BJERKNES CENTRE
for Climate Research

Erik Kolstad

# Climate risk prediction – challenges and benefits for the society

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# Climate risk

Table from the World Economic Forum's *Global Risks Report 2020*

Top 10 risks in terms of
**Likelihood**

1. Extreme weather
2. Climate action failure
3. Natural disasters
4. Biodiversity loss
5. Human-made environmental disasters
6. Data fraud or theft
7. Cyberattacks
8. Water crises
9. Global governance failure
10. Asset bubbles

Top 10 risks in terms of
**Impact**

1. Climate action failure
2. Weapons of mass destruction
3. Biodiversity loss
4. Extreme weather
5. Water crises
6. Information infrastructure breakdown
7. Natural disasters
8. Cyberattacks
9. Human-made environmental disasters
10. Infectious diseases

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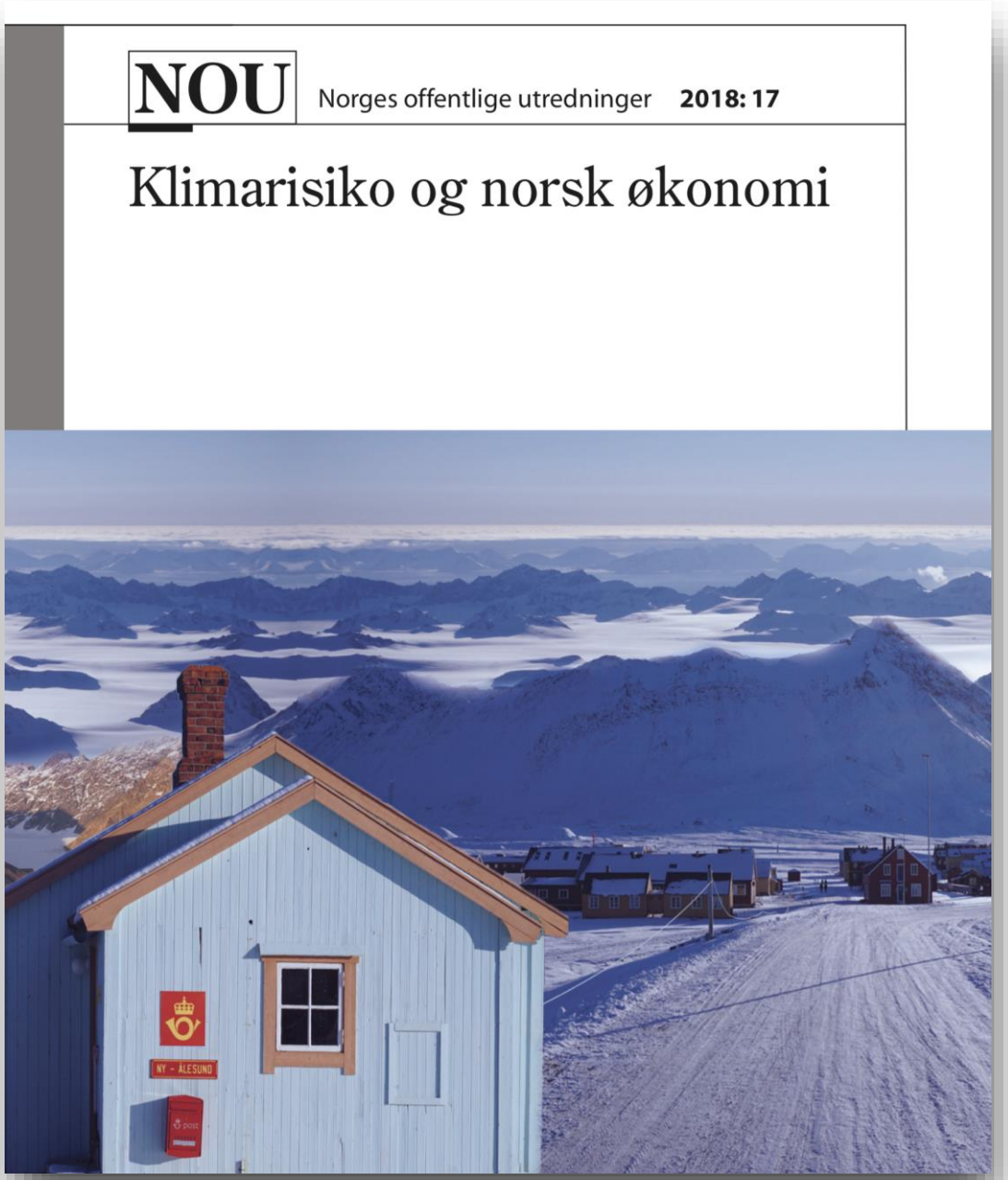
# Climate risk in Norway

- The Norwegian Climate Risk Commission warned that climate risk is inadequately managed due to knowledge gaps and deficiencies in the decision-making processes of businesses and public authorities

