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Microscale Measurement in the Atmospheric Boundary Layer: Collapse of Turbulence[1] HARINDRA FERNANDO, University of Notre Dame, ELIEZER KIT, Tel Aviv University, ANN DALLMAN, University of Notre Dame — During cooling of the Earth's surface in the evening, day-time convection subsides due to cut-off of its energy sources and a stable density stratified layer develops near the ground. In complex terrain, this evening transition from the convective boundary layer to the stable boundary layer is associated with low wind speeds, and hence low shear production of turbulence. Often the wind direction is also variable during the evening transition, and hence the use of probes such as hotwires/films for the measurements of microscale turbulent quantities needs special handling as they require the winds to have a specific alignment with the probe. To circumvent this problem, a combo of co-located sonic and hot-film anemometers, with the former measuring mean winds and aligning the latter in the appropriate wind direction via an automated platform, was successfully designed and implemented. A novel calibration procedure for the probes was also developed. It was found that the evening transition in complex terrain is associated with a sudden collapse of turbulence spectra across the entire spectrum. Observations taken in multiple locations show that the collapse is a complex phenomenon, sometimes showing layering with low rms vertical velocities and in other times showing higher vertical velocities perhaps due to instabilities and billowing.

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