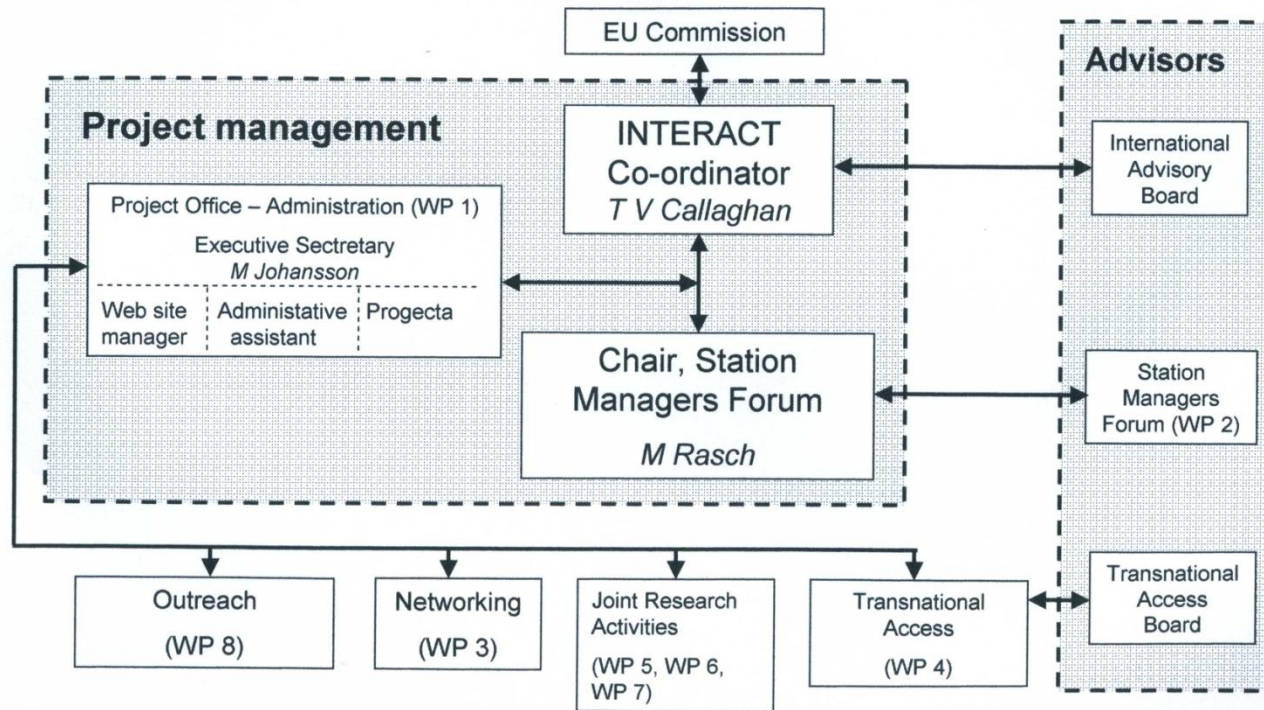


34 infrastructures (research stations and field sites) around the Arctic, plus 14 stations with an observer status



