



## WP 4– Unpredictable Arctic: Extreme weather



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## Aim of WP

The objective: to document and improve awareness of the many consequences of extreme weather events in the Arctic that are of importance to ecosystem services, local and global communities.

### Objectives:

- Document the effects of extreme weather events on rapid changes in biodiversity.
- Identify the societal impacts of extreme weather on local communities through community engagement.
- Evaluate the ability of current state-of-the-art weather predictions to forecast such events.

The WP will also provide guidance on how the INTERACT network can be used to improve weather forecasts and the way they are used in the Arctic and beyond.



## Progress Task 4.1: Deliverable done

D4.1 review of Ecological impacts of extreme climatic events on terrestrial and freshwater biota in the Arctic – **Submitted (also as in revision for journal publication).**

- identified a research bias towards single-events studies and a lack of focus on impact recovery.
- Found that extreme events are a key facet of climate change research with impacts on biodiversity expected to be particularly severe in the Arctic.
- Recommends moving beyond single-impact studies and spatial scales of observation; and consider predictive modelling to address ecosystem-level impacts.

Building upon the synthesis recommendations were made on bridging current knowledge gaps by taking advantage of the established pan-Arctic long-term monitoring network, the CBMP in order to better define what is considered extreme in terms of events and ecological impacts.

**Discussions with Elmer Topp-Jørgensen on how to develop recommendations into a monitoring plan are ongoing.**

## Progress Task 4.2 – Deliverable due Dec

**Task 4.2 Identify societal impacts of extreme weather and other events and explore ways in which local communities can contribute to identify these events and their impacts**

**D4.2** - Report on monitoring by Indigenous and local residents of extreme weather events and other unpredictable environmental challenges and their consequences. – due Dec 21



Very low water level, Nadym river

## Highlights – development of citizen network

### Approaches:

- Reports from about 500 people including local residents, administrative staff, *emergency service*, teachers and students of secondary and vocational schools, reindeer herders reporting to <https://siberiaweather.ftf.tsu.ru/> by mobile phone and browsers
- Visits to settlements with medics
- Large scale surveys (almost 1000 people)

**In-person meeting of citizen science network in September 2021.**



## Highlight – Monitoring of extreme events

Progress has been made on many issues  
The extreme events and its consequences continue to be recorded.



**August 26-30<sup>th</sup> 2021** - sharp change from the very hot weather to cold accompanied by storm wind with thunderstorm and hail. It caused the breaking of electrical wires (Tazovskiy) and damaging of antenna-post (Gas-Sale) and a building destroyed (Yar-Sale)

**August 2021** - smog from forest fires in Yakutia, reached the Yamal. Due to the deterioration of visibility, the operation of the ferrying between Salekhard and Labytnangi was suspended



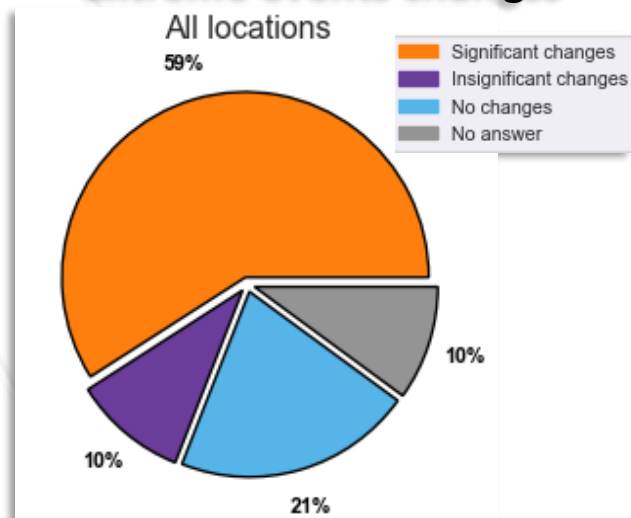
# Highlights – Paper and AMBIO Special issue

Special issue of AMBIO on Siberian environmental change

Includes: *Rakhmanova et al* . “Perspectives of climate change. A comparison of scientific understanding and local interpretations by different Western Siberian communities, Ambio 2021, 50:2072–2089 <https://doi.org/10.1007/s13280-021-01621-y>

Development of collaborations with wider community.

