

***Monitoring of the transport of chemicals to the eastern Mediterranean and the Black Sea through the atmosphere***

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**ABSTRACT:**

To evaluate the importance of the atmospheric transport, deposition, identification of sources and source regions of trace elements and ions we collected daily aerosol samples on the Mediterranean coast of Turkey and on board during an oceanographic cruise at the Black Sea.

The analyses of aerosol samples measurements during August 1991 - December 1992 at Erdemli (36°N, 34°E) located on the Turkish coast of the Eastern Mediterranean has shown higher concentration of dust load and total deposition during transitional seasons (spring and autumn) compared to summer and winter seasons. The data, coupled with three-dimensional (3-D) air mass back trajectories, suggest that North African and Middle East desert derived dust particles are transported to the region during transitional seasons. It is shown that dust transport constitutes a large fraction of the annual atmospheric deposition in the eastern Mediterranean, with two deposition events of short duration accounting up to 30 % of the total annual flux. Therefore, the dissolved and particulate species associated with dust could be extremely variable in the mixing layer during large deposition events that could easily be missed in a short -- term sampling program. Aerosol sulfate and nitrate concentrations were relatively low during winter months due to scavenging by frequent precipitation. Case studies, using back trajectories of aerosol samples combined with high  $\text{nss-SO}_4^-$  and low  $\text{NO}_3^-$  concentrations reveal biogenic sources of  $\text{nss-SO}_4^-$  in the Levantine basin of the eastern Mediterranean. In July 1992, the coincidence of an enhanced coccolithophorid bloom in the Black Sea with high levels of  $\text{nss-SO}_4^-$  suggests biogenic dimethylsulfide (DMS) to be a dominant source of  $\text{nss-SO}_4^-$  transport from this region.

The elemental compositions of the atmospheric aerosols over the Black Sea have been shown to vary by an order of magnitude in association with the synoptic scale weather system. It has also been shown that mineral aerosol originating from the Sahara can reach the Black Sea and alter the elemental concentrations of trace metals. It has been estimated that the atmospheric input of oxidised nitrogen ( $\text{NO}_3+\text{NO}_2\text{-N}$ ) can reach 13% of the total inorganic nitrogen input of the Danube.

Lead (Pb) input reaches 39 % of this riverine input. Such loads can play an important role in the present state of the sea.

The results obtained from this study form an important contribution towards understanding the eastern Mediterranean and the Black Sea aerosols using the future participation of the riparian states in an atmospheric sampling program.