



Using under-dispersive ensembles

Using ECMWF Forecasts meeting 2023

Isla Finney

June 6th 2023

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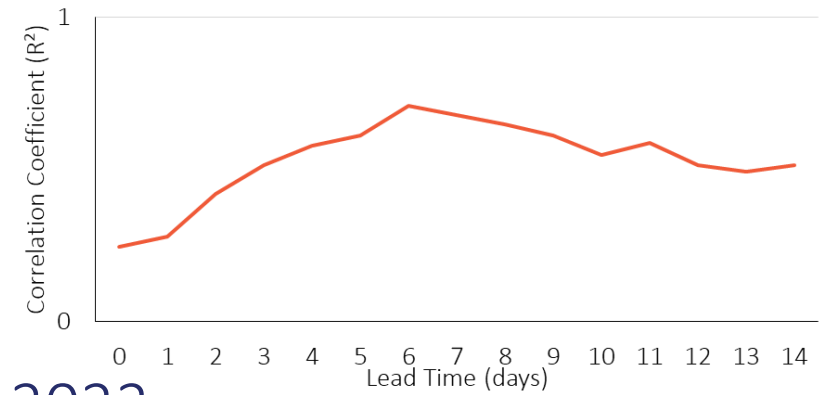
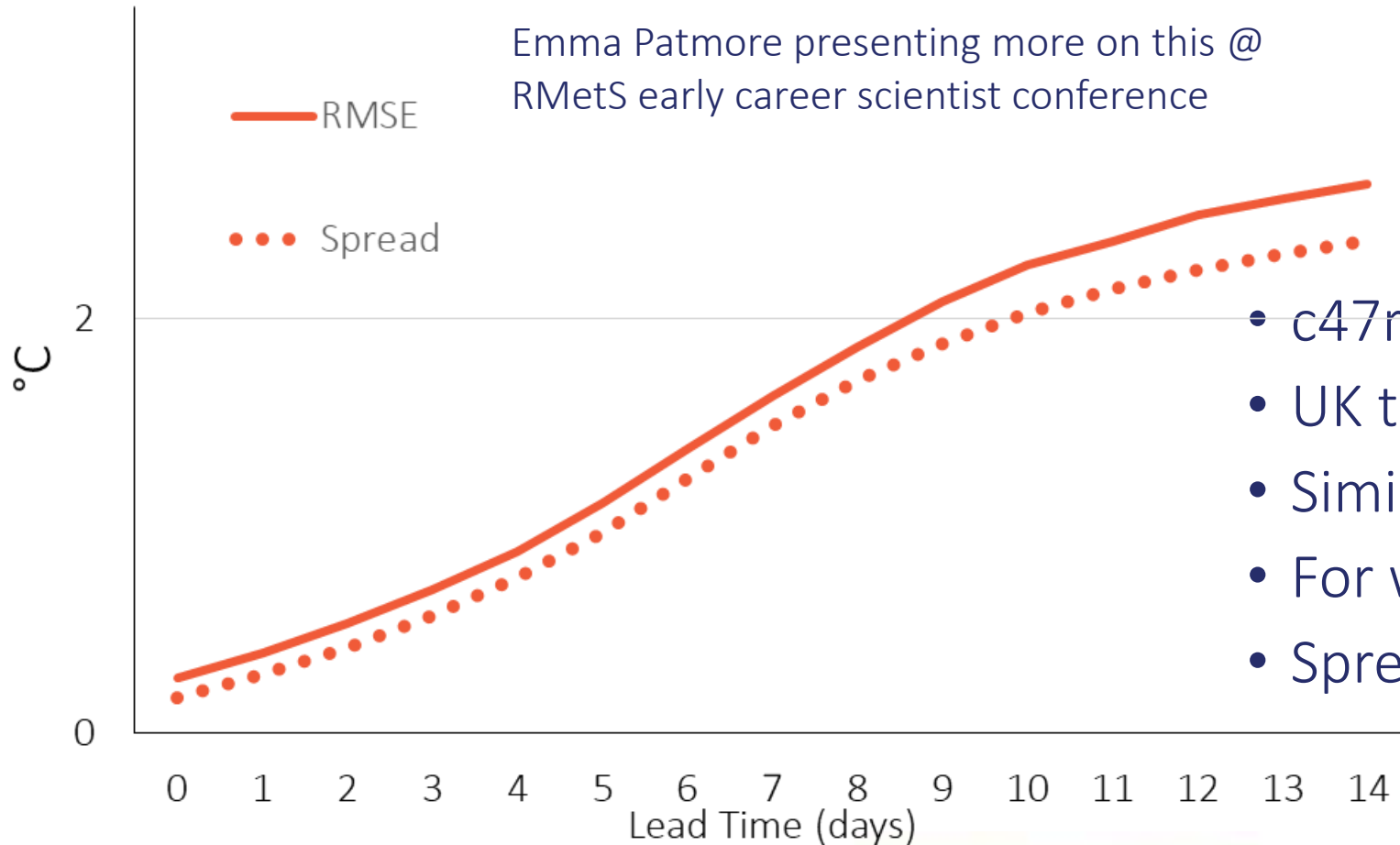
30 years of ensembles!

