Mobile atmospheric observations in Svalbard

MobileObs

UNIS

telenor

Tilsig

Norwegian Meteorological Institute

Mobile atmospheric observations in Svalbard

MobileObs

SIOS INNOVATION AWARD 2023

UNIS

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Norwegian Meteorological Institute

Team

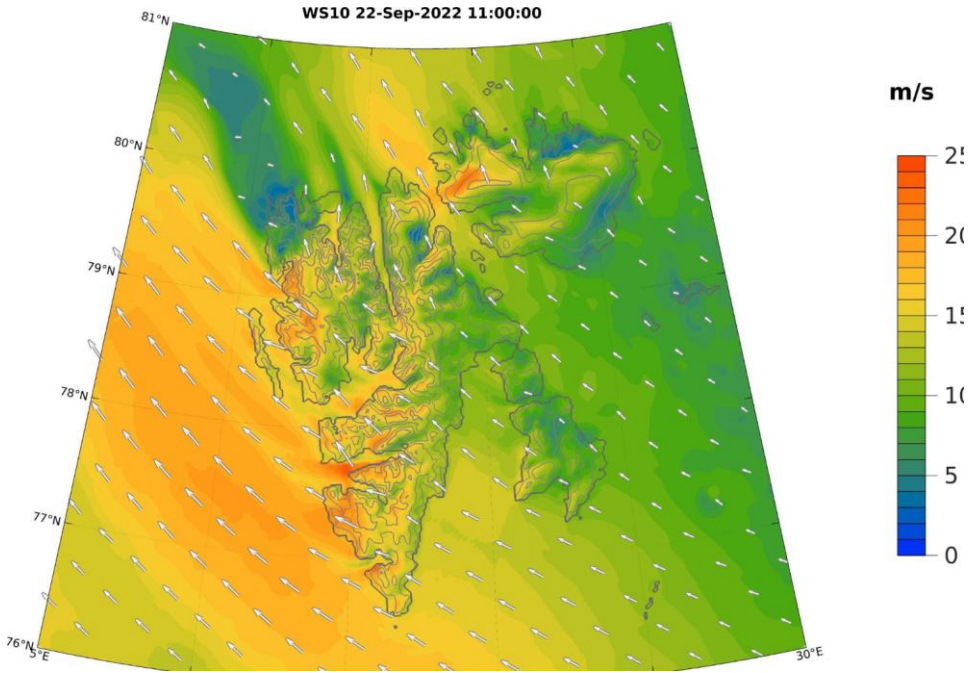
Team of experts within

- Meteorology
- Logistics
- Data communication
- Sensor technology
- Data sharing and numerical modelling

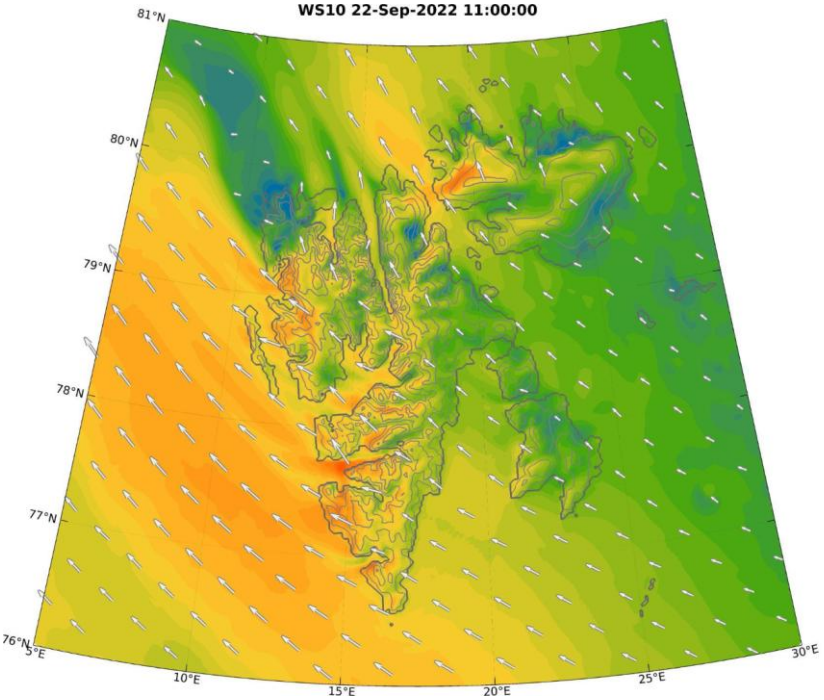
Background

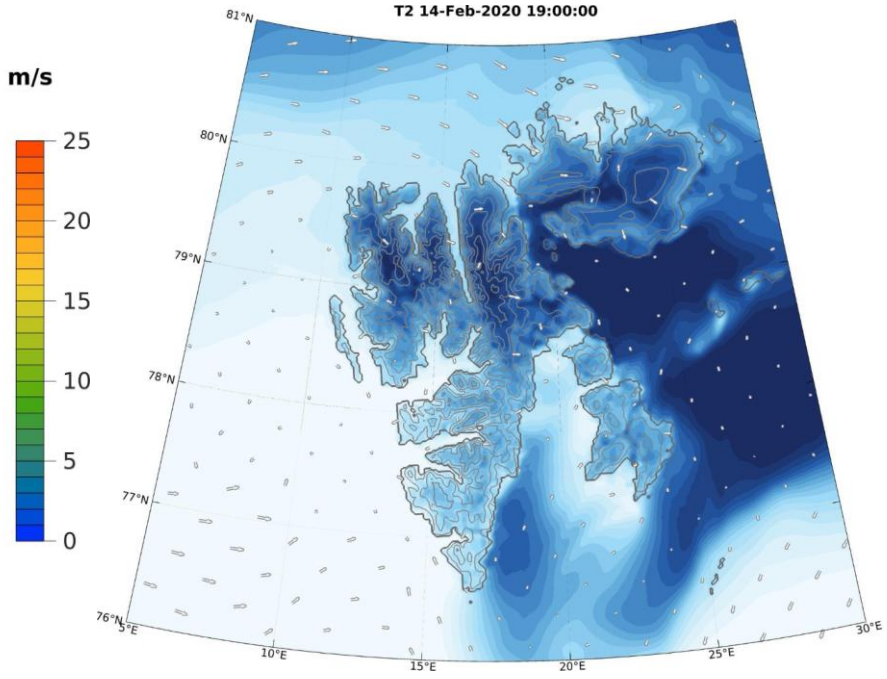
Svalbard has a varied landscape with a highly complex topography and marked land-sea contrasts

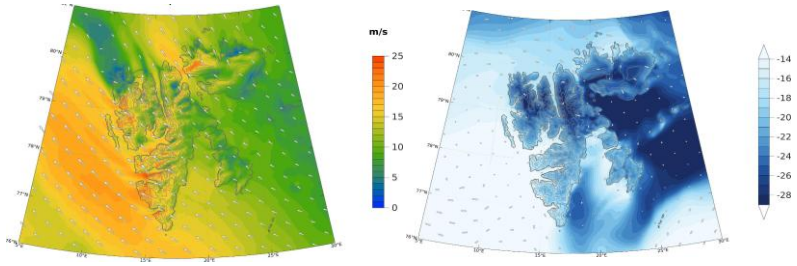
=> Strong variability in local weather patterns