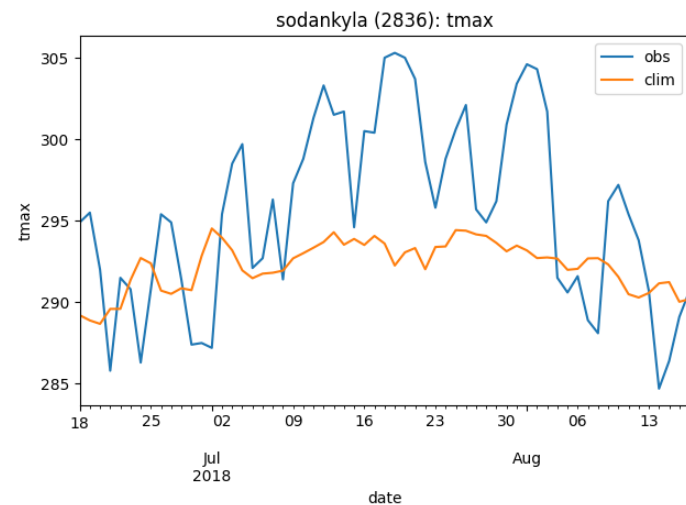
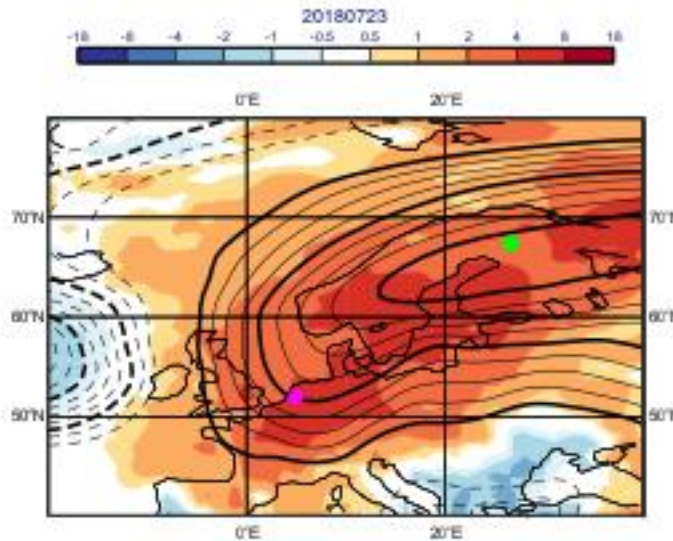
## Extreme events changes



## Progress Task 4.3 – Deliverable done

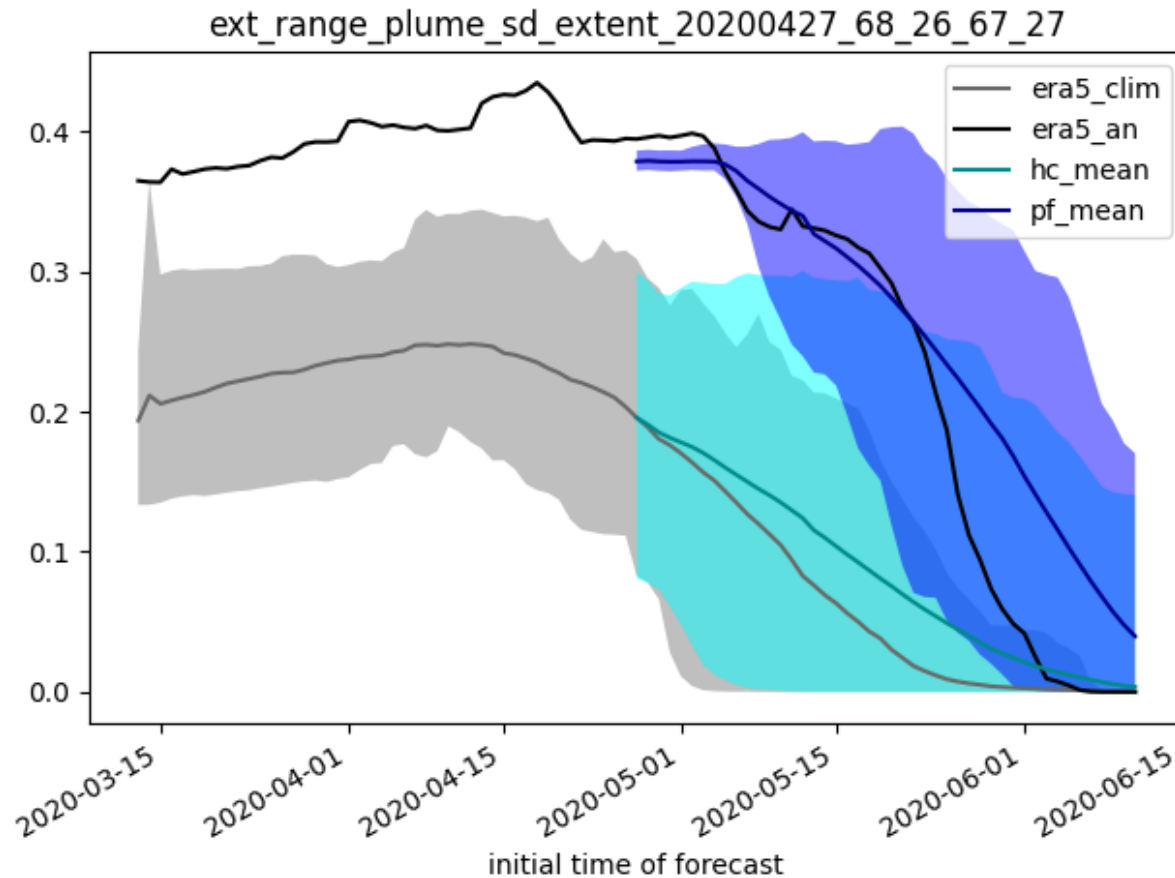
### Task 4.3: Evaluation of extreme event forecasts in the Arctic

