

Assessment of the urban pressures on Rare Earth Element contaminations in coastal wetlands subjected to submersion risk: case study of La Rochelle (France)

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Urban areas are exerting increasing chemical pressure on marine ecosystems, particularly coastal wetlands. Trace metals are among the contaminants that appear regularly. In recent years, new technological advances have led to the emission of emerging pollutants such as Rare Earth Elements (REEs). This study is part of a national project (PAMPAS) and consists in a spatial geochemical monitoring of the urban area of La Rochelle (France - 75 000 inhabitants). In a context of coastal wetland management faced with the risk of marine submersion (diking or reopening to the sea), the geochemical characterization of water and sediments of these areas is essential. For this, samples (dissolved and particulate) were collected at different strategic locations covering the urban area of La Rochelle: the Tasdon Marsh, the main urban canals and the historical Port area. The objectives were to analyze the spatial variability of REE concentrations, to identify controlling factors and to evaluate the contribution of different sources exported by the urban area of La Rochelle. We demonstrated that the urban area of La Rochelle, through its wastewater, strongly influences the geochemical composition of the waters of the urban canals and the Tasdon Marsh. Indeed, the urban canal near the hospital shows very high anthropogenic Gd_D anomalies (~30 ng.L⁻¹ - 97.5% of total Gd_D). The Tasdon Marsh also shows anomalies in anthropogenic Gd_D (~1.40 ng.L⁻¹ - 30% of total Gd_D). The anomaly observed in the Tasdon Marsh could be explained by the inputs from the urban canal. The origin of the Gd_D anomalies is related to its use as a contrast agent for MRI examinations. In fine, this study brings new knowledge for a sustainable management of coastal wetlands.