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Weather . Intelligence . Quality

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Forecast performance during the cold spells in February 2021 in Europe and the USA

Evelyn Müller

Jan Hoffmann, Dennis Schulze

Introduction meteoIQ

Founders

Evelyn Müller

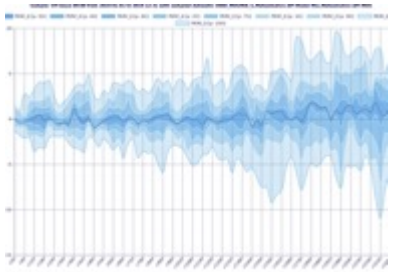
@meteomueller

Dennis Schulze

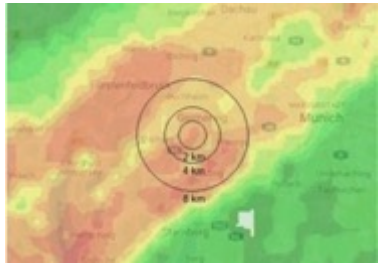
@snow73

Jan Hoffmann

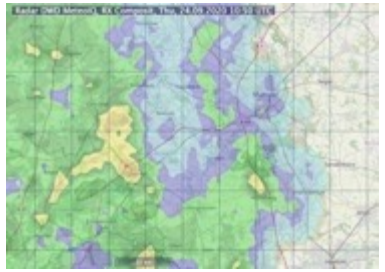
Services



Forecast verification as an external service



Meteorological products for the insurance sector



Software for the processing and visualization of meteorological data

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Forecast verification as an independent service

Answers to questions about forecast quality

from end-users,

for management reports,

from the weather room,

for forecasting system developers.

Expectations of the service

Easily accessible (data already prepared)

Well communicable measures

Comparison with other providers

Continuously updated (no on-off project)

Available the following day

Who does best for my location?

How many of your forecasts are correct?

What errors should I expect in my provider's wind forecast?

Has our quality improved after we updated the system?

Was my forecast good yesterday?

Which model captured last week's development better?

Do we predict the diurnal cycle well?

How is our error distributed geographically?

