

APPLICATE energy case study

Understanding linkages between
the Arctic and mid-latitudes

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**Barcelona
Supercomputing
Center**

Centro Nacional de Supercomputación

IN A NUTSHELL

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





USER ENGAGEMENT

USER GROUP



BLOG Polar Prediction Matters



ONLINE COURSE 2019



WORKSHOPS



EU-ARCTIC CLUSTER



CASE STUDIES

IN THE MEDIA



Work from Ivana Cvijanovic, Research Scientist and Beatriu de Pinós fellow at BSC

<https://www.highnorthnews.com/en/loss-arctic-sea-ice-affects-weather-europe-and-north-america>

CASE STUDIES

- ▶ **Past events of relevance** for stakeholders (affecting their business, activities, etc.)
- ▶ **Showcase the utility of enhanced weather, climate and sea ice prediction** (i.e., how this information would have been useful if available in the moment of the event)
- ▶ Illustrate how to **move from model outcomes to decision-making**
- ▶ Useful to identify **research gaps**

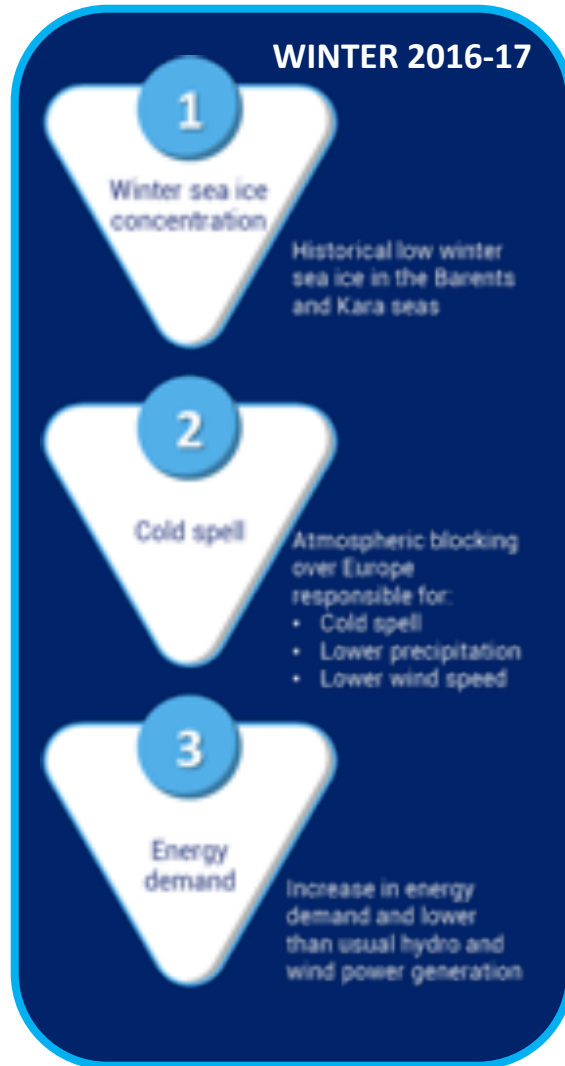
CASE STUDY



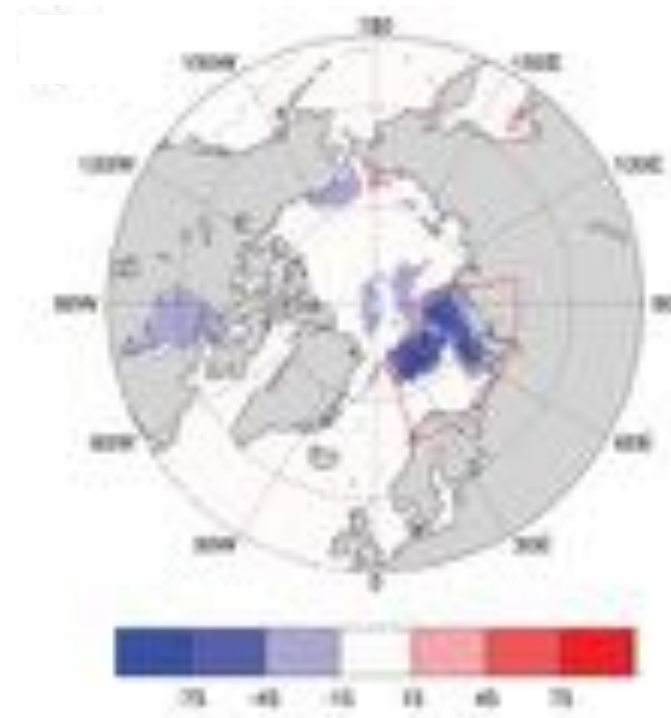
- ▶ Winter 2016: event **identified as relevant** by stakeholders in the energy sector
- ▶ Joint effort between **climate scientists, social scientists and science communication specialists** taking part in the consortium in collaboration with the **S2S4E project**

- ▶ Policy makers
Big energy associations (EWEA, IRENA, AREA...)
Global networks of TSOs (ENTSO-E...)
Others?

