

Assessment of Trace Metals Contamination in Surficial and Core Sediments from Ghannouch- Gabes Coastline, Impact of Phosphogypsum Discharge, Southeastern of Tunisia, Mediterranean Sea: Geochemical and Mineralogical Approaches

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Abstract : The purpose of the present study is to assess the level and the distribution of CaO, SO₃, Cd, Cu, Pb and Zn in core sediments of Ghannouch-Gabes coast, Gulf of Gabes, Tunisian Mediterranean coast. The XRD analyses indicate that the sediments of Ghannouch-Gabes coast are mainly composed of quartz, calcite, gypsum and fluorine reflecting the impact of the phosphate fertilizer industrial waste. The vertical distribution of surface sediments shows for all the elements analyzed, that the area located between the commercial and the fishing port of Gabes, is the most polluted zone, where the two harbors acted as barriers and limited the dispersion of phosphogypsum discharge. The abundance order of metals was found to be Zn > Cd > Cu > Pb and that the highest levels of heavy metals were found in the uppermost segment of the sediment core compared to lower depth subsurface due to a continuous input of PG release and showed that the area between the two harbor suffered from several types of pollutants compared to reference core C1, collected from non-industrialized area. The level of pollution was evaluated using contamination factor (Cf), pollution load index (PLI) and the geoaccumulation index (I_{geo}). The obtained results of I_{geo} allowed us to distinguish that the area between the commercial harbor of Ghannouch and the fishing harbor of Gabes is the most polluted where sediments are strongly contaminated for Pb, Cu and Cd. The pollution load index (PLI) of all sediments collected classified them as "polluted". According to contamination factor (Cf), the sediments can be considered as 'considerable' to 'very high' contaminated for Pb, 'very high to moderate' for Cd, 'moderate' for Zn, between 'moderate' and 'considerable' for Cu. Statistical analyses show that heavy metals, fluoride, calcium and sulphate are resulting from the same anthropogenic origin. The metallic pollution status of sediments of Ghanouch -Gabes coast is worrying and requires a serious intervention.

Keywords : trace metals, phosphogypsum, core sediments, accumulation factor, contamination factor

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