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Grid-dependent Convection in WRF-LES JASON SIMON, Department of Civil and Environmental Engineering, University of California, Berkeley, BOWEN ZHOU, Key Laboratory for Mesoscale Severe Weather/MOE, and School of Atmospheric Science, Nanjing University, FOTINI CHOW, Department of Civil and Environmental Engineering, University of California, Berkeley — Traditional numerical weather prediction (NWP) models parameterize the boundary layer with planetary boundary layer (PBL) schemes, which assume a coarse resolution so that energy-containing eddies are nearly exclusively sub-grid scale (SGS). Newer NWP models can also be used as large-eddy simulation (LES) models, which use a grid resolution that is sufficiently fine to resolve energy-containing eddies. For atmospheric flows the energy-containing eddies are typically on the scale of the PBL depth [O(1 km)]. The range of resolutions between the maximum appropriate resolution for LES and the minimum for PBL schemes is the turbulent gray zone, or terra incognita. The resolution limit for atmospheric LES is largely unexamined despite its dynamical significance. Here we examine the Weather Research and Forecasting model in LES mode (WRF-LES). We attempt to identify the symptoms of the turbulent gray zone with WRF-LES under primarily convective conditions using the Wangara Day 33 case. Grid-dependence, a signal of the gray zone, is evaluated by considering the stability profile, resolved convection, higher-order statistical profiles, and turbulence spectra. Also considered are the effects of isotropic mixing length-scales, domain extent and spatially heterogeneous surface fluxes.

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