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Geochemical composition of dust from Qatar peninsula

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Atmospheric dust samples have been collected from different areas in Qatar and analyzed for major and trace element composition. This region of the Arabian Gulf represents an area largely affected by dust from natural and anthropogenic sources. Twenty one samples were collected during 2014 and 2015 from Al-Khor, Katara, Sealine, Al-Waab, and Qatar University by passive and active sampling techniques. Some bulk samples were collected during the massive megastorm that occurred in April 2015. Back trajectories were determined for each sample set using the NOAA HYSPLIT model over a 50 hour time interval. Samples were equally divided between northerly (n=12; northern Saudi Arabia, Kuwait or Iraq) and southerly (n=8; SE Saudi Arabia, United Arab Emirates and Oman) sources. One sample is expected to originate from westward, in Saudi Arabia. There is more variability noticed in source locations throughout the winter months (October to March), with more of them coming from the south (9 times) compared to summer months (April to September) for twice only. Dust samples were microwave-assisted, total acid digested ($HF+HCl+HNO_3$) and oxidized with H_2O_2 before analyses were conducted by ICP-OES. Only 12 out of 23 elements (Al, Ca, Fe, K, Mg, Na, Ag, As, Ba, Be, Cd, Co, Cr, Cu, Li, Mn, Mo, Ni, Pb, Sr, V, Zn, P) of the Qatari dust samples were enriched relative to Upper Continental Crust (UCC). Calcium was especially enriched to a level of 400% relative to UCC. About 33% of the total sample mass was $CaCO_3$, reflecting the composition of surface rocks in the source areas. Of the elements typically associated with anthropogenic activity, Ag, Ni, and Zn were the most enriched relative to UCC, with enrichment factors of 182%, 233%, and 209%, respectively. Other metals like Pb and V were not significantly enriched, with enrichment factors not exceeding 25% and 3%, respectively. Major elements (Al, Mn and Fe) were depleted relative to UCC due to the strong enrichment of $CaCO_3$, with enrichment factors of -58%, -35% and -5%, respectively. Samples with northern and southern origins were separated to investigate if the elemental composition could be used to identify source/origin. Only three elements were observed to have a statistical difference. Pb and Na were higher in the samples collected from the south while Cr was higher in those from the north. This study aims to investigate present-day

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geochemistry of dust particles and its effect on the marine environment of the Arabian Gulf. The geochemical composition of dust is essential component for correcting lithogenic input to water column suspended matter samples.

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