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Approach

Technical setup

Get forecasts from API or open data access points

For ECMWF data we download daily from MARS the non-realtime ECMWF HRES forecasts

Extract and archive location specific data

Daily computation of quality scores

Present results in a web frontend

Seven dimensions

Location

Parameter

Score

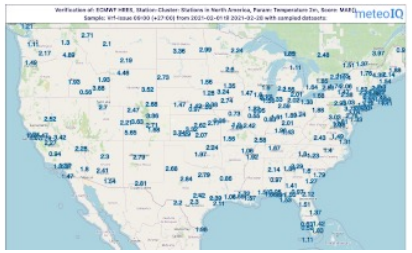
Lead time

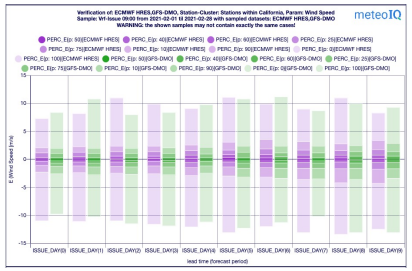
Period

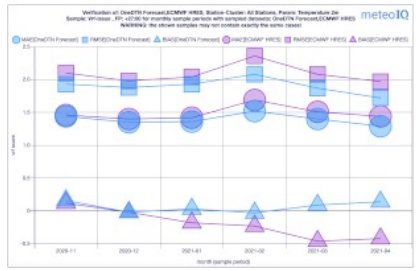
Provider

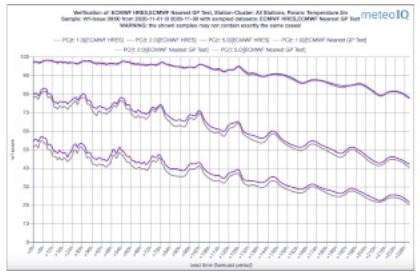
Sampling method

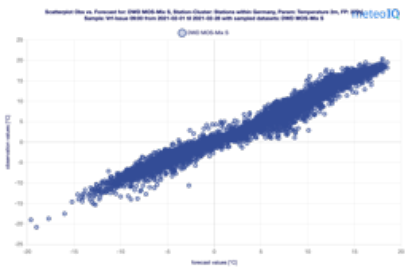
https://verify.meteoiq.com





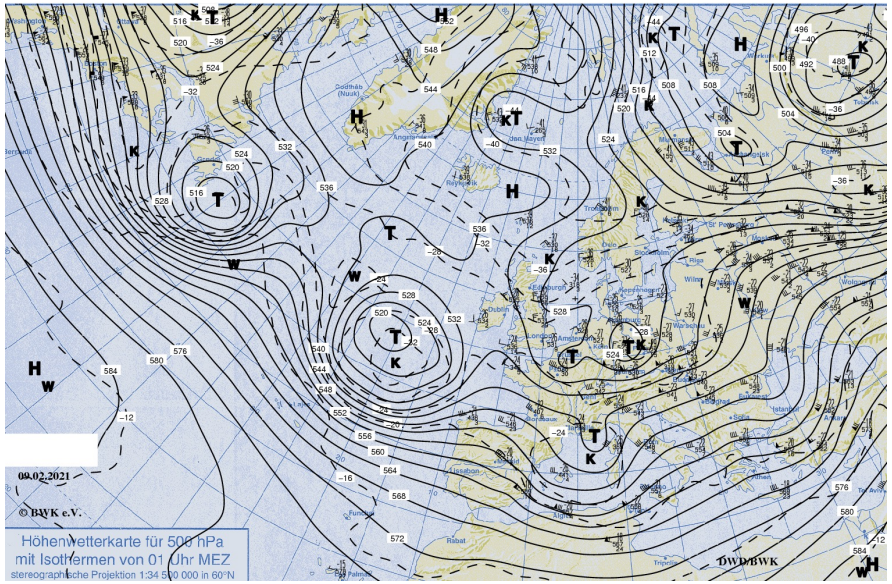




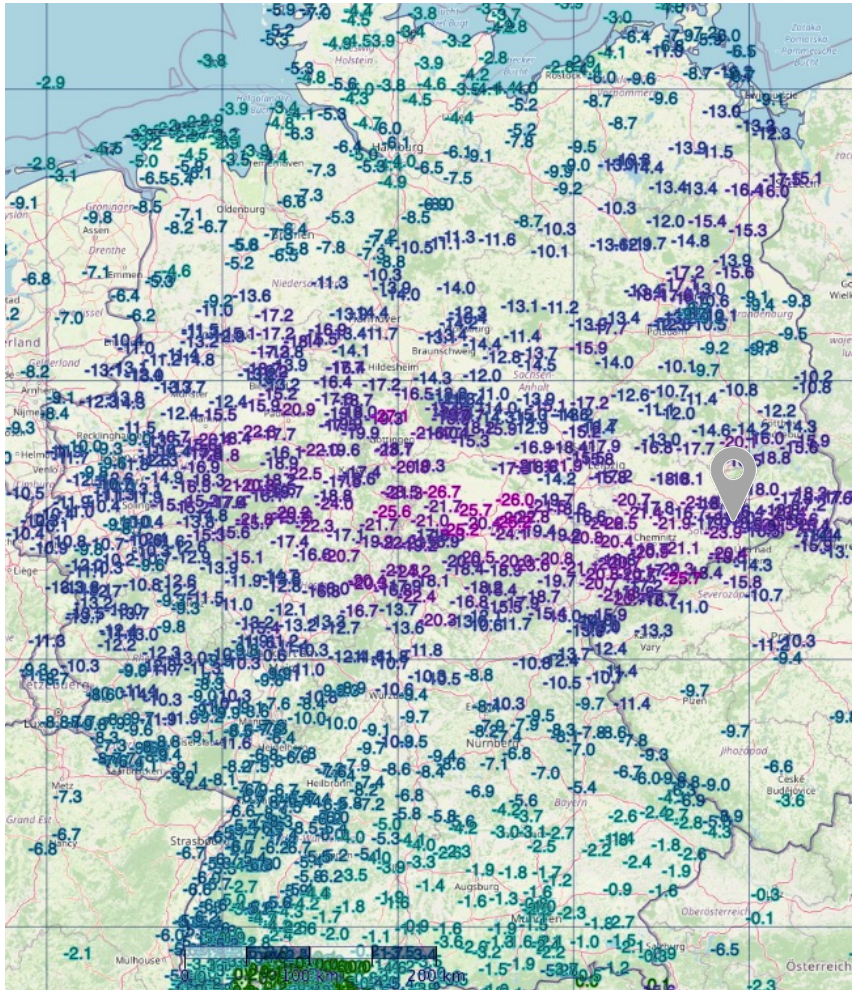


(and more)

Cold spell February 2021 in Germany



2021-02-09 00 UTC
500 hPa GPH Analysis