Report focussed on evaluation of forecasts of extreme heat in the Arctic at leadtimes of 1-6 weeks and links to land-surface properties and their errors.

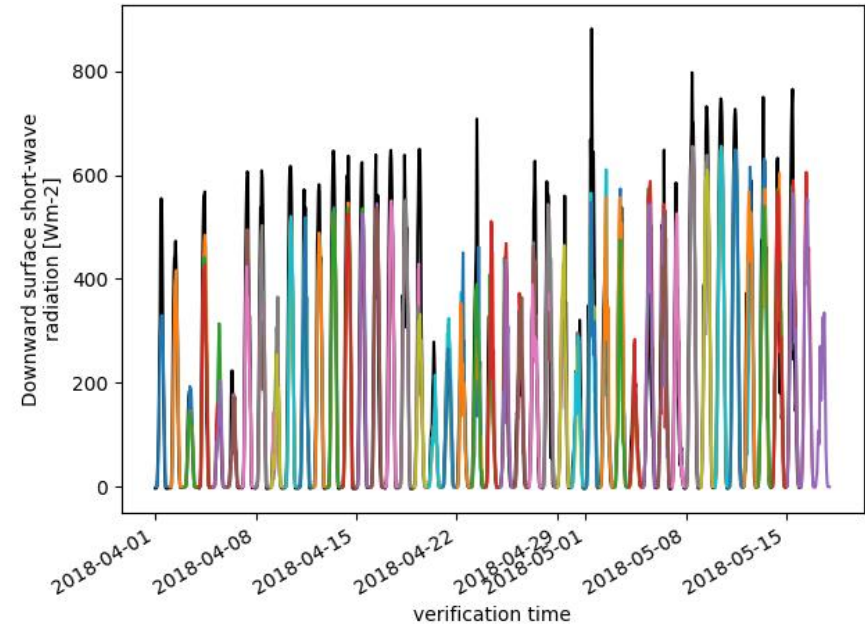
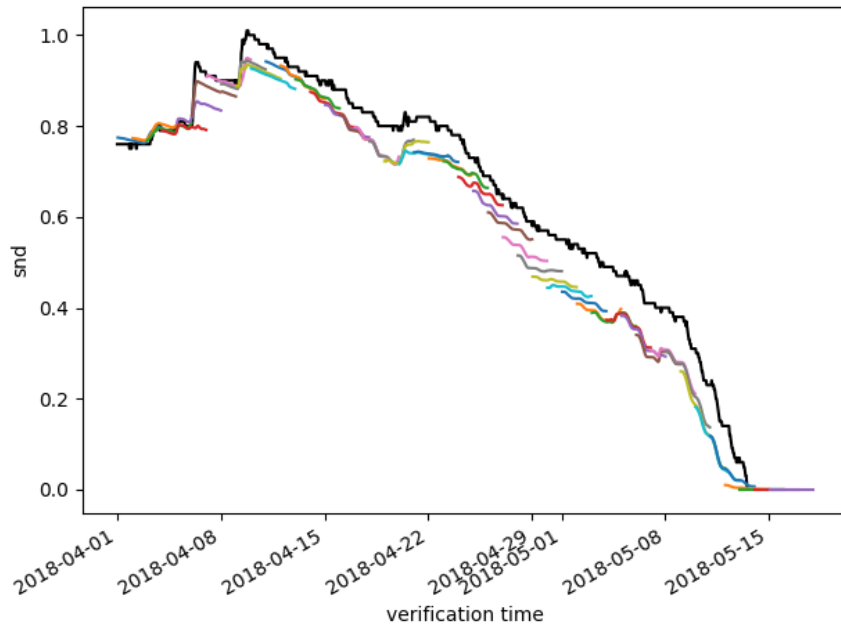




