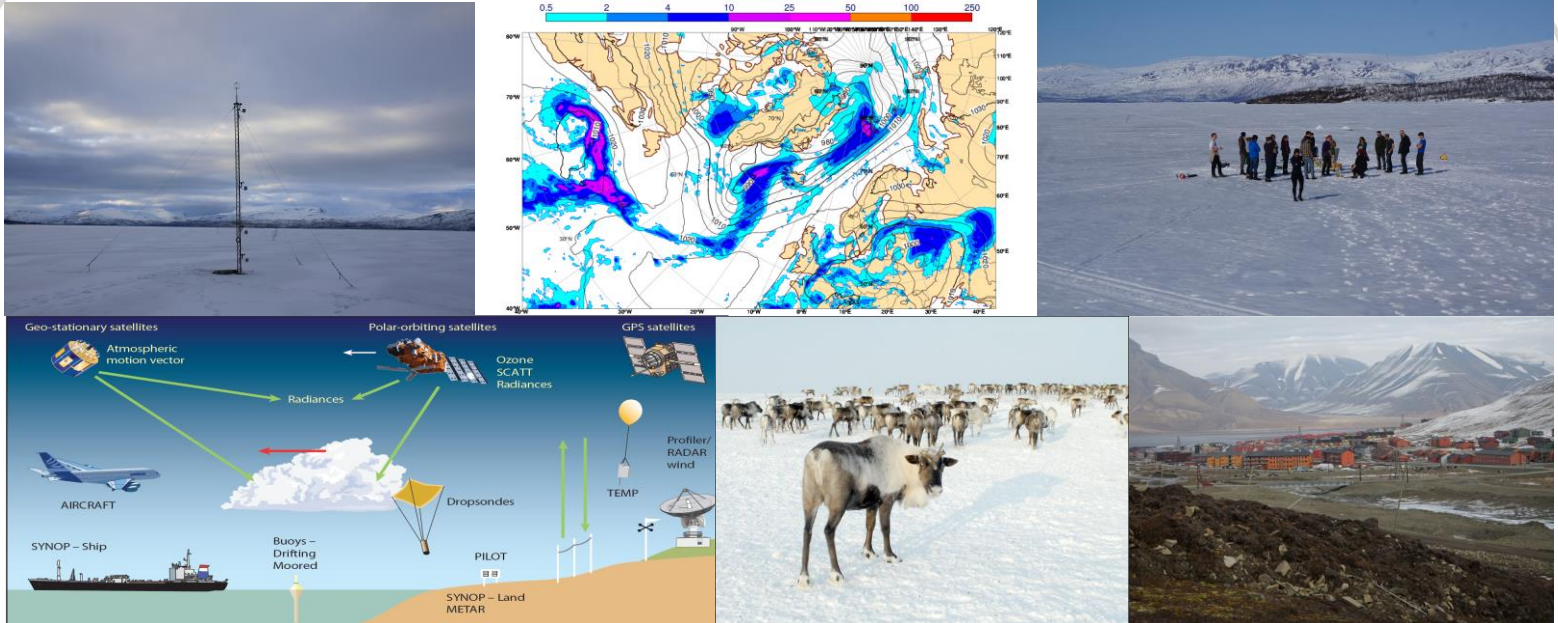# WP4: Unpredictable Arctic – extreme weather events

Jonny Day (ECMWF)
WP 4 lead

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Aim of the WP

The objective of this work package is 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, so that appropriate timely responses can be made.

The specific aims are to:
1. Document the effects of extreme weather events on rapid changes in biodiversity.
2. Identify the societal impacts of extreme weather on local communities through community engagement.
3. Evaluate the ability of current state-of-the-art weather predictions to forecast such events.

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Task 4.1: Documenting the effects of extreme weather events on ecosystems and biodiversity

- Will underpin ongoing work that is informing research, monitoring and policy frameworks related to extreme events and Arctic biodiversity.

- Will identify the types of extreme events that potentially can influence Arctic Biodiversity in extreme ways (e.g. tipping points). This can be extreme weather, flooding, landslides, slush flow avalanches, invasive species, fires etc.

- The study will be used to design a monitoring system to detect impacts of extreme events on biodiversity and identify how this could be incorporated within existing CBMP monitoring plans.