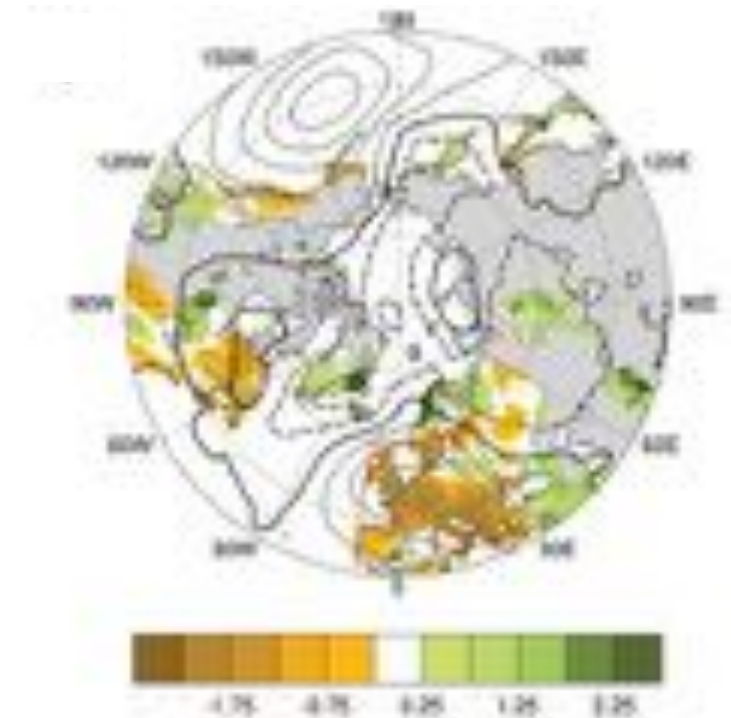
CASE STUDY



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



Sea ice concentration anomaly Nov-Dec 2016
relative to the average for 1980-2015



Dec 2016 standardized anomalies for **total precipitation** (colour) and sea level pressure (contours)