## Highlight – slow snowmelt in the IFS



## Highlight – Understanding snow forecast errors at Sodankylä





## Progress Task 4.4 – Deliverable due May 2022

### Task 4.4: Advancing the exploitation of INTERACT station data to improve weather predictions

Diagnosing the causes of forecast error using research station observations and identifying processes to be improved.

**Multi-model:** Using and developing YOPPsiteMIP forecast archive: Legacy activity of World Meteorological Organisations's – Year of Polar Prediction.

**Multi-Site:** Pan Arctic to capture various environments (tundra, taiga, ice-sheet, sea-ice) collaborating with technical experts at NOAA, NSIDC, FMI, ECCO, U. Stockholm to develop Merged Observatory Data Files.

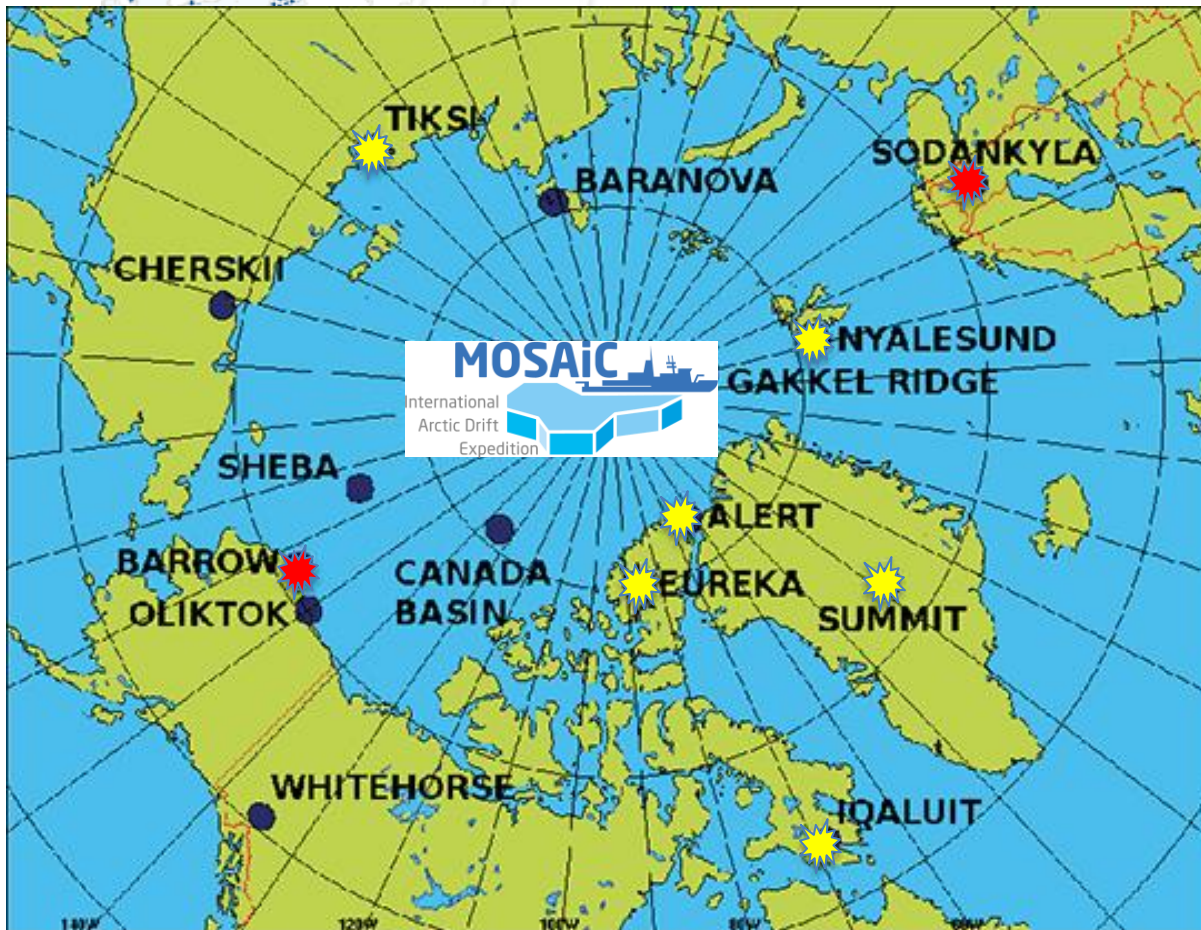
Iterating on Model and Observation files from the project. Initial analysis of forecasts where observations are available (i.e. Sodankylä, Finland and Utqiagvik, USA-Alaska).