=> Strong variability in local weather patterns







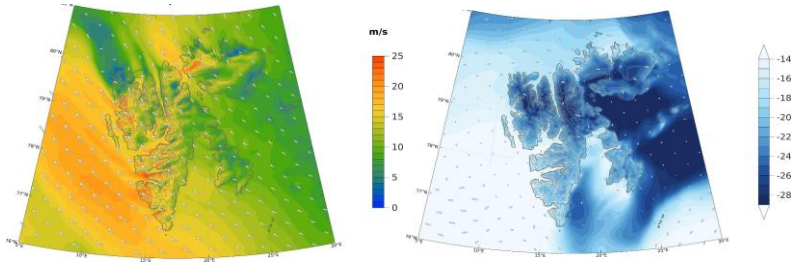
Local weather matters for…

Scientific fieldwork

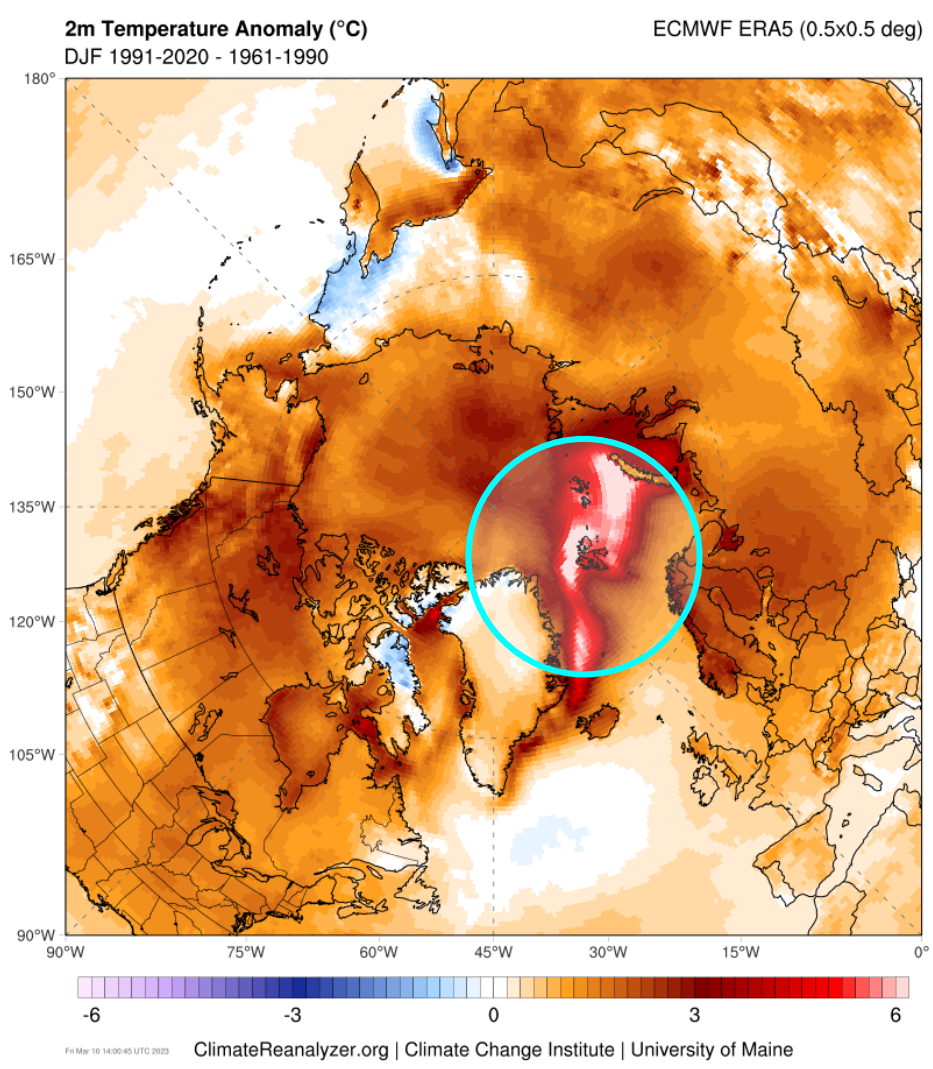
Tourism

Fishery

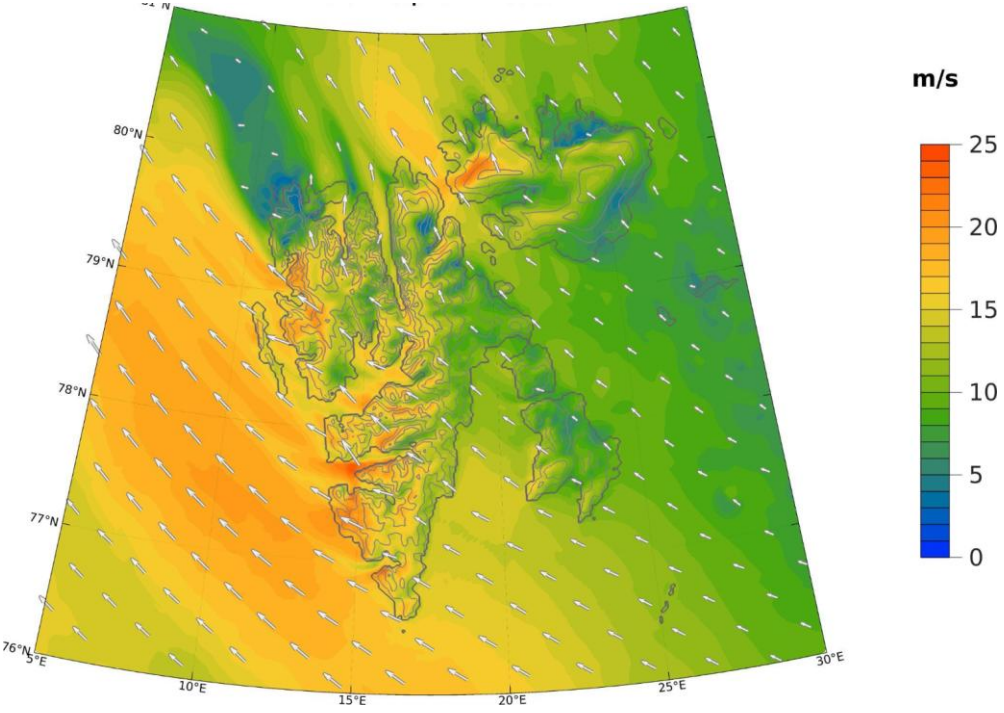
SAR



Svalbard and its local climate conditions are also highly relevant in a climate change context

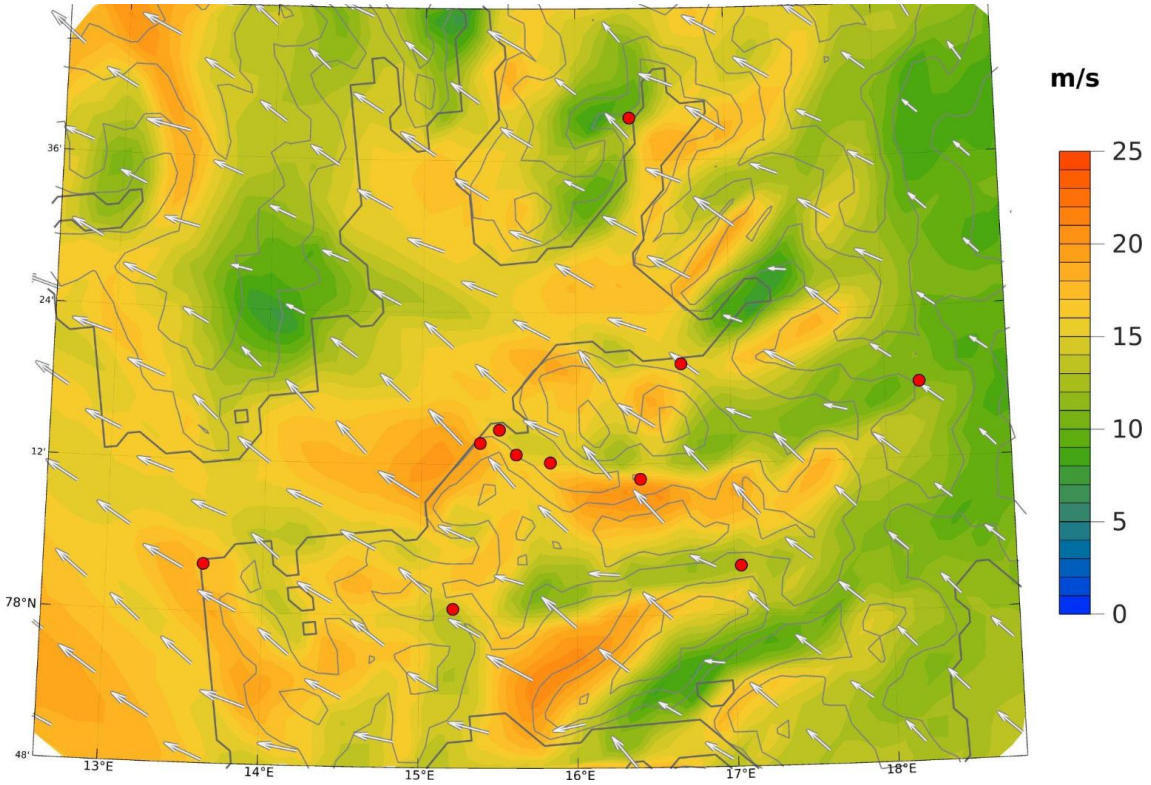


We need data for understanding, monitoring and forecasting weather and climate in Svalbard

