Using Global Mesoscale Model Results to inform GEOS GCM Moist Process Parameterizations

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The GEOS Atmospheric General Circulation Model (AGCM) is currently in use in the NASA Global Modeling and Assimilation Office (GMAO) at a wide range of resolutions for a variety of applications including atmospheric analyses and forecasts, coupled atmosphere-ocean simulations and global mesoscale simulations. A global mesoscale simulation at approximately 7-km horizontal resolution was used to examine the subgrid-scale variability of several fields within several coarser-resolution grid sizes. These subgrid scale variances are relevant for informing the parameterization of moist processes in the GEOS GCM, and are the total water, relevant for the cloud macrophysics, the vertical velocity, relevant for the cloud microphysics related to cirrus formation, and the near-surface moist static energy, relevant for the cumulus parameterization. The analysis of the global mesoscale model output also allowed a proper implementation of resolution dependant behavior in the parameterizations. Modification of the parameterizations using the subgrid scale information were implemented in the GCM and the impact on the AGCM simulations will be presented here. The statistics of total water and vertical velocity had a positive impact on the simulations, and the moist static energy impact is still under development.

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