Abstract Submitted
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Large-eddy simulation of the nighttime boundary layer over the US Great Plains[1] FOTINI CHOW, BOWEN ZHOU, University of California, Berkeley — The nighttime stable boundary layer (SBL) is associated with various atmospheric processes including low-level jets, internal gravity waves, Kelvin-Helmholtz shear instabilities, and turbulence events. These phenomena due to the strong stable stratification are quite difficult to represent in numerical models and often require very high grid resolution. In this study, nested large eddy-simulations (LES) are performed over the site where the Cooperative Atmospheric-Surface Exchange Study (CASES-99) field experiment took place, near Leon, Kansas. The night of Oct 5-6 (IOP2) is chosen to represent a typical intermittently turbulent night over the Great Plains. Two turbulent bursting events in the SBL are identified. Simulations are initialized with North American Regional Reanalysis (NARR) on 32 km grids, and one-way nested to a very fine grid with 16 m horizontal spacing. Results using the conventional TKE-1.5 and dynamic reconstruction turbulence models are compared with observations. While both turbulence closures predict the first event with great precision at 16 m scale, only the dynamic reconstruction model (DRM) is able to sustain intermittent turbulence and predict the second bursting event.

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Fotini Chow
University of California, Berkeley

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