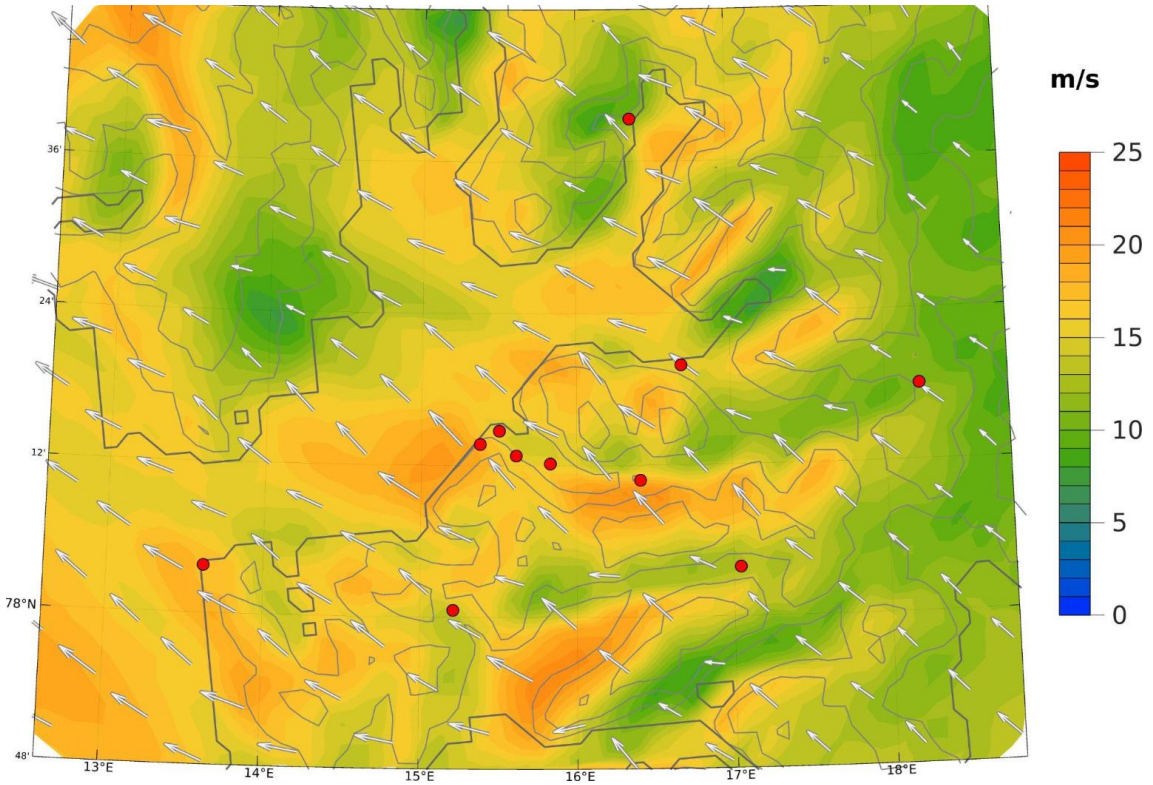


Data sources

Model data



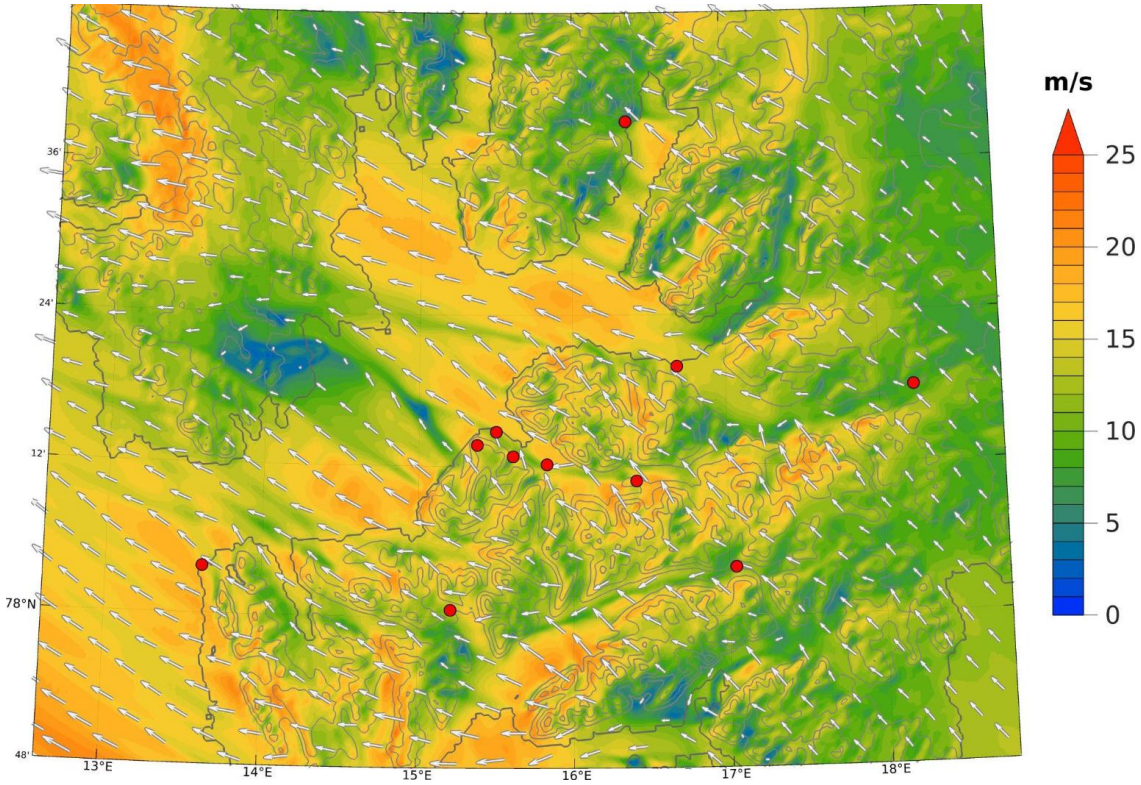
Model data



Automatic weather stations

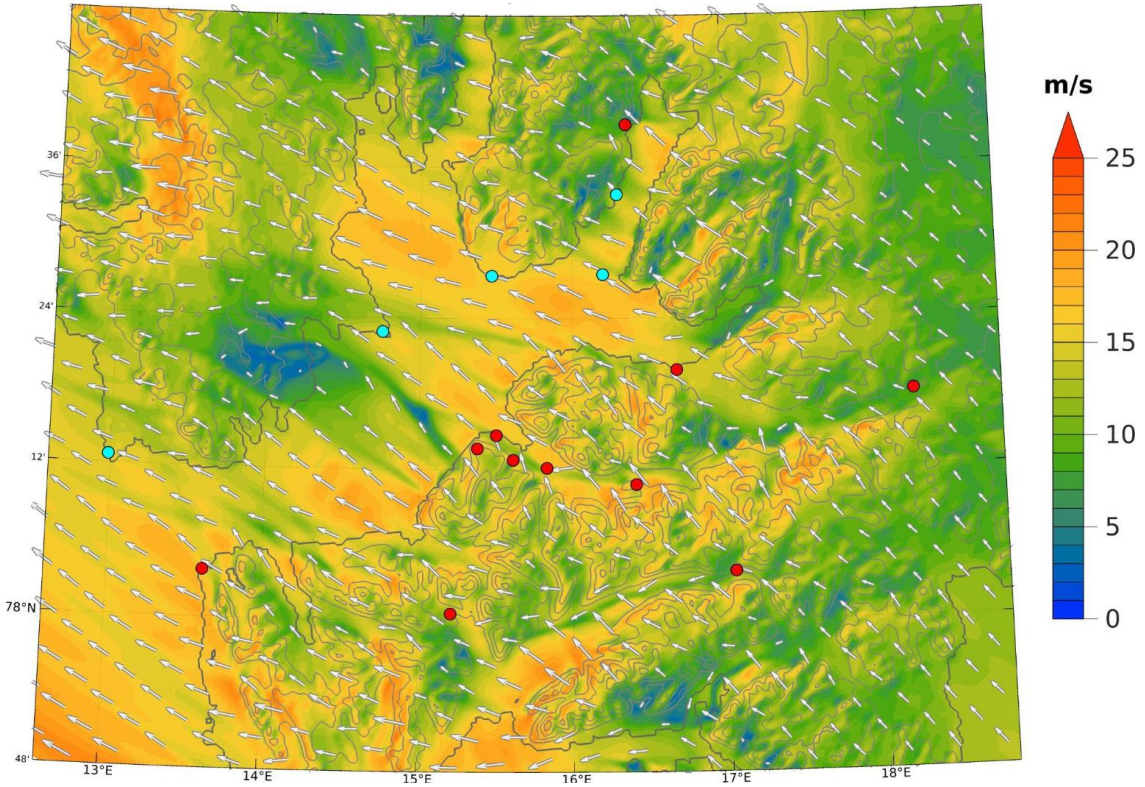
Credits: Ine-Therese

Hyper-resolution model data

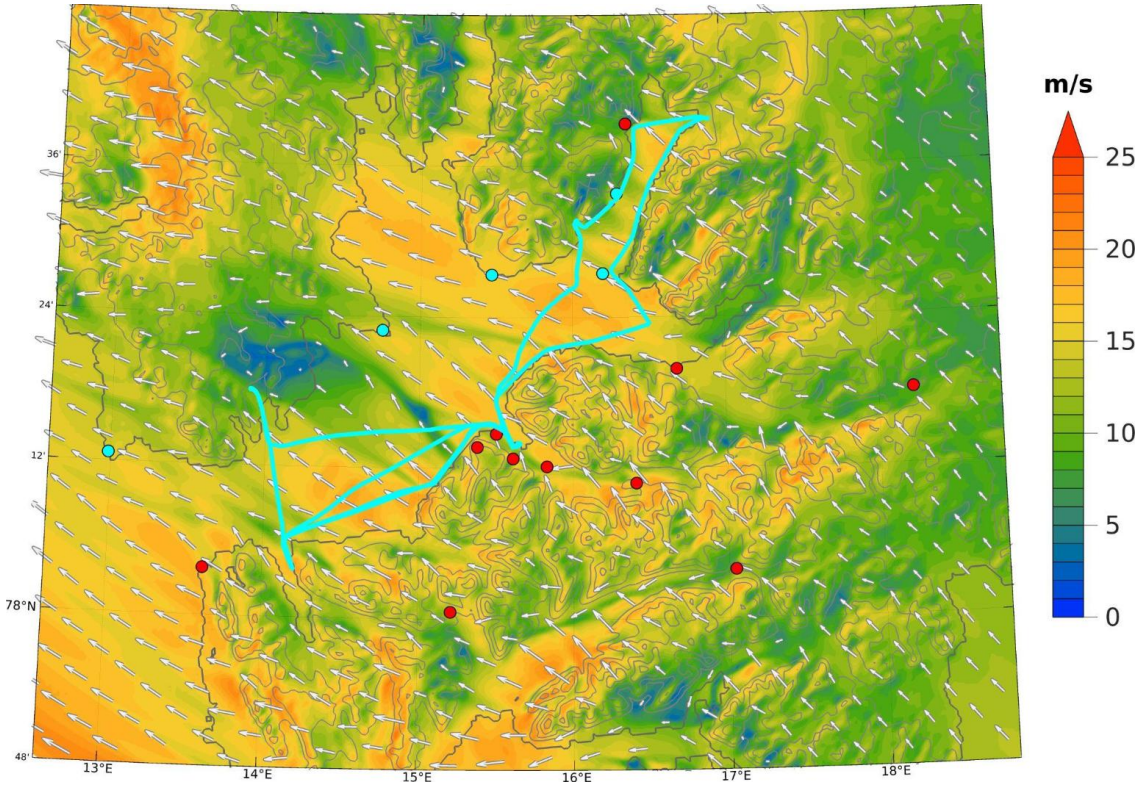