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WP4: Task 1. CBMP extreme events and biodiversity Monitoring

CAFF
Conservation of Arctic Flora and Fauna
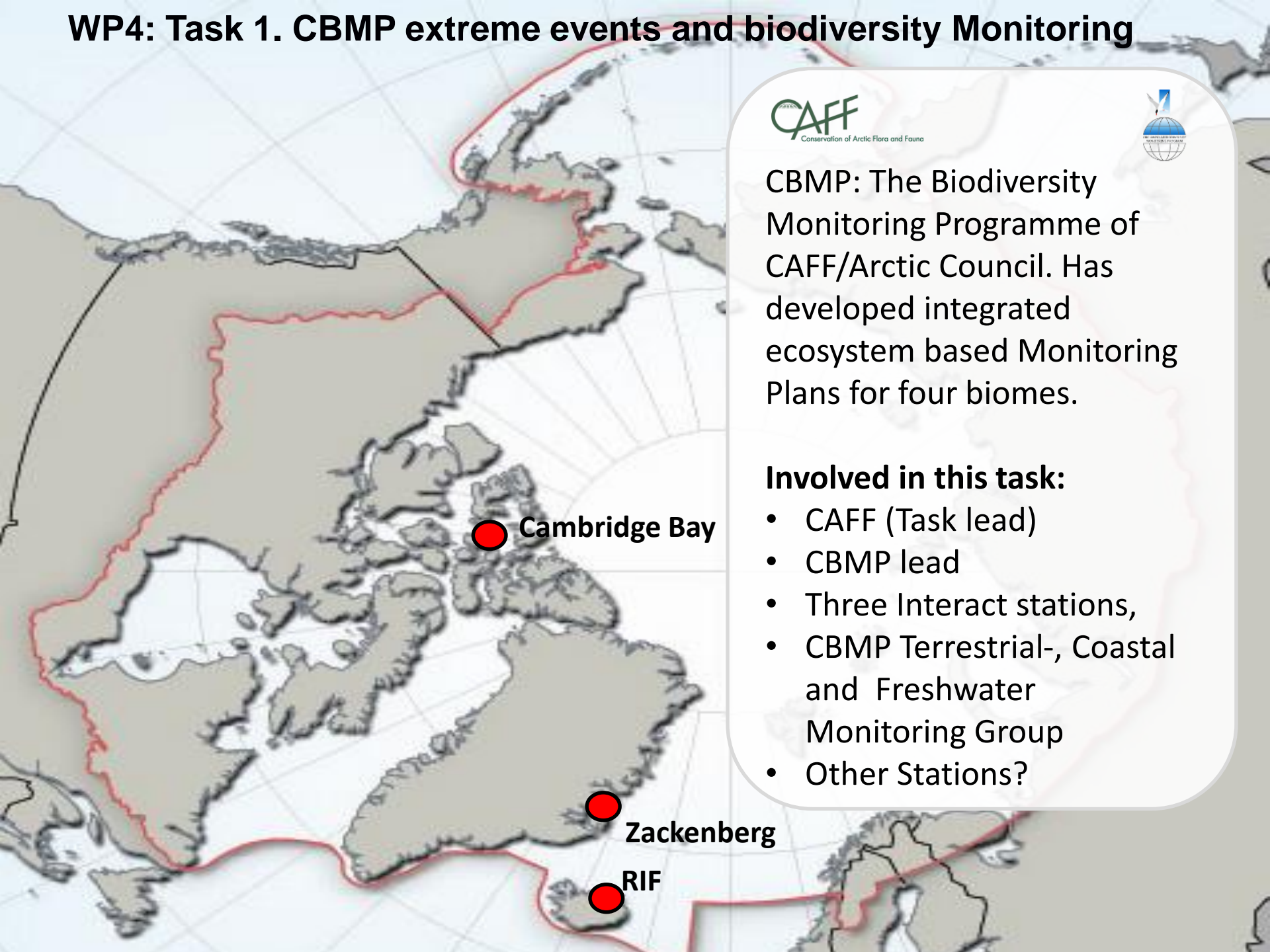
CBMP: The Biodiversity Monitoring Programme of CAFF/Arctic Council. Has developed integrated ecosystem based Monitoring Plans for four biomes.

Involved in this task:
- CAFF (Task lead)
- CBMP lead
- Three Interact stations,
- CBMP Terrestrial-, Coastal and Freshwater Monitoring Group
- Other Stations?