www.berliner-wetterkarte.de



2021-02-10 06 UTC
Observed minimum 2m air temperature
Source: DWD and DTN

Snowfall:
Public traffic broken down, schools closed

Frost damage:
Millions in losses for insurers due to burst water pipes

Temperatures:
Strong price increase for electricity and gas

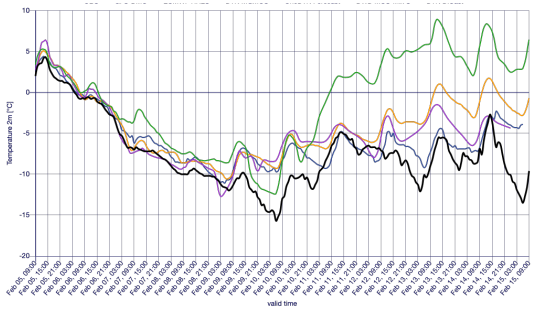
Cold spell February 2021 in Germany

The keyhole-perspective
of a forecaster with a multi-forecast ensemble, or an end-user

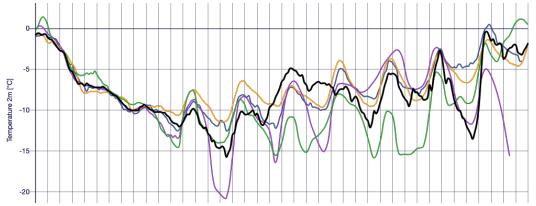
2m temperature forecasts for 10488 Dresden as available on consecutive days by 07 UTC

Black: Realized observation
Colors: ECMWF HRES, GFS, DWD MOSMIX S, DTN

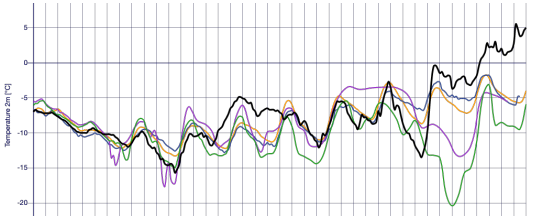
2021-02-05



2021-02-06



2021-02-07



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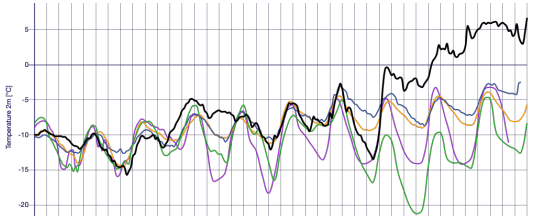