Extra automatic weather stations

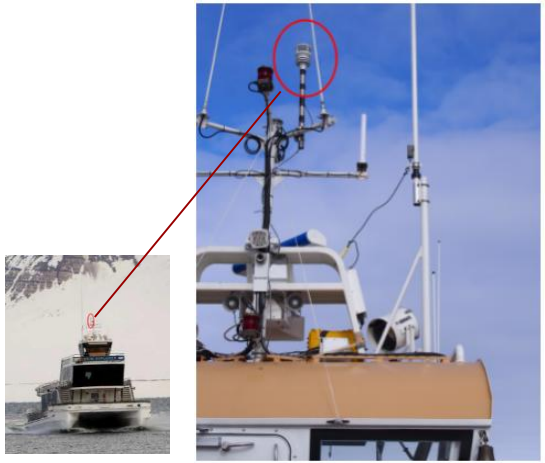
Hyper-resolution model data



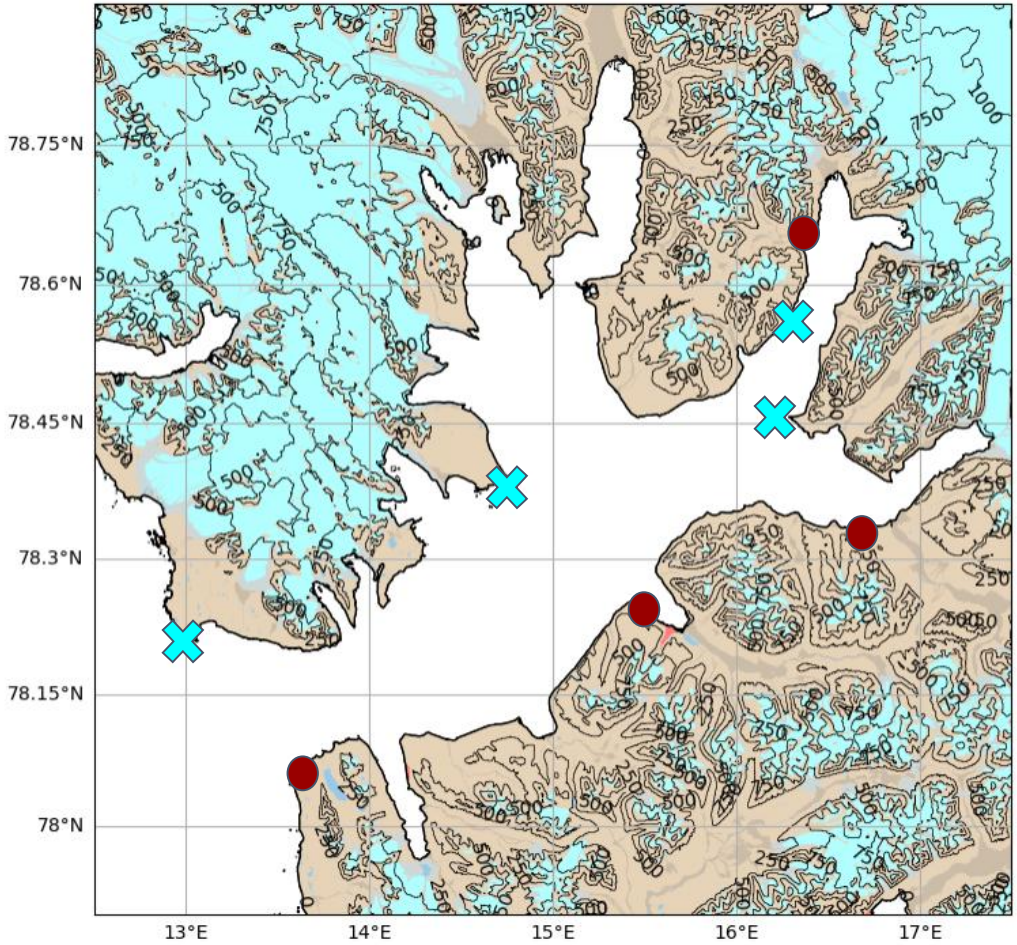
Hyper-resolution model data



Extra automatic weather stations



Isfjorden Weather Information Network (IWIN)



