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Trace metals and nutrients fluxes and solubility during the PEACETIME cruise of May-June 2017 in the western and central Mediterranean

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The atmospheric inputs to the Mediterranean Sea play a significant role in marine nutrient cycles during the summer period of surface water stratification. The PEACETIME cruise aimed at studying the physical, chemical and biological processes and their interactions at the air-sea interface in this Mediterranean environment, and in particular the effect of a Saharan dust deposition event. During the PEACETIME oceanographic cruise in May-June 2017, two rains were collected and analysed, including a targeted wet deposition during a Saharan dust event. About 40 aerosol filter sets were also sampled during the cruise, containing filters dedicated to measurements of major elements, trace metals, organic and black carbon, and inorganic salts concentrations. Filters were also used for solubility measurements (quick leaching GEOTRACES protocol).
The results show a first rain with a high anthropogenic influence and a second associated to a Saharan dust event. The chemical composition of filters emphasize a large variability of particles along the cruise route, showing the influence of various anthropogenic and natural sources. The atmospheric deposition fluxes of nutrients (DIN, DIP and DFe) and trace metals (Cd, Co, Cr, Cu, Mn, Ni, V and Zn) associated to wet and dry deposition are estimated from rainwater and aerosol filters composition, respectively. Zn, Mn, Cu, Ni and V are much more abundant than other trace metals in the two rainwater samples, with higher concentrations in the anthropogenic rain than in the dusty rain for Zn, Ni and Cu. The atmospheric fluxes are compared to the microlyaer and marine concentrations of these elements to estimate the link between atmospheric deposition and surface seawater composition.