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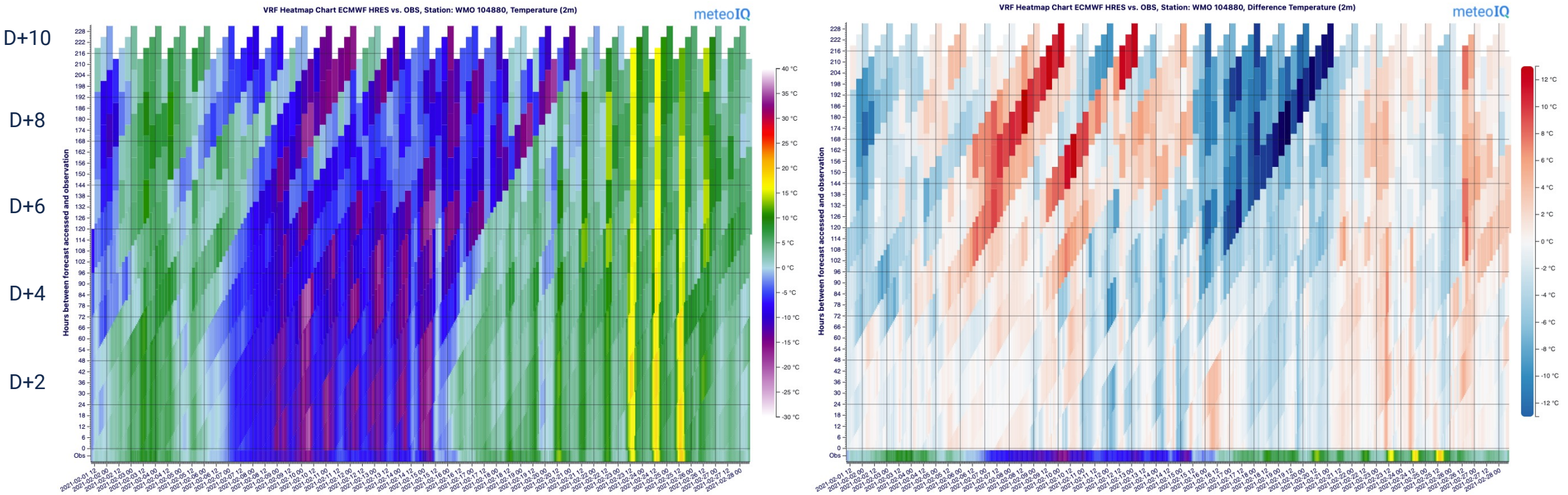
Cold spell February 2021 in Germany



10488 Dresden-Klotzsche
February 2021 2m air temperature. Left: forecast vs observation (lowest line). Right: Error vs observed absolute value.
ECMWF HRES 00 UTC forecast issues
X-axis: (calendar) time
Y-axis: forecast as available Y hours before the observation was made.

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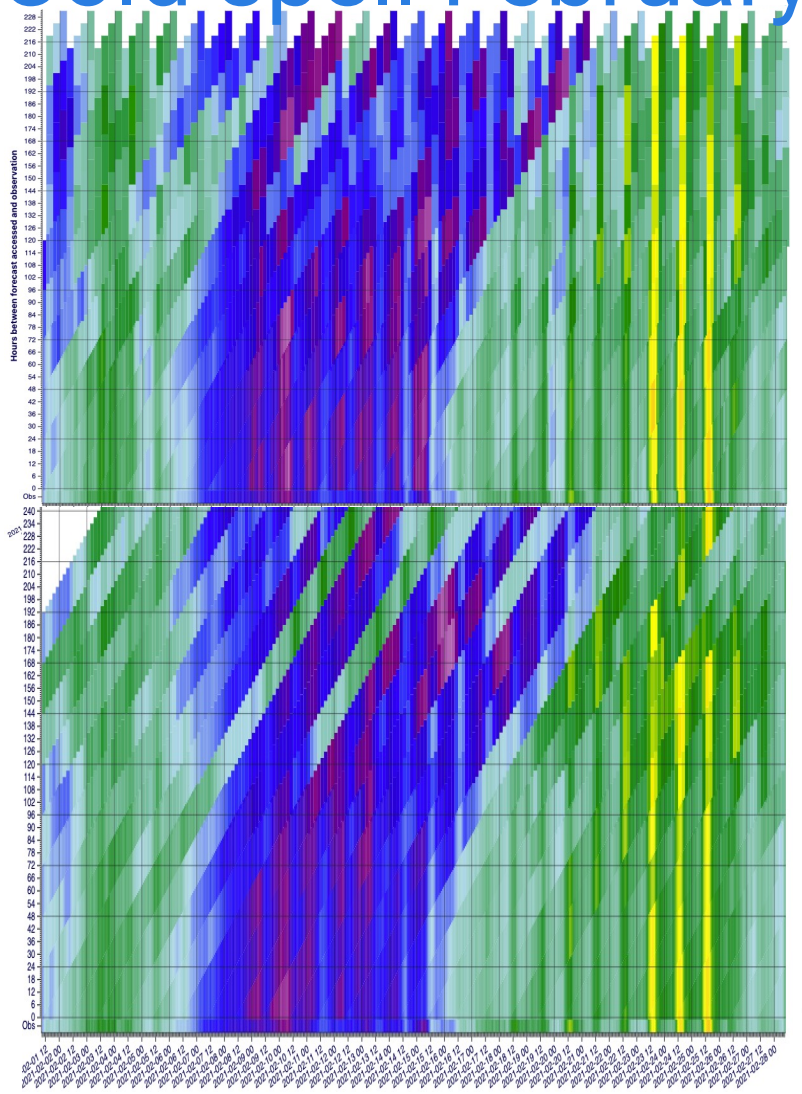
Cold spell February 2021 in Germany

