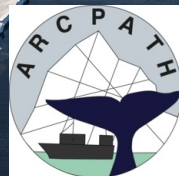




# *Climate predictions: Pathways to resilient, sustainable societies*

Noel Keenlyside

*Geophysical Institute, University of Bergen  
Nansen Centre for Environmental Research*



# Building world leading competences in the Nordic region

BJERKNES CENTRE  
for Climate Research



**Climate predictions**  
Knowing better how climate will be  
during the next month to years ahead



**Climate Services**  
Providing the information as it is useful  
to the society

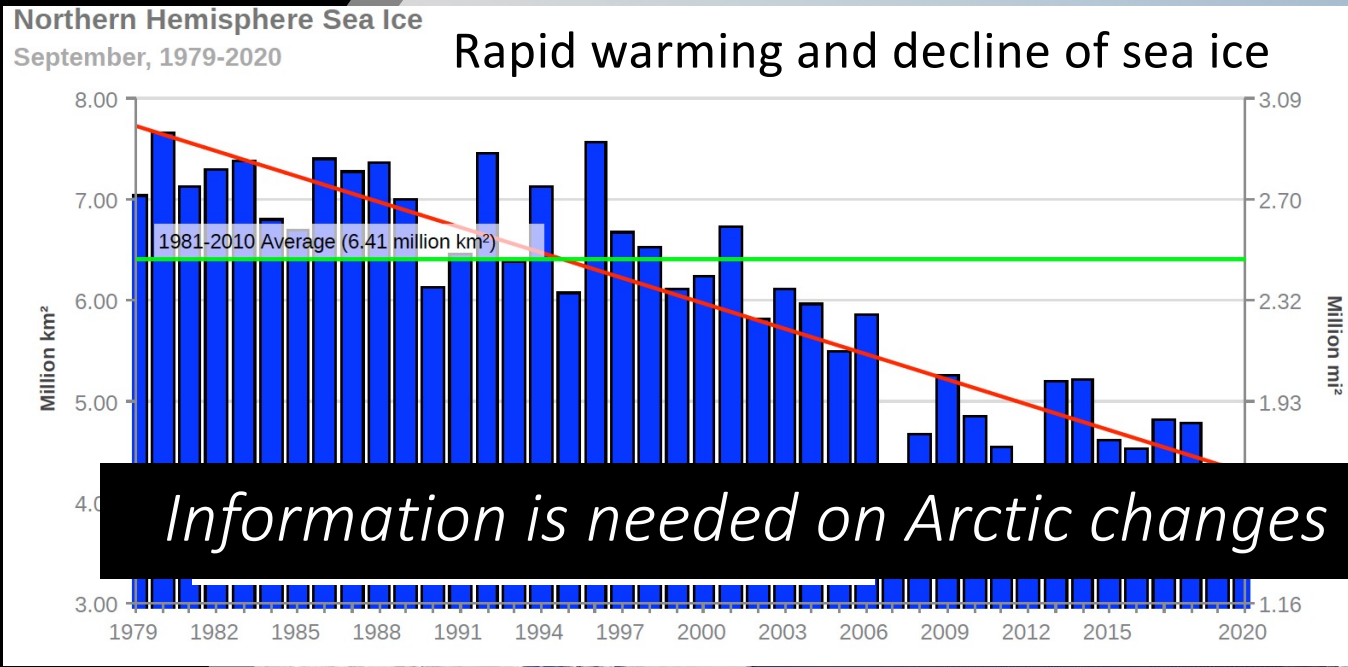


**Building a resilient society**



BjerKNES Climate Prediction Unit  
<https://bcpu.w.uib.no>

Geophysical Institute, University of Bergen



*Information is needed on Arctic changes over the next few years*

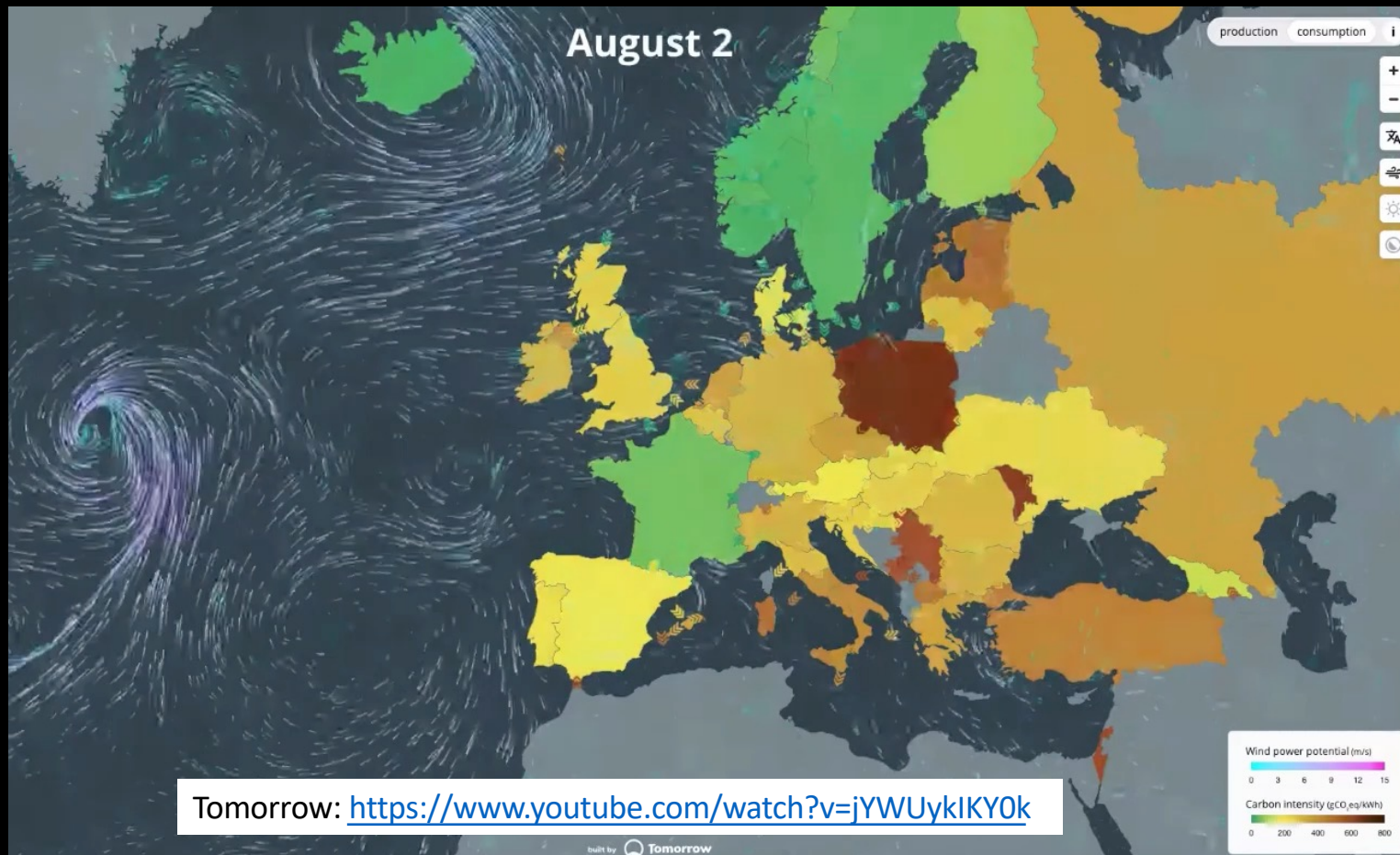




# Reaching carbon neutral economy

Challenges related to energy production and demand, and weather and climate

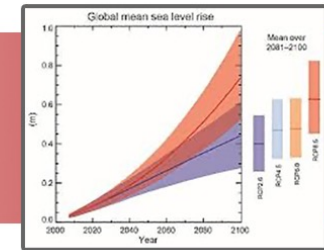
Wind power potential and carbon intensity for August 2020



