Geophysical Research Abstracts,
Vol. 11, EGU2009-10541, 2009
EGU General Assembly 2009

Atmospheric Boundary Layer and Clouds wind speed profile measurements with the new compact long range wind Lidar WindCube(TM) WLS70

M. Boquet, J.P. Cariou, L. Sauvage, S. Lolli, R. Parmentier, and S. Loaec
Leosphere, 42 Rue de Clignancourt, Paris, France (mboquet@leosphere.fr)

To fully understand atmospheric dynamics, climate studies, energy transfer, and weather prediction the wind field is one of the most important atmospheric state variables. Small scales variability and low atmospheric layers are not described with sufficient resolution up to now. To answer these needs, the WLS70 long-range wind Lidar is a new generation of wind Lidars developed by LEOSPHERE, derived from the commercial WindCube™ Lidar widely used by the wind power industry and well-known for its great accuracy and data availability.

The WLS70 retrieves the horizontal and vertical wind speed profiles as well as the wind direction at various heights simultaneously inside the boundary layer and cloud layers. The amplitude and spectral content of the backscattering signal are also available. From raw data, the embedded signal processing software performs the computation of the aerosol Doppler shift and backscattering coefficient. Higher values of normalized relative backscattering (NRB) are proportional to higher aerosol concentration. At 1540 nm, molecular scattering being negligible, it is then possible to directly retrieve the Boundary Layer height evolution observing the height at which the WindCube NRB drops drastically.

In this work are presented the results of the measurements obtained during the LUAMI campaign that took place in Lindenberg, at the DWD (Deutscher WetterDienst) meteorological observatory, from November 2008 to January 2009. The WLS70 Lidar instrument was placed close together with an EZ Lidar™ ALS450, a rugged and compact eye safe aerosol Lidar that provides a real time measurement of backscattering and extinction coefficients, aerosol optical depth (AOD), automatic detection of the planetary boundary layer (PBL) height and clouds base and top from 100m up to more than 20km.

First results put in evidence wind shear and veer phenomena as well as strong convective effects during the raise of the mixing layer or before rain periods. Wind speed profiles and atmospheric structures (PBL height, clouds top and base) are retrieved from the WLS Lidar data with outstanding time resolution (10s per profile), spatial resolution (50m) and velocity resolution (0.4m/s) for a heights range from 100m to 2km. Intercomparison results with wind profilers and cup anemometers are also available. Due to its robustness and fully transportability (95x65x55cm dimensions and 50kg weight), together with velocity resolution, range and temporal resolutions of 0.4 m/s, 50m, 10s, are potentially useful for a range of boundary layer meteorology applications where punctual measurements in the micro and mesoscale are required.