

## **Decadal Climate Studies with Enhanced Variable and Uniform Resolution GCMs Using Advanced Numerical Techniques**

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### **Summary (the U.S. component of the study)**

This research is devoted to: (a) developing the stretched-grid (SG) GCMs using advanced numerical techniques and ensemble integrations, and (b) conducting decadal climate studies on regional-to-global scale anomalous climate events, in a context of climate variability and predictability. The variable-resolution SG-GCMs: (a) produce accurate and cost-efficient regional climate simulations; (b) provide efficient regional downscaling to mesoscales; (c) allow us to preserve the high quality of both global and regional circulations while providing consistent interactions between global and regional scales and phenomena. The international SGMIP-1 (Stretched-Grid Model Intercomparison Project, phase-1), initiated and conducted as a part of this research activities, with participations of the major centers and groups from the U.S., Canada, France, and Australia, has been successfully completed in 2005. The U.S. SG-GCM was run on the terra-scale SciDAC supercomputers at ORNL and NERSC. The results of the 12-year (1987-1998) SGMIP-1 multi-model ensemble simulations of the U.S. and global climate are available at the SGMIP web site (<http://essic.umd.edu/~foxrab/sgmip.html>). Our collaboration with J. Côté of (Meteorological Service of Canada/RPN and UQAM) and his group is a strong integral part of the joint effort. We are also collaborating with the groups led by M. Déqué (Météo-France) and J. McGregor (CSIRO, Australia). The continuation of SGMIP or SGMIP-2 (phase-2) has begun in 2005. It includes the climate simulations for longer, 25-year period (1979 to present), with SG-GCMs as well as with high-resolution GCMs. It will provide unique high-resolution regional and global multi-model ensembles beneficial for modeling community. The WMO/WCRP/WGNE endorsed the SGMIP activities in October 2004 and the progress report was presented in November 2005.