



LOCAL AIR: Local Aerosol monitoring combining in-situ and Remote Sensing observations

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The atmospheric aerosols have effects on climate, environment and health. Although the importance of the study of aerosols is well recognized, the current knowledge of the characteristics and their distribution is still insufficient, and there are large uncertainties in the current understanding of the role of aerosols on climate and the environment, both on a regional and local level. Overcoming these uncertainties requires a search strategy that integrates data from multiple platforms (eg, terrestrial, satellite, ships and planes) and the different acquisition techniques (for example, in situ measurements, remote sensing, modeling numerical and data assimilation) (Yu et al., 2006). To this end, in recent years, there have been many efforts such as the creation of networks dedicated to systematic observation of aerosols (eg, European Monitoring and Evaluation Programme-EMEP, European Aerosol Research Lidar NETwork-EARLINET, MicroPulse Lidar Network- MPLNET, and Aerosol Robotic NETwork-AERONET), the development and implementation of new satellite sensors and improvement of numerical models.

The recent availability of numerous data to the ground, columnar and profiles of aerosols allows to investigate these aspects. An integrated approach between these different techniques could be able to provide additional information, providing greater insight into the properties of aerosols and their distribution and overcoming the limits of each single technique. In fact, the ground measurements allow direct determination of the physico-chemical properties of aerosols, but cannot be considered representative for large spatial and temporal scales and do not provide any information about the vertical profile of aerosols. On the other hand, the remote sensing techniques from the ground and satellite provide information on the vertical distribution of atmospheric aerosols both in the Planetary Boundary Layer (PBL), mainly characterized by the presence of aerosols originating from local sources, which in the troposphere, where there are aerosols transported over long distances by the phenomena of atmospheric circulation. The purpose of the LOCAL AIR project is the development of a methodology for using synergistic data at different resolutions (ground measurements, remote sensing from ground and satellite) as an effective tool for the characterization of tropospheric aerosols on a local scale.

The backbone of the project is the long-term ground-based measurements collected at CIAO (CNR-IMAA Atmospheric Observatory) plus the CALIPSO observations.. The location of the plethora of instruments and measurements of atmospheric interest available at CNR-IMAA makes it a sample site not only for the realization of the methodology, but also allows a feasibility study of this method in the absence of some by analysis of the measures considered in the scaling down of the algorithm developed. It will be evaluated the applicability and reliability of the algorithm implemented for the characterization of the aerosol content to the ground in other places of special interest.

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