Abstract Submitted
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Investigation of Subgrid-Scale Turbulence in the Atmospheric Surface Layer using AHATS Field Data[1] KHUONG NGUYEN, Clemson University, STEVEN ONCLEY, TOMAS HORST, PETER SULLIVAN, National Center for Atmospheric Research, CHENNING TONG, Clemson University — Data obtained in the atmospheric surface layer during the recent Advection Horizontal Array Turbulence Study (AHATS) field program are used to study issues met in large-eddy simulation (LES) of atmospheric boundary layer. The array technique, which has been successfully employed in several previous programs, is extended to include a second array to measure the advection of the subgrid-scale (SGS) stress. Pressure sensors are also deployed to measure the fluctuating pressure, enabling separation of the resolvable- and subgrid-scale pressure. We analyze the subgrid-scale terms in the joint probability density function (JPDF) of the resolvable-scale velocity, which must be reproduced by the SGS model in order for LES to predict correctly the resolvable-scale velocity JPDF. These terms include the conditional SGS stress (on the resolvable-scale velocity), the conditional SGS stress production rate, the conditional resolvable-scale pressure, and the conditional resolvable-scale pressure-strain rate correlation. We also analyze the advection and pressure terms in the SGS stress budget, which are important for understanding the dynamics of the SGS stress and for modeling the SGS stress using the transport equation.

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