Aerosol Assimilation of lidar data from Satellite (AEOLUS) and Ground-based (EARLINET) instruments in COMPO-IFS.

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Since several years, the number of aerosol data coming from lidar has grown and improved in quality. These new datasets are providing a valuable information on the vertical distribution of aerosols which is missing in the AOD (Aerosol Optical Depth), which has been used so far in aerosols analysis. The launch of AEOLUS in 2018 has increased the interest in the assimilation of the aerosol lidar information. In parallel, the ground-based network EARLINET (European Aerosol Research Lidar NETwork) has grown to cover the Europe with good quality data. Assimilation of these data in the ECMWF/CAMS (European Centre for Medium-range Weather Forecasts / Copernicus Atmosphere Monitoring Service) system is expected to provide improvements in the aerosol analyses and forecasts.

Three preliminary studies have been done in the past four years using AEOLUS data (A3S-ESA funded) and EARLINET data (ACTRIS-2 and EUNADIC-AV, EU-funded). These studies have allowed the full development of the tangent linear and adjoint code for lidar backscatter in the ECMWF’s 4D-VAR system. These developments are now in the operational model version in research mode. The first results are promising and open the path to more intake of aerosol lidar data for assimilation purposes. The future launch of EARTHCARE (Earth-Cloud Aerosol and Radiation Explorer) and later ACCP (Aerosol Cloud, Convention and Precipitation) might even upgrade the use of aerosol lidar data in COMPO-IFS (Composition-Integrated Forecast system).

The most recent results using AEOLUS data (for October 2019 and April 2020) and using EARLINET data (October 2020) will be shown in this presentation. The output will be compared to the CAMS operational aerosol forecast as well as to independent data from AERONET (AErosol Robotic NETwork).