

The impact of localized grid refinement on sub-grid parameterization in idealized climate experiments

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ABSTRACT

We present simulations exploring the behavior of subgrid physical parameterizations at multiple resolutions in an idealized framework. In particular, we utilize the Community Atmosphere Model's Spectral Element (CAM-SE) dynamical core to explore the impact of grid refinement on simplified climate systems. We compare variable-resolution to globally-uniform grids using a moist extension of the Held-Suarez test case. The consequences of using different cell structures in transition regions are discussed in addition to the impacts of varying explicit diffusion. We also explore the resolution signatures which arise from using variable-resolution CAM-SE grids in conjunction with CAM version 4 and CAM version 5 physics packages in an aquaplanet framework. We use these results to consider the implications of using multi-resolution grids in coupled climate simulations.