- Thanks to the ECMWF team of the 90s, headed by Tim Palmer
- Ensemble vs deterministic debate fading
- c48r1 reflects that with its focus on ensembles
... and raises the question: Where next?
- Ensemble spread vs error is a headline statistic
... to which so many different dynamics contribute



Ensembles are under-dispersive

Emma Patmore presenting more on this @
RMetS early career scientist conference



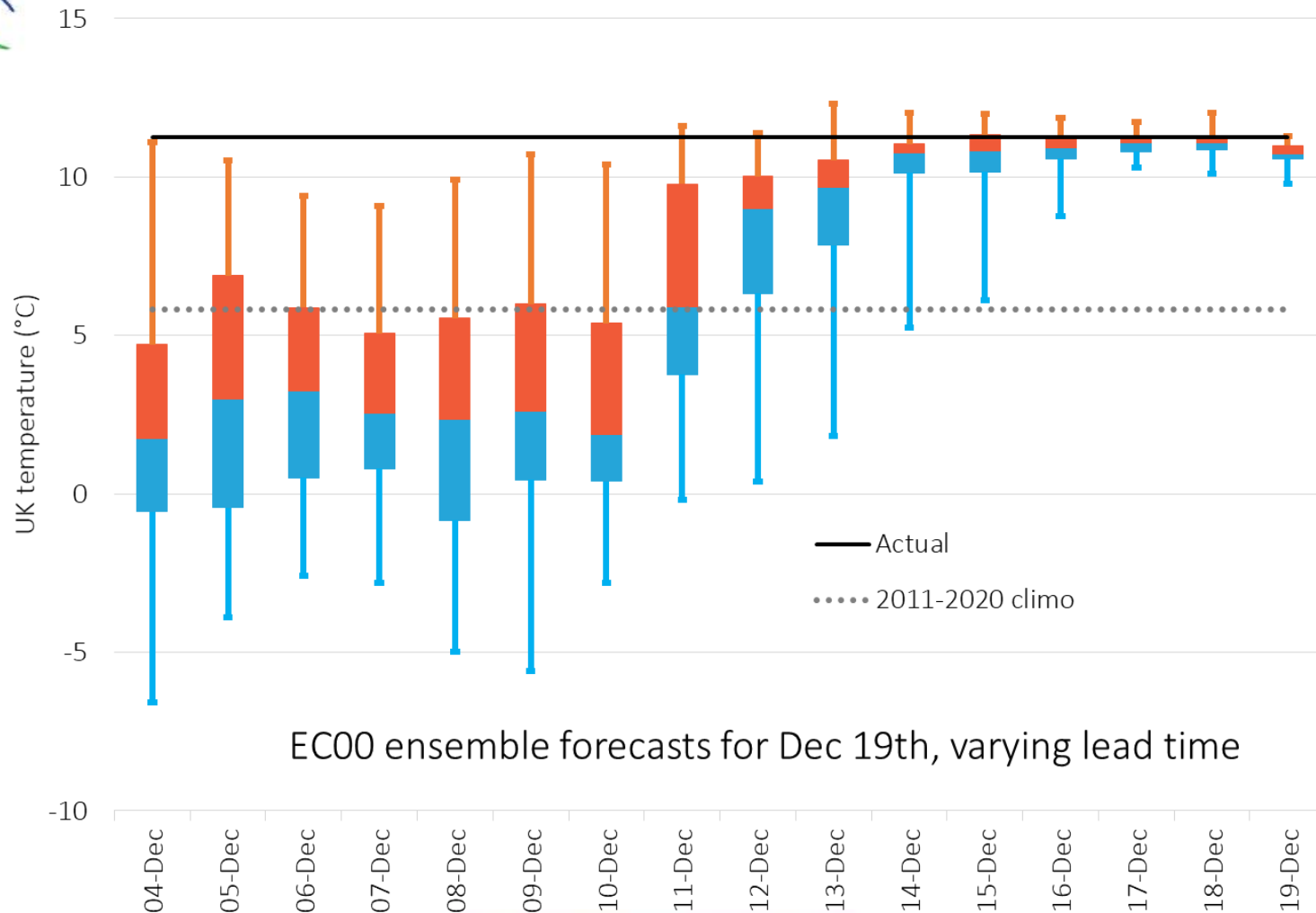
- c47r3, 2022
- UK temperature
- Similar for other countries
- For wind & solar, gap is larger
- Spread skill correlation variable