ECMWF HRES

DWD MOSMIX S
opendata.dwd.de

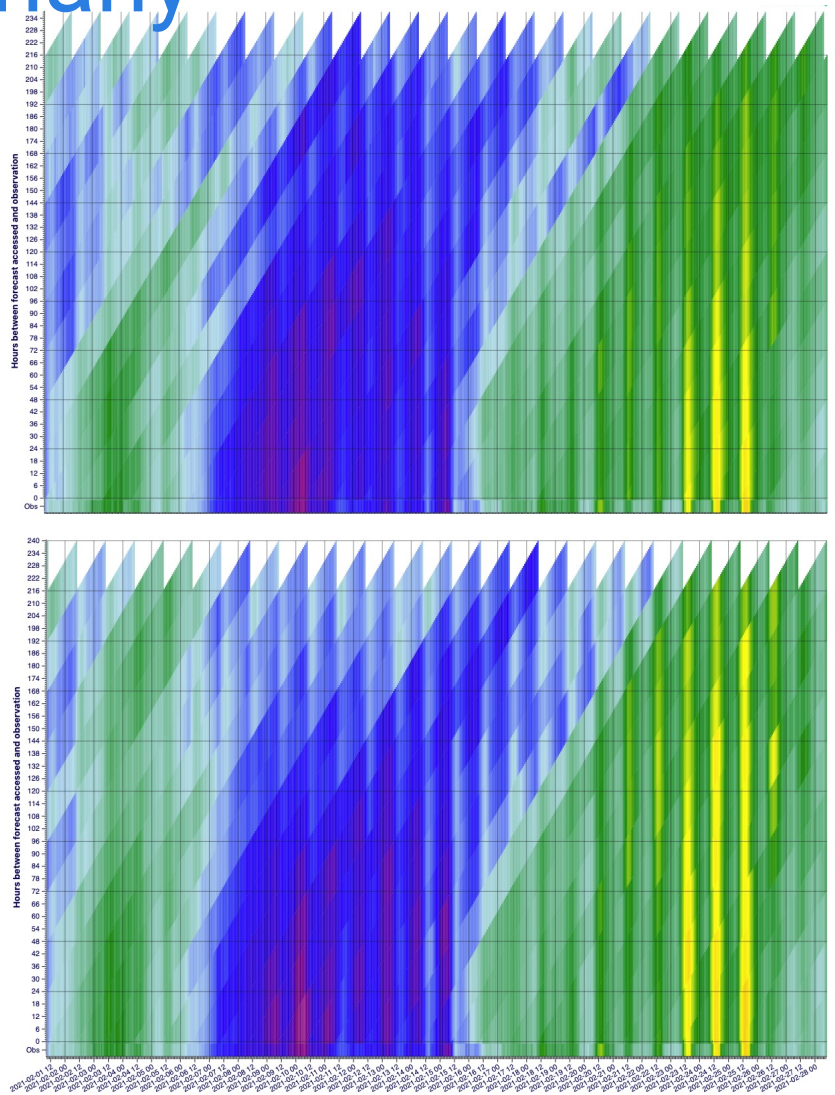


10488 Dresden-Klotzsche
February 2021 2m air temperature
Forecast vs observation (lowest line).
X-axis: (calendar) time
Y-axis: forecast as available Y hours before the observation was made.

