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Extracting air motion velocity data from aerosol distortion patterns detected in fast lidar scans JAN MARIE ANDERSEN, THOMAS WILKERSON, Utah State University; Space Dynamics Laboratory, Research Division, North Logan, UT 84341, USA — Rapid elevation scans using a LIDAR pointing in the upwind direction at a fixed azimuth reveal distinct patterns in the spatial structure of the aerosols in the low-altitude boundary layer. Typically, these aerosol clouds are borne aloft from air pollution sources and areas of loose soil such as gravel roads and plowed fields. Such aerosol patterns are kinematically distorted due to the combination of finite scan time and cloud motion. True motion patterns are interpreted by means of a joint analysis of successive "up" and "down" scans. Analysis of two fast, successive elevation scans yields information about the motion of the cloud features and the fluid flow of the air itself - and thus about the turbulent motion within the atmospheric boundary layer. In spite of scan limitations, the temporal and spatial dependence of air flow can be determined by careful analysis of these repeated pairs of rapid scans. Examples are given of measurements of the mean horizontal wind, the shape of prominent vertical plumes of wind-borne aerosols, and inferences about vertical aerosol transport.

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