Geophysical Research Abstracts
Vol. 19, EGU2017-10687, 2017
EGU General Assembly 2017

Particulate Matter over the Western Mediterranean sea: new insights gained from data collected during the 2011, 2012 and 2015 CNR research cruise campaigns

Jessica Castagna (1), Francesco D'Amore (1), Attilio Naccarato (1), Sacha Moretti (1), Valentino Mannarino (1), Mariantonia Bencardino (1), Francesca Sprovieri (1), and Nicola Pirrone (2)

(1) CNR-Institute of Atmospheric Pollution Research, Division of Rende, Italy, (2) CNR-Institute of Atmospheric Pollution Research, Montelibretti, Rome, Italy

The Mediterranean basin, due to its unique geographic position and its peculiar meteo-climatic conditions, appears to be an area with a relevant pollution load. Significant is the contribution of dense ship traffic and highly industrialized population centres surrounding the basin itself but a large influence is also due to geological sources like Saharan dust and volcanic ashes. The transport of both natural dust and anthropogenic aerosols into the marine environment involves considerable interest, not least for its potential impact on marine ecosystems, world climate and air quality. However, whereas there is already a large monitoring database measuring air pollution at surface land-based sites and in ports, there is a relatively little information on atmospheric aerosol directly measured at sea. In order to fill in the gap of observations in the Mediterranean basin and to gain more insight into the atmospheric dynamical and chemical mechanisms leading to high surface Particulate Matter (PM) levels, the Institute of Atmospheric Pollution of the National Research Council (CNR-IIA), since 2003, has started regular ship-borne measurements over the Mediterranean Sea. In the present work we will specifically focus on PM observations obtained, travelling on the sea, during three cruise campaigns performed during autumn 2011, summer 2012 and summer 2015, along different tracks and almost covering the Western Mediterranean sector. We specifically recorded two, gravimetrically determined, PM size fraction mass concentrations (PM2.5 and PM10), whose major and trace elemental composition was subsequently obtained by chemical analysis with an Inductively Coupled Plasma Mass Spectrometer (ICP-MS). Overall, we obtained 40 days of data observations whose analysis contributes to investigate the causes of aerosol pollution in this area. Data on PM mass concentrations showed a quite high variability ranging from 10.5 to 38.8 μg.m-3 for the PM10, and from 5.5 to 29.7 μg.m$-$3 for the PM2.5 size fraction, respectively. Meteorological conditions, at both local and synoptic scales, were jointly investigated with PM levels to highlight seasonal influence and to identify potential long-range transport events. Data on elemental composition were also used as input data for a Principal Component Analysis (PCA), whose results gave us some qualitative understanding on the sources with major impact on the investigated Mediterranean sector.