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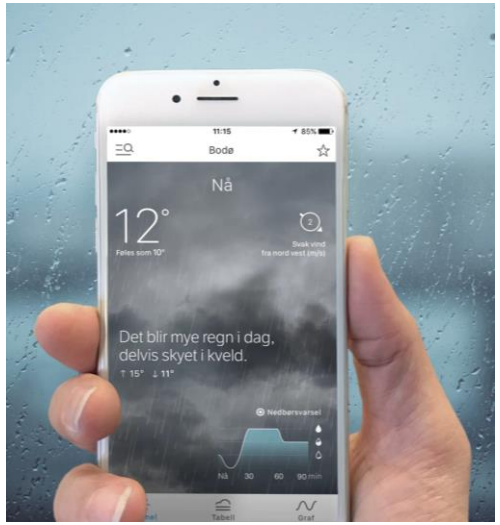
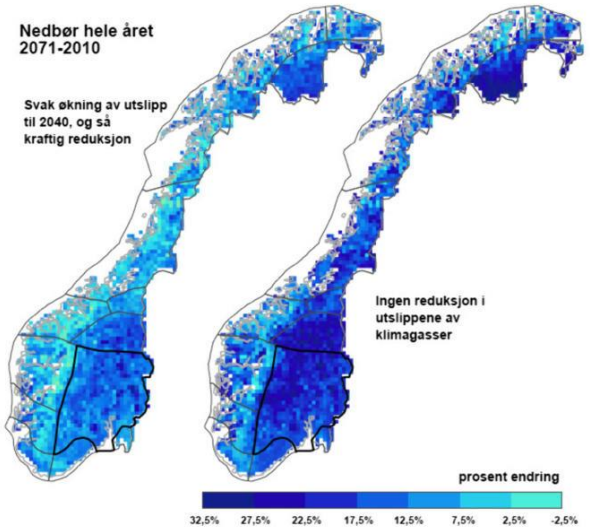
# Concept

*Weather forecasting*




The horizon between 10 days and 10 years into the future suffers from a lack of tools for planning for different weather and climate scenarios

*Climate projections*




0 days | 10 days | 10 years | 100 years

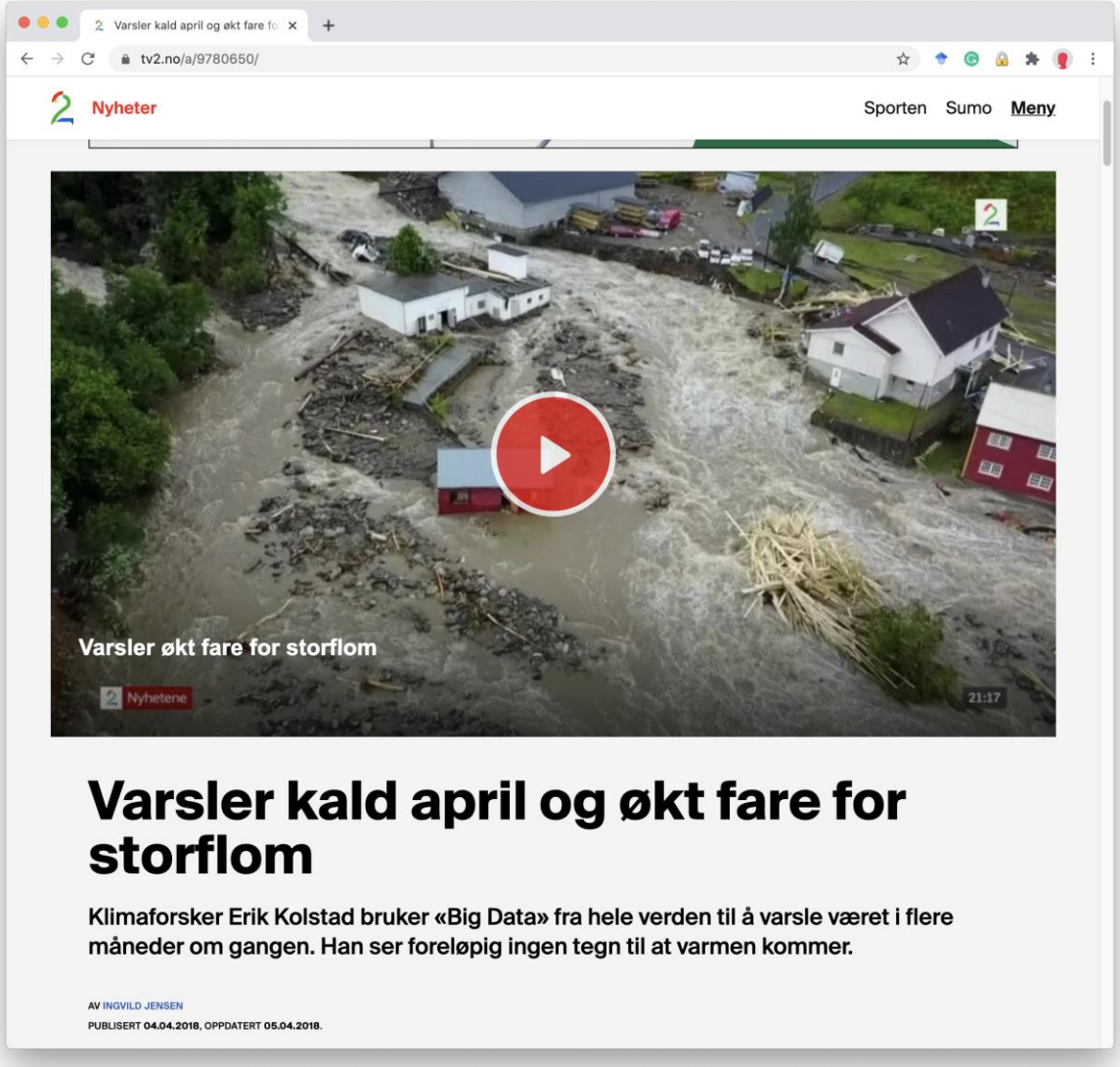
**Time horizon**

# Climate Futures

- A new Center for Research-based Innovation (SFI in Norwegian), funded by the Research Council of Norway
- Research partners: NORCE, University of Bergen, NERSC, Norwegian Computing Center, MET Norway, Norwegian School of Economics (NHH), SNF, and Statistics Norway (SSB)