Management Structure

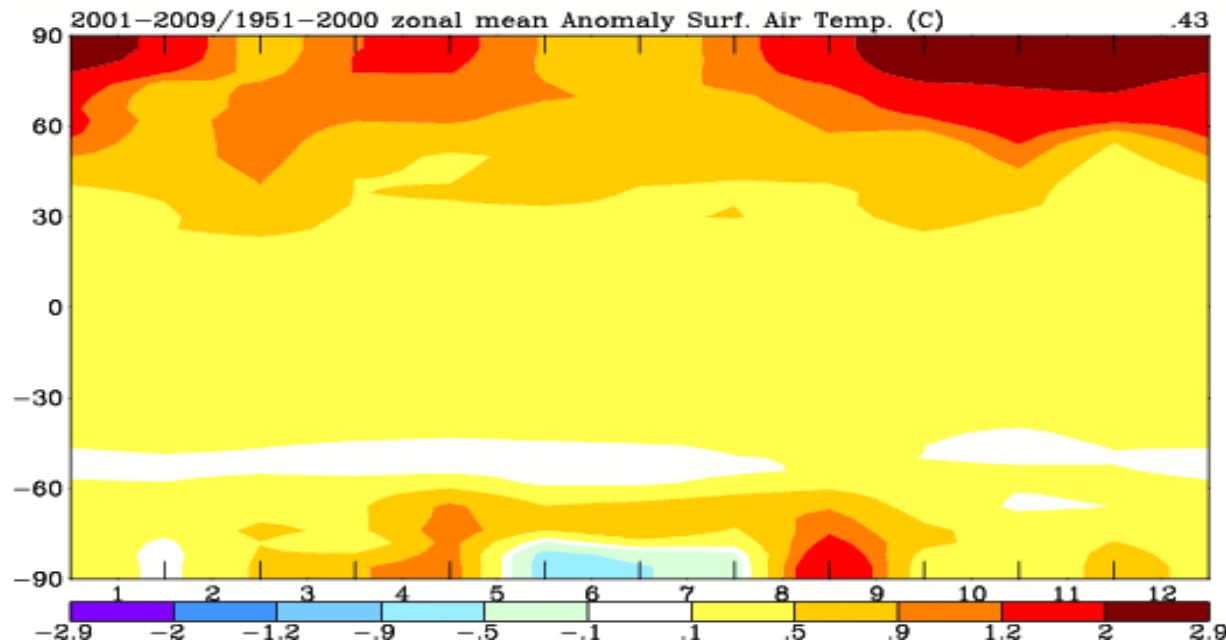
INTERACT Management Structure and Information Flow



Why focus on the Arctic, and why the urgency?

Drivers of ecosystem change such as climate change are profound

The past years (2005-2010) have been the warmest recorded in the Arctic



Latitude-month dependence of temperature anomalies, 2001-2009
(Walsh et al., *Ambio* 2011)

Why focus on the Arctic, and why the urgency?

- Biodiversity has lost resilience and current changes in some ecosystems are profound
- Provisioning ecosystem services are threatened
- Arctic regulatory ecosystem services are fundamental
 - biospheric feedbacks potentially have global implications
- **Complexity:** There are many drivers of change and multiple responses to a particular driver
 - pan-arctic scale vs. Regional scale vs. Local scale
 - local view is needed to explain the big picture!
 - major changes - minor changes - no change: for example changes in tree line

→ **Detecting change can be easy but attribution is difficult:
multiple approaches are needed!**

To summarize: three approaches are essential to facilitate adaptation and mitigation

Monitoring

Identification of
change

Validation of
models

Experimentation

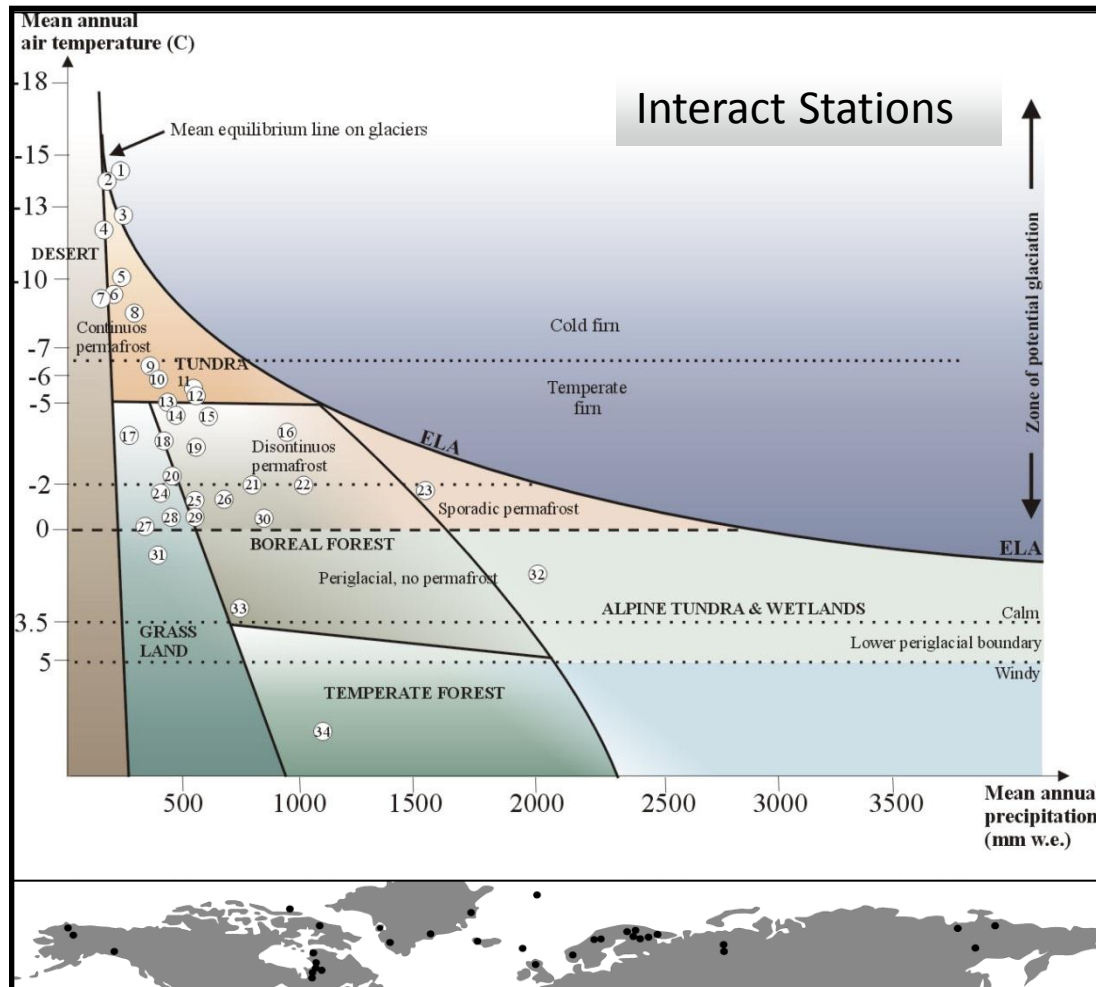
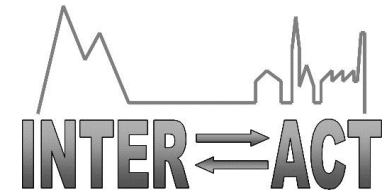
Understanding causes
of change