CASE STUDY

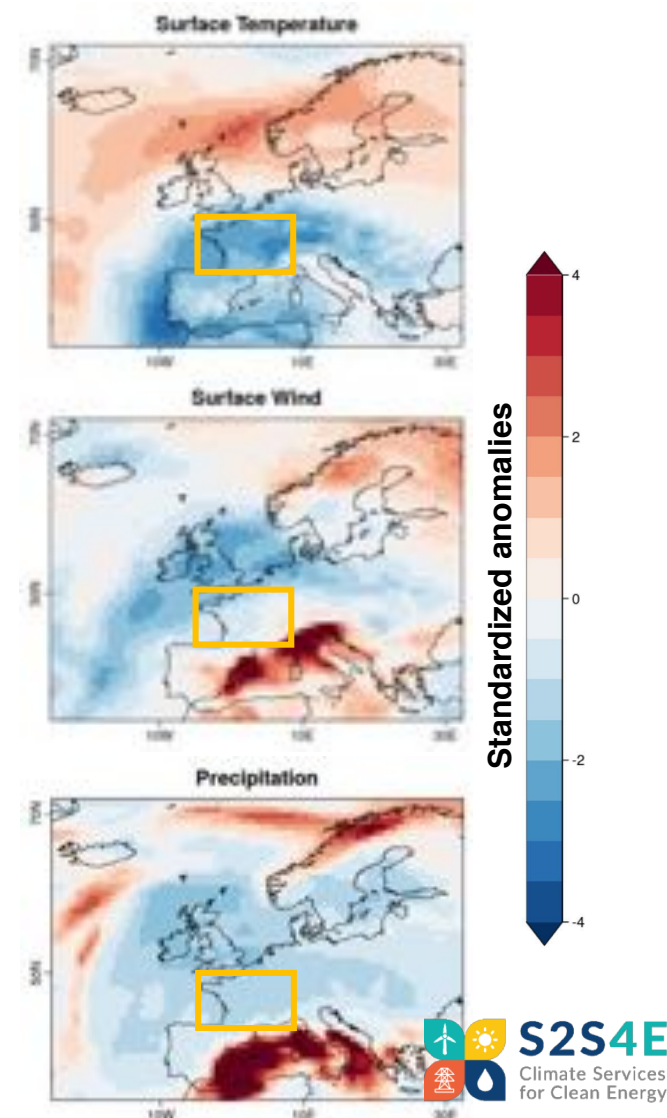


2. Cold spell over Europe

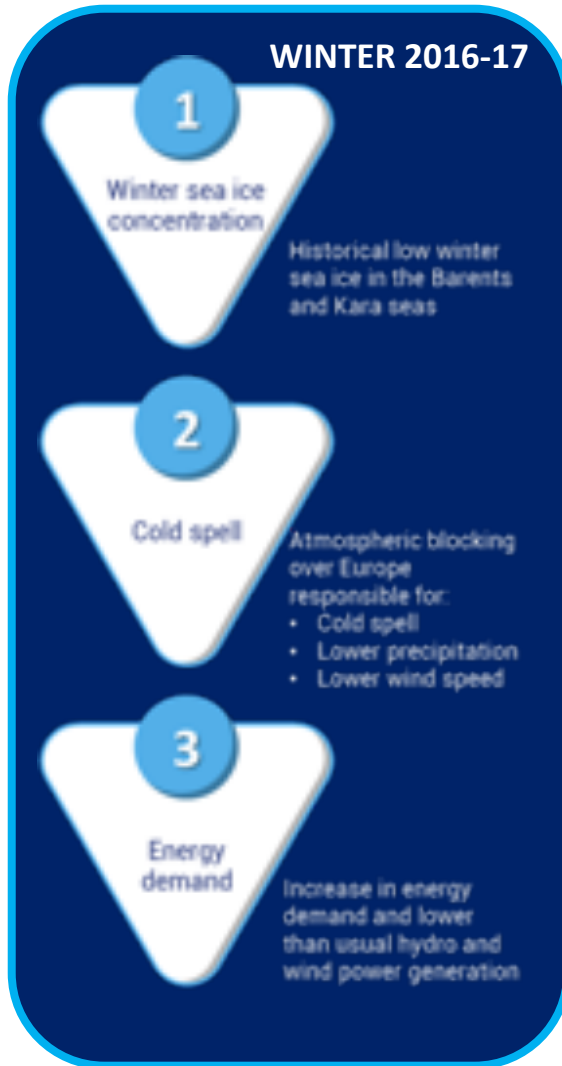
- ▶ **Lowest total precipitation since 1901** (Acosta Navarro 2018)
- ▶ **Least windy winter months of last three decades** (Vautard et al. 2017)

Temperature, precipitation and wind speed anomalies in the third week of January 2017 (17-23 Jan) relative to the average for 1980-2015

Source: *Pechlivanidis et al. 2018*

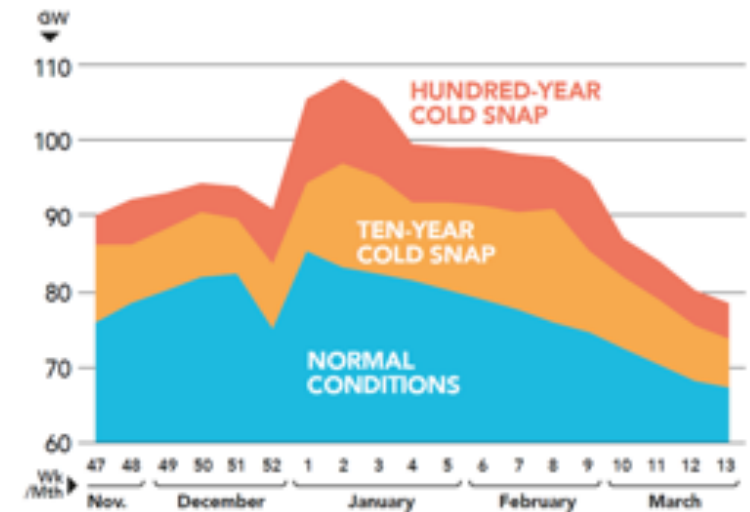


CASE STUDY



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

- ▶ **Increase of demand** in France, since most the domestic heating systems feed on electricity
- ▶ Electricity consumption **peaked at 94 GW at 7pm on 20 Jan** (third highest peak ever recorded in France)
- ▶ Cold spell + nuclear shutdown = **energy security risk** with restrictions and energy import from neighbouring countries



▶ **Peak electricity demand (GW) for winter 2016-17 in France.** The event recorded in the third week of Jan corresponded to a once in ten year cold spell occurrence (under normal conditions: 85 GW in Jan)

CASE STUDY

OUTCOMES

- ▶ Suggests that a **high reduction of Arctic sea ice has favoured a record-breaking low precipitation and wind speed** over parts of western Europe
- ▶ APPLICATE **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**

DOWNLOAD case study:

<https://applicate.eu/news/221-effects-of-arctic-sea-ice-on-energy-production-in-mid-latitudes>

NEXT CASE STUDIES

- Heatwaves/fires
- Rain on snow/landslides & reindeer husbandry
- Policy brief: optimal locations to describe variability in Arctic sea ice
- Insurance
- Biodiversity

Thank you!

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APPLICATE.eu 
Advanced prediction in
polar regions and beyond



The projects participating in this presentation have received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n° 727862.

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