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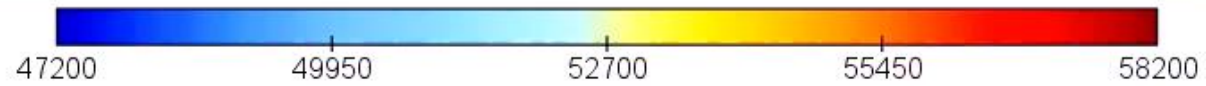
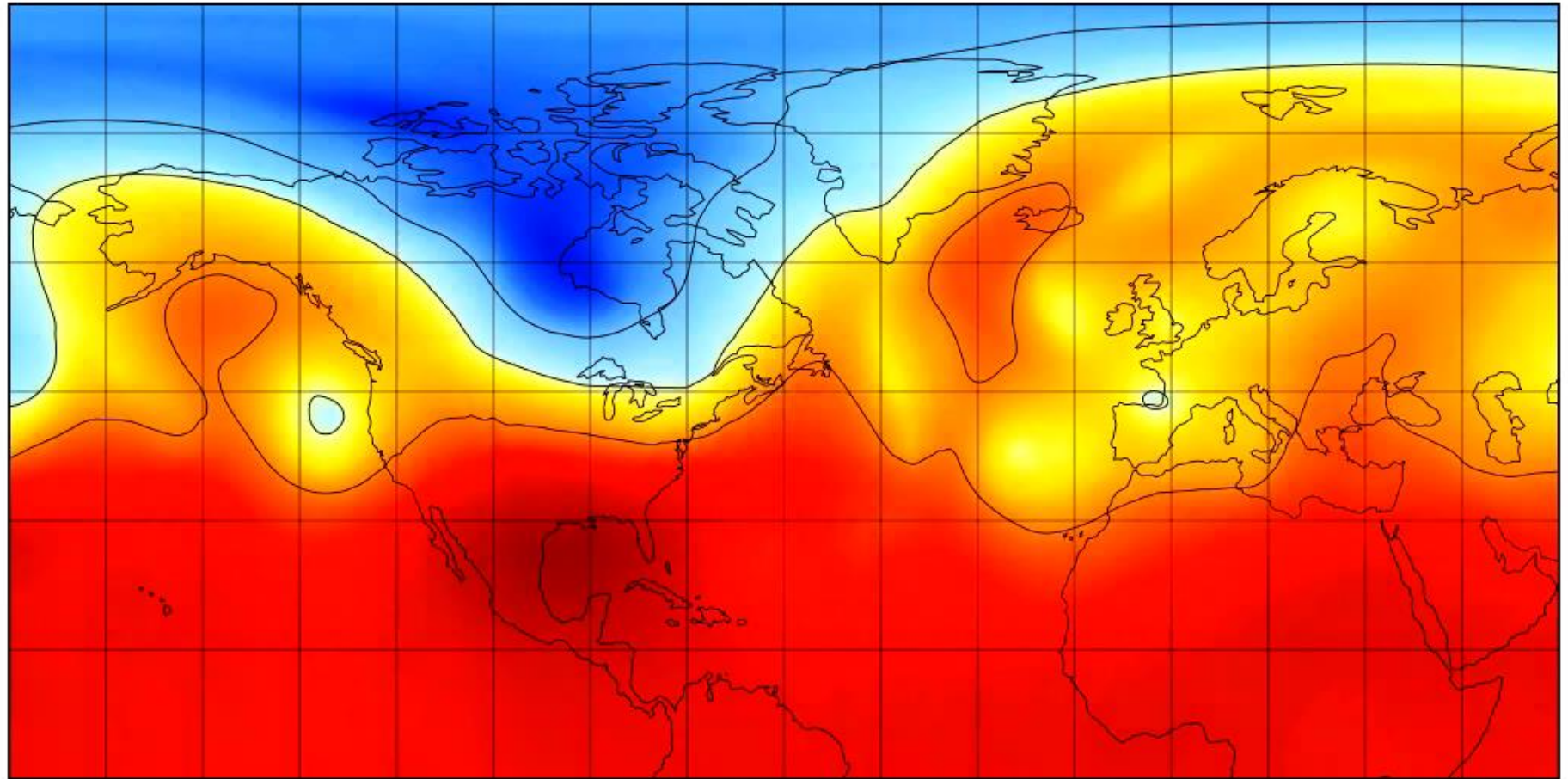


