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Characterization of events of transport over the Mediterranean Basin during summer 2012

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Long-range transport has a great influence on the atmospheric composition in the Mediterranean Basin (MB). This work focuses on the dust intrusion events and the outflows of polluted air from the Po Valley during the PEGASOS (Pan-European Gas-AeroSOls Climate Interaction Study), TRAQA (TRAnsport et Qualité de l'Air au dessus du bassin Méditerranéen) and Supersito Arpa (Emilia Romagna) measurements campaigns of June – July 2012. In order to investigate the sources and identify the transport patterns, numerical simulations, in-situ, remote sensing and airborne aerosol measurements were jointly used. The ground based lidar situated at the San Pietro Capofiume (SPC) station, in the eastern part of the Po Valley, provides continuous measurements of backscatter and depolarization profiles and the Aerodynamical Particle Sizer (APS), in the same site, gives the aerosol spectral distribution at the ground. Observations show two main events of mineral aerosol inflow over north Italy (19- 21 June and 29-01 July). Optical properties provide a primary discrimination between coarser (likely dust) and finer particles (probably anthropogenic). The vertical statistical distribution of the different aerosol classes shows that larger particles are mainly individuated over the Planetary Boundary Layer (PBL) level while smaller particles tend to follow the daily evolution of the PBL or remain confined under it. Dust events are also detected during the TRAQA airborne campaign in the area of the gulf of Genoa, contributing to the identification of the dust plume characterization. Cluster trajectories analysis coupled to mesoscale simulations highlights the effective export of air masses from the Sahara with frequent intrusions of dust over the Po Valley, as recorded in the observational SPC site. Transport analysis also indicates an inversion of the main advection pattern (the Po Valley outflow is mainly directed eastward in the Adriatic region) during 23th and 26th June, with a possible impact of the Po Valley emissions on the Genoa Gulf where simultaneous airborne observations occurred.