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On stable boundary-layer height estimation using backscatter lidar data and variance processing

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This study describes a method to estimate the nocturnal stable boundary layer height (SBLH) by means of lidar observations. The method permits two approaches which yield independent retrievals through either spatial or temporal variance vertical profiles of the attenuated backscatter. Then, the minimum variance region (MVR) on this profile is identified. Eventually, when multiple MVRs are detected, a temperature-based SBLH estimation derived from radiosonde, launched within the searching time, is used to disambiguate the initial guess. In order to test the method, two study cases employing lidar-ceilometer (Jenoptik CHM 15k Nimbus) measurements are investigated. Temperature-based estimates from a collocated microwave radiometer permitted validation, using either temporal or spatial backscatter variances. The dataset was collected during the HD(CP)2 Observational Prototype Experiment (HOPE) [1].

[1] U. Saeed, F. Rocadenbosch, and S. Crewell, "Adaptive Estimation of the Stable Boundary Layer Height Using Combined Lidar and Microwave Radiometer Observations," *IEEE Trans. Geosci. Remote Sens.*, 54(12), 6895–6906 (2016), DOI: 10.1109/TGRS.2016.2586298.

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