Cambridge Bay

Zackenberg

RIF

Progress and next steps

Total time is 15 months. However COVID-19 has delayed the timeline:

May 2020: Task Group Meeting (Roles and responsibility and to develop a revised task timeline):

Step 1. May 2021: conduct a literature survey of known events to help frame the task and monitoring response(s)

Step 2. August 2021: Select 1 or 2 events to focus on and which are common to all 3 stations or/and across ecosystems:

>Look at the CBMP monitoring plans. Are modifications needed?
>Create scenario(s) of possible impacts. This process presented as a model on how extreme events might be addressed within CBMP monitoring plans

Step 3. October/ November 2022: Draft design of monitoring approach for discussion at workshop (exact location and date tbc)

Step 4. May/ june 2022: Finalise design of monitoring approach

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Input would be appreciated

- What extreme events, related to ecosystem change, would be relevant to focus on, seen from a Station Manager perspective?

- Are there any experiences at stations on how local people and inidgenous peoples can be involved ?

- How can we best plan the project, so station managers (others that from the three stations already involved) can help give input on how extreme events might be addressed within CBMP monitoring plans?

Please respond the questionnaire or contact Tom Barry.

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No deliverables or milestones due

Next deliverable: 24th month, Dec.2021 - D4.2 - Report on monitoring by Indigenous and local residents of extreme weather events and other unpredictable environmental challenges and their consequences.

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Task 4.2: Progress

- A common data collection protocol was developed for many groups of respondents, adapted to different living conditions.

- The target groups were identified (indiginous people, local residents, administrative staff, *EMERCOM*, students of secondary and vocational schools)

- 500 respondents were contacted in Yamal-Nenets Autonomous okrug.
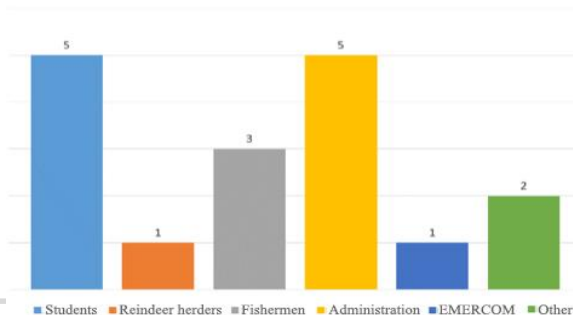
Average number of messages per respondent per month

Improved weather forecasting and understanding of events for local people

Task 4.2: Ways forward

Analysis of the following information

1. Take a picture of a weather event or its consequences.
2. Specify the coordinates or location of your shooting.
3. Describe in the comments about how the weather (extreme) event affects you. How does the weather event affect your health? How does the weather event affect your mood? Give from 0 to 5 evaluating point where 0 is no effect; 5 is the maximum effect.
4. How does the weather event affect economic activities (reindeer herding, fishing, transport)? Give from 0 to 5 evaluating point where 0 is no effect; 5 is the maximum effect.

Continue and refine monitoring

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Task 4.3 and 4.4 Progress

D4.3 Report on severe weather event case studies evaluation and implications for monitoring within INTERACT (due Month 16)

