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## Doppler wind lidar activities at Cabauw

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Atmospheric motion and turbulence are essential parameters for weather and topics related to air quality. Therefore, wind profile measurements play an important role in atmospheric research and meteorology. One source of wind profile data are Doppler wind lidars, which are laser-based remote sensing instruments that measure wind speed and wind direction up to a few hundred meters or even a few kilometers. Commercial wind lidars use the laser wavelength of 1.5  $\mu\text{m}$  and therefore backscatter is mainly from aerosols while clear air backscatter is minimal, limiting the range to the boundary layer typically.

We have carried out a two-year intercomparison of the ZephIR 300M (ZX Lidars) short-range wind lidar and tall mast wind measurements at Cabauw [1]. We have focused on the (height-dependent) data availability of the wind lidar under various meteorological conditions and the data quality through a comparison with in situ wind measurements at several levels in the 213m tall meteorological mast. We have found an overall availability of quality-controlled wind lidar data of 97% to 98 %, where the missing part is mainly due to precipitation events exceeding 1 mm/h or fog or low clouds below 100 m. The mean bias in the horizontal wind speed is within 0.1 m/s with a high correlation between the mast and wind lidar measurements, although under some specific conditions (very high wind speed, fog or low clouds) larger deviations are observed. This instrument is being deployed within North Sea wind farms.

Recently, a scanning long-range wind lidar Windcube 200S (Leosphere/Vaisala) has been installed at Cabauw, as part of the Ruisdael Observatory program [2]. The scanning Doppler wind lidars will provide detailed measurements of the wind field, aerosols and clouds around the Cabauw site, in coordination with other instruments, such as the cloud radar.

[1] Knoop, S., Bosveld, F. C., de Haij, M. J., and Apituley, A.: A 2-year intercomparison of continuous-wave focusing wind lidar and tall mast wind measurements at Cabauw, *Atmos. Meas. Tech.*, 14, 2219–2235, 2021

[2] <https://ruisdael-observatory.nl/>