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Distribution of current use pesticides in surface marine sediments from the Mar Menor Lagoon (SE Spain)

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Abstract

Coastal lagoons and surroundings are exposed to high anthropogenic pressures (industrial activities, agricultural growing, urban sewages, harbours, uncontrolled spills. . .). These activities generate a great input of pollutants in the environment, which in many cases are not treated properly or being dumped to the environment directly. Mar Menor is a hypersaline (42-47) coastal lagoon located in the Cartagena Field area at the South East of Spain, which is subjected to intensive agriculture, phreatic level rise, recreational activities and sporadic torrential rainfall regime. This intense sporadic torrential rainfall regime leading to violent flash floods in the rivers and wadis provokes the mobilization and transport of contaminants to the lagoon (Moreno-González et al., 2013) and the mobilization of the “in situ” pollutants in sediments. The seasonal input of organic pollutants through El Albuñón watercourse (the main continuous flow to the lagoon) and their distribution in seawater have been previously characterized (Moreno-González et al., 2013a,b). The distribution of PAHs and organochlorinated compounds in sediments was also described (León et al., 2013), but no information is available about the occurrence of current used pesticides in this lagoon. In this study the distribution of organophosphorus pesticides, triazines and other pesticides was semiannually characterized from spring 2009 to autumn 2010. Sampling campaigns were performed at 18 stations inside the lagoon and one, as reference, was taken in the Mediterranean Sea. Pesticides were extracted using sonication extraction or pressurized liquid extraction and were analyzed by GC-MS.

Triazines (terbuthylazine, simazine, etc), organophosphorus pesticides (chlorpyrifos, methyl-chlorpyrifos, etc) and other pollutants (tributylphosphate, propylamide, chlortal-dimethyl, etc) were detected in surface sediments in the low range of ng g^{-1} . More pesticides were detected in sediments sampled in 2010 than the corresponding ones obtained in 2009. The distribution of all the contaminant groups studied was heterogeneous, and significant seasonally differences were observed in the organic pollutants concentrations. The higher concentrations were detected close to different ports and wadis, as consequence of their input through groundwater and surface waters. Chlorpyrifos showed a preferential input to the lagoon through El Albuñón watercourse. Partition coefficients (K_d) were also calculated where chlorpyrifos showed a wide range and the highest values of K_d .

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