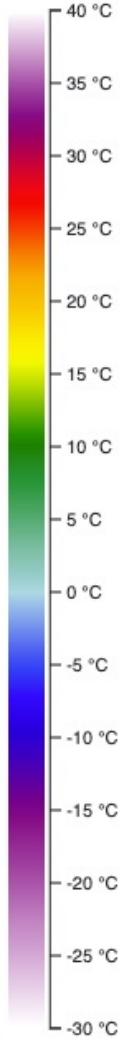
Left: Direct model output

Right: Post-processing systems

GFS



DTN



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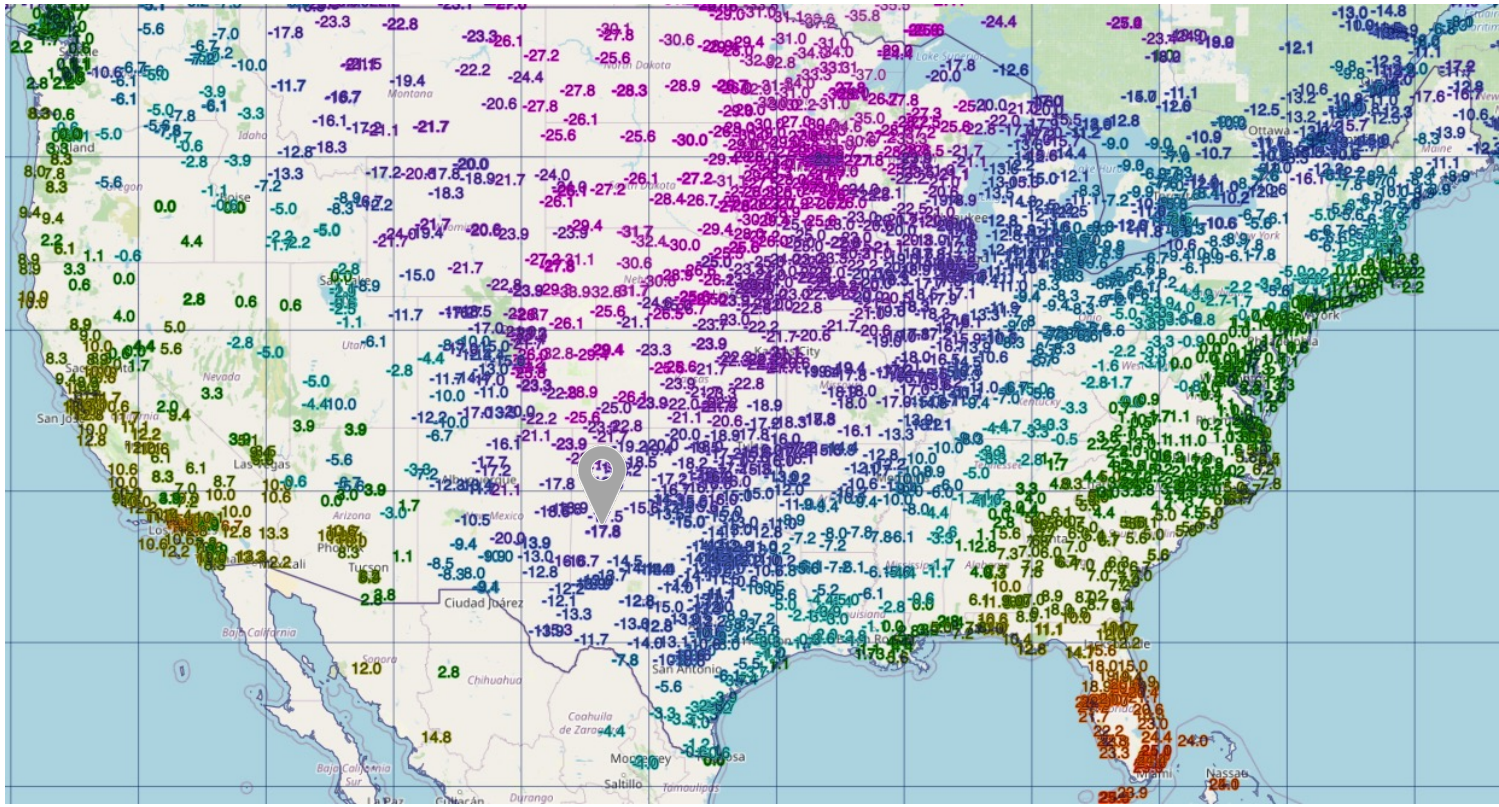
Cold spell February 2021 in the US

