

On the relative value of a High Resolution Forecast in an Ensemble Prediction System

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Most weather prediction centres produce both a high resolution model based forecast (HiRes) and an ensemble based forecast. The computational cost of the high resolution model run increases much faster than linearly with resolution, and it is interesting to explore how the relative value of this component of the forecast system changes over lead times. Evaluation of probability forecasts for target observations of both industrial and meteorological interest indicate that the relative weight assigned to the HiRes drops to that of only a few ensemble members in week two, the forecast consisting of a blend of the HiRes, the ensemble and climatology. The full blend forecast continues to outperform climatology out to day ten (the forecast range for which a large archive is available for the ECMWF HiRes and ensemble forecasts).

A game theoretic formalism for determining the value of the high resolution forecast relative to the ensemble is presented, valuing the high resolution forecast directly in terms of potential income; this approach can, of course, be used to determine the relative value of each constituent forecast in any forecast mix. Limits to the implications of this game theoretic approach for real world forecast applications are discussed. Numerical results are presented using ECMWF forecasts and corresponding observations for temperature and pressure at a number of locations.