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Examinations of the Extratropical Weather and Subseasonal Variability in an AGCM with Constrained Tropics

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Abstract

With an atmospheric general circulation model (GEOS-5 AGCM), we conducted a number of idealized simulations to understand the tropical influences on the extratropical weather and climate variability in the subseasonal timescale. The idealization is to strongly constrain the tropics over the 30S-30N latitude belts to a reference state that obtained from the NCEP-DOE Reanalysis, using a data assimilation technique (i.e., the incremental analysis update). This allowed us to assess how much the controlled tropics and the improved simulation of the tropical MJO in the AGCM would constrain the extratropical variability. It is found that a significant error reduction in the upper-level winds over the extratropics, compared with the free-running model simulation (driven only by the observed SSTs). The results also highlighted that some of the major extratropical weather events were apparently associated with the developments and temporal evolutions of the tropical MJO. Additional sensitivity experiments revealed that the tropical wind forcing is more important than moisture forcing in driving those extratropical weather extremes.

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