



APPLICATE.eu

Advanced prediction in
polar regions and beyond

Inspiring the sea ice forecasting community to co-produce knowledge

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IN A NUTSHELL

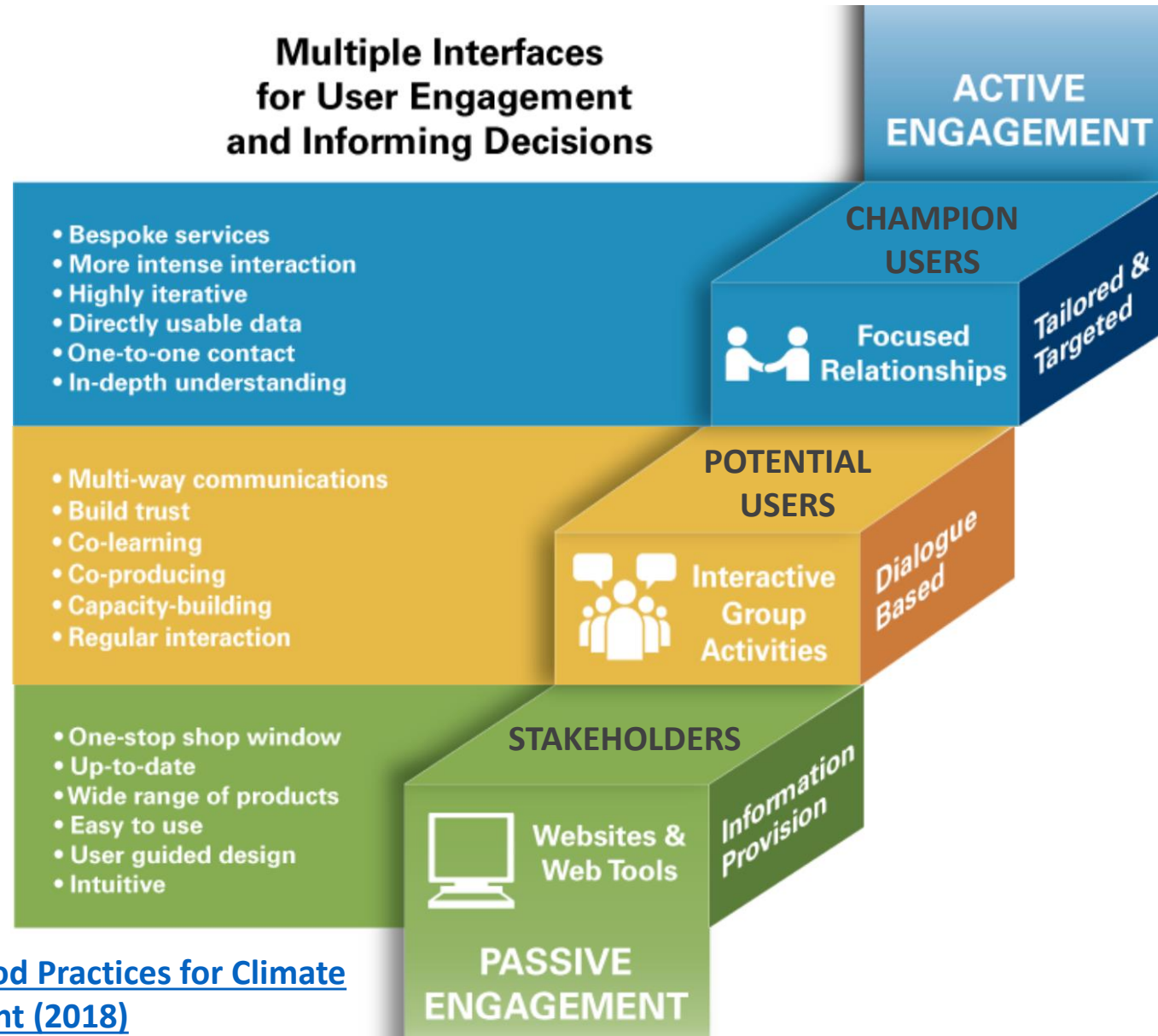
Develop enhanced predictive capacity for weather and climate in the Arctic and beyond and determine the influence of Arctic climate change on Northern Hemisphere mid-latitudes, **for the benefit of policy makers, businesses and society.**



