ARCTIC NETWORKS AND DATA REPORTING

Henrik Skov

Professor

VILLUM RESEARCH STATION

ARCTIC RESEARCH CENTRE

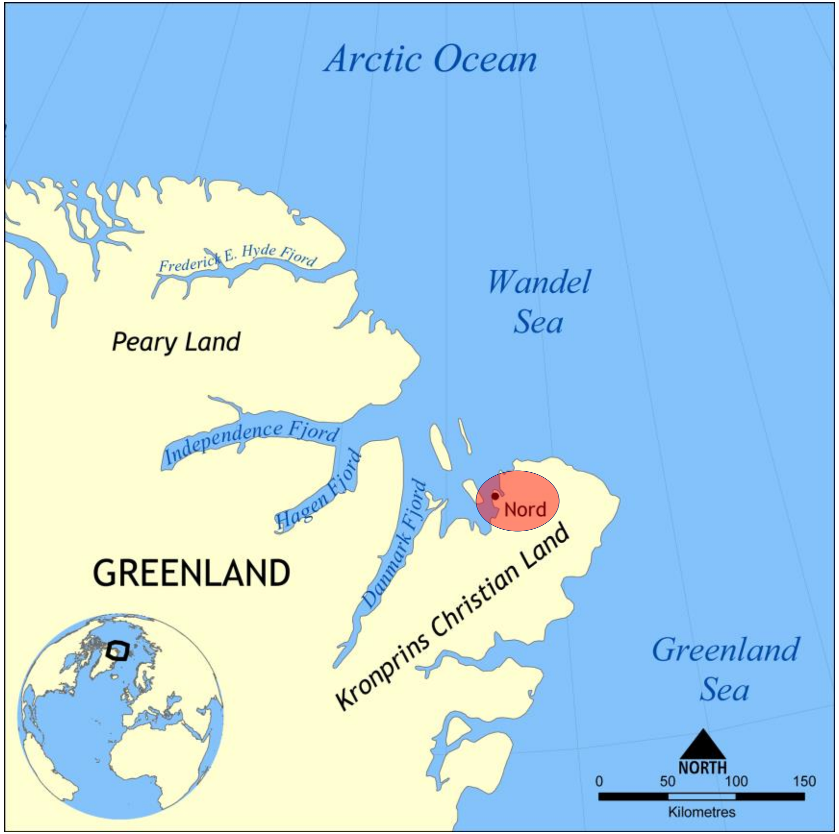
ASP Arctic Science Partnership

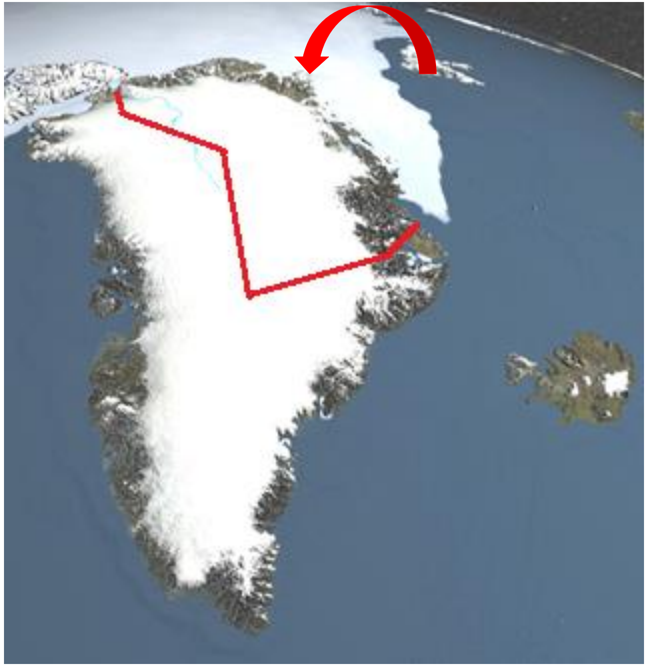
AARHUS UNIVERSITY
DEPARTMENT OF ENVIRONMENTAL SCIENCE