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Open Access Earth System Science Data

IWIN: the Isfjorden Weather Information Network

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Abstract. In an effort led by the University Centre in Svalbard (UNIS), with support from the Norwegian Meteorological Institute (MET Norway), the Isfjorden Weather Information Network (IWIN) is under development in the Isfjorden region in central Svalbard. The network substantially expands upon the relatively sparse existing operational network of weather stations and consists of compact and cost-efficient all-in-one weather stations permanently installed at lighthouses around Isfjorden and on board small tourist cruise ships trafficking the fjord from spring to autumn. All data from the network until June 2023, as presented in this paper, can be found at https://doi.org/10.5281/zenodo.8137588 (Frank et al., 2023b). New data become freely available in near-real time via MET Norway's data portals (https://doi.org/10.21343/ebrw-w846, Frank et al., 2023a). The IWIN data are highly valuable for scientific purposes such as atmospheric boundary layer research, the validation and development of numerical weather prediction models, and assimilation in these, as well as the planning and safe conduction of outdoor activities in the region.

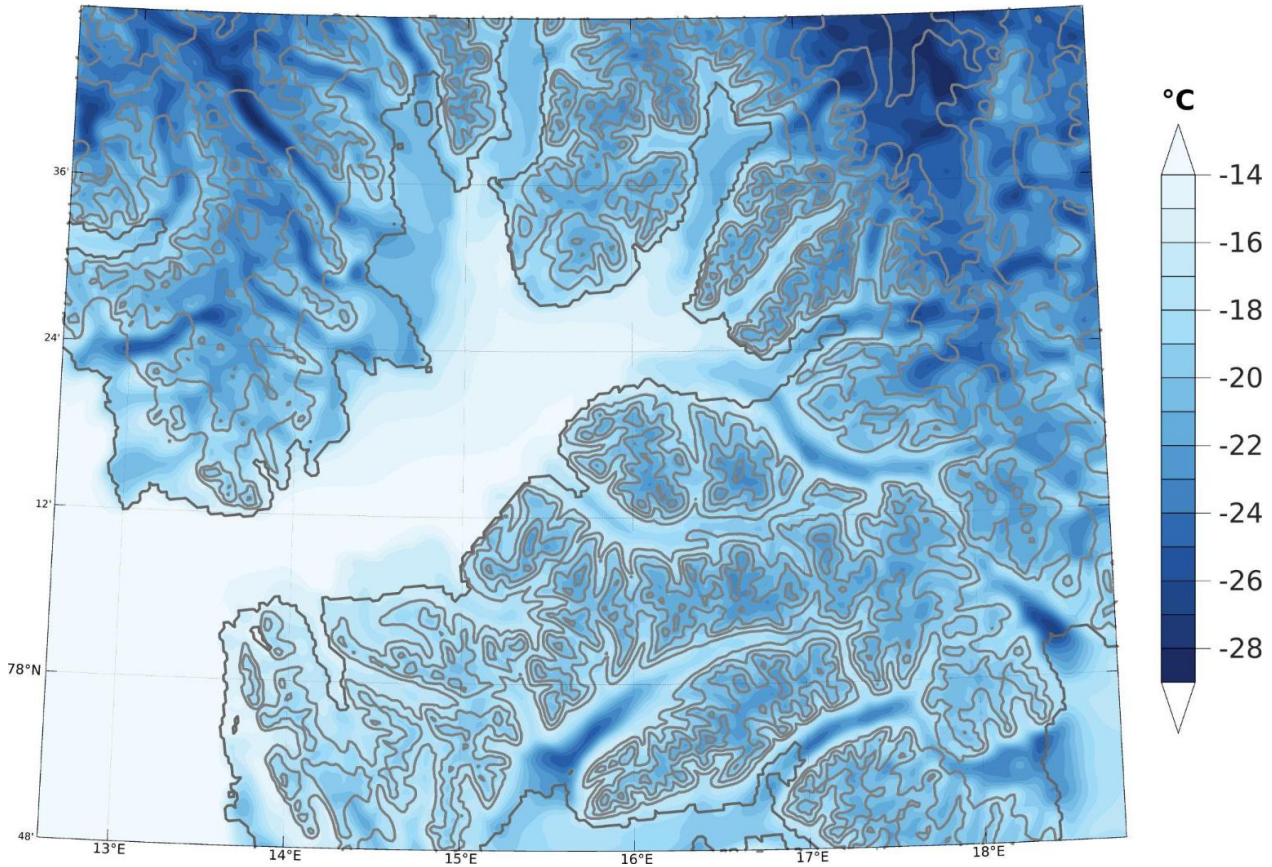
1 Introduction

In this study, we present the Isfjorden Weather Information Network (IWIN), which is a new network of automatic weather stations located in the Isfjorden area in central Svalbard. The network is developed by the University Centre in Svalbard (UNIS) with support from the Norwegian Meteorological Institute (MET Norway).

IWIN consists of compact and relatively cost-efficient all-in-one weather stations measuring near-surface temperature, humidity, wind speed, wind direction and pressure. The stations are robust with no movable parts and are thereby well suited to the harsh arctic climate in Svalbard. The stations are mounted both at fixed points (lighthouses) situated along the shoreline of Isfjorden and on small tourist ships that traffic the fjord from spring to autumn. Hence, the network uses existing infrastructure as instrument platforms, and its (added) environmental footprint is therefore minimal. IWIN is under continuous development, and as of summer 2023, it consists of seven weather stations, four of which are mounted on lighthouses and three of which are mounted on ships (in the following, these are referred to as mobile stations). The data from IWIN are made freely and publicly available in near-real time on MET Norway's Thematic Real-time Environmental Distributed Data Services (THREDDS) server (https://thredds.met.no/thredds/unis-obs/unis-obs.html, last access: 12 September 2023) and via the Arctic Data Centre (ADC, https://doi.org/10.21343/ebrw-w846. Frank et al., 2023a).

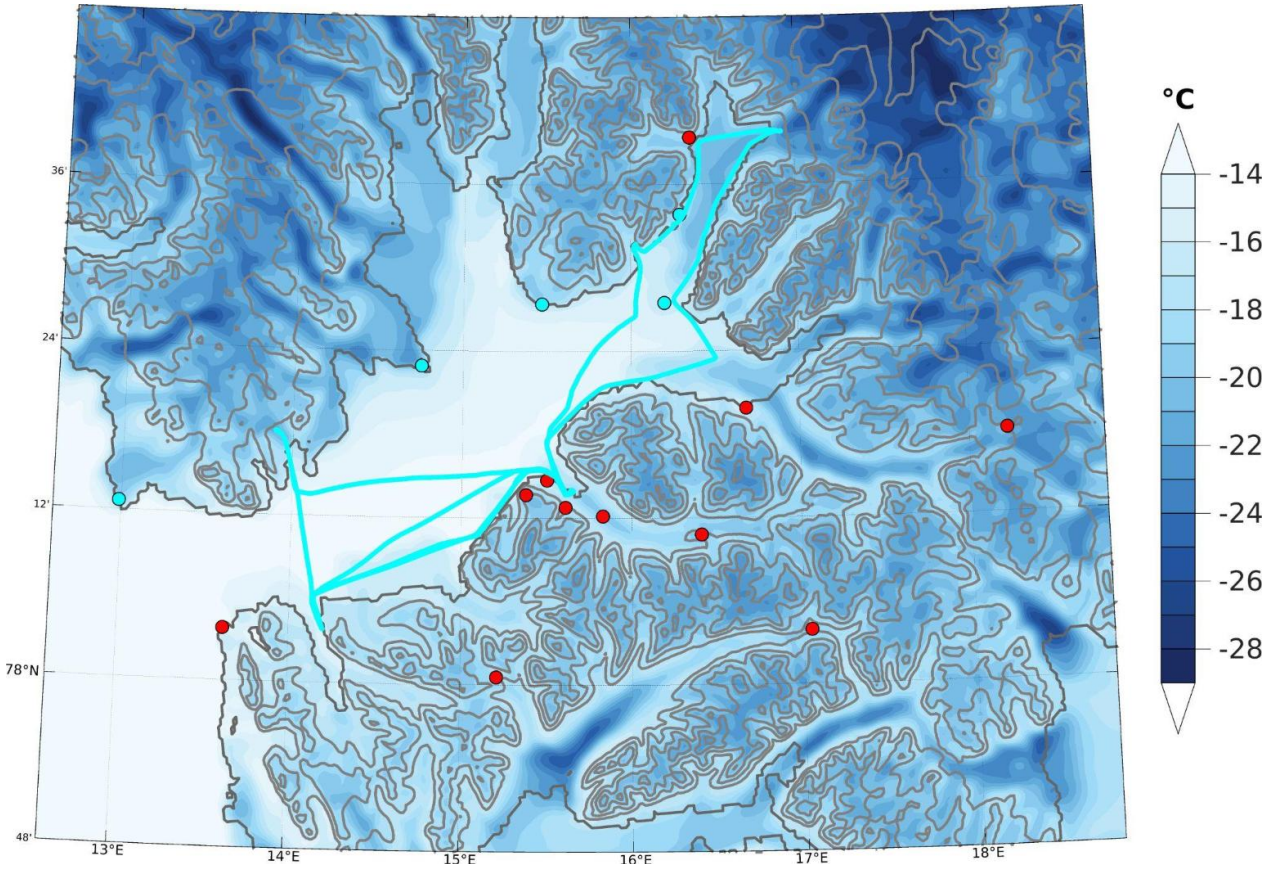
The usefulness of the IWIN observations is multifold. From a research perspective, IWIN provides valuable in situ, near-surface weather observations from the Arctic, where such observations are otherwise very sparse. The network

