

ADDRESSING MODEL INADEQUACY THROUGH MULTI-MODEL ENSEMBLES

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The problem of model inadequacy can be partially addressed by constructing ensembles over models. By considering the output from a number of distinct but imperfect models we hope to anticipate the future dynamics more often than with a single imperfect model. The question remains, however, as to how one should interpret this multi-model ensemble in an internally consistent manner; while one can always maximise some in-sample utility function on past forecasts, the epistemological status of a multi-model ensemble is unclear.

Initial condition ensemble forecasts that aim to capture the uncertainty due to observational uncertainty condition have frequently been reposed as probability forecasts. Having acknowledged that our model class is imperfect, and knowing that a union of imperfect models classes is also imperfect, it is clear that such an interpretation is dubious. As ensemble forecasts are deployed in applications, a coherent interpretation is desirable. In this work we extend the “dressing” of Roulston and Smith (Combining Dynamical and Statistical Ensembles. *Tellus* **55** A, 16–30, 2003) to the case of multi-model multi-initial condition ensembles and discuss their interpretation in terms of specifying odds for the user, as opposed to providing a probability forecast.