iCLIMATE INTERDISCIPLINARY CENTRE FOR CLIMATE CHANGE

INTERACT PRESENTATION
24-28 SEPTEMBER 2018

VILLUM RESEARCH STATION, STATION NORD, GREENLAND 81° 36'N 16°40' W





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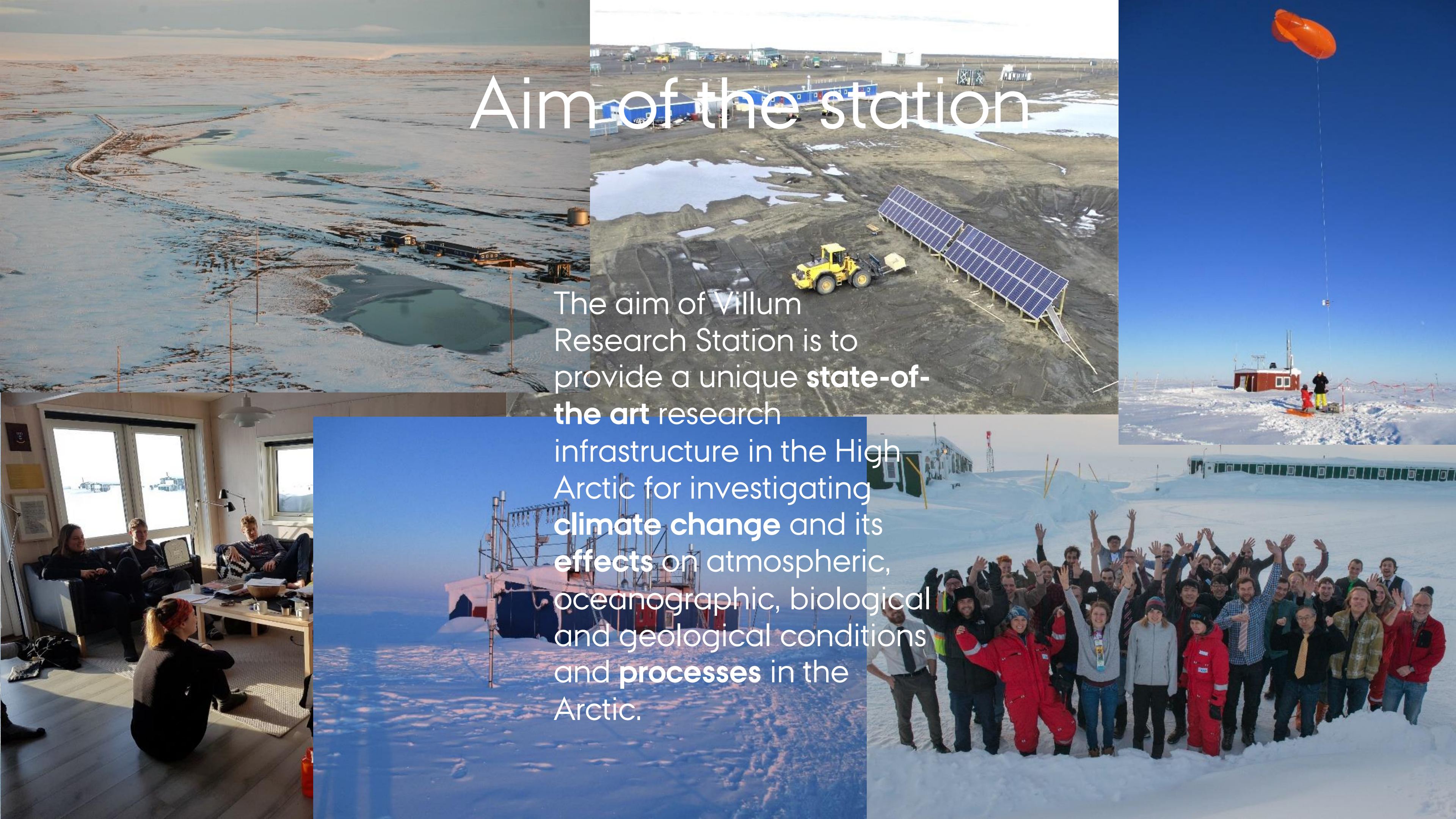
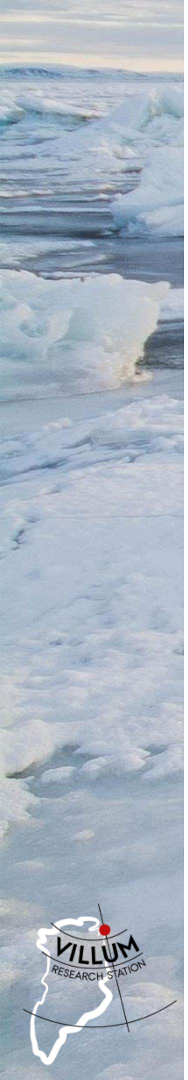