D4.4 Report on the use of INTERACT station data to understand systematic forecast errors and suggest which processes should be improved (due Month 29)
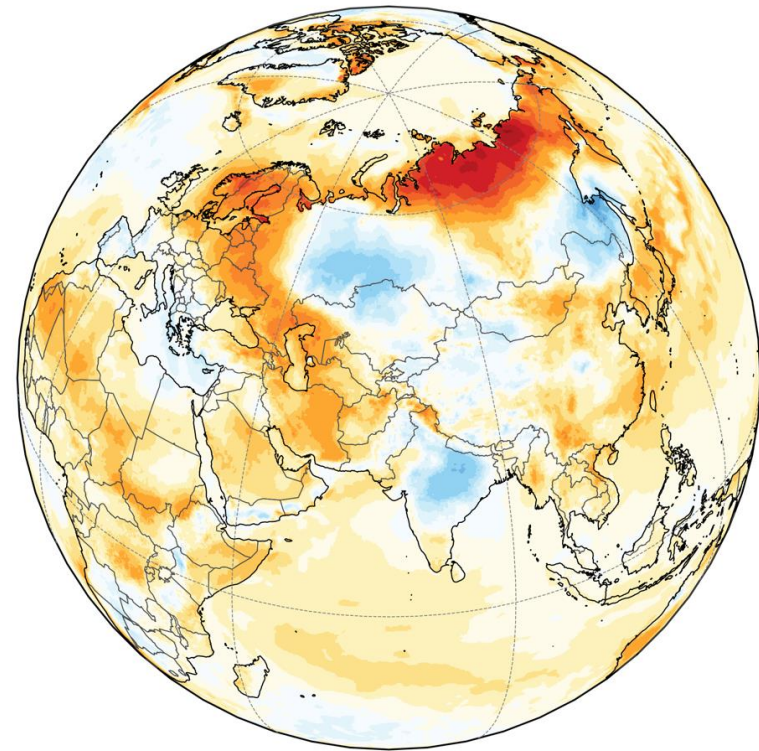
A delay of 3 months for each has been requested.
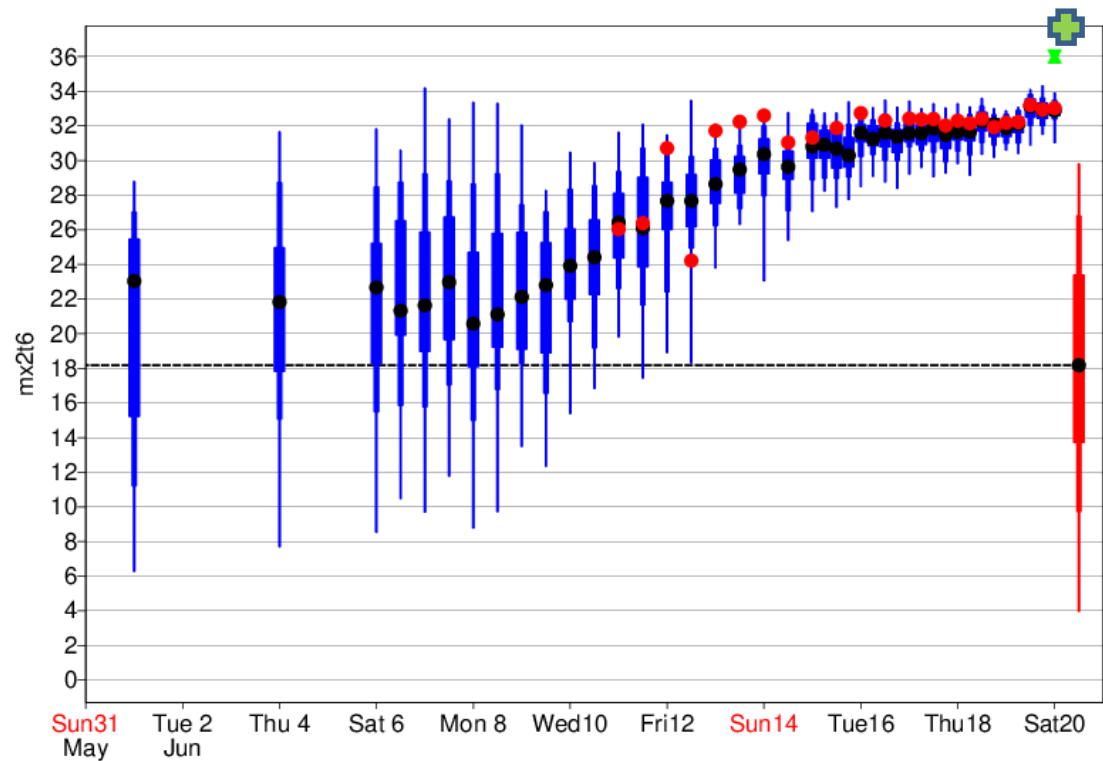
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Started evaluating performance for a number of Arctic extreme events