Modelling

Integration of disciplines.
prediction of future change
and upscaling

The communities
need to come
together better!

INTERACT: Strategically sampling the wide environmental envelope of the North



Interact Stations

1. Chokurdakh
2. Bylot Island
3. Samoylov
4. Point Barrow
5. Spasskaya Pad
6. Zackenberg
7. Ward Hund Island
8. Toolik Lake
9. Sverdrup
10. Salluit
11. Nymto Park Station
12. Lac à L'eau Claire
13. Ny Aalesund
14. Boniface River
15. Whapmagoostui -Kuuijuarapik
16. Tarfala
17. Kluane Lake
18. Arctic Station
19. Umiujaq
20. Vindelfjällen
21. Kilpisjärvi
22. Finse
23. Sermilik Station
24. Kevo
25. Mukhrino Field Station
26. Radisson
27. Svanhovd
28. Kolari
29. Oulanka
30. Khibiny
31. Abisko
32. Sornfelli
33. Litla Skard
34. Cairgorms

INTERACT Work Packages

- WP1 Management and Coordination
- WP2 Station Managers' Forum
- WP3 International Cooperation
- WP4 Transnational Access
- WP5 Virtual Instrumentation
- WP6 Measurements of terrestrial biospheric feedbacks to climate
- WP7 Data management
- WP8 Outreach

Station Manager's Forum (WP2)

Platform for exchange of information among research station managers and with other INTERACT participants. Coordinated by NERI/University of Aarhus (DK).