Tomorrow: <https://www.youtube.com/watch?v=jYWUykIKY0k>



# CLIMATE PREDICTION



day

week

month

season

year

decade

century

Weather  
predictions

Seasonal to  
interannual  
predictions

Long term  
climate change  
projections

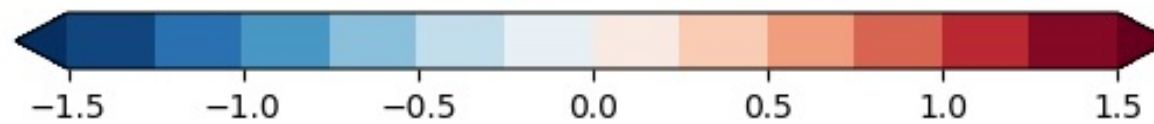
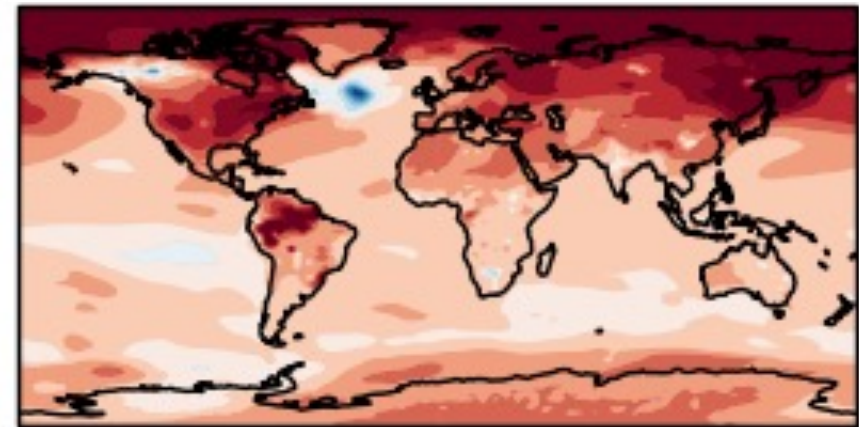
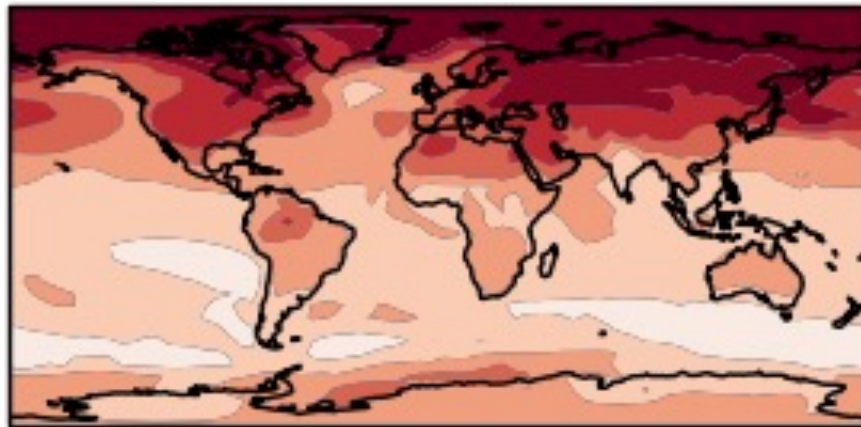


## We predict a continuation of the North Atlantic “Cold Blob”

*Pre-operational Predictions for surface temperature for 2020-2024*

Multi-model average

Norwegian Climate Prediction Model



Anomalies from 1971-2000 (K)

<https://hadleyserver.metoffice.gov.uk/wmolc/>

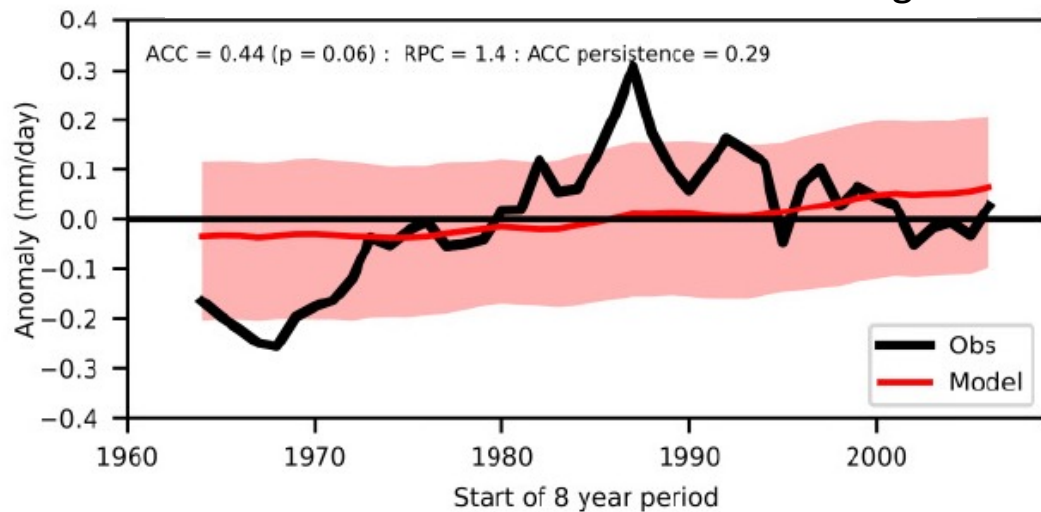


## European climate is more predictable than we thought!!

Predictions for Northern European winter precipitation for forecast years 1 to 9.

