# A 12-year (1987-1998) ensemble simulation of the U.S. climate with a variable-resolution stretched-grid GCM

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The GEOS (Goddard Earth Observing System) stretched-grid (SG) GCM and the GEOS SG-DAS (Data Assimilation System) have been developed and thoroughly tested over the last few years (Fox-Rabinovitz et al. 1997, 2000, 2001, 2003, Fox-Rabinovitz 2000). The model and system are used for regional climate experiments for seasonal, annual, and multiyear time scales.

The variable-resolution GEOS SG-GCM has been used for long-term/multiyear limited ensemble integrations with a relatively coarse, 60 to 100 km, regional resolution over the U.S. The experiments have been run for the 12-year period, 1987-1998, which includes the recent ENSO cycles. Initial conditions 1-2 days apart are used for ensemble members. The goal of the experiments is analyzing the long-term SG-GCM ensemble integrations in terms of their potential in reducing the uncertainties of regional climate simulation while producing realistic mesoscales.

The ensemble integration results are analyzed for both prognostic and diagnostic fields. A special attention is devoted to analyzing the variability of precipitation over the U.S. The internal variability of the SG-GCM has been assessed. The ensemble means appear to be closer to the verifying analyses than the individual ensemble members. The ensemble means capture realistic mesoscale patterns, especially those of induced by orography. Two ENSO cycles have been analyzed in terms of their impact on the U.S. climate, especially on precipitation. The ability of the SG-GCM simulations to produce long-term regional climate anomalies has been confirmed. However, the optimal size of the ensembles depending on fine regional resolution used is still to be determined.

T is noteworthy that the SG-GCM ensemble simulations are performed as a preparation for the international SGMIP (Stretched-Grid Model Intercomparison Project) that is under way with participation of the major centers and groups from the U.S., Canada, France, and Australia employing the SG-approach for regional climate modeling. The SGMIP results are planned to be submitted later to AMIP-II as a regional project.

References

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