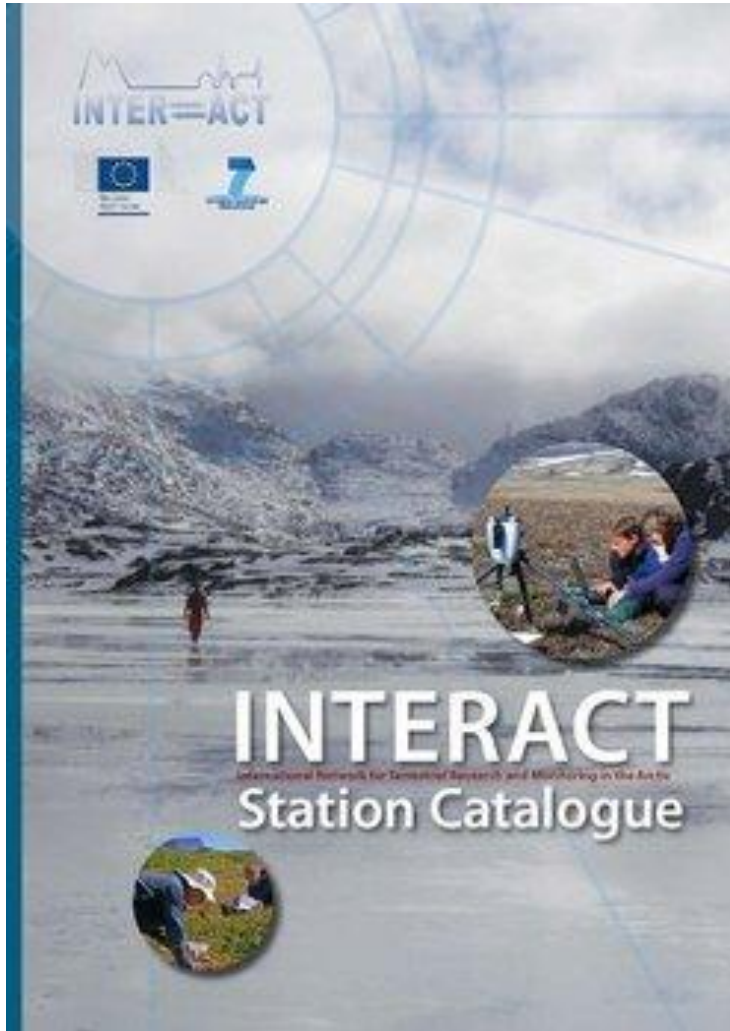
→ ecosystem monitoring, station management and administration



Station Managers' Forum meetings held twice a year at a consortium partner institution or field station. Three SMF meetings held by far.

Deliverables include reports on 'Research and Monitoring at INTERACT sites', 'Abilities of the stations within INTERACT', 'Best practices of Station Management and Administration at Arctic Research Infrastructures', and 'INTERACT Station Catalogue'

Station Manager's Forum (WP2)



INTERACT Station Catalogue:

- Published in July 2012
- Also found at www.interact-eu.org
- Describes the natural environment and facilities available at INTERACT Stations and Observer Stations
- Produced by WP2 with contributions from all stations participating INTERACT.

International Collaboration (WP3)



- External networking component of INTERACT
- Secures the further integration of INTERACT globally and within the EU
- Coordinated by NERI (Univ Aarhus, Denmark)



Transnational Access (WP4)

- Biggest work package of INTERACT: total EU contribution 3.2 M€
- Coordinated by Thule Institute, University of Oulu (WP4 leader and coordinator)
- Free access for user groups/users to research facilities and field sites, including support for travel and logistic costs
- Free access to information and data in the public domains maintained at the infrastructures
- 20 research stations in 8 countries offer TA in INTERACT
 - Finland (4), Sweden (2), Norway (2), Greenland (4), Iceland (1), Faroe Islands (1), Russian Federation (5), Scotland (1)
 - altogether 9955 person-days of access offered in 2011-2014
 - from 35 to 2120 person-days per station

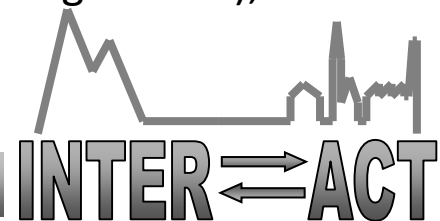


Transnational Access (WP4), cont.

- Available to user groups, where group leader and majority of group members work in an institution established in a EU Member State or Associated State
 - Scientists representing other nationalities are encouraged to attend as members of an EU based group!
 - New users, comparative studies at several stations, young scientists given priority
- Maximum amount of access is 90 person-days per user group
- TA Board evaluates the applications and selects projects recommended to stations

Statistics from the first 18 months of INTERACT TA:

- 3 TA calls; altogether 3872 person-days, of which 1511 used and 2361 granted to 19 stations (40 %). Altogether 68 user groups involved.
- 37 user groups from 12 countries (103 users from 14 countries) by June 2012.
- Disciplines: Global change and climate observation (59 %), ecosystems and biodiversity (30 %), water sciences and hydrology (5 %), other earth sciences (3%), life sciences (3 %)
- 65 % new users, 53 % young scientists (post-doc, post-graduate, undergraduate), 34% females



Transnational Access: examples of projects

Bio-geo-chemical cycling

A functional analysis of microbial diversity in sub-arctic soils
(R. Aerts, ANS, FINSE, Sweden & Norway)

