ABSTRACT

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SGER: Evaluation of Midlatitude Storm Characteristics and Variability in Intergovernmental Panel on Climate Change (IPCC) Coupled Models

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The frequency and intensity of baroclinic storm systems determines to a large extent the energy and water cycles in the Northern and Southern midlatitudes. In light of potential systematic changes in midlatitude storm characteristics with climate change, it is crucial to test the ability of climate models to simulate correctly the characteristics and variability of midlatitude storm tracks. In this project, storm tracking techniques that have been applied to the National Centers for Environmental Prediction (NCEP) reanalysis data will be applied to the Intergovernmental Panel on Climate Change (IPCC) - Fourth Assessment Report (AR4) coupled model output to determine the spatial and temporal characteristics of midlatitude storm tracks in the 1960-2000 time period.

This study will evaluate the skill of coupled climate model historical runs to simulate the spatial characteristics of midlatitude storm tracks, the intensity distributions of midlatitude storms, and the temporal variability of storm tracks at time scales that range from the seasonal to the decadal. Preliminary analyses of the observed storm variability indicate potential trends in both storm frequency and intensity that are particularly evident in the Southern Hemisphere. The ability of climate model simulations to reproduce such trends will be evaluated along with the ability to reproduce Arctic Oscillation and El Nino related changes in storm track frequency and intensity. The results of the model evaluation will provide a first look at the effects of model resolution on storm track simulation, will test the ability of the models to simulate potential changes in extreme storm events with climate warming, and will help to attribute errors in model radiation and precipitation fields to model dynamical or microphysical schemes. The study will also provide leads to modelers that will help evaluate the use of damping mechanisms in model physics parameterizations.

Broader Impacts: To the extent that this study pinpoints and helps to improve deficiencies in the modeled representation of mid-latitude storm tracts in a changing climate environment, it will have a positive impact on the quality of future climate and water resources information provided to environmental managers and policy-makers.

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