Strong variability in temperature



Strong variability in temperature

Hyper-resolution model data + extra automatic weather stations



Strong variability in temperature

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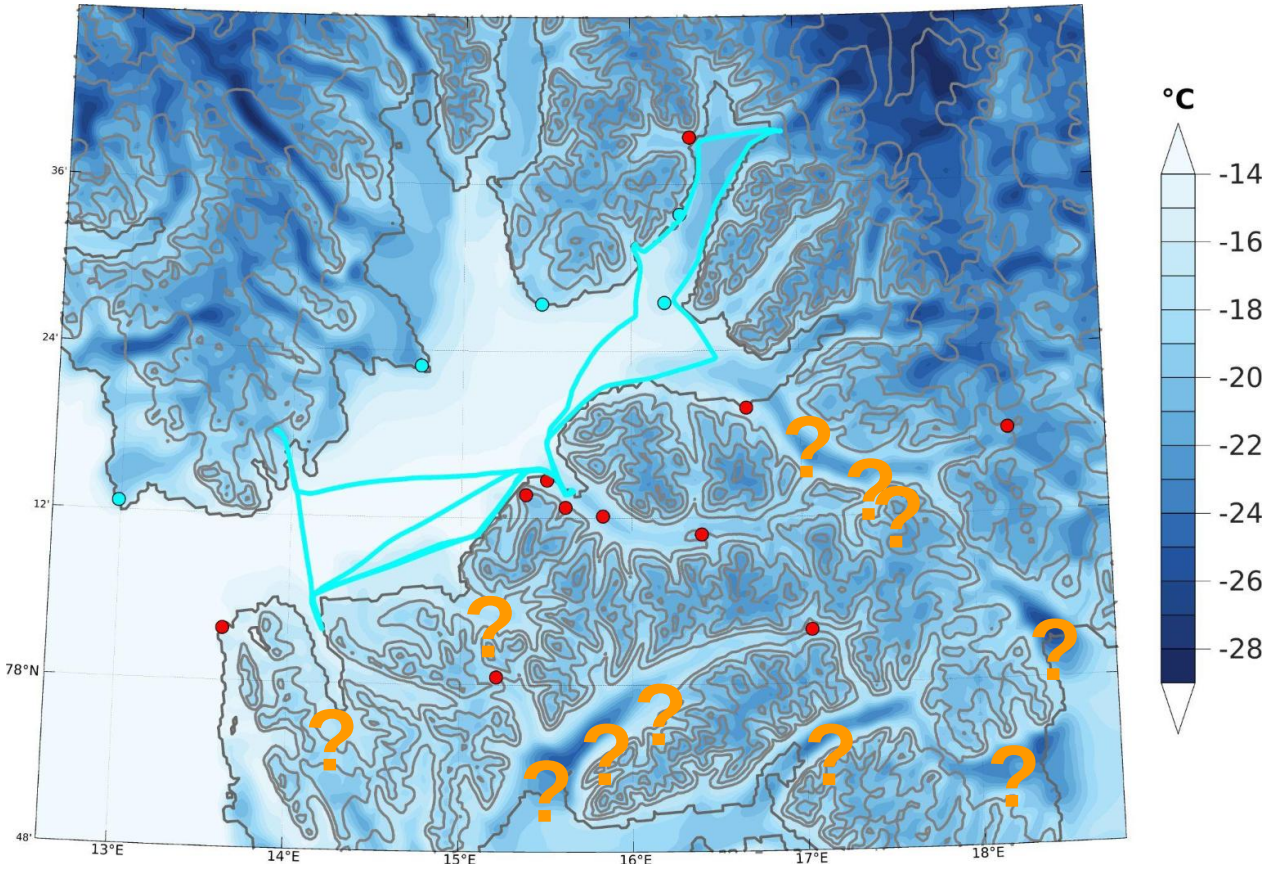

Observation gap:

Inland, during winter!