Plant-soil interactions in greening arctic: effects of shrub expansion on carbon cycling
(T. Parker, ANS, Sweden)

Interactions between thawing permafrost and CO₂, CH₄ and energy exchange in Greenland
(A. Lindroth, GINR, Greenland)

Impact of arctic zone on the chemical and biochemical processes, conversions and Transformations in peat layers (L. Zjadak, MFS, Russian Federation)

Biodiversity and ecosystems

Strength of symbiotic interactions in extreme ecological environments
(K. Saikkonen and I. Zabalcolgeacazoa , KEVO, FINI, BIOFORSK, ARCST, LBHI)

Quantitative insect foodwebs for the sub- and high-arctic
(T. Roslin, ZAC, GINR, Greenland)

How predator-prey interactions impact biogeography and breeding systems of High Arctic waders under current climate change (J. Renerkens, ZAC, Greenland)



Transnational Access: examples of projects

Glaciology

Glacier monitoring in SE Greenland (*E. Hanna, SER, Greenland*)

Testing hypothesis on the response of small Arctic Glaciers to climate change (*D. Rippin, ANS, Sweden*)

Seismic assessment of basal glacier ice and its water content at Storglaciären, Sweden (*A. Booth, ANS, Sweden*)

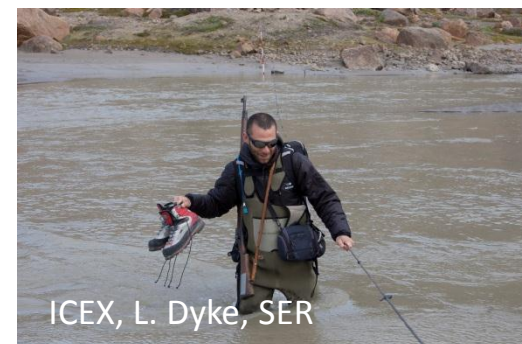
A sedimentological investigation of palaeoglacier dynamics from Midtdalsbreen, south central Norway (*B. Reinardy, FINSE, Norway*)

Hydrology, freshwater biology

Sediment and meltwater dynamics in glaciated catchments of Arctic Permafrost (*K. Adamson, ARCST, Greenland*)

Spatial expression of millennial-scale Holocene climate changes: a multi-proxy lake sediment approach (*D. Fower, KEVO, OULANKA, KILPIS, KOLARI*)

'Winter survival strategies of freshwater zooplankton in subarctic ponds (*M. Striebel, KILPIS, Finland*)



Transnational Access: examples of projects

Life Sciences, Ecosystem services

Rodent-borne Ljungan virus in migrating Norwegian lemmings
(*H. Hauffe & A.P. Rizzoli, KILPIS, Finland*)

Possible range expansion of Plasmodium in bird populations of the Northern Europe
(*I. Krams, KEVO, KILPIS, OULANKA, Finland*)

Ecosystem service social assessments in Extreme Environments
(*D. Orenstein, CEH, Scotland, UK*)

Testing methodologies to monitor the ecosystem services and establish large Forest dynamics plots at two Eurasian Boreal forest sites
(*M. Smith, MFS, SPA, Russian Federation*)



Human dimension

Spatio-temporal risk management for arctic mountain regions (S. Fuchs, KHIBINY)

Valuing ecosystem services in the Abisko area (P.-P. Franzese, ANS)

Transnational Access: publications

Publications by user groups recorded into Access Database

The Cryosphere, 6, 625-639, 2012
www.the-cryosphere.net/6/625/2012/
doi:10.5194/tc-6-625-2012
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Multi-decadal marine- and land-terminating glacier recession in the Ammassalik region, southeast Greenland

S. H. Mernild¹, J. K. Malmros², J. C. Yde³, and N. T. Knudsen⁴

¹Climate, Ocean, and Sea Ice Modeling Group, Los Alamos National Laboratory, New Mexico, USA