Aim of the station

The aim of Villum Research Station is to provide a unique **state-of-the art** research infrastructure in the High Arctic for investigating **climate change** and its **effects** on atmospheric, oceanographic, biological and geological conditions and **processes** in the Arctic.



NETWORKS

REPORTING DATA

AMAP; Arctic Monitoring and Assessment program

EMEP; European Monitoring and Evaluation Program

WMO- GAW; global atmospheric watch

ICOS; International carbon observatory system

ACTRIS; Aerosols, Clouds and Trace gases (Observatory status)

ERA PLANET (IGOSP - Integrated Global Observing Systems for Persistent Pollutants and ICUPE - Integrative and Comprehensive Understanding on Polar Environments)

COPERNICUS CAMS 84

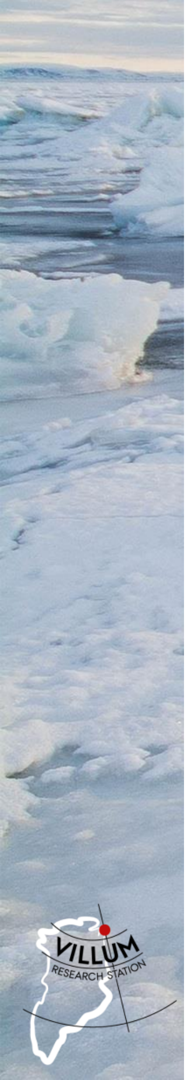
Interact

Professional networks

UARCTIC, IASOA, IASC, PEEX, GMOS; SMEAR, VRS user group

”Internal” networks

ARC, iCLIMATE, ASP, MOSAiC

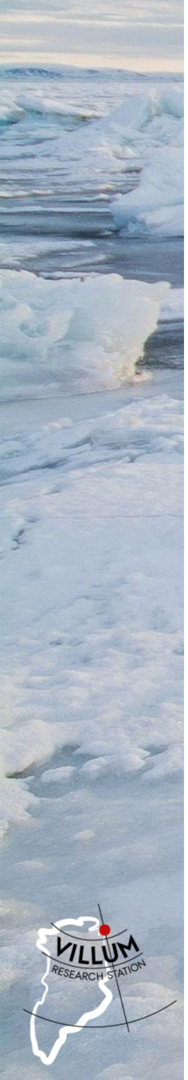


NETWORK CHALLENGES

Each network often want their format of the data (exception AMAP, EMEP and WMO-GAW) => labour intensive

It is difficult to know which one is the important ones and in any case it takes time

You might be loose a lot of time if choosing wrongly



BENEFITS

Be together with people with low for these remote and tuff but also incredible beautiful places

Collaboration not competitors (Terry)

Awareness of what is going on

Visibility

Joint application

Joint publications

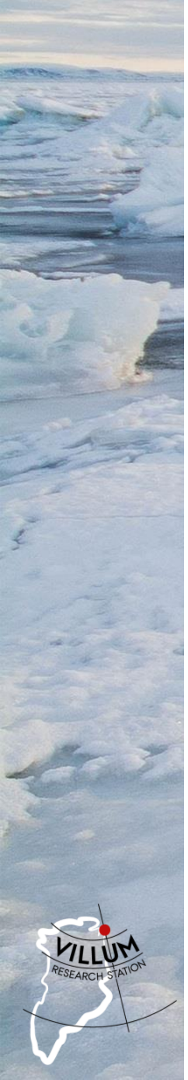
Establishment of bilateral collaboration

