

Evaluation of scan-patterns for a triple Doppler lidar setup

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A triple Doppler lidar setup allows direct observation of 3D wind vectors at the laser beam intercept. We can explore atmospheric flow spatially with scan routines that operate the three lidar-beams in concert.

We evaluated five scan-patterns in search for an optimum in measurement duration and spatial coverage of the intercepting lidar beams. In our study, each scan-pattern was required to include a vertical profile of triple lidar beam intercepts above predefined coordinates. This resulted in a remotely sensed ‘virtual tower’ up to 800 m above ground of three-dimensional wind vectors. The Doppler lidar measurements (Halo Photonics Streamline) were conducted during the 2015 June-July ScaleX campaign at the TERENO preAlpine site Fendt in the Ammer catchment, Southern Germany. The performances of the scan-patterns were quantified and we discuss these in relation to the complexity to organise such a sensor network for the acquisition of meaningful time series of flow in the surface boundary layer.