²Department of Geography and Geology, University of Copenhagen, Denmark

³Sogn og Fjordane University College, Sogndal, Norway

⁴Department of Geoscience, Aarhus University, Aarhus, Denmark

Abstract. Landsat imagery was applied to elucidate glacier fluctuations of land- and marine-terminating outlet glaciers from the Greenland Ice Sheet (GRIS) and local land-terminating glaciers and ice caps (GIC) peripheral to the GRIS in the Ammassalik region, Southeast Greenland, during the period 1972–2011. Data from 21 marine-terminating glaciers (including the glaciers Helheim, Midgaard, and Fenris), the GRIS land-terminating margin, and 35 GIC were examined and compared to observed atmospheric air temperatures, precipitation, and reconstructed ocean water temperatures (at 400 m depth in the Irminger Sea). Here, we document that net glacier recession has occurred since 1972 in the Ammassalik region for all glacier types and sizes, except for three GIC. The land-terminating GRIS and GIC reflect lower marginal and areal changes than the marine-terminating outlet glaciers. The mean annual land-terminating GRIS and GIC margin recessions were about three to five times lower than the GRIS marine-termination recession. The marine-termination outlet glaciers had an average net

From scientific journals....



Are Carotenoid Pigments in Zooplankton Related to UV-protection or to Optimal Food Uptake?

T. Schneider¹, M. Rautio¹

¹Université du Québec à Chicoutimi, Chicoutimi, Canada

To abstracts in scientific meetings....

To press releases....

Studies of seasonal variations in carotenoid pigment accumulation in zooplankton are rare, especially in high-latitude systems, where observations of intensely colored copepods in absence of light (*i.e.*, during arctic winter) are linked to different levels of UV radiation. Yet many studies are linked to different levels of UV radiation. In addition there are other drivers of carotenoid accumulation in zooplankton.



To podcasts....

...To sharing sampling sites and Data in Google maps!

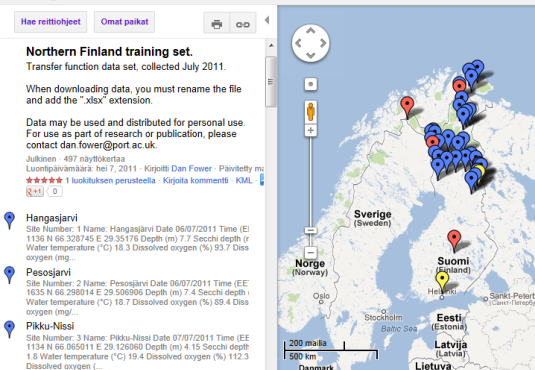
PRESS RELEASE FOR IMMEDIATE DISTRIBUTION
Mittivakkat Gletscher, the longest-observed mountain glacier in Greenland, experiences its fourth largest mass loss year since 1995

Sebastian H. Mernild (Los Alamos National Laboratory, USA, mernild@lanl.gov)

N. Tvis Knudsen (Aarhus University, Denmark, ntk@geo.au.dk)

Edward Hanna (University of Sheffield, UK, ehanna@sheffield.ac.uk)

We report our 11-21 August 2012 fieldwork surveys of Mittivakkat Gletscher in southeast Greenland (17.6 km²; 65°41'N, 37°48'W), which has the longest observational mass balance record in the world. The glacier has been surveyed for annual mass balance since 1995.



INTER⇌ACT

Transnational Access: outreach

The screenshot shows the INTERACT website homepage. At the top, there is a navigation bar with links: INTERACT | CONTACT | ABOUT | NEWS | SITEMAP | REGISTER | LOG IN / LOG OUT. Below this is a search bar and a logo for INTERACT. The main content area features a large image of a wooden research station on a rocky shore, a map of the Arctic region with station locations, and a welcome message. The welcome message states: "Welcome to INTERACT - International Network for Terrestrial Research and Monitoring in the Arctic. INTERACT is an infrastructure project under the auspices of SCANNET, a circumarctic network of 33 terrestrial field bases in northern Europe, Russia, US, Canada, Greenland, Iceland, the Faroe Islands and Scotland. INTERACT specifically seeks to build capacity for research and monitoring in the European Arctic and beyond, and is offering access to numerous research stations through the Transnational Access programme." There are also sections for "TRANSNATIONAL ACCESS" and "NEWS".

INTERACT website

- www.interact-eu.org
- information about TA calls
- project and field site information
- news and feature articles
- publication information

The screenshot shows the Arctic Research blog page. At the top, there is a header with the title "Arctic Research" and a sub-header "Reports from INTERACT field sites". Below this is a large image of a bison standing next to a white tent in a snowy landscape. The main content area features a "Welcome!" message from the blog manager, thanking visitors for visiting the Arctic Research blogs from INTERACT, an EU project that offers access to the Arctic for researchers through a Transnational Access Programme. There is also a "Recent Posts" section with links to various blog entries, and an "Archives" section with links to past blog posts.

