



Vertical distribution of the aerosol optical properties on multi-annual scale observed by lidar at L'Aquila, Italy.

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The CETEMPS lidar (42.38N, 13.32E, 683m a.s.l.) is, since May 2000, fully operational for the measurement of the vertical profile of the aerosol extinction and backscatter coefficients, of the water vapour concentration, in PBL and in the lower troposphere. The source of the system is an excimer laser (351nm), the typical nighttime measurement covers a period of 2-3 hours, the system has reduced performances during daytime. In climatological mode, on average, two sessions of measurements per week are usually performed. In the case of special events (i.e. Saharan dust outbreaks, forest fires, etc.) or along intensive campaign of validation and comparison versus other instruments, the rate of observations increases.

The geophysical products of the CETEMPS lidar consist in the vertical profile of the extinction and backscatter coefficients at 351nm, and the water vapour mixing ratio.

The algorithms used to evaluate the lidar measurements and to quantify their reliability have been tested within the EARLINET (<http://www.earlinet.org/>) activities that are devoted to the data quality assurance. These EARLINET tasks have also included several hardware tests.

In a standard/typical measurement session, the CETEMPS lidar has the following performances, for the aerosol optical properties:

- 351nm backscatter coefficient - temporal resolution of 30 minutes, indetermination between 5% and 15% , altitude resolution between 60m and 600m;
- simultaneous 351nm extinction coefficient - temporal resolution of 30 minutes, indetermination between 10% and 20% , altitude resolution between 60m and 600m,;

Concerning the water vapour profile, the lidar data inversion is based on standard algorithms:

- the water vapour mixing ratio is obtained with a temporal resolution of 10minutes, errors ranging between 5% and 20% (including some systematics coming from calibration procedures), vertical resolution between 30 and 100m.

The liquid water lidar channel of the CETEMPS lidar is sensitive to the liquid water content, and it provides information in presence of clouds or wet aerosols. With dedicated calibration procedures, it is possible to evaluate the cloud liquid water content.

The CETEMPS lidar, within EARLINET, contributes to the constitution of a database for investigating the aerosol climatology on continental scale. We will report analysis (about 7 years of observations at the site of L'Aquila) of the aerosol optical properties: the seasonal behavior and the monthly means variations of the PBL aerosol optical depth (AOD), and of the PBL height. The possible correlation between the aerosol optical properties and the water vapour content is also discussed.