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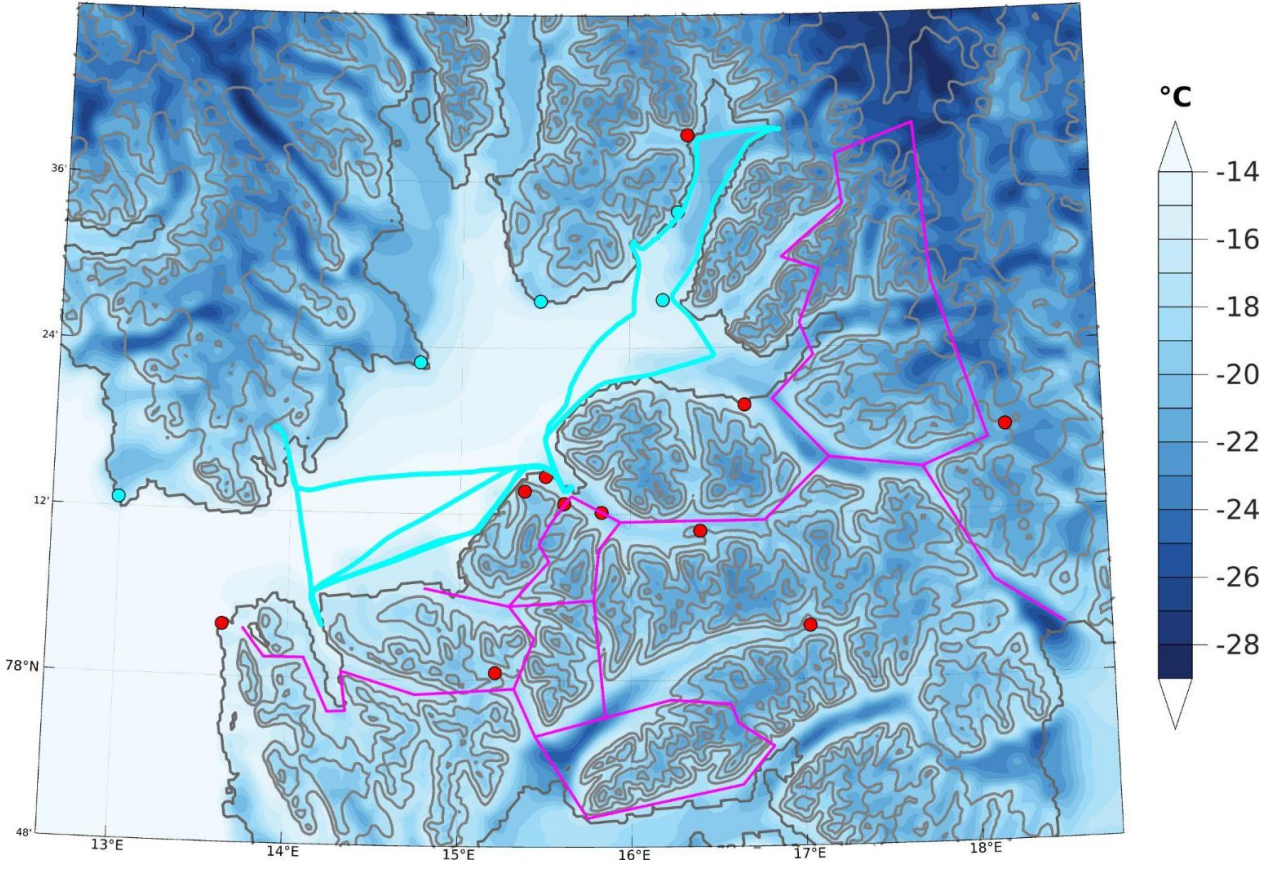
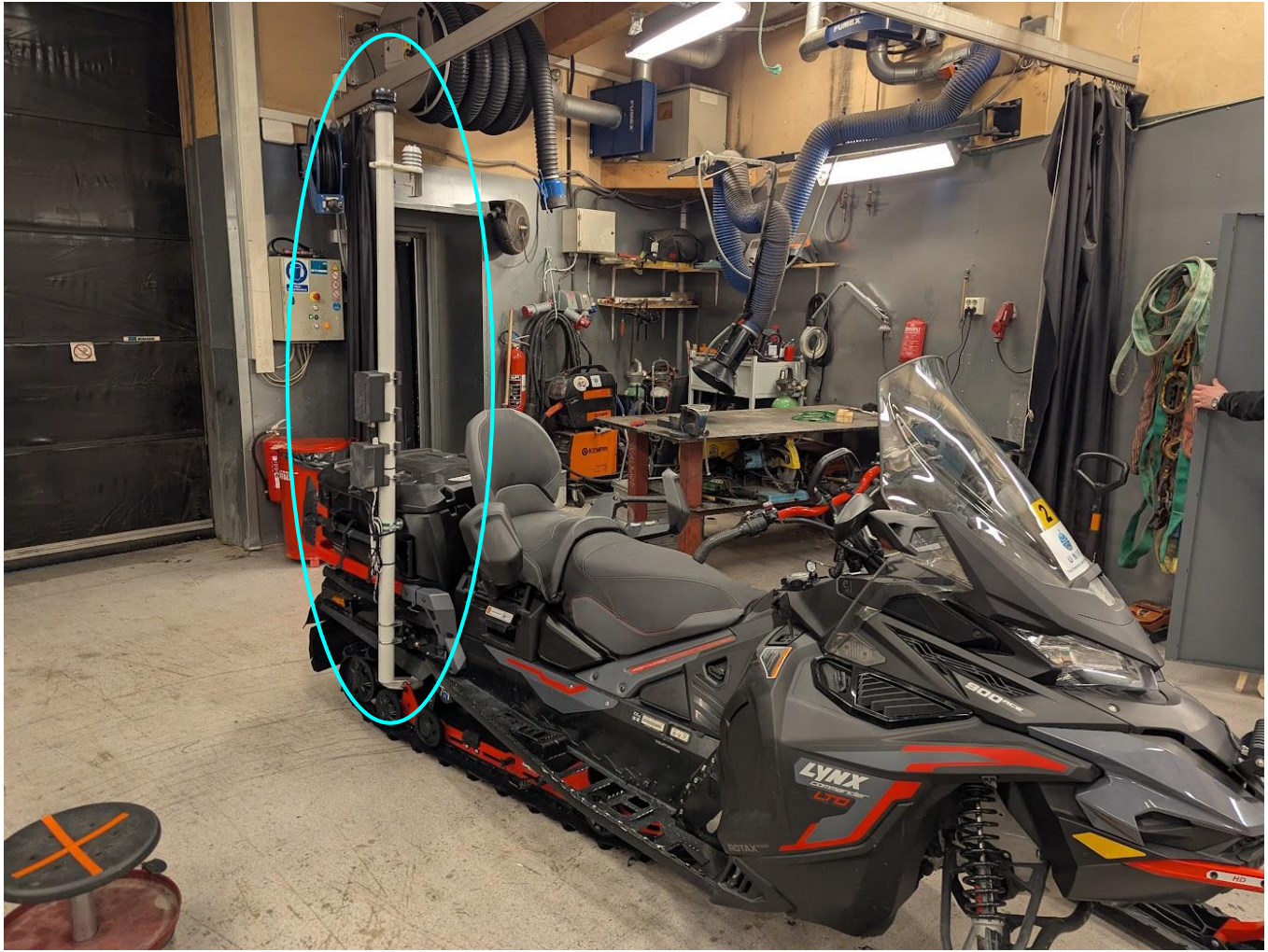


MobileObs

Status today


LYNX
LTD

Wind:

Ultra-Low-Power Ultrasonic wind meter (ULP Standard). SDI12

Temperature:

ST-110-SS: Thermistor Temperature Sensor

Temperature + Humidity

EE08-SS: Air Temperature and Relative Humidity Probe

To be added

Surface temperature

SI-431-SS

Atmospheric pressure:

To be decided

Analog -> SDI12 converter

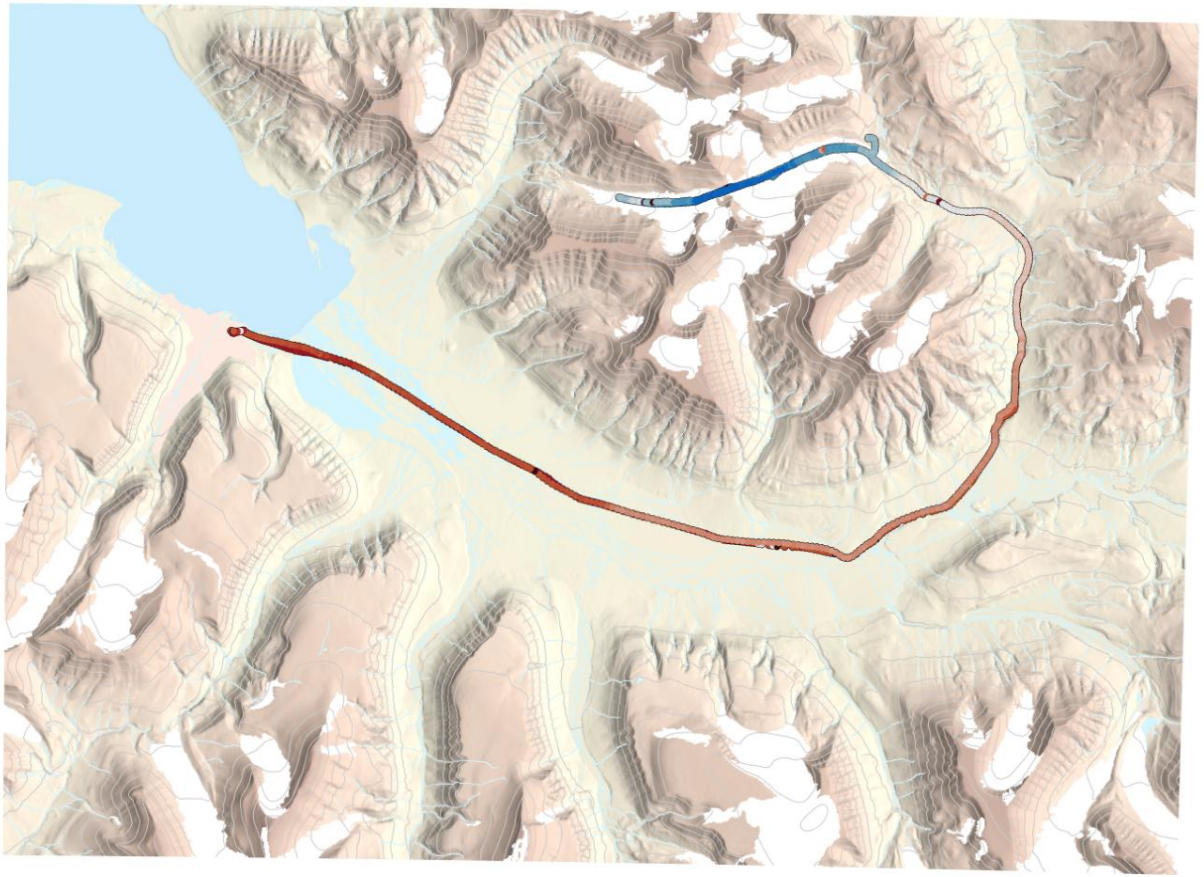
Data logger/communication box (Mobile IoT)

