



Synchronized Trajectories in a Climate “Supermodel”

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Differences in climate projections among state-of-the-art models can be resolved by connecting the models in run-time, either through inter-model nudging or by directly combining the tendencies for corresponding variables. Since it is clearly established that averaging model outputs typically results in improvement as compared to any individual model output, averaged re-initializations at typical analysis time intervals also seems appropriate.

The resulting "supermodel" is more like a single model than it is like an ensemble, because the constituent models tend to synchronize even with limited inter-model coupling. Thus one can examine the properties of specific trajectories, rather than averaging the statistical properties of the separate models. We apply this strategy to a study of the index cycle in a supermodel constructed from several imperfect copies of the SPEEDO model (a global primitive-equation atmosphere-ocean-land climate model). As with blocking frequency, typical weather statistics of interest like probabilities of heat waves or extreme precipitation events, are improved as compared to the standard multi-model ensemble approach. In contrast to the standard approach, the supermodel approach provides detailed descriptions of typical actual events.