- **Arctic Research blogs**
<http://arcticresearch.wordpress.com>
- highlighting experiences of researchers and station managers
- part of outreach activities

Transnational Access (WP4): Next call

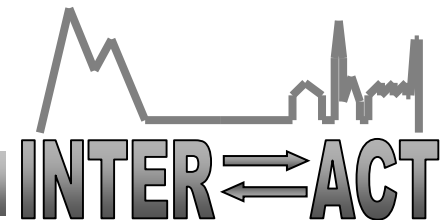
TA call for summer 2013 and winter 2013/2014 opens in October



www.interact-eu.org

Apply to conduct research at the coolest places of the North!

Photo by Wladimir Bleuten, Mukhrino Field Station (RUS)



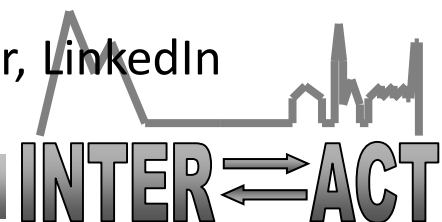
Joint Research Activities (WP5-7)

- Aim to improve methods for automatic data collection, studies of ecosystem feedbacks to climate change, and methods for coordinated storage of data from many sites
- close collaboration with INTERACT stations
- **WP5: Virtual Instrumentation** (*IT University of Copenhagen*)
 - leverage low-power wireless communication capabilities to make in-situ sensing easier to manage and more effective
- **WP6: Improved measurements of terrestrial biospheric feedbacks to climate** (*Lund University, Sweden*)
 - improve monitoring and research of key feedback mechanisms from northern terrestrial ecosystems in a changing climate
 - quantify interactions of snow/ice, temperature, moisture and exchanges of energy and CH₄/CO₂ and their intra- and inter annual variability at multiple sites
- **WP7: Data Management** (*SLU, Sweden*)
 - geo-referenced data service
 - design, development and testing of ScanDB, a repository of tools and products for environmental data management

Outreach (WP8)

Aims to inform and interact with the public, stakeholders and primary, secondary and tertiary students, especially people living in and around the Arctic by:

- **Sharing knowledge and discoveries** of the INTERACT partners in order to highlight the importance of the Arctic
- **Alert people to environmental changes** in and around the Arctic
- **Influence attitudes** towards Arctic environments and peoples' behaviours
- **Gather relevant information** from stakeholders such as traditional/indigenous knowledge and through community monitoring programs
- **Work together with local people** to contribute to local adaptation strategies to cope with the impacts of climate change in the Arctic.
- Coordinated by CEH (UK), POLAR (SWE), FINI (Faroe Islands)
- Lectures, visits to schools and institutions, webpages, Twitter, LinkedIn



From the present to the future...



The screenshot shows the INTERACT project website. At the top, a blue navigation bar contains the text "European Commission > Research & Innovation > ... > Success > INTERACT". Below this, on the left, is a vertical menu with a "Research Infrastructures" logo and links to HOME, WHAT ARE RIs?, THE EUROPEAN LANDSCAPE, ACTORS, FINANCIAL SUPPORT, ERIC-LEGAL FRAMEWORK, SYNERGIES - EU INITIATIVES, INTERNATIONAL COOPERATION, SOCIO-ECONOMIC IMPACT, INNOVATION, ESFRI, and CONSULTATION ON RI. The main content area features a "SUCCESS STORIES" header. The first story is titled "INTERACT: an international alliance of research stations and scientists studying environmental changes in the Arctic". It includes a link to "Download the INTERACT story" (129 KB) and a paragraph describing INTERACT as a network of terrestrial research infrastructures. Below this is a section titled "What has the project achieved?" with a photograph of a snowy mountain landscape and a text box describing the project's goals and achievements. The text mentions that the project started in 2001, involved 45 infrastructures, and covered all Arctic countries, alpine regions in Central Europe, and southern Siberia. It also notes that the project has led to news reports of record low ice levels in Greenland glaciers and energy and greenhouse gas measuring equipment installed at four Arctic sites. At the bottom of the page, there is a "Press corner" link.

INTERACT
nominated as
"Success Story" by
EC in July 2012

After the first 1.5
years of activity,
INTERACT has
reached its goals set
by far, and is
heading strong
towards the future

Let's INTERACT!