## Highlight – YOPPsiteMIP Model Data archive available at Met No.

Centre	Model-name	Atmosphere (and resolution)/Global /Regional	Coupled ocean-sea ice yes/no	Lowest model level height	References/Public ations	SOPs in Met No
ECMWF	IFS	Global: TCo1279 (~9km), 137L, Cy43r3	NEMO3.4-LIM2	~10m	Buizza et al., (2017)	SOP1 (SOP2, SOP-SH and MOSAIC not uploaded yet)
MeteoFrance	ARPEGE/GELATO	Global:	Yes	10m		SOP1, SOP2,SOP-SH
MeteoFrance	Arome-Arctic MF	Regional: 2.5km/ LBCs and ICs from ARPEGE?	No	Explicit 6-layer BL scheme	Seity et al. (2011)	SOP1, SOP2,
ECCC	CAPS	Regional: 3km/62L/IC & LB conditions from GDPS	No	20m for thermal levels and 40m for momentum	<a href="#">(Milbrandt et al. 2016)</a>	SOP1, SOP2
ICON-DWD	ICON	Global r3b07 (~13km); 90L	no	~10m	<a href="#">(Zängl et al. 2015)</a>	SOP1, SOP2, MOSAIC
HMCR	SL-AV (global, atmosphere only)	Global: SLAV20, 0.225x(0.16-0.24)deg lon-lat, 51L	no	~30m	Tolstykh et al. (2018)	SOP1, SOP2, MOSAIC
MetNo	AROME-Arctic	HARMONIE-AROME cy40h 2.5-km, Regional, LBs and ICs from ECMWF	no	~11 m (explicit BL scheme)	<a href="#">(Müller et al. 2017)</a> Bengtsson et al. (2017)	SOP1,SOP2
US Navy	Navy-ESPC					MOSIAC
AWI	ICON-AWI					MOSAIC

## Highlight – Supporting production of Merged Observatory Data Files (MODFs)



### MODF Status:

Utqiagvik (Barrow):  
Prototype available

Sodankylä: prototype  
imminent.

MOSAiC: prototype  
imminent

Tiksi & Ny-Ålesund: MODF  
maker identified

Other stations: TBC.



## Requirements from others

### Task 4.1:

- Feeding results of study into monitoring activities, ongoing...

### Task 4.4:

- How to get other stations involved?
- How to move from snapshots (YOPP SOPs, MOSIAC year, specific campaigns...) to longterm near-realtime production of MODFs.
- Securing a legacy: long-term funding for development and maintenance





Questions?

## Where to go from here

What will happened to **People** –

1. Extreme weather events together with not effective management system cause more economic losses then it could be.....

..... the possible new subject for a new project.



Long queue to ferry in Salekhard, 10h waiting

## Progress

Progress has been made on many issues  
The extreme events and its consequences continue to be recorded.



**Storm wind, Sept, 17-21, 2021 , the gusts up to 27 m/s**



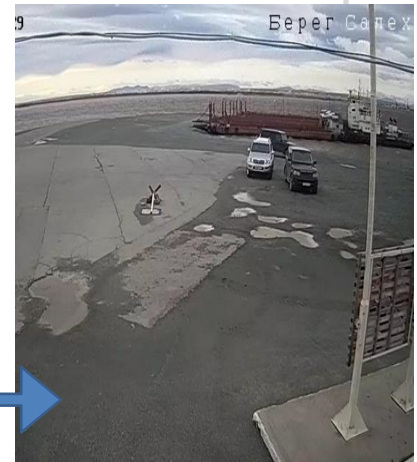
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**First snow, 18/09/2021 Yamal.**  
*This was not in-line with meteo-data*



Road between Noyabrsk and Muravlenco



**Storm wind, Sept, 17-21, 2021 , the gusts up to 27 m/s**  
- the ferryings Salekhard-Labytnangi , Salekhard-Yar-Sale,  
Muzhi-Salekhard-Berezovo, Ratravorzh-Salekhard were closed  
- local and interregional flights were delayed