Predicting French surface temperature

- We can combine multi-model ensemble forecasts for a single event to understand the evolution of forecast skill.
- We look at 2 metre weekly mean temperature over France - directly meaningful for users.
- Extended range forecasts often offer little different to climatology.
- Clear skill in these examples is limited to less than 2 weeks.
- Some extended range forecast include the observed extremes - is there predictive skill at any lead times?

We use 20 years (1999-2019) of observed forecast data to calculate bulk statistics.

- Calculate a linear fit between quintiles of forecasts and corresponding reanalysis.
- Prediction of DJF cold extremes drops rapidly between weeks 1 and 2, and no skill remains by week 4.
- Skill deterioration in forecasts is not smooth.

- DJF warm extremes (cold weeks) lose predictability later, after week 2, but are unpredictable from week 3 onwards.
- All models show rapid jumps in skill over periods of a few days.

- Skill deteriorates rapidly at 2 weeks for cold extremes.

Relating temperature and regimes

- French DJF temperatures are significantly affected by the observed regimes.
- Scandinavian blocking and NAO- make extreme cold more likely.
- Are these jumps a spurious causality due to boundary layer interactions? No!
- We see the same behaviour in forecasts of T850.

Are ‘busts’ in predicting cold extremes linked to missed regime transitions?
- We separated week 1 EC45 ensemble forecasts by how many members correctly predicted a regime transition and looked at the RMSE error distribution.

Drifts in DJFM circulation regime statistics

- How do the regime statistics of S2S forecast models change with lead time?
- We look at the probability of entering a regime each day and leaving a regime each day.
- EC45 enters Atlantic Ridge too often.
- All models enter NAO+ too rarely.
- SEAS5 shows much more transience in regime transitions than other models.
- All models’ regimes are generally underpersistent.

Predicting energy demand - an applied problem

- How useful are current S2S forecasts in an applied setting?
- We look at the predictability of UK daily averaged residual energy demand 2015-2018.
- Residual demand is predictable only out to 6 days (albeit with a simple demand model).
- Residual demand is predictable only out to 4 days (albeit with a simple demand model).

References

- Prior work on regime approaches to forecasting cold extremes: Ferranti et al. 2018. How far in advance can we predict changes in large-scale flow leading to severe cold conditions over Europe? Q J R Meteorol Soc, 144, 1788–1802.

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