# Resilient societies

- In 2018, a Tryg forsikring press release warned of increased flood risk in eastern Norway, based on seasonal temperature forecasts and large snow amounts in the mountains
- In 2020, NVE warned of greatly increased flood risk for the same reasons



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# Sustainable food production

- Farmers are prone to frost damage, flooding, rain during harvesting and many other weather-related hazards
- The drought in 2018 cost more than 2 billion NOK and extreme wildfire hazard
- We plan to develop an Yr-like tool for farmers for more than 10 days ahead

SJEKKET SKADENE: I starten av august var landsbruksminister Jon Georg Dale og statsminister Erna Solberg på gården til Lars Egil Lauten.
Foto: Hallgeir Vågenes, VG

## Bøndene får 525 millioner kroner i krisepakke etter tørkesommeren

**Bondeorganisasjonene og staten er blitt enige om en krisepakke på 525 millioner kroner.**

Av VAKTSJEF@NTB.NO
30. august 2018

# Renewable energy

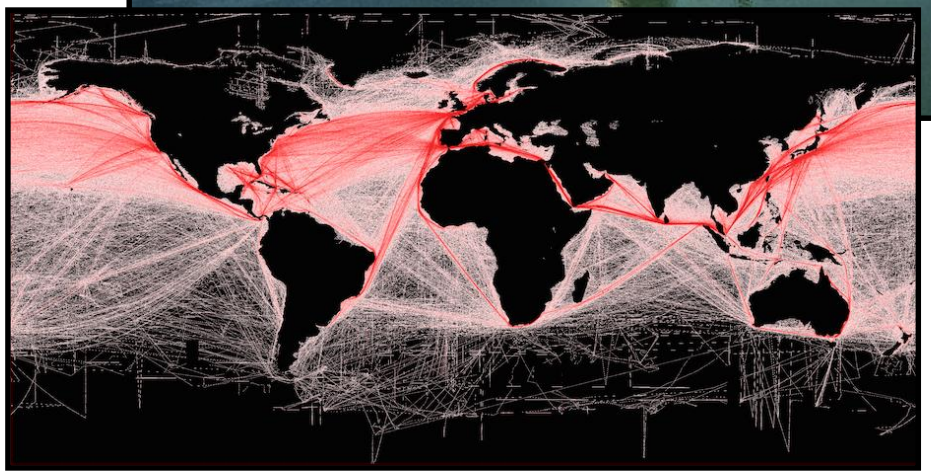
BKK

- Production planning, supply and demand estimations etc. are already heavily based on long-range weather prediction
- Our aim is to improve the prediction skill, and also to help companies incorporate predictions in their planning

# Smart shipping

G2 Ocean

- More accurate predictions beyond 10 days ahead can be used to optimize routing and avoiding extreme weather
- Better predictions several years ahead can allow foresight into trends in transport needs