Record cold in Texas

Rolling electricity outages in 13 US states with dramatic consequences

Oil wells frozen, reducing US output by 40%

Wind turbines ice covered and out of operation



2m air temperature observations 2021-02-15 06 UTC

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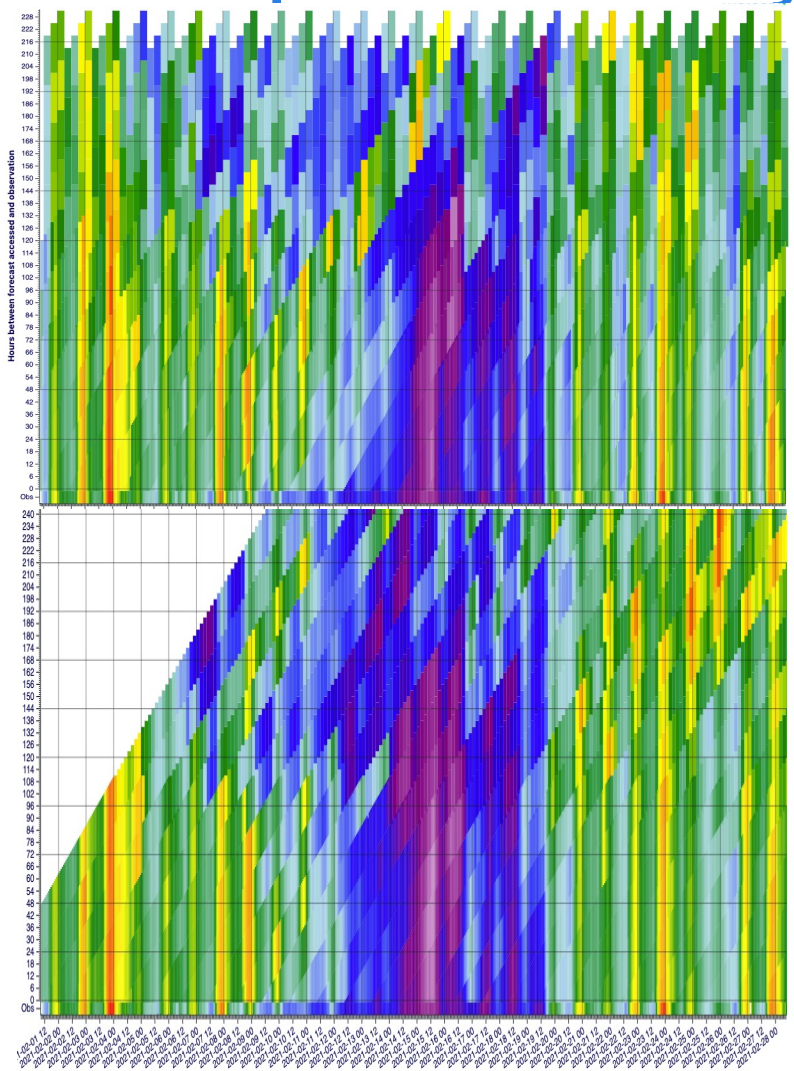
Cold spell February 2021 in the US

