Notes S2S,S2D,Climate session 20:00 UTC

Discussion following the presentation of Paco Doblas-Reyes (FDR):

Oral Q: Does the issue of observational uncertainty in climate forecasts also apply to weather forecasts? How is it accounted for there?

FDR: yes, but sample sizes are much bigger for weather forecasts where are 90 daily forecasts for 1 full season. Weather forecasts are often evaluated against stations, or operational analyses done in same year (rather than reanalyses used for verifying climate forecasts). These are much better quality than for climate where we need to go far back and depend heavily on reanalyses that use few stations in earlier years. In short, weather forecasts are not affected as badly by observational uncertainty, but a quantification could be made; the framework is easily implementable in weather forecasts context

Anca Brookshaw (AB): we should not provide maps of best individual model skill, they have no correct inference associated to them, and do not include error bars, or take spatial correlation into account.

FDR: The best individual model skill map is not meant to characterize the MME skill, but rather as communication tool to explain to users *why* we choose multi-model; not as skill communication, but to communicate why the MME is safest option
we provide map for visual guidance, consensus …

Deryn Griffith (DG): Sensitivity of verification to observation / analysis has been a theme of this workshop for me. We need to put effort into estimating this error and mitigating for it. I am interested to hear of techniques for estimating the error and its contribution towards our (lack of) confidence in our verification results.

Oral Question KarunaSagar: which analysis is the best for verification? Is using reanalysis better than using the models's own analysis?

> FDR Answer: there is no better, some very good analyses can be poor in certain regions/for certain variables. We need to verify against independent data with observational uncertainty estimates included. If you verify against your own analysis, then you are missing the observational uncertainty.

DG: We know that forecasts of mean conditions improve by taking consensus of various NWP or ensemble members. I presume the same applies to analyses. Has anyone done any work to confirm this, or used such a consensus analysis?

DG: Hotta (JMA) who presented on 10 Nov showed that for NWP using "own analysis" effects verification of short-term forecasts (to at least 24-72 hours depending on parameter). Has similar analysis been done on seasonal scale models?

Barbara Casati (BC): Park et al (2008) shows verification against own analysis favors corresponding model, for NWP global models.

Manfred Dorninger (MD): An analysis ensemble as produced for MesoVICT showed the spread of the analysis uncertainty in the same magnitude as of the FC ensemble sperad.

Discussion following the presentation of Andrea Manrique-Sunen (AMS):

Chat Question KarunaSagar: We can see the lot difference between analysis and reanalysis too. So as park mentioned, the own analysis may favors corresponding model. But with respect to any of the reanalysis, there will be a large bias.

BC: One of the take home message of the workshop is that we need to use multiple observation sources / reanalyses, and account for the uncertainty associated to those, for a correct interpretation of the verification results.

DG: Is there any appetite for comparing a forecast cdf to a cdf of an observation? Or could such a comparison be used to quantify the (lack of) confidence in verification results when based on a single-valued analysis?

KarunaSagar: Hotta mentioned in his presentation, instead of its own analysis, model forecasts have very good skills with independent analysis. So can anyone tell me how to generate independent analysis? I actually missed that part.

BC: The idea of a CRPS with two cdf, rather than a cdf and a Heviside function, has been around for a little while, and has been applied for sea-ice (SPS, Goessling 2018)

BC: two analyses from two different centres are more independent than Hotta twin analyses.

AB: the verification must match the way you define the forecast. Do you have as fixed the time of validity, or the initial time?
AMS: what is fixed is the start date, so that we separate different lead times.

KarunaSagar: @Casati, better to use multiple analysis form multiple centers than using a single analysis from a single center. It should be like average of multi model analysis. Is this possible?
BC: ensemble, no average
KarunaSagar: Yes. If all centers provide its own analysis, it will be good.

Discussion following the presentation of Caio Coelho (CC):

Question BC: PCA is a way of filtering. Does each mode have a physical interpretation? The third mode seems sometimes to be reproduced better by models than the second mode.

Answer CC: yes, the PCA enables performance to be related to the 3 leading modes of variability which are associated with MJO, ENSO and tropical-extratropical interaction.

Discussion following the presentation of Felipe Andrade (FA):

AMS ask a technical question related to the shown procedure: in the last part of study, where you add and remove the driver, can you better explain?
FA answer: To explore the ability of forecasts to capture the relationship between precipitation variability and different drivers, a simple linear regression analysis between weekly precipitation and drivers' indices (Nino 3.4, DMI, RMM1, and RMM2) was performed using observations and hindcasts in Weeks 1-4. Modelled (observed) regression coefficients were obtained by regressing out ECMWF hindcast (GPCP) precipitation anomalies with forecasted (observed) drivers' indices. Since significant associations can exist between ENSO and IOD, a multiple linear regression approach was also employed to examine ENSO- and IOD-related rainfall variability simultaneously

AMS: Is it based on observations or model data?
FA answer: Observed and modelled rainfall variations linearly dependent on drivers were respectively removed from observed and predicted fields to evaluate the association between observations and hindcasts after subtracting ENSO-, IOD- and MJO-related rainfall patterns.
Also, after removing the modelled precipitation variability associated with the drivers from hindcasts, the effect of adding observed regression patterns, i.e. obtained by regressing GPCP precipitation anomalies with observed drivers' indices, to the hindcasts was also examined to verify the quality of calibrated forecasts.

Angel Mugnoz: this decomposition is linear? Or are different climate driver interact non-linearly?
FA answer: it is MLR, we eliminate redundancy

Discussion following the presentation of Angel Mugnoz:

No questions.

End of session Discussion:

The issue of observation uncertainty has been vocalized (see previous discussion on chat following FDR talk).

Calibration: look at calibrated forecast and look at improvements.

Angel Mugnoz (AM): tercile approach is traditional. Users might be interested in a different threshold. How can we perform verification of entire pdf, in a way that can be understood by the user?
Manfred Dorninger (MD): we should look at some examples from sophisticated users, e.g. energy company which have very specific needs.