One example from Dec 2022





Time: 2022-12-04 00:00



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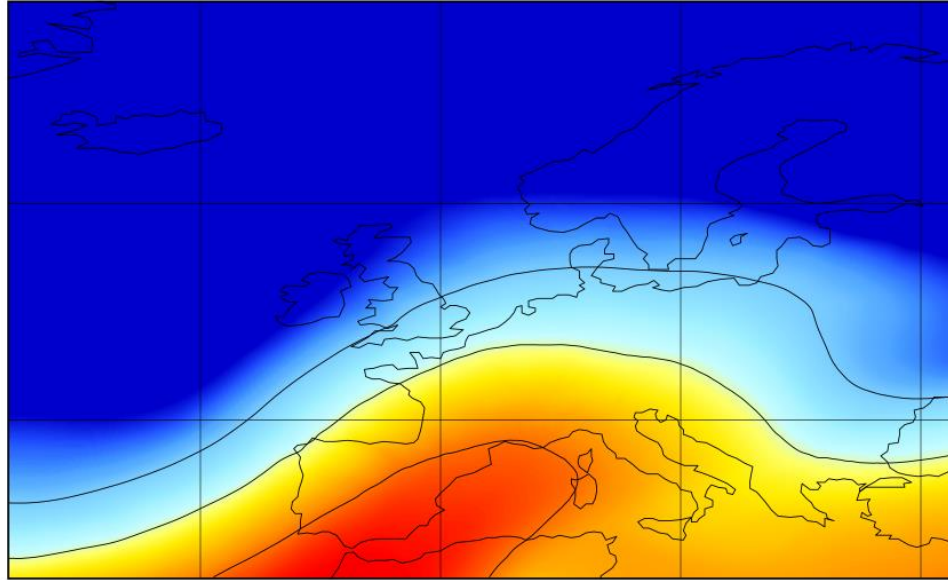


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Source: data from Copernicus plotted using GISS software

