Geophysical Research Abstracts
Vol. 17, EGU2015-658, 2015
EGU General Assembly 2015

Evaluation of model-simulated water vapor profiles as a tool for aerosol hygroscopicity studies: based upon lidar and microwave radiometer measurements from the HygrA-CD campaign

Lev Labzovskii (1,2), Ioannis Binietoglou (1), Alexandros Papayannis (3), Robert Banks (4), and José Maria Baldasano (4)

(1) National Institute of R-D for Optoelectronics, Romania (lev.labzovsky@inoe.ro), (2) University of Bucharest, Faculty of Physics, Bucharest, Romania, (3) Laser Remote Sensing Laboratory, Physics Department, National Technical University of Athens, Athens, Greece, (4) Barcelona Supercomputing Center-Centro Nacional de Supercomputación (BSC-CNS), Earth Sciences Dept., Barcelona, Spain

Atmospheric water vapor content information is needed as input for various studies devoted to hygroscopic growth of aerosols. Due to the limited amount of experimental datasets of water vapor content, numerical weather prediction is frequently used for these studies. The capability of model-simulated water vapor is evaluated using experimental data from measurements. This work is devoted to the comparison between experimental water vapor retrieval based on Raman lidar, microwave radiometer and radiosounding measurements, and numerical modeling of water vapor. A Raman multi-wavelength lidar is used as a core instrument for high-spatial resolution water vapor retrievals for this study. It has a capability to detect water vapor based on the Raman signals obtained at 387 and 408 nm. A second main instrument is the microwave radiometer which provides relative and absolute humidity profiles based on the detection of atmospheric water vapor emission continuously. Radiosoundings are also used in this work for lidar-derived water vapor mixing ratio calibration and validation. The experimental data presented here is acquired during the HygrA-CD campaign held in Athens from May to June 2014. During the HygrA-CD 198 hourly profiles of water vapor mixing ratio were retrieved from lidar measurements, while the microwave radiometer performed 25 days of continuous measurements, while more than 20 radiosondes were launched. The WRF (Weather and Forecasting Model) model was used during the campaign to simulate water vapor mixing ratio profiles. A comparison between the retrieved profiles is presented, assessing the uncertainties associated to both instruments and simulations.

Keywords: Lidar, Microwave Radiometer, Water vapor retrieval, Water Vapor Mixing Ratio

Acknowledgments: This work has been supported by the program of FP-7-PEOPLE-2011-ITN under grant no. 289923 - ITaRS