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Exploring effects of different dynamical cores in global climate models on regional predictions[1]

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We investigate the uncertainty in regional climate response to patterns of sea surface temperature (SST) anomalies due to multiple sources including the choice of the dynamical core. We quantify the sensitivity of regional climate to localized SST anomaly perturbations via a global teleconnection operator (GTO) [2] (i.e., an empirical Green's function.) Structural uncertainty is sampled in two primary ways. (1) We use versions of the NCAR Community Atmospheric Model (CAM3.1, CAM4, and CAM5) to examine the dependence on the sub-grid scale physics parameterizations. (2) We vary the dynamical cores (spectral, finite volume, and HOMME) for each model. We focus on the seasonal climate response over extensive continental regions as well as global scales. Overall, we can explore the dependence of the GTO on physics parameterizations, model resolution, and dynamical cores and identify regions related to atmospheric circulation patterns that exhibit different response characteristics. We note that initial condition uncertainties require sufficient sample sizes to identify such dependencies.

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[2]Li et al. (2012), *J. Geophys. Res.*, **117**, D20103, doi:10.1029/2011JD017186