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Use of a Doppler wind lidar for estimating a combination of wind measurements and turbulence parameters

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A Doppler wind lidar (Halo Photonics, UK) is in use at the Falkenberg measurement site of the Lindenberg observatory since the beginning of 2014. Based on heterodyne detection, the system measures the wind speed along the line of sight of its laser beam, which can be directed into any desired direction of the upper hemisphere. The lidar is operated using a combination of vertical stare mode and VAD mode (conical scan mode at a fixed elevation). The combination of these specific modes allows for resolving both the variance of the vertical wind speed as a proxy for buoyancy and the vertical wind gradient as a proxy for wind shear. Hence, the system is able of capturing the most important sources of boundary layer turbulence. Challenging is the amount of time available for both measurement modes. This paper focuses on result obtained during the first 6 months of operation. Comparison with wind data from the 100-m tower and Sodar measurements will be presented, as well as the boundary-layer parameters obtained by the system.