

PM₁ chemical and mineralogical characterization near a crude oil pre-treatment plant (Agri Valley) during an emergency procedure

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Systematic PM₁ (i.e., aerosol particles with aerodynamic diameter less than 1 µm) measurements have been performed in Agri Valley (Basilicata Region - Southern Italy) since December 2011.

This area is of great concern in environmental and health-related studies since it houses the largest European on-shore reservoir and one of the largest crude oil pre-treatment plant within an anthropized area. In this plant, identified as Centro Olio Val d'Agri (COVA), oil stabilization and gas conditioning are performed implying continuous gaseous and particulate emissions. Moreover, emergency procedures aimed at plant depressurization occasionally occur involving great concern in population living near the COVA plant due to the rise of the height of the control flames that continuously burn in the system of torches. These events, besides having an high visual impact, could also represent risks for environment and human health (Mourad *et al.*, 2009).

In this context, PM₁ daily concentrations and its content in 14 chemical elements (Al, Be, Ca, Cr, Fe, K, Li, Mg, Mn, Na, P, Ti, S and Zn) recorded in Viggiano (the nearest town to the COVA plant at about 2 km away from it) immediately before, during and immediately after the activation of an emergency procedure occurred on 28 September 2012 were analysed. Chemical analysis was performed by Inductively Coupled Plasma-Optical Emission Spectrometry (ICP-OES).

Geochemical and mineralogical characterization of the PM₁ by means of Scanning Electron Microscope Field Emission Gun (FEG) are being carried out as well.

During the period under consideration, the PM₁ daily concentrations ranged between 1.6 µg m⁻³ and 8.0 µg m⁻³, with a mean value of 4.5 µg m⁻³.

The role of the potential sources of crustal and anthropogenic components can be identified by applying the Enrichment Factor (EF) technique using Al as reference crustal element (Caggiano *et al.*, 2011). Enrichment Factor (EF) mean values show that Fe, K, Mg, Mn, Na and Ti were of prevailing natural origin (EF ≤ 10) while Be, Ca, Cr, Li, P, S and Zn mainly originated by anthropogenic sources (Figure 1).

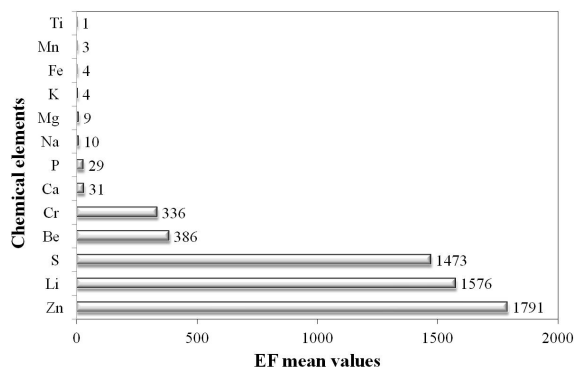


Figure 1. EF mean values.

Focusing on 28 September, S concentrations increased reaching the highest value of the entire study period. This could suggest also a contribution of the safety procedure activation occurred on this day to the PM₁ measured.

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