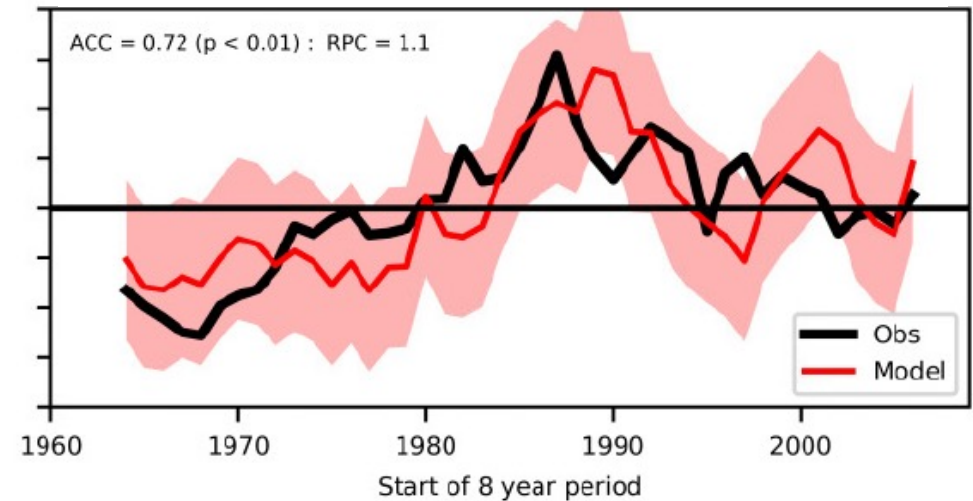
*Traditional approach prior 2020*

Standard multi-model ensemble average



*Novel approach*

Calibrated multi-model ensemble predictions

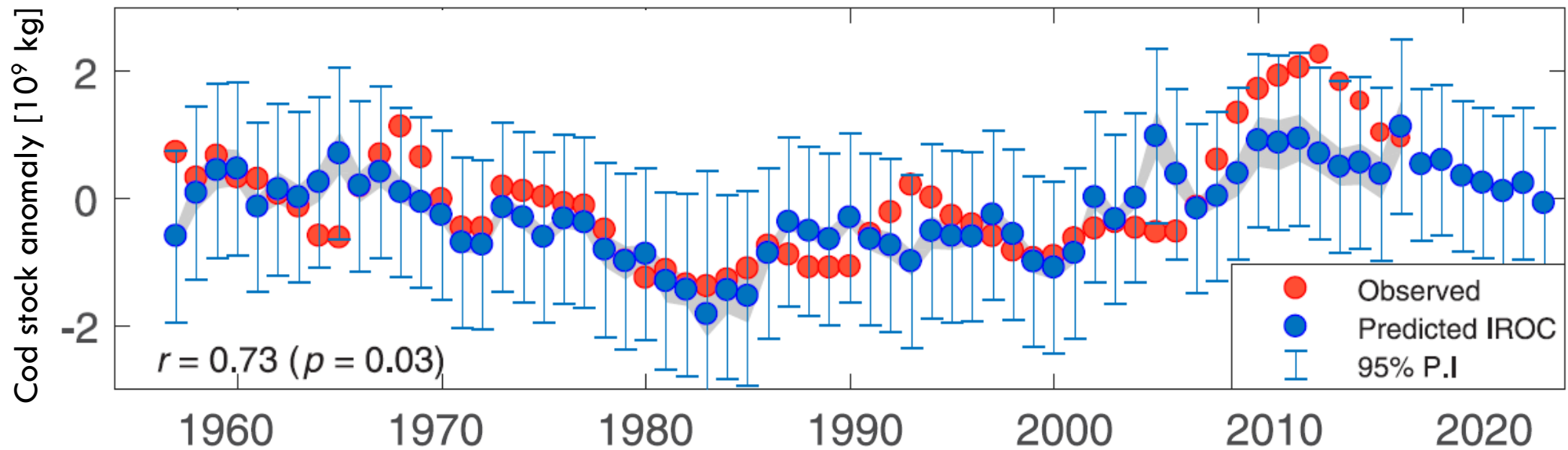


Smith, et al. *Nature* 2020



## Cod in the Barents Sea can be predicted years in advance based on ocean conditions in the Gulf Stream

Statistical predictions based on oceanic conditions seven years earlier and 1000's of km up stream in the North Atlantic



What next?



To develop realistic digital twins to monitor and predict change for the benefit of society



*Thank you*



<https://greenice.w.uib.no>



<https://ncoe-arcpath.org>

Bjerknes Climate Prediction Unit: <https://bcpu.w.uib.no>

