Heavy Metal Contamination and Its Ecological Risks in the Beach Sediments along the Atlantic Ocean

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Abstract : Sediments collected along the beaches of the Atlantic Ocean in Africa were analyzed by geochemical proxies such as the ICP-MS technique to determine their heavy metal contamination and related ecological risks. Several metals were selected and show a decreasing trend: Fe > Mn > Ni > Cu > Co > Zn > Cr > Cd. Several pollution indices have been calculated, including the enrichment factor (EF), whose values are generally higher than 1. 5; the geo-accumulation index (I-geo), with values of some elements (Co, Ni and Cu) in the sediments of the study area being higher than 0, and other metals (Zn, Cr, Fe and Mn) being lower than 0; the contamination factor (CF), where the values of all the selected elements are between 1 and 3; and the pollution load index (PLI), where the values in almost all the study sites are higher than 1. These results show moderate contamination of the investigated sediments with heavy metals. The potential ecological risk assessment (Eri and RI) suggests that this part of the African coast is a low to a slight risk area. Statistical analyses indicate that heavy metals have shown fairly similar trends with anthropogenic and natural sources. This study shows that this coastal area is not highly concentrated in heavy metals and reveals that the Atlantic coast of Africa would be moderately polluted by the metals studied, with a low to moderate ecological risk.

Keywords : heavy metals, pollution, atlantic ocean, sediments