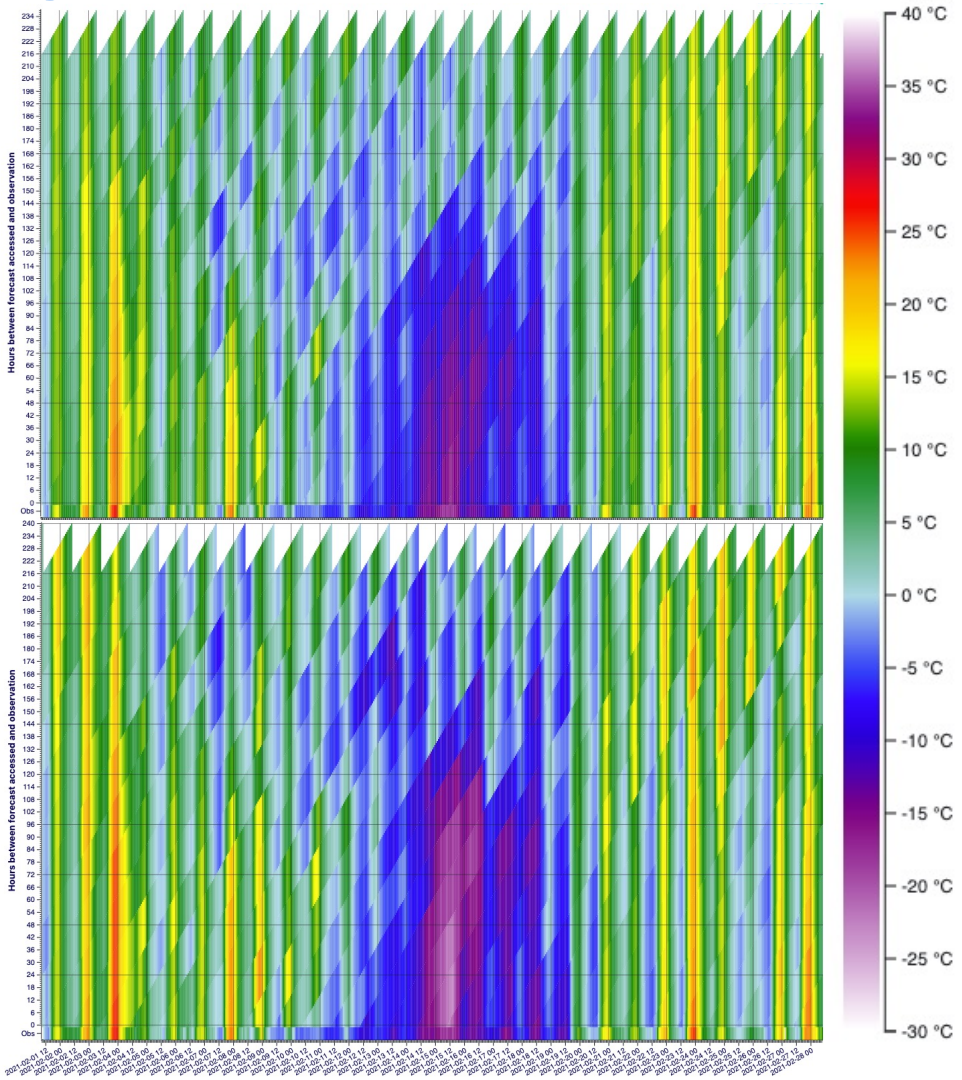


ECMWF HRES

GFS

DWD MOSMIX

DTN



KLBB Lubbock
February 2021 2m air temperature
Forecast vs observation (lowest line).
X-axis: (calendar) time
Y-axis: forecast as available Y hours before the observation was made.

Left: Direct model output
Right: Post-processing systems

Summary

February 2021 saw significant cold spells in Central Europe and Southern USA with severe impacts.

ECMWF HRES had a strong signal 7 days in advance, similar to GFS. Both deterministic models had some issues in providing a consistent view in the medium-term forecast from model run to model run.

Post-processing techniques such as the statistical method MOS provided a more consistent view but only showed the significance of the impact 3-4 days ahead.

MeteoIQ‘s verification platform https://verify.meteoiq.com allows to investigate the forecast performance of such events and address many other use cases for verification information.

Thank you!

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