Ensuring the quality

Storage of results for future scientists (Open source policy => more publications)

Educating new generation of scientists

INTERACT does a lot of the above



ARTICLES FR
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Atmos. Chem. Phys., 17, 8101–8128, 2017
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Atmospheric Chemistry and Physics

Pan-Arctic aerosol number size distributions: seasonality and transport patterns

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19 articles from 2016 to today

Abstract. The Arctic environment has an amplified response to global climatic change. It is sensitive to human activities that mostly take place elsewhere. For this study, a multi-year set of observed aerosol number size distributions in the diameter range of 10 to 500 nm from five sites around the Arctic Ocean (Alert, Villum Research Station, Station Nord, Zeppelin, Tiksi and Barrow) was assembled and analysed.

A cluster analysis of the aerosol number size distributions revealed four distinct distributions. Together with Lagrangian air parcel back-trajectories, they were used to link the observed aerosol number size distributions with a variety of transport regimes. This analysis yields insight into aerosol dynamics, transport and removal processes, on both an intra- and an inter-monthly scale. For instance, the relative occurrence of aerosol number size distributions that indicate new particle formation (NPF) event is near zero during the dark months, increases gradually to ~40 % from spring to summer, and then collapses in autumn. Also, the likelihood of Arctic haze aerosols is minimal in summer and peaks in April at all sites.

The residence time of accumulation-mode particles in the Arctic troposphere is typically long enough to allow tracking them back to their source regions. Air flow that passes at low altitude over central Siberia and western Russia is associated with relatively high concentrations of accumulation-mode particles (N_{acc}) at all five sites – often above 150 cm^{-3}. There are also indications of air descending into the Arctic boundary layer after transport from lower latitudes.

There are some consistent differences between the sites that are beyond the year-to-year variability. They are the result of differences in the proximity to the aerosol source regions and to the Arctic Ocean sea-ice edge, as well as in the exposure to free-tropospheric air and in precipitation patterns – to mention a few. Hence, for most purposes, aerosol observations from a single Arctic site cannot represent the entire Arctic region. Therefore, the results presented here are a powerful observational benchmark for evaluation of detailed climate and air chemistry modelling studies of aerosols throughout the vast Arctic region.

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Atmospheric Chemistry and Physics

Chemical cycling and deposition of atmospheric mercury in polar regions: review of recent measurements and comparison with models

Hélène Angot[1], Ashu Dastoor[2], Francesco De Simone[3], Katarina Gårdfeldt[4], Christian N. Gencarelli[3], Ian M. Hedgecock[3], Sarka Langer[5], Olivier Magand[6,1], Michelle N. Mastromonaco[4], Claus Nordstrøm[7], Katrine A. Pfaffhuber[8], Nicola Pirrone[9], Andrei Ryjkov[2], Noelle E. Selin[10,11], Henrik Skov[7], Shaojie Song[10], Francesca Sprovieri[3], Alexandra Steffen[12], Kenjiro Toyota[12], Oleg Travnikov[13], Xin Yang[14], and Aurélien Dommergue[1,6]

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Abstract. Mercury (Hg) is a worldwide contaminant that can cause adverse health effects to wildlife and humans. While atmospheric modeling traces the link from emissions to deposition of Hg onto environmental surfaces, large uncertainties arise from our incomplete understanding of atmospheric processes (oxidation pathways, deposition, and re-emission). Atmospheric Hg reactivity is exacerbated in high latitudes and there is still much to be learned from polar regions in terms of atmospheric processes. This paper provides a synthesis of the atmospheric Hg monitoring data available in recent years (2011–2015) in the Arctic and in Antarctica along with a comparison of these observations with numerical simulations using four cutting-edge global models. The cycle of atmospheric Hg in the Arctic and in Antarctica presents both similarities and differences. Coastal sites in the two regions are both influenced by springtime atmospheric Hg depletion events and by summertime snowpack re-emission and oceanic evasion of Hg. The cycle of atmospheric Hg differs between the two regions primarily because of their different geography. While Arctic sites are significantly influenced by northern hemispheric Hg emissions especially in winter, coastal Antarctic sites are significantly influenced by the reactivity observed on the East Antarctic ice sheet due to katabatic winds. Based on the comparison of multi-model simulations with observations, this paper discusses whether the processes that affect atmospheric Hg seasonality and interannual variability are appropriately represented in the models and identifies research gaps in our understanding of the atmospheric Hg cycling in high latitudes.