Surface air temperature anomaly - June 2020
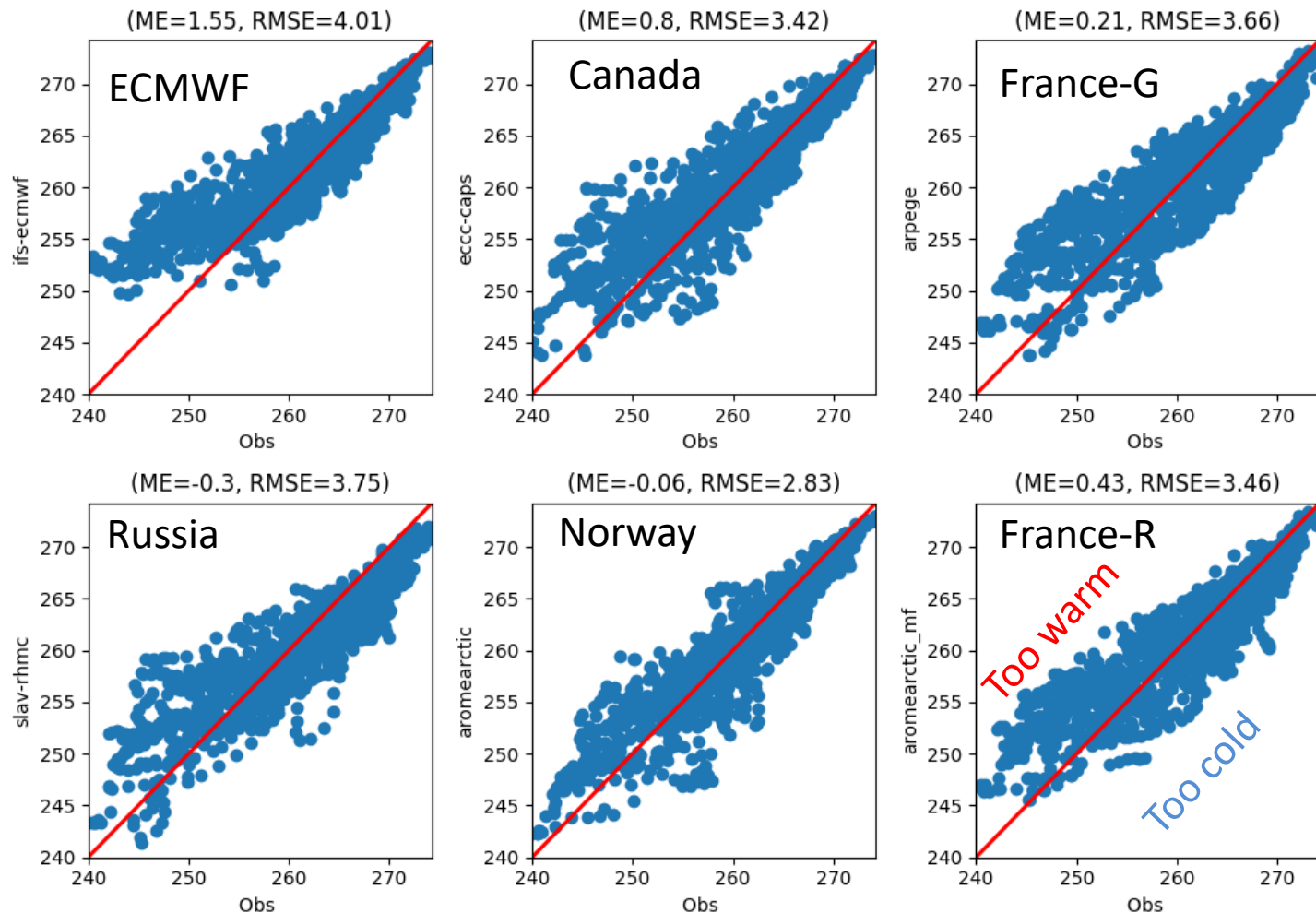[Data: ERA5. Reference period: 1981-2010]

Forecasts for Verkhoyansk, Russia

Task 4.4 using INTERACT station data to understand errors

Produced initial results for a multi-centre comparison of forecast skill at Sodankylä (making use of the YOPPsiteMIP database).

T4.3 and 4.4 ways forward

Identify case studies of relevance to biodiversity monitoring and indigenous communities to inform the focus of tasks (see questionnaire).

Increase links both within WP4 and with station managers forum (by focusing on extreme event cases of joint interest).

Continuing to build links with external projects, such as YOPPsiteMIP, to further the production of merged observatory data files (in progress for Utqiagvik, Tiksi, Sodankyla, MOSAIC, ...) to use in process-oriented model evaluation.

Year of Polar Prediction (YOPP) Supersites

White Horse
Oliktok Point
Utqiagvik
Cherskii
Sheba
Tiksi
MOSAIC
Cape Baranova
Eureka
North Pole
Alert
Iqaluit
Ny–Ålesund
Summit
Sodankylä

- IASOA
- RussianMet (soon IASOA)
- ECCC (soon IASOA)
- ocean sites

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