

## Regional variations in the elemental and mineral compositions of solid particles in rainwater in Iran

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We collected monthly solid particles (air dust;  $> 0.2 \mu\text{m}$ ) in rainwater samples in four western cities (Hamedan, Ilam, Shiraz, Ahvaz) from October 2014 to July 2015 and three eastern cities (Mashhad, Birjand, Zahedan) from January 2016 to January 2017 in Iran, and determined their elemental and mineral compositions in order to elucidate the regional variation and to consider their provenance. In no-rainfall months, we rinsed the sampler with ultrapure water and collected the trapped air dust. Mineral composition of the collected dust was determined using an XRD. We dissolved the same dust samples using mixed-acids and measured elemental compositions using an ICP-MS.

The amount of dust in eastern cities were higher than those in western cities, especially the samples collected in Birjand. Samples from Mashhad and Zahedan had high amount of dust during dry season. These results suggest that aeolian dust from surrounding deserts such as Dasht-e Kavir and Dasht-e Lut affected atmospheric deposition in eastern Iran.

All of dust samples contained quartz and feldspar. Most of the dust samples in western cities also contained calcite. The concentrations of Ca, Na and K in the dust of western cities were 0.45-29.33%, 0.24-0.82% and 0.49-1.94%, respectively. Those in the dust of eastern cities were 0.97-6.23%, 0.59-2.74% and 0.88-3.15%, respectively. The concentration of Ca in the dust of western cities were higher, and Na and K concentrations were lower than those of eastern cities. High calcite contents were observed in western cities and Birjand : thus, high-Ca in the dust is attributed to calcite originated from the arid area. A part of Ca in the dust of eastern cities could also be attributed to feldspars.

Cd, Sb, Pb and As in the dust of western cities and Ni, Zn, As, Cd and Sb in those of eastern cities had the maximum values of the enrichment factor (EF):  $(X/Al)_{\text{sample}} / (X/Al)_{\text{crust}}$  over ten. These results suggest a part of the dust were originated from anthropogenic substances such as road dust and petroleum industry. The EF values of Pb and As of dust samples in western cities showed higher than those in eastern cities, suggesting that the atmospheric deposition were influenced by anthropogenic substances from petroleum industry, which is generally high in Pb and As.

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