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Spatial distribution, enrichment and geo-accumulation of heavy metals in surface sediments near urban and industrial areas in the Persian Gulf

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ABSTRACT

Concentrations of Cd, Cr, Cu, Fe, Ni, Pb and Zn and geochemical controlling factors have been determined in surface sediment samples collected in the Persian Gulf (South of Iran) and were investigated using pollution indices including enrichment factor (EF), geo-accumulation index (Igeo) and contamination factor (Cf) distribution and its pollution status. Sediment samples were collected from 12 sites in a monitoring period of 4 months from September to December in 2014. The spatial distribution of heavy metals demonstrated that concentrations are much higher in the industrial areas in comparison with urban areas. Analytical results have been elaborated by using a geographical information system software to show metals accumulation areas. Based on the EF and Igeo, the order of heavy metal concentrations was Cd > Pb > Ni > Cr > Zn > Cu in industrial stations. For urban station, the order was as: Cd > Pb > Ni > Zn > Cu > Cr. EF and Igeo values showed that sediments were contaminated with Cd and Pb. Based on the EF, Cd was the heavy metal contaminant of most concern in urban and industrial surface sediments. Moreover, this study showed that Cd threshold concentrations to mostly be exceeded in the study area. Also, the concentration of heavy metals in the industrial areas was much higher than those of urban areas.

Keywords: Heavy metals; Sediment; Enrichment factor; Geo-accumulation index; Geographical information system; Persian Gulf

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