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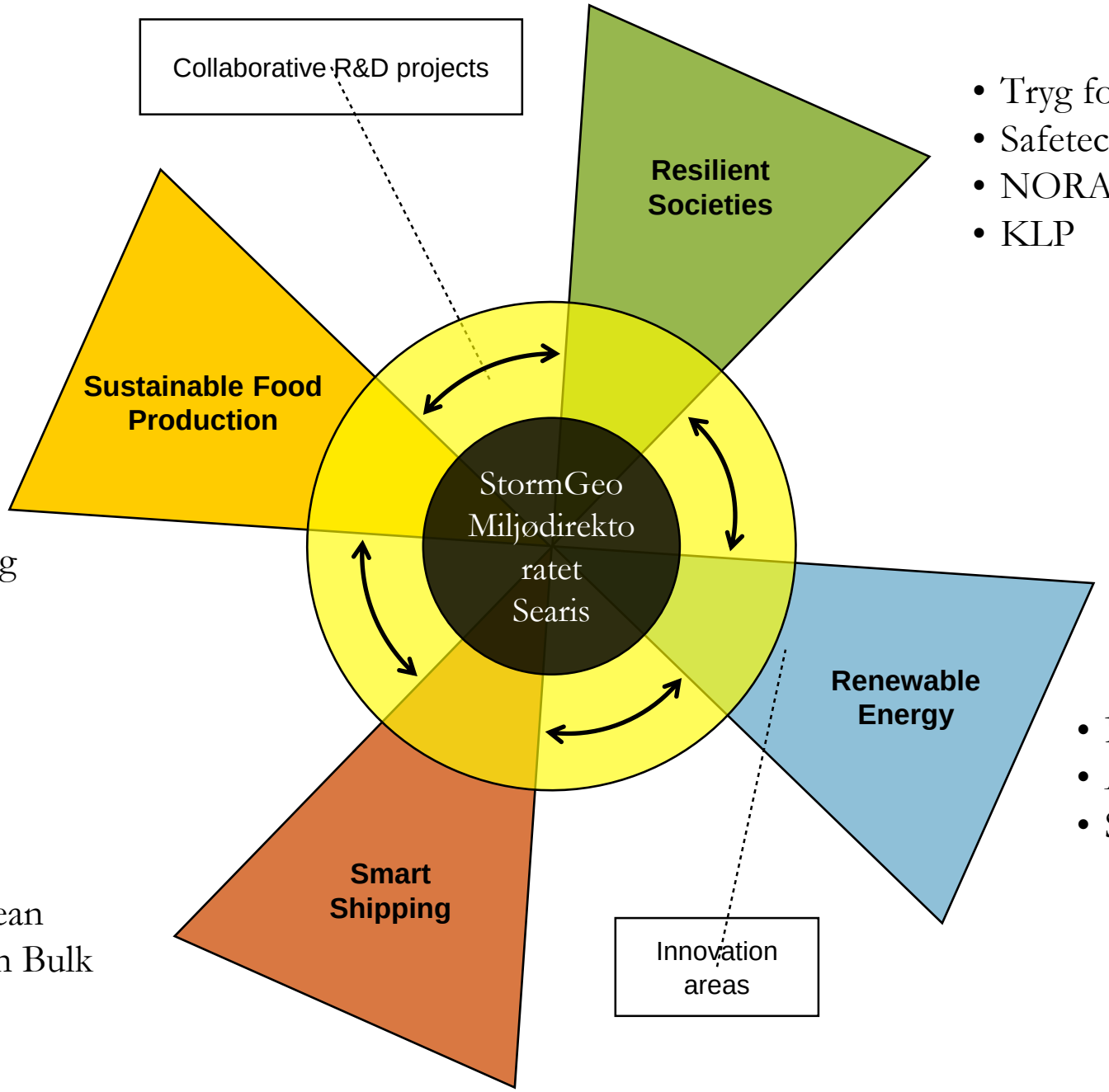
- Vestland FK
- Rogaland FK
- Viken FK
- Graminor
- Gartnerhallen
- Norges bondelag
- All 10 county governors
- Eide fjordbruk
- Norsk landbruksrådgiving




- Tryg forsikring
- Safetec
- NORAD
- KLP

- BKK
- Agder Energi
- Statkraft

- G2 Ocean
- Western Bulk

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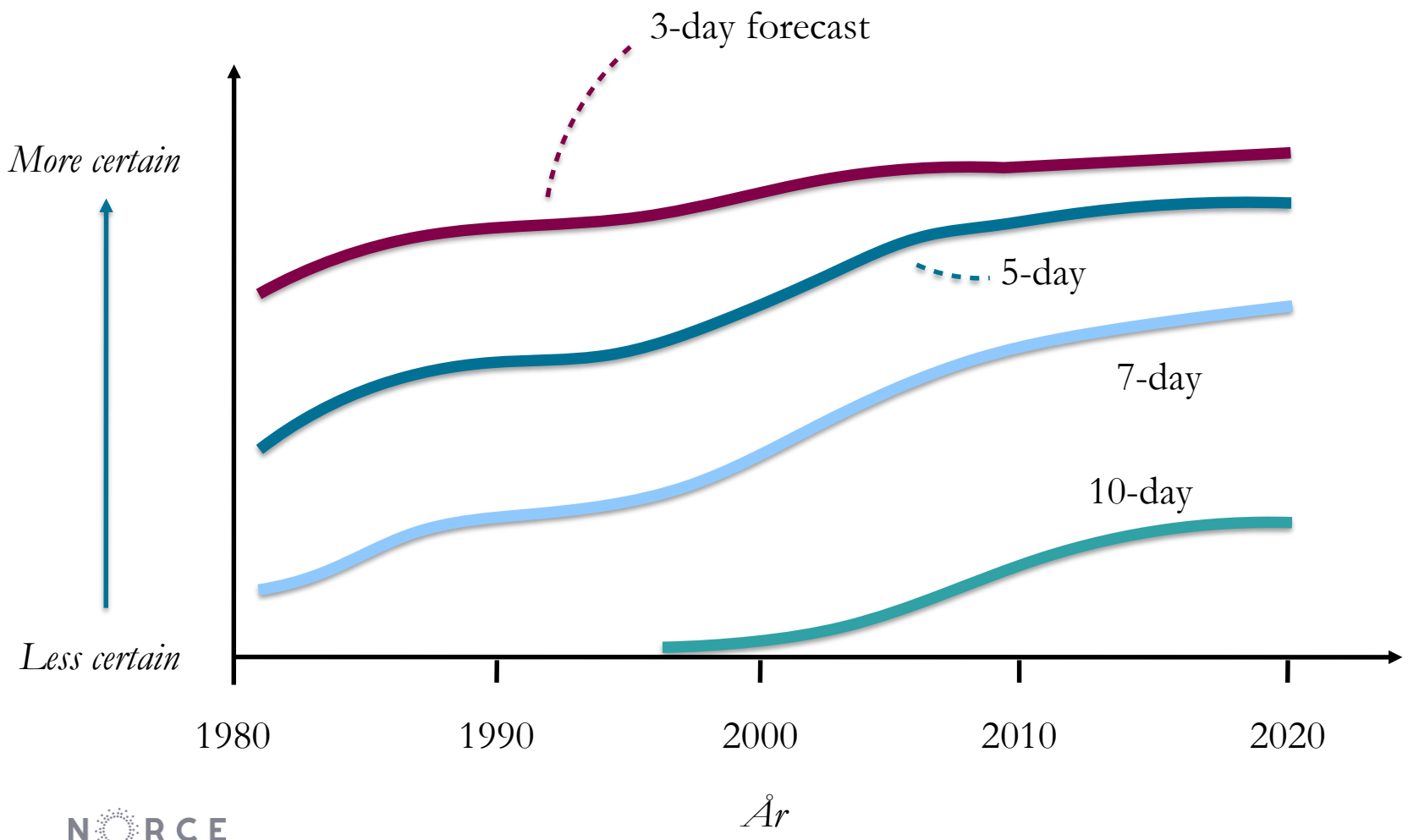
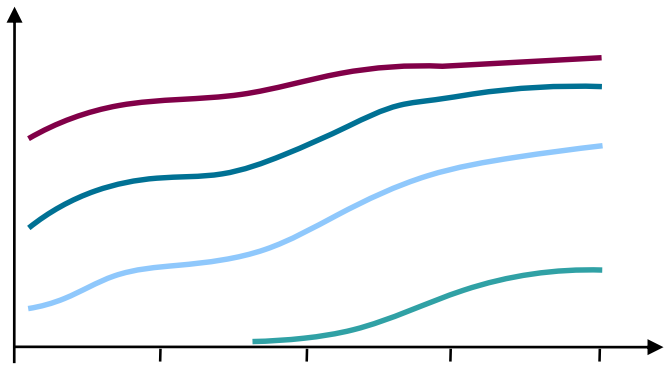
# The time is ripe for climate prediction




