Multi-Convective Parameterization as a Multi-Model Proxy For Seasonal Climate Studies.

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Abstract: A new multi-model ensemble approach is developed for coupled seasonal climate studies. This approach uses a single coupled model with six different state-of-the-art atmospheric deep convective parameterizations to make up the 'multi-model' ensemble. The coupled model is the FSU atmospheric model (T63L17) coupled to the Max Planck global ocean model (HOPE). The multi-model ensemble was integrated for a 12 year period (1986-1997) beginning 1 November of each year and continuing for 210 days (7 months). In addition a five member control ensemble was developed for the same 12 years using only a single convective scheme. The ensemble for the control was generated by varying the initial start date of the atmosphere using consecutive daily ECWMF 12UTC conditions centered on 1 November. The ocean initial conditions are identical to those used in the multi-model approach. Examination of the six different convective models show large differences in the precipitation climatologies over the Tropics and North and South America. The different convective parameterizations produce substantial differences in the evolution of the SSTs and anomalies in the Nino-3 and Nino-3.4 region compared to the control. Various deterministic and probabilistic skill scores (RMS, Anomaly Correlations, Brier Skill Score, Anomaly Equitable Threat Score and Relative Operating Characteristics) show that the SSTs and precipitation from the multi-model approach is consistently more skillful than the control ensemble for all domains examined. It will be shown that combining the two ensembles to increase the ensemble size does not always result in increased skill compared to the multi-model approach.