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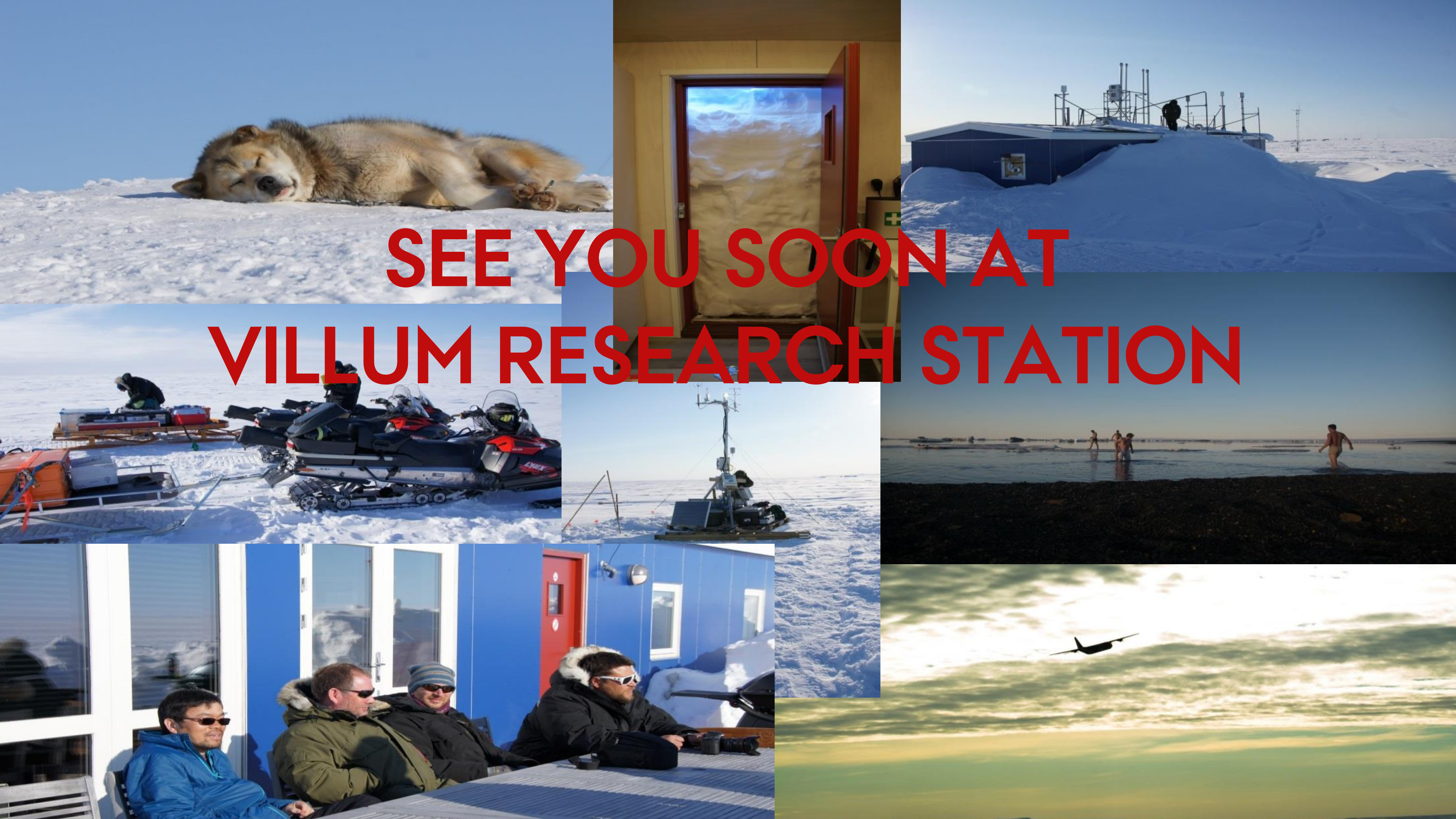
