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ASSESSING THE CORRELATION BETWEEN CONTAMINATION SOURCES AND ENVIRONMENTAL QUALITY OF MARINE SEDIMENTS USING MULTIVARIATE ANALYSIS

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Abstract

Water sea pollution is influenced mainly by anthropogenic causes due to industrial and municipal activities which affect the quality of sea water, sediments and the whole ecosystem. In this paper, the correlation between contamination sources and the environmental quality of marine sediments was analyzed through multivariate analysis, in particular Principal Components Analysis (PCA), Cluster Analysis (CA) and Correlation Analysis. Considering the case study of Mar Piccolo in Taranto (Ionian Sea, Southern Italy), it was performed first a PCA on the total matrix consisting of 1023 samples 3m deep and 20 variables (moisture content, granulometry, metals, metalloids and nutrients). Then, a PCA only for the superficial layers (0-50cm) was performed to better understand correlations with anthropogenic and natural impacts. Cluster and correlation analyses corroborated PCA results, identifying sub-clusters among the variables. The assessment showed how the type of pollution in Mar Piccolo of Taranto is widespread on superficial layers with some particular areas (hotspots) with a heavy and deeper contamination. Correlation between nutrients and metals, validated by CA analysis, showed that the excessive presence of nutrients and organic matter, in the Mar Piccolo water, acts as carrier for many contaminants that concentrate in the fine fraction of sediments with high percentage of organic matter.

Key words: chemometric techniques, environmental management, heavy metals, remediation, Total Organic Carbon

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