



The Multi-Scale multi-model Super-Ensemble cocktail

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The multi-model Super-Ensemble (SE) technique which uses an optimised combination of an ensemble of models has previously been demonstrated to improve forecast skills in atmospheric and ocean models over simple - and bias-removed - ensemble means, further improved using dynamic, regularization, non-linear or probabilistic techniques. A significant drawback of this method for systems which have specific peak frequencies - like well identified geophysical processes for example - , is that it does not allow a process-wise combination of models, i.e. the weight on a model is constant whatever the process. Here we show that, by decomposing the individual models into their most relevant spectral bands and re-combining them carefully, this Multi-Scale multi-model Super-ensemble (MSSE) approach outperforms traditional SE forecast skills and allows recovering high frequency phenomena usually averaged out by SE, which offers potential new improvement in atmospheric and oceanographic modelling, uncertainty estimation and data fusion.