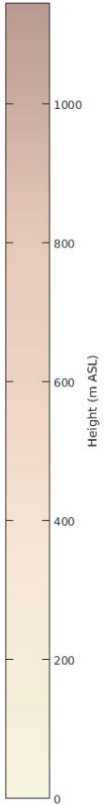
telenor

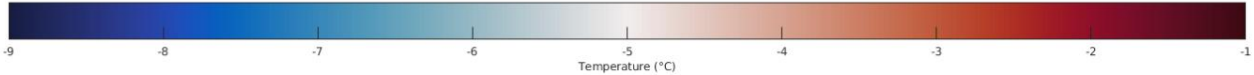
Tilsig

Analog -> SDI12 converter

First results, 1st March 2025

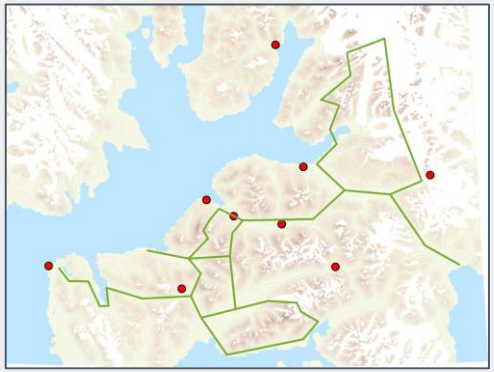






Data collection

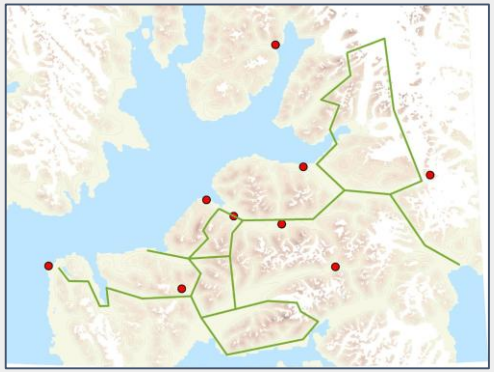
- Temperature
- Humidity
- Pressure
- Wind



UNIS telenor WHERE$_2$O Follow the water

Data collection

- Temperature
- Humidity
- Pressure
- Wind



UNIS telenor WHERE2O

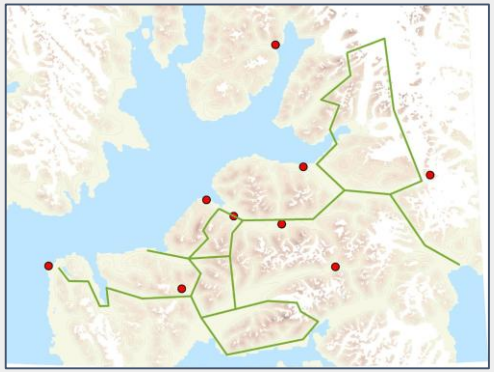
Online data sharing

- Arctic Data Centre
- SIOS data management system
- Thredds.met.no
- New data portal for visualisation

SIOS Norwegian Meteorological Institute WHERE2O

Data collection

- Temperature
- Humidity
- Pressure
- Wind



UNIS telenor

Online data sharing

- Arctic Data Centre
- SIOS data management system
- Thredds.met.no
- New data portal for visualisation

SIOS Norwegian Meteorological Institute Tilsig

Data utilisation

- Research
- Education
- Field safety

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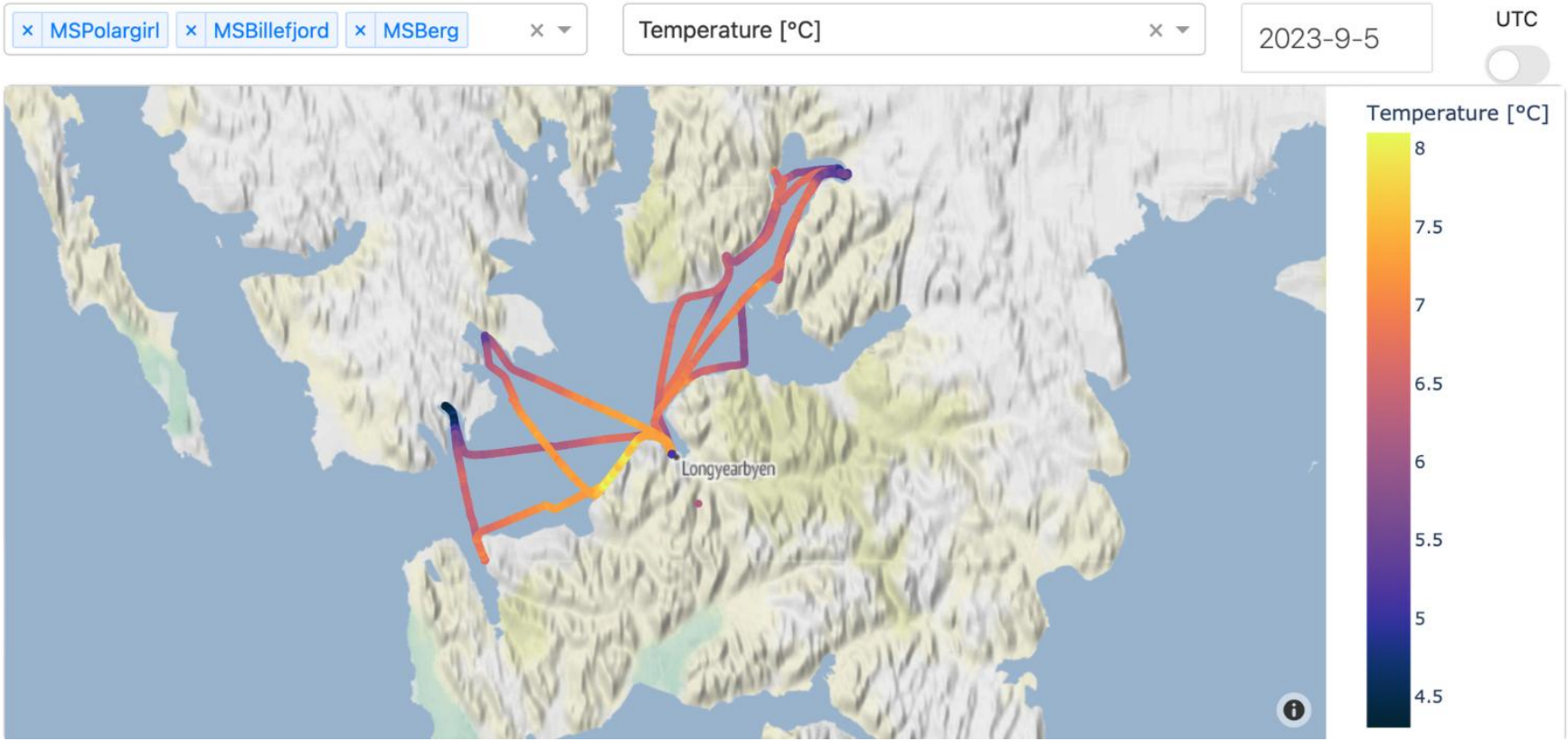
Norwegian Meteorological Institute

ARCTIC SAFETY CENTRE AT THE UNIVERSITY CENTRE IN SVALBARD

Data portal


MSPolargirl
MSBillefjord
MSBerg
Temperature [°C]
2023-9-5
UTC
Longyearbyen
Temperature [°C]
8
7.5
7
6.5
6
5.5
5
4.5

Thank you.