Juha
Lakaniemi



KNOWLEDGE CO-PRODUCTION



EMPOWERMENT
CO-DEVELOPMENT



INVOLVEMENT
KNOWLEDGE EXCHANGE



ENGAGEMENT
AWARENESS RAISING

Adapted from

[WMO's Guidance on Good Practices for Climate Services User Engagement \(2018\)](#)

KNOWLEDGE CO-PRODUCTION

USER GROUP



APPLICATE ©

BLOG Polar Prediction Matters



Joonas Vola ©

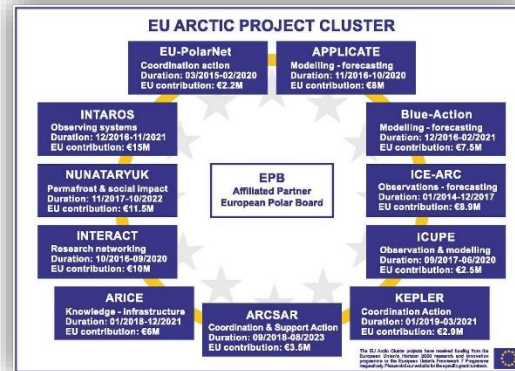


WORKSHOPS



APPLICATE ©

EU-POLAR CLUSTER/ OTHER PROJECTS



ECS



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CASE STUDIES



10 qualified representatives from:

- Scientific community and international organisations
- Public and private sector
- Society, including local and indigenous communities

Aim

- Comprehensive overview
- Advice and feedback to the project
- Help shaping data into relevant information and services

Challenges

- Find stakeholders/ Gender balance
- Equal contribution
- Sectoral & geographical coverage (bias)
- Over-generalisation
- Meetings: online vs face-to-face (relevant conferences, project GA...)
- User participation in kind vs project partners
- Need to report results back

EACH STAKEHOLDER IS UNIQUE



Search and rescue



Inuit local hunters



Sea transportation and icebreaking

There is no
▶ 'one solution that fits all'
(even within the same
sector)

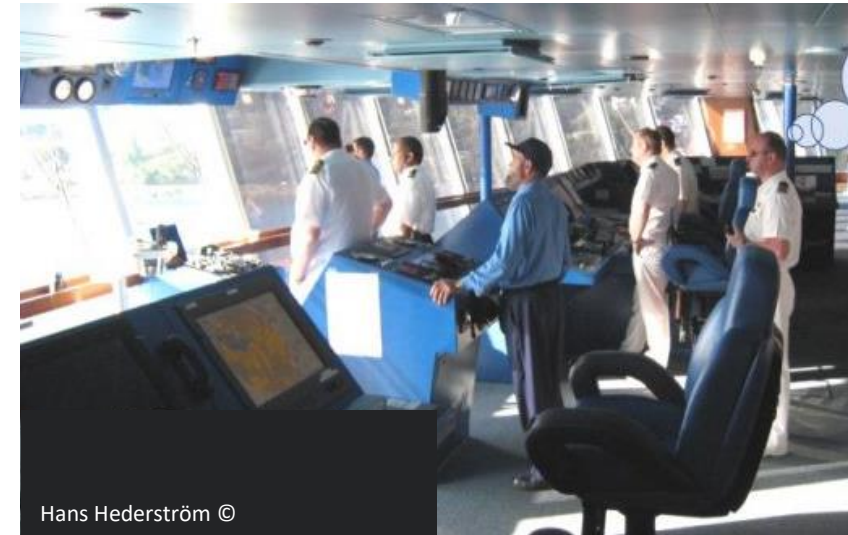
- Different backgrounds
- Different types of decisions
- Different information needs

STAKEHOLDERS MAKE DECISIONS UNDER DIFFERENT CONTEXTS

Immediate/ day-to-day decisions
‘Survival’
Almost real-time tools
documenting ice conditions



SIKU Project ©



Hans Hederström ©

Long-term regulatory
and planning decisions
Climate change adaptation
policies
Projections for the end of the
century



The Northern Forum©

Short- and mid-term
operational/management
decisions
Optimization of navigation costs
Sea ice predictions for next weeks and
months

