Application of Cabauw lidar data for campaigns, new methodology development and validation activities

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Caeli, the Cabauw Water Vapour, Aerosol and Cloud lidar, is a high-performance multi-wavelength Raman lidar and is part of EARLINET. It is one of the key instruments installed at the Cesar Observatory in Cabauw, located in the western part of The Netherlands (51.971° N, 4.927° E) in a polder 0.7 m below mean sealevel. At the site a large set of instruments is operated to study the atmosphere and its interaction with the land surface. Also operated at the site are a UV-backscatter lidar with depolarisation and a ceilometer.

The Cabauw lidar data were used for the development of several new methods, as well as in the validation of new techniques based on other sensor data. The potential of the site that is equipped with a suite of in-situ and remote sensing equipment provides the possibility to develop new methods, and test them using independent observations.

A method for estimations of the mass load of volcanic ash based on depolarisation lidar data was developed and could be tested using the Raman lidar data. A new method for tracking the height of the boundary layer using graph theory was developed and could be tested using the wind profiler. The lidar data was also used for testing a new technique to derive the aerosol layer height from passive satellite observations in the O_2 A-band, that can be applied in future operational earth observation platforms. The EARLINET Raman lidar acts as the reference instrument in the selection procedure for a new ceilometer for the Dutch ceilometer network. Future work will include validation activities for the upcoming European satellite missions Aeolus, Sentinel-5p/TROPOMI and EarthCare.