The skill of forecasts up to 10 days has increased dramatically, but the chaotic nature of the weather system makes it unrealistic to forecast beyond that

# How to overcome chaos?



These advances are due to a combination of model improvements, more available data (observations, satellite data) and more computing power

The large uncertainty of long-range forecasts prohibits deterministic forecasts (like on Yr), forcing us into probability space

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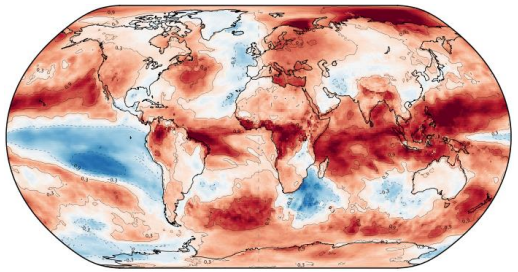
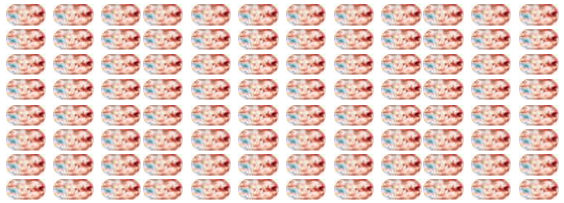
# Method

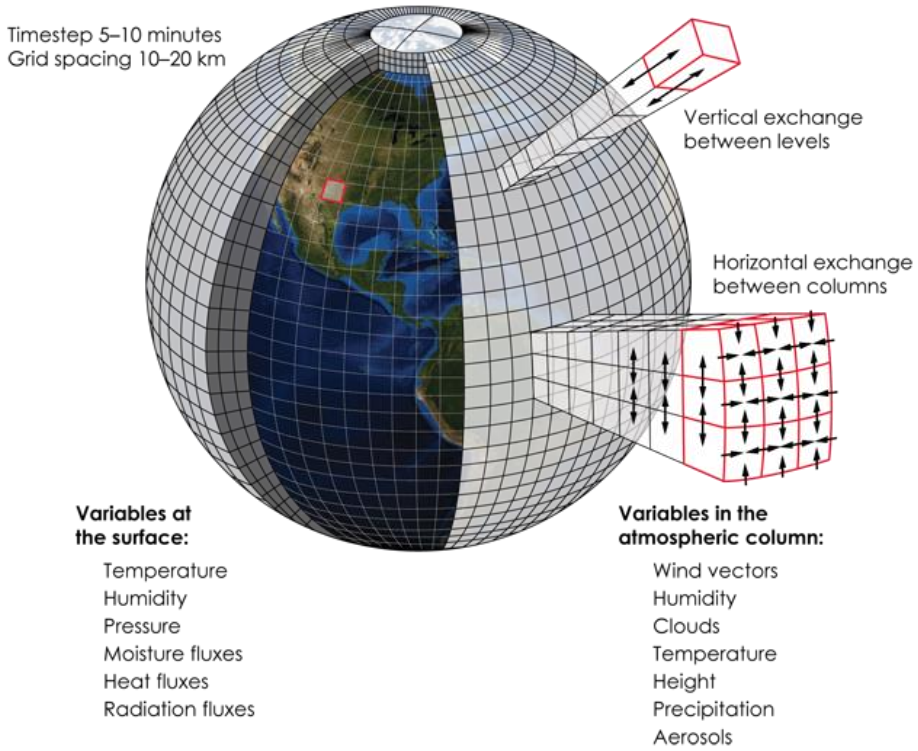
These are used to forecast temperature, rainfall etc.



We use hundreds of simulations



Our starting point is physical models representing the climate system

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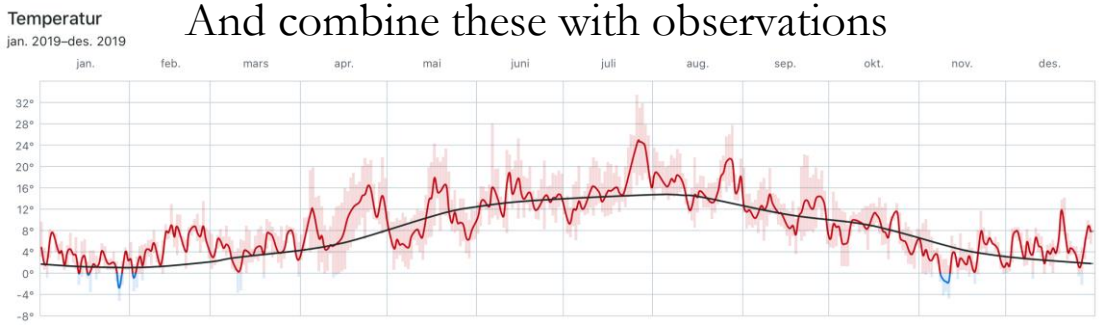


And combine these with observations

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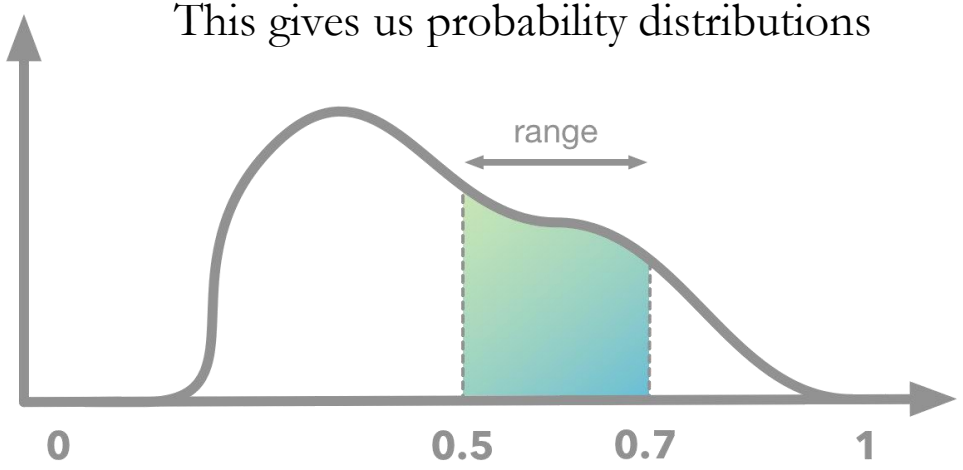
This gives us probability distributions

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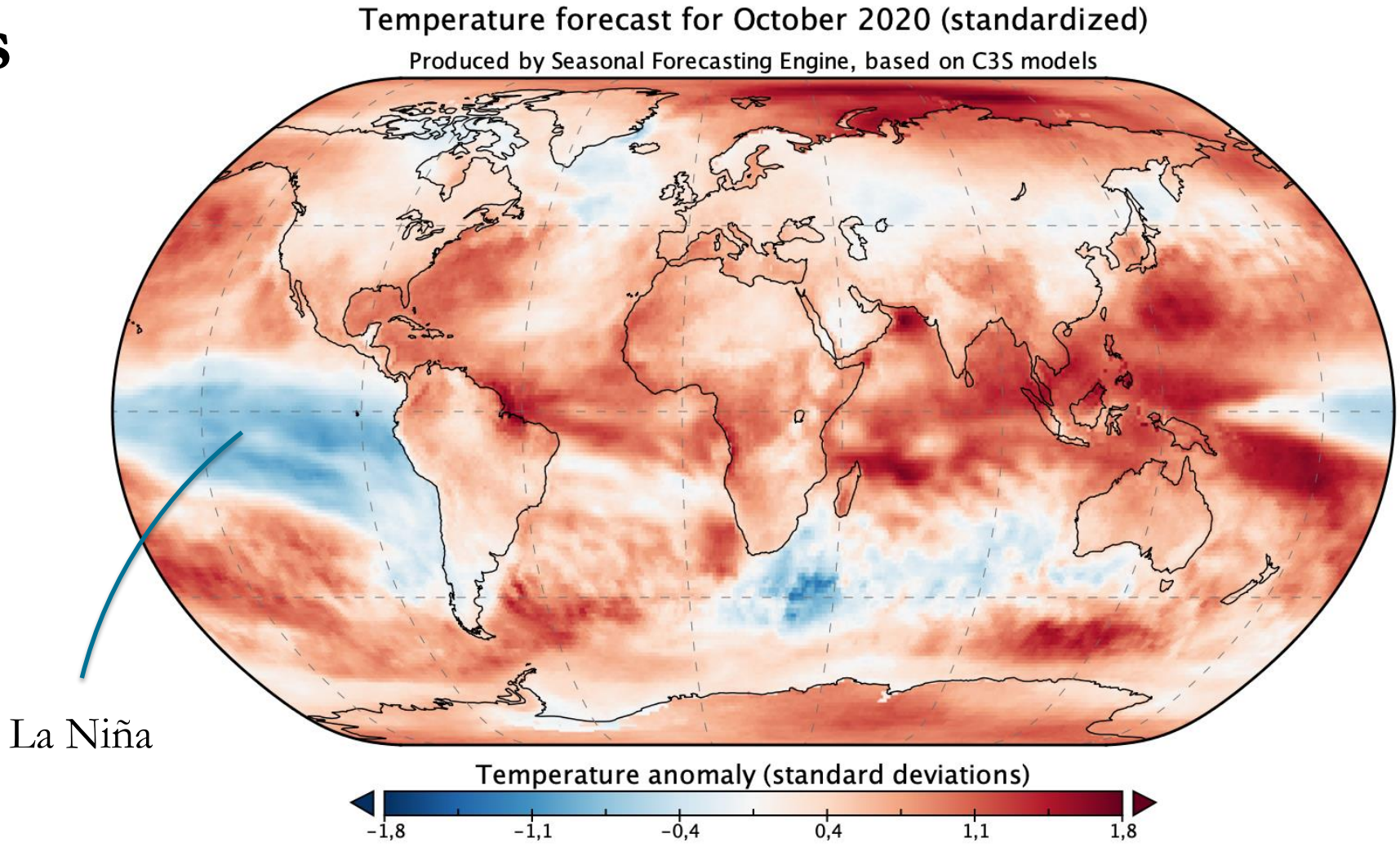
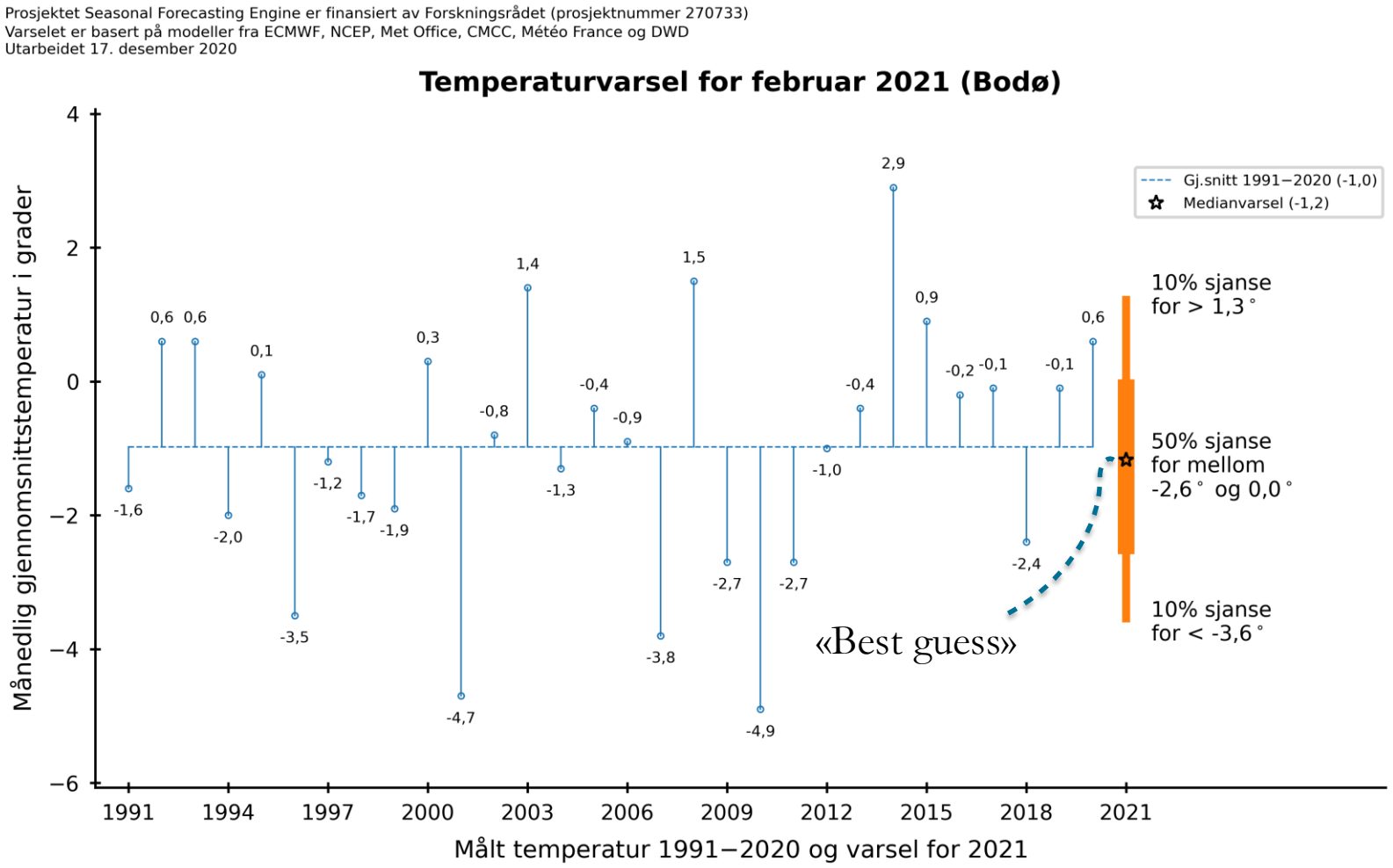
# Global forecasts

- The models we use cover the entire globe
- The picture shows our temperature forecast for October 2020, shown as deviations from normal

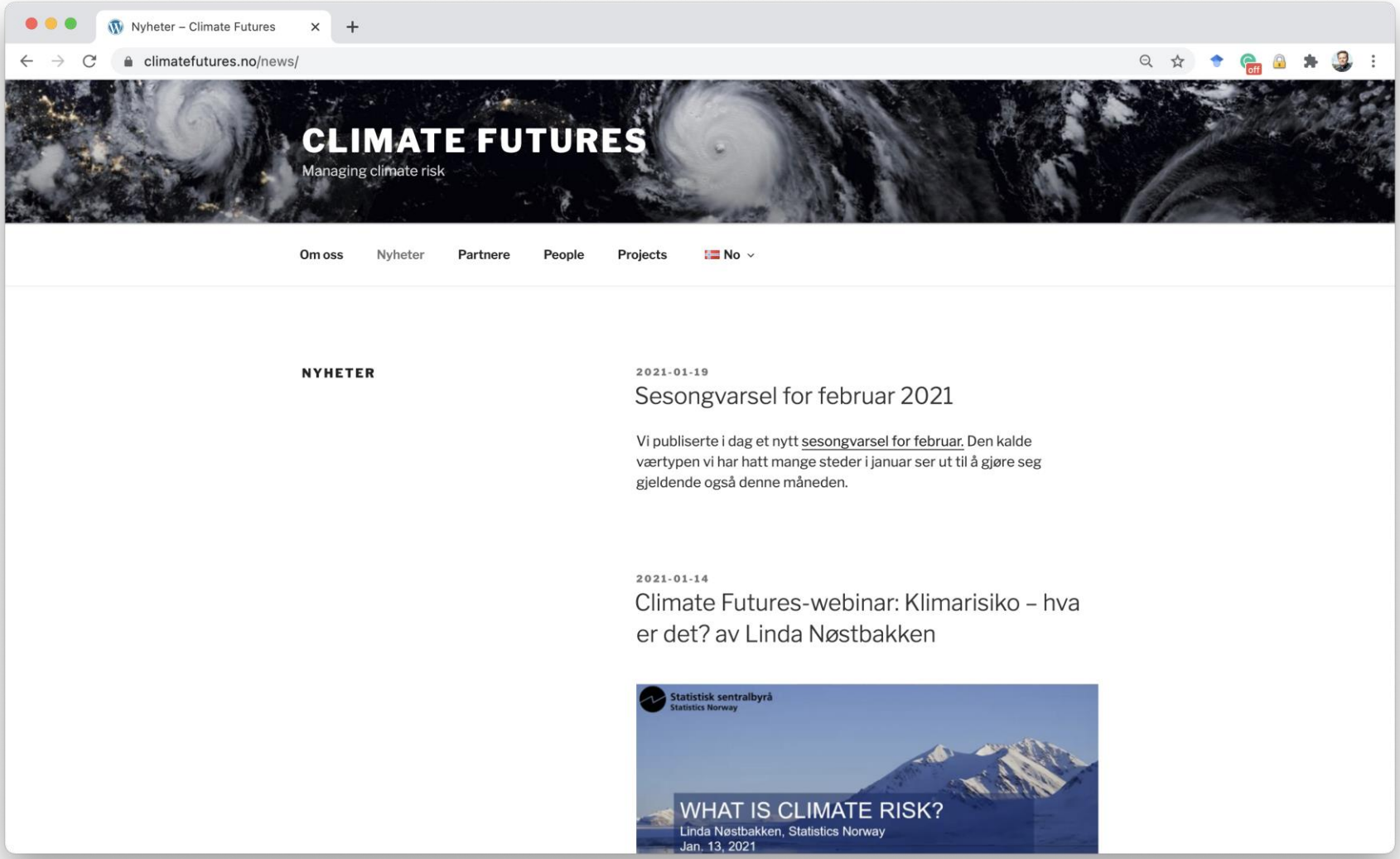


# Local forecasts

The probability distributions can be calibrated for any location with observations, such as for Bodø here



# Thank you!


Nyheter – Climate Futures
climatefutures.no/news/
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Managing climate risk
Om oss
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People
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NYHETER
2021-01-19
Sesongvarsel for februar 2021
Vi publiserte i dag et nytt sesongvarsel for februar. Den kalde værtypen vi har hatt mange steder i januar ser ut til å gjøre seg gjeldende også denne måneden.
2021-01-14
Climate Futures-webinar: Klimarisiko – hva er det? av Linda Nøstbakken
Statistisk sentralbyrå
Statistics Norway
WHAT IS CLIMATE RISK?
Linda Nøstbakken, Statistics Norway
Jan. 13, 2021