Particular **EXTREME** events of the past Arctic weather and climate with an **IMPACT** on specific aspects of the society or the economy of Arctic regions and beyond (identified by stakeholders)

- **Communicate** how project outputs are useful for different stakeholders (moving from models or data to decision-making)
- **Collaborate with stakeholders** by integrating their knowledge and experience (co-production)
- **Showcase the utility of weather, climate and sea ice predictions** (i.e., how this information would have been useful if available in the moment of the event)
- Compare the impact of the decisions taken **with and without the use of predictions**
- Identify **research gaps**

CASE STUDY: Winter cold spell impact on the energy market

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ENERGY CASE STUDY



HOW DOES ARCTIC SEA
ICE AFFECT ENERGY
PRODUCTION IN MID-
LATITUDES?

CHAIN OF EVENTS

1. Historical low sea ice concentration in the Barents and Kara (BK) seas.

During November and December 2016, extreme warm temperatures were observed in the Arctic. As a result, the total Arctic sea ice extent experienced a historical low value, with negative anomalies⁴ in most of the Arctic, but especially strong in the BK seas (Acosta Navarro et al. 2018). According to existing records, a breakpoint in sea ice loss (i.e., an accelerated decline) over the BK seas took place in the early 2000 (Close et al. 2015). In the last decade several studies have found causal links between low Arctic sea ice cover in the late autumn and extreme climate anomalies in the following winter in mid-latitudes (Cohen et al. 2014, Screen et al. 2018). In the framework of the APPLICATE project, retrospective forecasts⁸ with the EC-Earth3 climate model (Doblas-Reyes et al. 2013) were performed to attribute the role of extremely reduced Arctic sea ice conditions (mostly over BK) with regard to the extremely low precipitation event in Europe in winter 2016-2017 (Acosta Navarro et al. 2018; see Fig.1).

1
Winter sea ice concentration

Historical low winter sea ice in the Barents and Kara seas

2
Cold spell

Atmospheric blocking over Europe responsible for:

- Cold spells
- Lower precipitation
- Lower wind speed

3
Energy demand

Increase in energy demand and lower than usual hydro and wind power generation

GLOSSARY

A

Anomaly: difference between the sea ice extent, area or concentration at a given time and the long-term average. When it is negative, an anomaly indicates there is less ice than average for a given month.

B

Retrospective forecast: refers to a forecast made for a period of the past using only information available before the beginning of the forecast.

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Find other case studies at:
<https://applicat.eu/outreach/case-studies>

Energy Transition The Global Energiewende

France can't meet its own power demand

by Craig Morris
20 Jan 2017

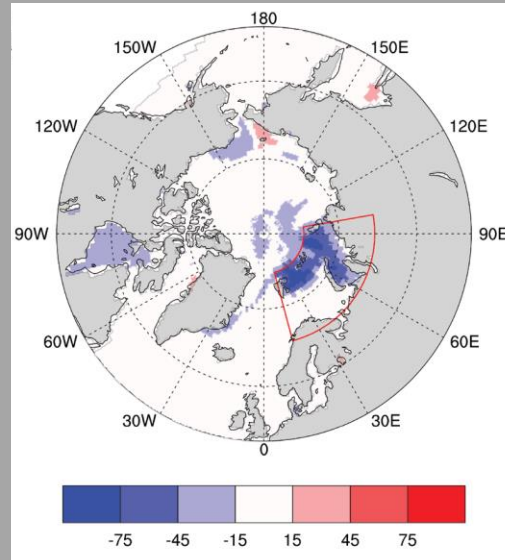
As expected, France was heavily dependent on power imports during the first cold spell of this winter. Yet, most of the country's reactors are back online. The US is now also investigating 17 reactors with parts from France that could also be defective. Craig Morris has the details.