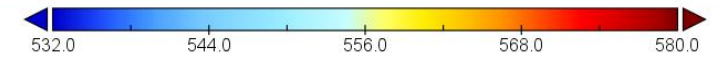
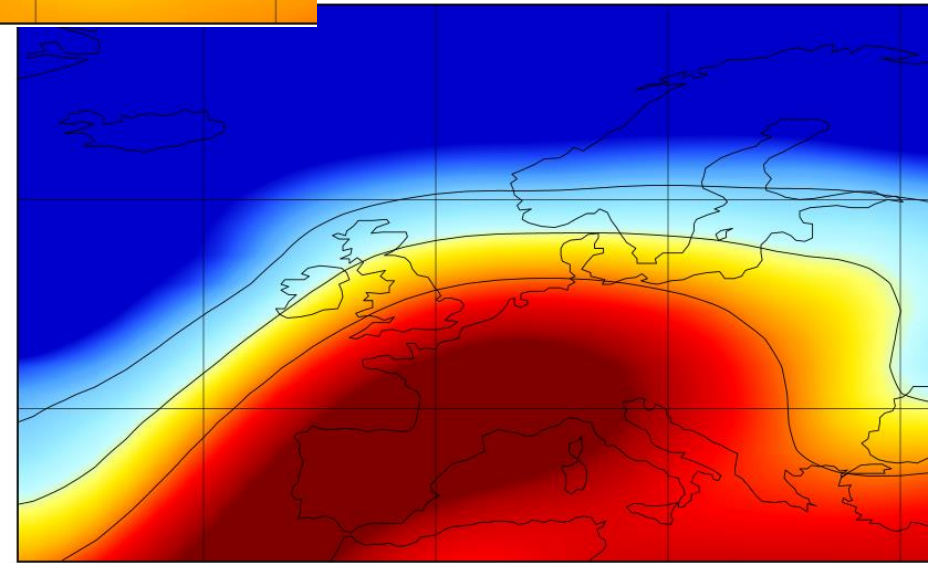
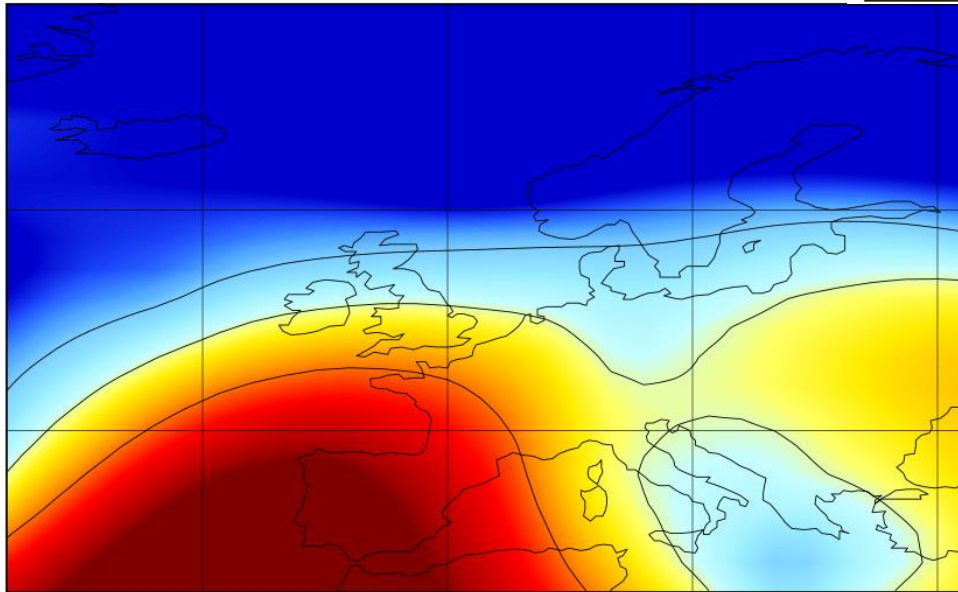


actual 1219



init 1205, verif 1219 'best' ensemble member

init 1211, verif 1209 'best' ensemble member



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Source: Lake Street. Data from ECMWF and Copernicus plotted using GISS software

