Composition of fine particles in area of the Mediterranean basin

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Abstract :

Aerosols can have important effects in many areas that are not confined to the climate. They also play an essential role in air quality, and therefore may affect our health by penetrating the respiratory tract **(**Donaldson et al., 2001; Delfino et al., 2005).

They can cause asthma among others, lung cancers or cardiovascular events, particularly in urban areas. In 2012, the World Health Organization (WHO) and the estimated 3.7 million number of premature deaths worldwide due to pollution of the ambient air by particles.

The seasonal and spatial characteristics of $PM_{2.5}$ and its chemical composition in the South west Mediterranean Sea have been studied over a 1-year period (August 2012– August 2013) in Bou-Ismail city Algeria. Observed mass concentrations varied between 0.8 and 50.6 µg /m^3 for $PM_{2.5}$ respectively.

The particulate organic matter (POM) present the greatest quantity of Bou-Ismail aerosols, with a percentage of 45%; inorganic secondary aerosols (SIA) is one third (32%) of total aerosol mass. Four periods with high levels (3.26 ; 2.98 ; 2.89 ; 2.38 and1.81 µg/m^3) of nss-Ca^{2+} have been selected and characterized using air mass back trajectory analysis (HYSPLIT model).

The first period (1-2 August 2012) corresponded to air masses from Mauritania through Mali which crosses the south of Algeria, the second period (3-4 August 2012) corresponded to air masses from the Mediterranean Sea through the island Sicily and the Mediterranean Sea, the third period (08-09 August 2012) corresponded to air masses from Morocco which runs through the south of Algeria, the fourth period (11-12 August 2012) corresponded to air masses from Morocco through south Algeria which crosses the south of Tunisia, finally the last period (4-5 March 2013) corresponded to air masses coming from Hungary via Italy crossing the Mediterranean Sea.

The OC/EC ratio = 5.1, inferring that the main source of organic carbon (OC) and elemental carbon (EC) in Bou-Ismail was vehicle exhausts.

The average value of OC / EC ratio is near 5.1 in Bou-Ismail, it is close to that found at Finokalia 4 (Greece 2004, 2006) is less than 11 Montseny (Spain 2002-2007) (Mediterranean Basin Western) (X .Querol et al 2009).

Table 1. Comparing the OC / EC ratio Bou-Ismail with other site-level Mediterranean.

	Period	OC/EC
Bou-Ismail (Algeria)	August 2012– August 2013	5.1
Finokalia (Greece)	2004, 2006	4
Montseny (Spain)	2002-2007	11

Reference :

Donaldson, K., Stone, V., Seaton, A., and MacNee, W., 2001. Ambient Particle Inhalation and the Cardiovascular System : Potential Mechanisms. Environmental Health Perspectives 109 (4), 523-527 .

Delfino, R.J., Sioutas, C., Malik, S., 2005 Potential Role of Ultrafine Particles in Associations between Airborne Particle Mass and Cardiovascular Health, Environmental Health Perspectives 113(8), 934–946.