

3-D characterization of aerosol pollution in the Haifa (Israel) region, including recent November 2016 wild fire events: Combined high resolution MODIS (MAIAC retrieval), polarization lidar (POLIPHON method), and AERONET photometer observations

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Although our understanding on the spatial and temporal variability of aerosols is improving, its composition and origin still remain one of the largest uncertainties in climate forcing assessments as well as being a limiting factor in health effects studies. In order to obtain a clear picture on aerosol levels and to quantify its contribution in a complex region such as Israel, there is a need to vertically and horizontally resolved aerosol observations. To achieve this goal, both, passive and active remote sensing techniques, need to be combined to provide 3D profile view of aerosol levels. In this study we used Multi-Angle Implementation of Atmospheric Correction (MAIAC) algorithm developed for MODIS which provides AOD at 1 km resolution. This data will be integrated with active multi-wavelength polarization lidar observation performed at Haifa, Israel, since August 2016. At the lidar site an AERONET photometer is installed, too. The applied lidar/photometer POLIPHON (Polarization Lidar Photometer Networking) technique allows to separate and quantify the contributions of dust (fine and coarse dust separation), anthropogenic haze and smoke, and marine aerosol (sea breeze influence) to the observed aerosol profiles (particle extinction coefficient at 532 nm, mass concentrations). To achieve our goals in this study we aim to: 1) investigate the performance of MAIAC for different aerosol mixing scenarios and vertical layering; 2) explore the main causes for variability in pollution levels between Terra and Aqua on a 3-D scale; 3) to get parametrization of major pollution sources. Our results are of especial relevance to heterogeneous nature of aerosols in the Eastern Mediterranean region and very much of relevance to policy-related studies. The recent bush and forest fires in Israel are also covered by our observations. The same approach of data analysis (conducted for Haifa observations) is also done for aerosol observations in central Asia (Dushanbe, Tajikistan, summer 2016) where dust can be found up to 10~km height almost every day. Haifa and Dushanbe case studies will be discussed at the conference.