**Bureau R&D Workshop 2018**

# NWP ensemble verification

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**Abstract**

In 2019 the Bureau of Meteorology (BoM) is planning to make operational a global numerical weather prediction ensemble system (EPS), Access-GE. This will be followed by city-scale EPSs, the Access-CE suite hopefully also in 2019. The arrival of these operational EPSs will be a milestone at the BoM but they must be fit for purpose.

Ensuring that new EPSs are indeed fit for purpose generally entails determining the characteristic strengths and weaknesses of such systems using subjective and objective verification methods. Subjective verification tends to be qualitative, for example, an EPS developer or a forecaster might 'eyeball' a range of EPS forecast charts to see if they 1) make physical/meteorological sense and 2) realistically capture past weather – including extreme or interesting events. Objective verification tends to be based on statistical measures of certain forecast attributes and is, therefore, quantitative in nature. Both verification approaches may involve inter-comparing the EPS of interest with other EPSs.

This presentation concerns objective verification which, so far, has focused on Access-GE. The verification will 1) inform development and operations teams whether Access-GE is ready to make the transition from development to operations and, once operational, 2) provide routine performance monitoring for operations and 3) provide the operational capability to meet WMO EPS verification reporting commitments.

We have adopted and implemented the WMO guidelines on global EPS verification [WMO] to meet all three of these aims. The verification measures in the guidelines are mature and represent a 'baseline' set of verification measures for the global EPS. Deterministic forecasts can be derived from an EPS so some of these verification measures are deterministic. Such measures may be simpler and/or familiar to new EPS users. However, in order to capture forecast uncertainty, the majority of EPS forecasts are probabilistic. Correspondingly many of the EPS verification measures reflect this probabilistic capability. Such measures may seem more complicated and/or less familiar to new EPS users. A small selection of these verification measures are described including preliminary verification results for Access-GE.

Having established an approach to objective verification for Access-GE next steps include identifying some opportunities and challenges EPSs may present for downstream users and associated verification needs. Downstream users include the BoM's guidance post-processing team, forecasters and external users. Some early thoughts for working with these users are outlined. Of course this process will then have to be repeated for the Access-CE suite!

# References

WMO 2017: Manual on the Global Data-processing and Forecasting System, appendix 2.2.35. Available at: <https://library.wmo.int/doc_num.php?explnum_id=4246>. [Accessed 2 November 18].