Geophysical Research Abstracts
Vol. 21, EGU2019-7730, 2019
EGU General Assembly 2019

Development of aerosol lidar calibration capabilities in ACTRIS

Doina Nicolae (1), Livio Belegante (1), Victor Nicolae (1,4), Volker Freudenthaler (2), Lucia Mona (3), and Aldo Amodeo (3)

(1) National Institute of R&D for Optoelectronics, Remote Sensing, Magurele, Romania (nnicol@inoe.ro), (2) Meteorological Institute of the Ludwig-Maximilians-University, Munich, Germany, (3) Consiglio Nazionale delle Ricerche – National Research Council of Italy, Rome, Italy, (4) Faculty of Physics, University of Bucharest, Magurele, Romania

The Aerosol, Clouds and Trace Gases Research Infrastructure (ACTRIS) is a pan-European initiative consolidating actions amongst European partners that produces high-quality data documenting short-lived atmospheric constituents and processes leading to their variability in natural and controlled atmospheres.
Through its about 100 observational sites foreseen in 2025, ACTRIS is responsible for the acquisition of reliable, accurate, and high-quality data to document the 4-D distribution and variability of aerosols, clouds and trace gases and their complex interactions. ACTRIS data are harmonized through standardized quality controls, archived, and made accessible to all users for the long term.
The Centre for Aerosol Remote Sensing (CARS) is one of the six ACTRIS Topical Centres with an essential role to ensure compliance with standard operation procedures and data analysis, and to provide tailored services to the scientific community and other stakeholders. CARS is set up as a partnership of eight Units, out of which three are dedicated to aerosol high-power lidars, and are operated in Romania, Germany and Italy. The mission of these expert Units is to further develop the EARLINET-ACTRIS quality assurance program, which at this moment includes the calculation of the Rayleigh scattering coefficients, the Rayleigh-fit, the trigger delay determination, the telecover tests, the dark signal subtraction, the specialised lidar pulse generator, and the polarisation calibration (Freudenthaler et al., 2017), for the most part in the aim to reduce systematic errors. These are considered as a starting base for the quality assurance and quality control (QA/QC) program of the ACTRIS aerosol high-power lidars.
As part of their responsibilities, the aerosol high-power lidar units at CARS will develop, document and distribute a package of tools which facilitate the automatic submission of aerosol lidar measurements to the EARLINET Single Calculus Chain (D'Amico et al., 2015), as well as regular control of the instrument's performances, by implementing the existing tests into software routines with fast diagnosis capabilities. This will allow the operators to better control the quality of the collected datasets without resorting to costly and generally inefficient procedures such as direct comparison with a reference system, currently considered for calibration. Such tools, although not avoiding the expert check-ups (based on annual QA test data or through instrument inspection in case of persistent malfunction), ensure a more reliable operation of the very different lidar systems in ACTRIS, while promoting the principle of "un-touched data".
In addition, the aerosol high-power lidar units at CARS will establish new tools to quantify the signal disturbances, and will develop an error analysis of the final products which includes and combines systematic and random errors. This will finally contribute to a more realistic estimation and consequently to a reduction of the uncertainties of aerosol profiling data products.
The present contribution introduces some of these tools, and the plan for implementing them at the ACTRIS aerosol remote sensing observation facilities.