Weekly periodicities of aerosol properties and impacts on irradiance measurements at the surface.

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The effect of anthropogenic activities on the atmospheric aerosol composition, meteorological, and climatological parameters cannot be easily detected. However, the identification of weekly cycles on the atmospheric aerosol concentration and composition represents a potent tool to understand the anthropogenic aerosol effects on climate. In fact, the aerosol weekly cycle is strictly related to the working one, as several studies have revealed (e.g., Georgoulias and Kourtidis [1] and references therein). A negative aerosol optical depth (AOD) weekly cycle (higher AOD values during weekend) was observed by Georgoulias and Kourtidis [1] over Eastern Europe and the Mediterranean Sea. They investigated the spatial and temporal variability of the aerosol weekly cycle by using the AODs retrieved from Terra MODIS (February 2000February 2009) and Aqua MODIS (July 2002December 2008) satellite measurements. Then, the AOD weekly variability examined in conjunction with the dominating synoptic wind pattern from the NCEP/NCAR reanalysis has shown that the negative AOD weekly cycle over Eastern Europe and the Mediterranean Sea could be partially attributed to the westerly transport of pollution. Columnar aerosol parameters retrieved from sun/sky photometer measurements and ground-level aerosol parameters retrieved by nephelometer measurements were used by Perrone et al. [2] to investigate the aerosol weekly cycle over south-eastern Italy. The analysis of the weekly cycle of the ground-level and columnar aerosol parameters indicated that the weekend daily means of the aerosol optical depth and scattering coefficient may have been partially affected by the transboundary pollution from Eastern Europe, due to weekday anthropogenic activities, in good agreement with the results by Georgoulias and Kourtidis [1].

PM2.5 and PM10 samples have been collected on the roof of the Mathematics and Physics Department of the University of Salento at ∼10 m above ground level, to investigate the weekly cycle on the PM concentration and composition. The monitoring station is located in a suburban site of the Salento's peninsula (40.4^0N; 18.1^0E), south-eastern Italy, about 20 km away from both the Ionian and the Adriatic Seas and, consequently, it can be considered representative of the Central Mediterranean [3]. A low volume (2.3 m^3 h^{-1}) HYDRA FAI Instruments dual sampler has been used to simultaneous collect 24-hour PM2.5 and PM10 samples on 47-mm-diameter preheated quartz filters from October 2014 to September 2015. Ion chromatography analyses have been performed to determine the mass concentration of selected anions (Cl^-, NO_3^-, SO_4^{2-}, MS^-) and cations (Na^+, NH_4^+, K^+, Mg_2^+, Ca_2^+). The mass concentration of selected metals (Al, Fe, Mn, Pb, Ba, V) has been determined by an Inductively Coupled Plasma - Atomic Emission Spectrometer (ICP-AES). Finally, the thermal optical transmittance technique by means of the Sunset Carbon Analyzer Instrument has been used to determine EC and OC mass concentrations. Figure 1 shows, as an example, the weekly evolution of the PM10 mass concentrations with corresponding ± 1 stan-

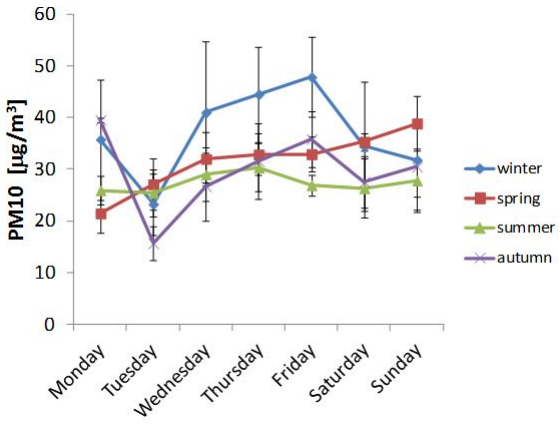

Figure 1. Weekly evolution of the PM10 mass concentrations on different seasons.

dard deviations (error bars) for different seasons. One observes that the PM10 mass concentrations on average increased with the day of the week on spring. A weak increasing trend on Sunday has been also observed on autumn and summer.

Two Kipp & Zonen pyranometers (CMP 21 model) and two pyrgeometers (CGR 3 model) have been used to measure upward and downward radiative fluxes at the surface in the solar (0.312.8 μm) and the terrestrial (4.542 μm) spectral range, respectively, and to identify weekly cycles on the clear-sky radiative flux measurements. Main results on the PM and radiative flux weekly cycle will be combined with the ones retrieved from sun/sky photometer and nephelometer measurements to better evaluate the anthropic aerosol impact. Analytical back-trajectories from the HYSPLIT (Hybrid Single Particle Lagrangian Integrated Trajectory; http://ready.arl.noaa.gov) model will be used to investigate the role of the transboundary pollution.

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