A cold snap in France and nuclear shutdowns (Photo by Flavio Ensiki, edited, CC BY 2.0)

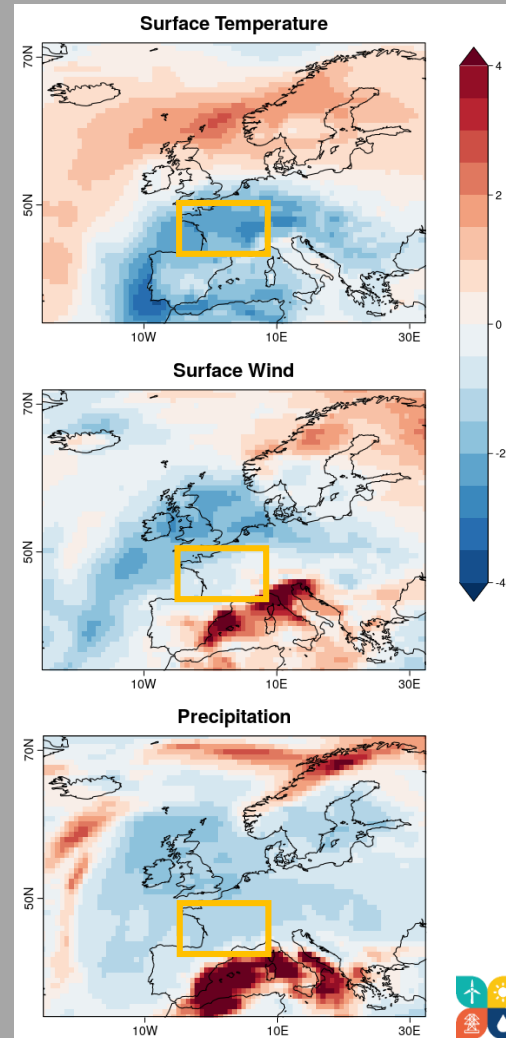
CASE STUDY: Winter cold spell impact on the energy market

Sea ice concentration anomaly
Barents and Kara Seas Nov-Dec 2016



Acosta-Navarro et al. (2018)

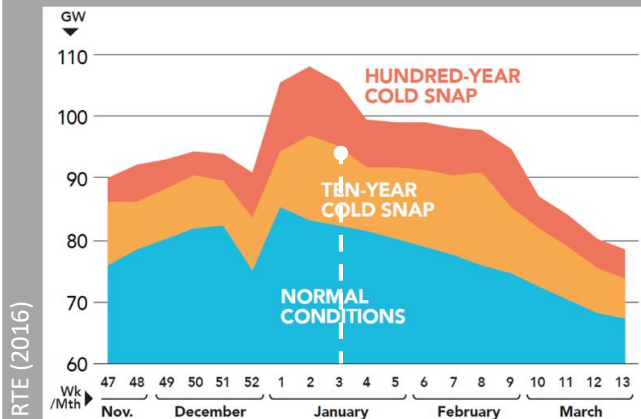
Cold spell + Lower-than-normal resources
for renewable energy production
France third week Jan 2017



Pechlivanidis et al. (2018)



Peak energy demand - France winter 2016-17



- Suggests that a **high reduction of Arctic sea ice has favoured a record-breaking low precipitation and wind speed** over parts of western Europe
- **Contributes to understand the linkages** between the Arctic and mid-latitudes
- Once better understood, future forecasts of extremely low sea ice extent (that also relate with forecasts of electricity demand and supply) could be **potentially valuable for adaptation and for assessing risk for the European energy systems**

WHAT CAN THE SEA ICE FORECASTING COMMUNITY LEARN?

- Frame research in the right way to **provide solutions** to real-world challenges
- Provide information that answers the **needs of stakeholders** (timely, in adequate format, etc.)
- Develop **skills to communicate** scientific results to people beyond academia

Taking our knowledge to society: The case studies

The case studies focus on **extreme events of Arctic weather and climate** on different time scales, and their **impact on a specific aspect of society or daily life** in the Arctic and beyond. **Severe Weather Europe** has a good collection and documentation of unusual weather events in Europe. Visit the [APPLICATE website](#) for examples of case studies done by the project so far.

➔ Renewable energy

➔ Health in the Arctic

➔ Safety/Insurance issues in the Arctic

➔ Biodiversity and conservation

➔ Local infrastructure

“Having to explain my work to someone else helped me to have a clearer idea of what I was doing and why and see how this work could also be useful for society”

Thank you!

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Blog Polar Prediction Matters: <https://blogs.helmholtz.de/polarpredictionmatters/>

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