

## **Transport of Pollutants by Atmospheric Desert Dust in the Levant**

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The transport of anthropogenic pollution by desert dust in the Eastern Mediterranean region was studied by analyzing major and trace element composition, organic species, and Pb isotope ratios in atmospheric dust samples collected in Israel. Dust storms in this region are associated with distinct synoptic conditions that carry dust mostly from North African and Arabian and Syrian deserts. Substantial contamination of dust particles by Pb, Cu, Zn, and Ni was observed, while other elements (Na, Ca, Mg, Mn, Sr, Rb, REE, U, and Th) displayed natural concentrations. Sequential extraction of the abovementioned elements from the dust samples indicated that the carbonate and mineral-surface fractions contained most of the pollution (more than 10-times enriched in Pb, Ni, Cu, Zn relative to the upper continental crust). The Al-silicate fraction was sometimes also contaminated (more than five-times enriched in the same metals relative to the upper continental crust), implying that soils and sediments in the source terrains of the dust were already polluted. We identified the pollutant sources by using Pb isotopes. It appeared that before the beginning of the dust storm, the pollutants in the collected samples were dominated by local sources ( $^{206}\text{Pb}/^{207}\text{Pb} = 1.11 - 1.13$ ), but with the arrival of dust from North Africa, the proportion of foreign pollutants increased, having  $^{206}\text{Pb}/^{207}\text{Pb}$  values of 1.15 – 1.16, typical of Pb emitted in Cairo, as well as natural Pb ( $^{206}\text{Pb}/^{207}\text{Pb} \geq 1.18$ ). Organic pollutants (e.g., PAHs, pesticides) exhibited behavior similar and complementary to that of the inorganic tracers, attesting to the importance of anthropogenic-pollutant addition en-route of the dust from its remote sources. Pollution of suspended dust was observed under all synoptic conditions, yet it appears that easterly winds carried higher proportions of local pollution and westerly winds carried pollution emitted in the Cairo basin. Therefore, pollution transport by mineral dust should be accounted for in environmental models and in assessing the health-related effects of mineral dust.