

LIDAR observations of fine-scale gravity waves in the nocturnal boundary layer above an orchard canopy

Shane D. Mayor, Elizabeth R. Jachens, Tyson N. Randall
Department of Physics, California State University, Chico
sdmayor@csuchico.edu

Fifty-two episodes of micrometeorological gravity wave activity were identified in data collected with the Raman-shifted Eye-safe Aerosol Lidar (REAL) near Dixon, California, during a nearly continuous 3-month period of observation. The internal waves, with wavelengths ranging from 40 m to 100 m, appear in horizontal cross-sectional elastic backscatter images of the atmospheric roughness sublayer between 10 m and 30 m AGL. All of the episodes occur at night when the atmosphere tends toward stability. Time-series data from in situ sensors mounted to a tower that intersected the lidar scans at 1.6 km range reveal oscillations in all three wind velocity components and in some cases the temperature and relative humidity traces. We hypothesize that the lidar can reveal these waves because of the existence of vertical gradients of aerosol backscatter and the oscillating vertical component of air motion in the wave train that displace the backscatter gradients vertically.