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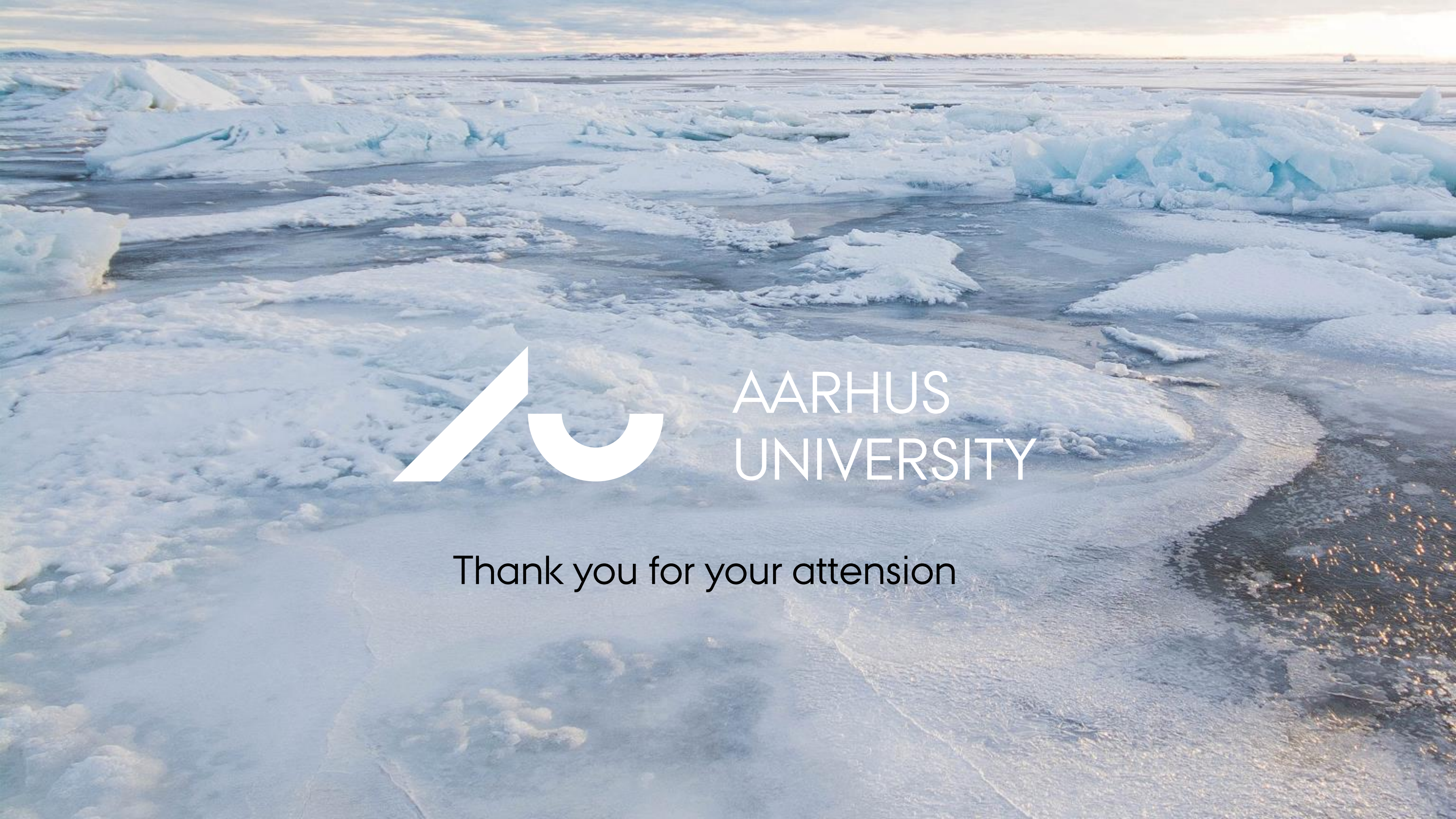
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