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Sewage outflow impact and temporal variation of butyltins in an intermittent French River

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Organotins (OTs) are anthropogenic molecules used in many industrial applications for their thermoresistant and biocidal properties. Because of their toxicity and widespread use these molecules are on the EU water directive's list of prioritary substances. Organotins are prone to adsorption, can bond easily to particulate matter and "migrate" from the water column unto the sediments where their half-life can extend to a few decades. