This presentation participates in OSPP

EGU

Outstanding Student & PhD candidate Presentation contest

A NOVEL COLD SEASON TEMPERATURE FIELD RECONSTRUCTION FOR THE NORTHERN MIDLATITUDES FROM PHENOLOGICAL DATA

Angela-Maria Burgdorf, Stefan Brönnimann, Lukas Reichen, Yuri Burgnara, Ralf Hand, Jörg Franke, Veronika Valler, Eric Samakinwa and This Rutishauser

erc
European Research Council
Established by the European Commission

UNIVERSITÄT BERN

OESCHGER CENTRE
CLIMATE CHANGE RESEARCH

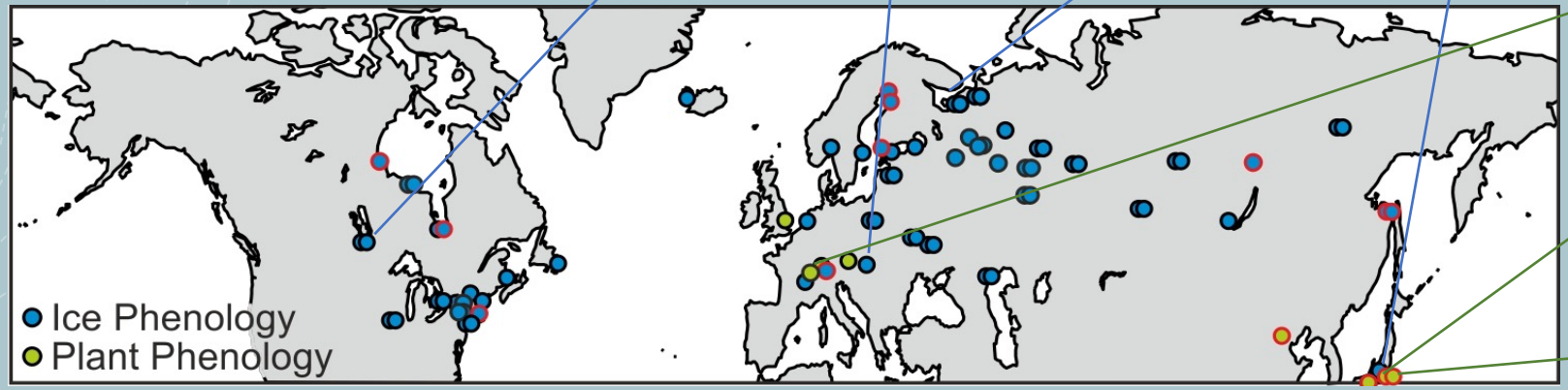
A COLD-SEASON RECONSTRUCTION FOR 1701-1905

FOR THE NORTHERN MIDLATITUDES [35°-70° N]

UNIVERSITÄT BERN
OESCHGER CENTRE CLIMATE CHANGE RESEARCH
European Research Council
Established by the European Commission




COVERAGE





> **82 temperature-sensitive records** (8 plant phenology, 74 ice phenology)
14 records retained for validation

> **Extended cold-season (October-May average) temperature field reconstruction**

A COLD-SEASON RECONSTRUCTION

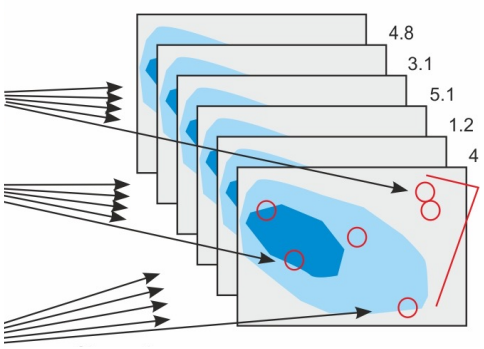
VIA „BAYESIAN REWEIGHTING“

Observations

Forward models

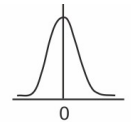
Prior

10000+ years of modelled preindustrial climate



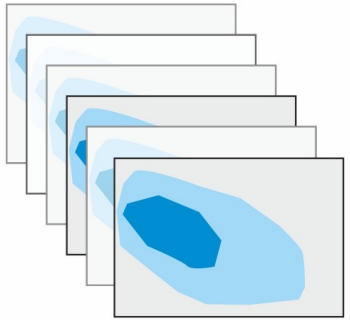
Observations are modelled in simulations and compared using a **distance measure**

Probability density

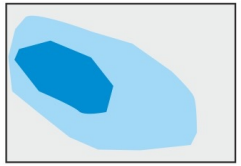


Weights

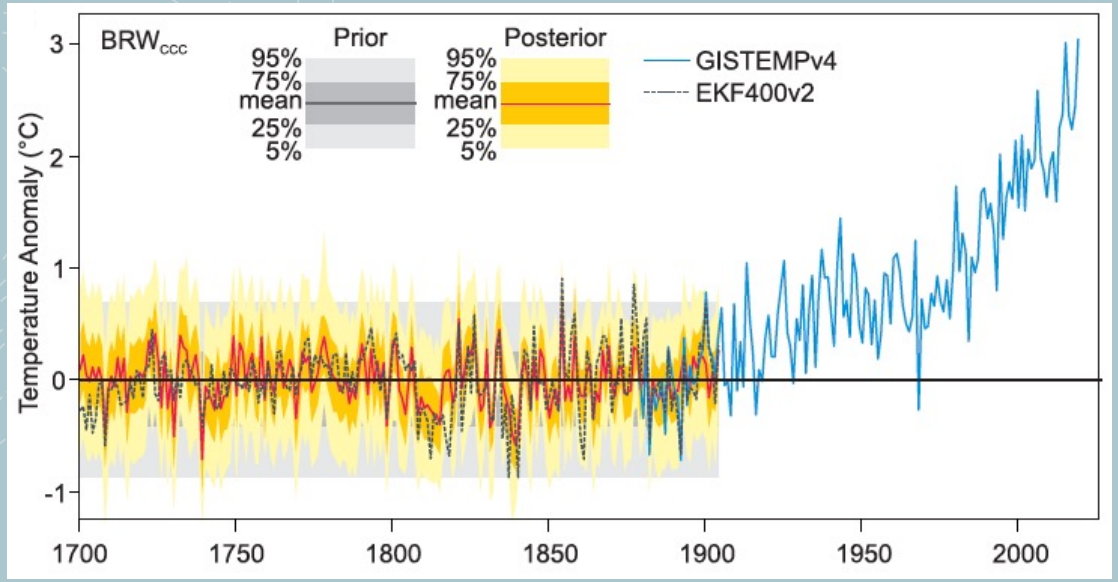
Model years multiplied with weights



Reconstruction

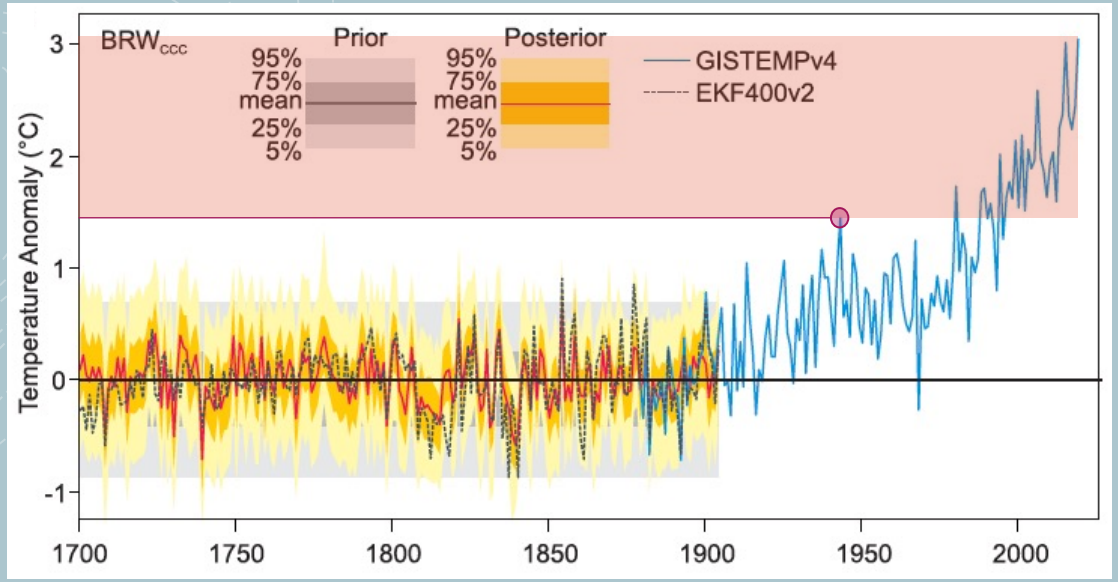


BOREAL COLD-SEASON TEMPERATURES FROM 1701-2020



- **Good agreement with overlapping instrumental data**
  (overlap with GISSTEMP)
- **Good agreement with independent station and phenological data**
- **Good reconstruction skill**
  except Alaska, the US Southwest, East Siberia, and southern Central Asia

BOREAL COLD-SEASON TEMPERATURES FROM 1701-2020



- **320-year perspective** of **boreal cold-season climate** variability and change over land
- **Strong warming trend** since the 1880s
- Already **1944** was outside the **variability range** of the **18th and 19th century**
- **Winters now → + 3°C**

TEMPERATURE FIELDS

COLD PERIOD 1808/09 – 1815/16

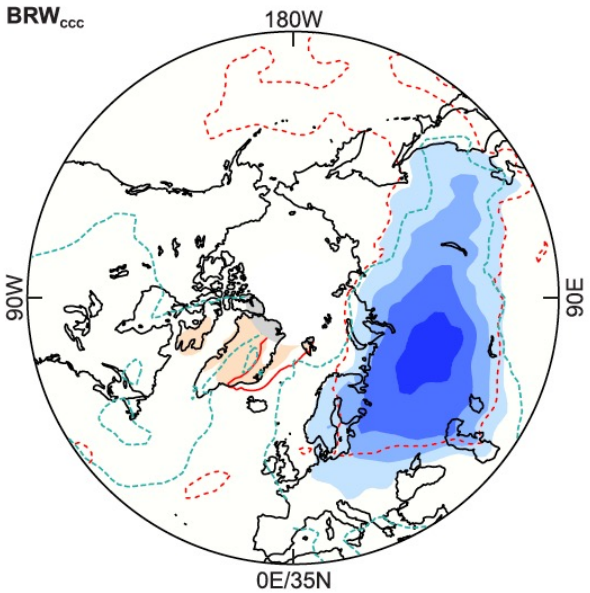
nature COMMUNICATIONS

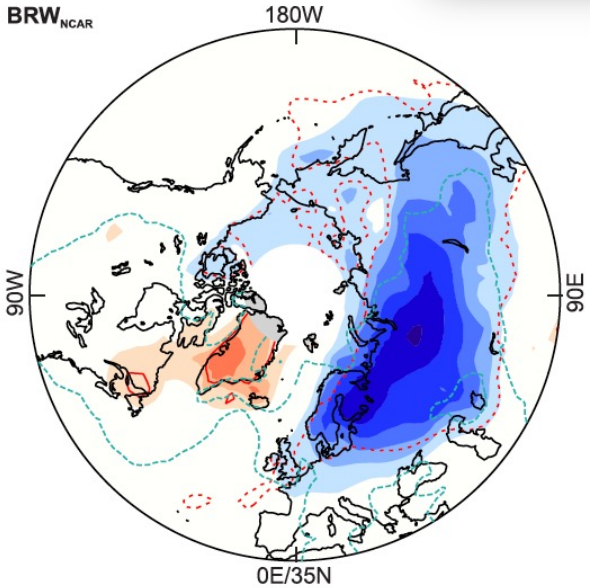
ARTICLE

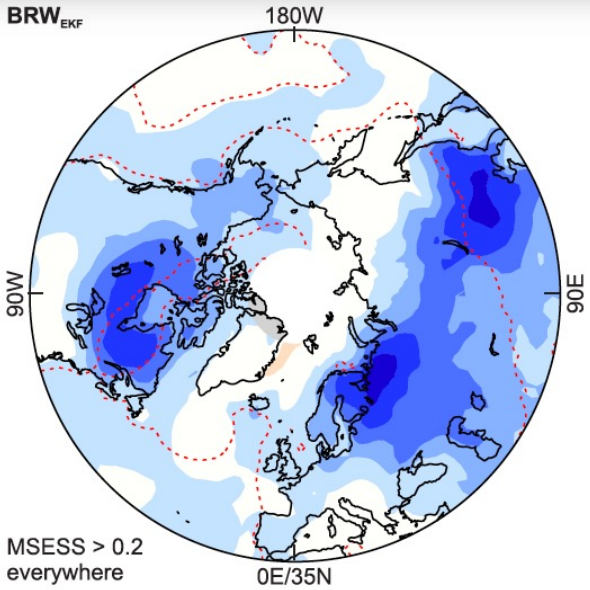
https://doi.org/10.1038/s41467-022-29677-8 OPEN

A decade of cold Eurasian winters reconstructed for the early 19th century

Lukas Reichen[1,2], Angela-Maria Burgdorf[1,2], Stefan Brönnimann[1,2✉], Jörg Franke[1], Ralf Hand[1], Veronika Valler[1], Eric Samakinwa[1], Yuri Brugnara[1] & This Rutishauser[1]







TAKE HOME MESSAGES

UNIVERSITÄT BERN
OESCHGER CENTRE CLIMATE CHANGE RESEARCH

European Research Council
Established by the European Commission

- **Boreal cold-season (Oct-May) reconstruction** for **1701-1905** for the **northern midlatitudes** based on highly temperature-sensitive **phenological proxies**
- Promising new **temperature field reconstruction** to analyse **past cold-season variability** on a **interannual-to-decadal time-scale**

angelamaria.burgdorf@giub.unibe.ch

This presentation participates in OSPP
EGU
Outstanding Student & PhD candidate Presentation contest