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COPPER AND LEAD COMPLEXATION BY DISSOLVED ORGANIC MATTER IN MAR MENOR COASTAL LAGOON

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Abstract: Mar Menor coastal lagoon is a shallow system with a reduced exchange with the open sea, that is affected by several anthropogenic pressures, mainly agriculture and mining. The mining sierra of Cartagena-La Unión has been historically discharging mining waste rich in heavy metals in the south area of Mar Menor, resulting in high metal concentrations in sediments (García and Muñoz-Vera., 2015). The nutrients reaching the lagoon, together with the high temperatures, also provoke phytoplankton blooms that lead to high concentrations of dissolved organic matter (DOM). It is well known that total metal concentrations are not good predictors of their bioavailability, and metal speciation should be taken into account. The presence of ligands, such as DOM in the water, may form metal-DOM complexes and protect against the deleterious effects of metals. The present study aims at studying the effect of DOM on the speciation of dissolved metals (Cu and Pb) in Mar Menor waters. With that aim, filtered water was sampled at five sites in Mar Menor lagoon at several sampling periods. Metal concentration was analysed by ICP-MS with Argon gas dilution, DOC was analysed in a carbon-specific infrared gas analyser and optical characterization of DOM was obtained from absorbance and fluorescence spectra. Complexiometric titrations of Cu and Pb were performed by anodic stripping voltammetry following Durán and Nieto (2011). Preliminary results show that Cu and Pb concentrations in Mar Menor waters are higher than in other coastal areas, especially in the south area of the lagoon, reaching concentrations of tens of nanomolar. DOC concentrations are also very high in Mar Menor waters, leading to high complexation capacities for Cu, therefore protecting aquatic biota from the deleterious effects of Cu. Pb, on the contrary, is poorly complexed by DOM, and almost all dissolved Pb is present in inorganic forms.

Key words: Metal speciation, ASV, cDOM

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References:

Durán, I. and Nieto, O., (2011). Electrochemical speciation of dissolved Cu, Pb and Zn in an estuarine ecosystem (Ria de Vigo, NW Spain): comparison between data treatment methods. Talanta, 85: 1888-1896.

García, G. and Muñoz-Vera, A., (2015). Characterization and evolution of the sediments of a Mediterranean coastal lagoon located next to a former mining area. Marine Pollution Bulletin, 100(1): 249-263.