P26 Effects of the deep convection schemes in variable-resolution aquaplanet simulations using CAM-MPAS.

Jang, Jihyeon, *National Center for Atmospheric Research (NCAR),* Sang-Hun Park, *Yonsei University, South Korea*, Colin M. Zarzycki, William C. Skamarock, *NCAR,* and L. Ruby Leung, *Pacific Northwest National Laboratory*

Recently, the nonhydrostatic dynamical core of the Model for Prediction Across Scales (MPAS) has been implemented within the Community Earth System Model (CESM). Running variable-resolution climate simulations with regional refinement is an important application. However, it is known that there is a dependence of physics time step on model results, since the deep convection scheme in the Community Atmosphere Model (CAM) physics is constrained by a convective relaxation time scale which does not remove instabilities in a short time step. This raises a question of whether a spatially and temporally constant value of the time scale is appropriate for higher resolution simulations, particularly for variable-resolution modeling in which the grid spacing is not uniform globally. To address this issue, we implemented the Grell-Freitas (GF) scale-aware stochastic deep convection scheme into the CAM physics. The GF scheme uses multiple formulations of the quasi-equilibrium closures, and the relaxation time-scale is a function of the mesh size and vertical velocity scale. The effects of the two deep convection schemes on the simulated characteristics of precipitation will be compared in aquaplanet simulations with quasi-uniform (120 km) and variable-resolution (120-30 km) meshes to document and understand differences in the model behaviors.