

Questions on the evolution, structure, and horizontal extent of wave-turbulence effects

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Profiles of the mean-wind speed and turbulent-velocity variances extend through the nocturnal boundary layer to provide time-height cross sections of the evolution of the low-level jet and accompanying turbulence structure. The profiles are from Doppler lidar scan mean and fluctuating wind data that have been shown to be well correlated with corresponding tower-anemometer measured quantities. Under weakly stable conditions ($Ri_B < 0.15$, LLJ speeds $> 15 \text{ m s}^{-1}$) strong turbulence in the SBL is continuous but variable, and in the very stable case ($Ri_B > 0.5$, wind speeds $< 5 \text{ m s}^{-1}$ in the lowest 200 m) turbulence is very weak. Between these two regimes, stronger turbulence and wave activity is found to occur in events of several minutes to an hour. Questions that arise for research are, what controls the timing between wave/turbulence events, and what is the horizontal extent of the events? Answers to these questions are important for assessing large-scale effects of these turbulent events, and thus the ability to parameterize stable turbulent mixing effects on these kinds of night.