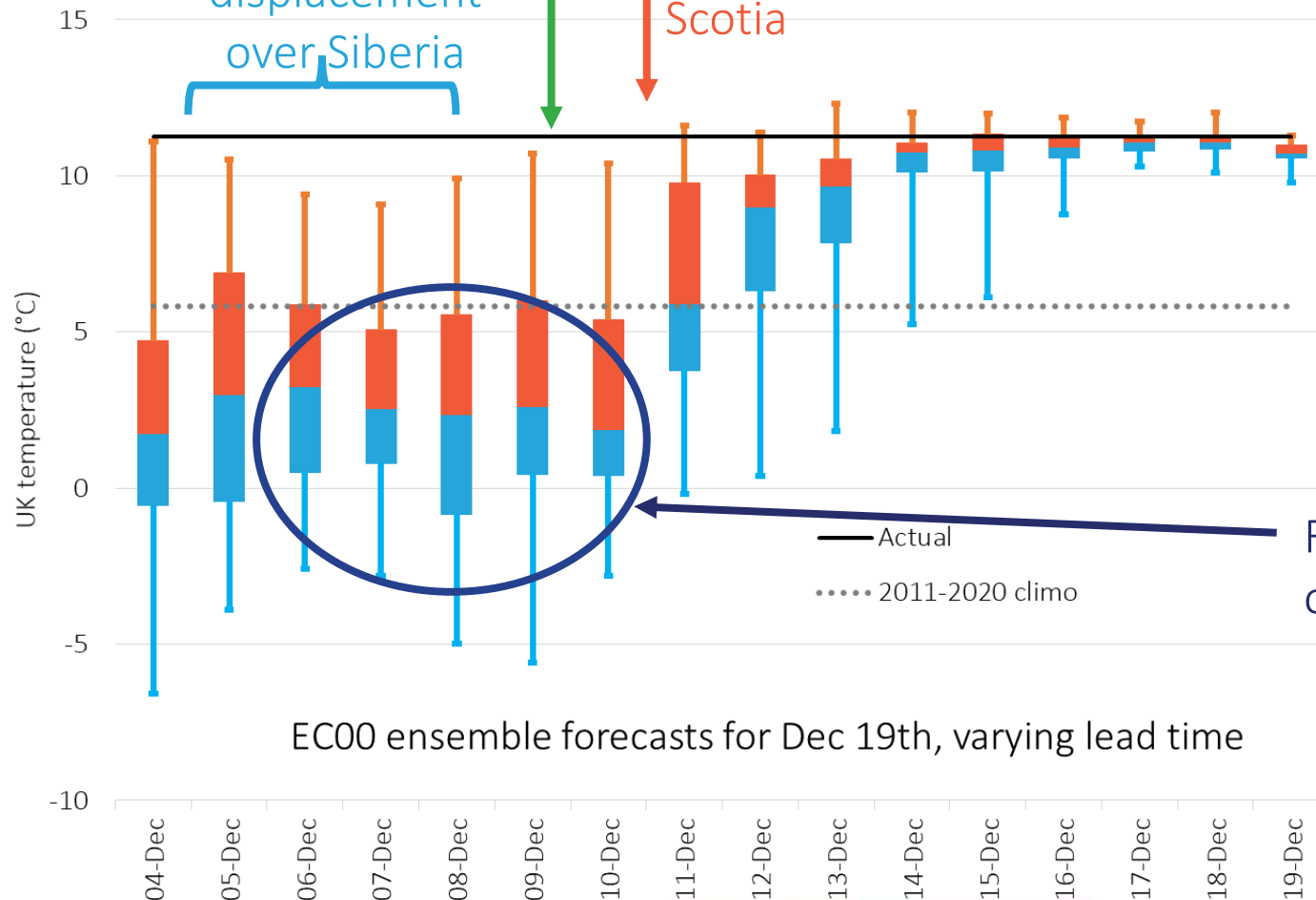


Polar vortex progresses

Polar vortex displacement over Siberia

Low forms over Nova Scotia

Model error or perturbation choice?



Retrograding flow over Europe



Which part of the distribution of expectations will future ensembles sample?

~~The system isn't designed to do that~~

The system wasn't designed for ensembles in 1990s

~~SPPT represents model uncertainties at all time steps~~

SPPT does not represent all model error...
See this talk as an example!

- Possible ways for ensembles to be well dispersed
 - More synoptic measures in headline scores
 - Humanitarian argument for improved extreme weather prediction
 - Ensemble perturbations at points of model error vs only at initialisation
 - Extra-tropical cyclone initialisation similar to that for tropical cyclones
- What are your 'headline scores'?



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