LEVELS OF HEAVY METALS COMPOSITION IN ATMOSPHERIC AEROSOL SAMPLES AND THE INFLUENCE OF AFRICAN EPISODES

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Particulate matter pollution is a serious environmental issue mainly due to the presence of toxic substances and trace metals in the atmosphere from a variety of pollution emission sources. Information about aerosol composition and their sources especially during pollution events can be further used to establish strategies for the reduction of particulate matter concentration. The objective in the present study was to analyse variations in total suspended particle (TSP) mass concentration and heavy metal components for evaluating the atmospheric loadings of substances with different sources as well as to further examine the relationship between the occurrence of African dust intrusions and metallic species concentrations at our coastal station located in South Spain. Metal-bearing aerosols in the ambient atmosphere are produced by various anthropogenic (particles generated from road traffic, industrial and construction activities) and natural sources (sea salt spray, forest fires, Saharan dust) in the area. Non-destructive Wavelength-Dispersive X-Ray Fluorescence (WDXRF) analysis has been applied for the determination of multi-element contents of atmospheric particulate matter (Kavčič, 2012).

TSP samples (N=60) were periodically collected over 48-hour periods using a high-volume sampler (MCV, S.A.) at a flow rate of 30 m^3 h^{-1}. Rapid and simple determination of multi-elements in aerosol collected on sub-samples was carried out using WDXRF analysis without any further sample pre-treatment and requiring minimal sample preparation. WDXRF analysis was successfully applied for the determination of metallic species such as Al, Cr, Cu, Fe, Mn, Ni, Ti and V on these aerosol filters. Additionally, data of daily concentrations of particulate matter fraction PM10 and levels of gaseous pollutants (CO, NO_2, SO_2 and O_3) were also obtained from a monitoring station belonging to the regional Atmospheric Pollution Monitoring network.

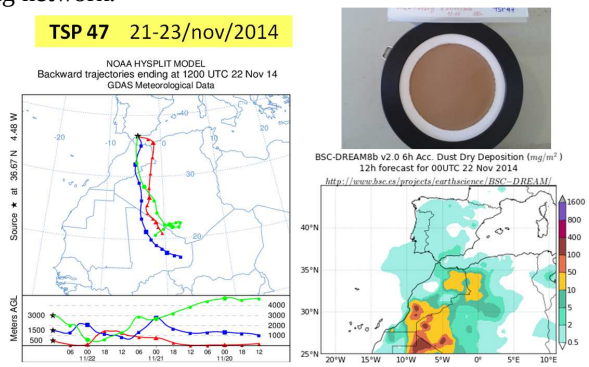

Figure 1. A filter sample collected on days affected by an African dust episode; 3-day backward trajectories at 500 m (red), 1500 m (blue) and 3000 m (green); BSC-/DREAM dust map is shown at bottom right.

The most abundant of the detected metallic elements in our sampling site were Fe (1.52-97.0 μg m^{-3}), Al (0.32-19.3 μg m^{-3}), Ti (0.07-6.63 μg m^{-3}), Mn (0.03-1.55 μg m^{-3}) and Cu (0.05-1.14 μg m^{-3}) reflecting influences of natural geochemical behaviour and urban activities. During the study period, 26 filters were collected under the influence of African dust intrusions (Fig. 1). Mean values for the different elements and gaseous pollutants in days affected or not by African dust intrusions as well as correlations examining the association among the different variables during African and non-African dust events were tested during this study.

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– Kavčič, M., (2012). *Application of Wavelength Dispersive X-Ray Spectroscopy in X-Ray Trace Element Analytical Techniques, X-Ray Spectroscopy*, Dr. Shatendra K Sharma (Ed.), ISBN: 978-953-307-967-7, http://www.intechopen.com/books/x-ray-spectroscopy/application-of-wavelengthdispersive-x-ray-spectroscopy-in-x-ray-trace-element-analytical-techniques.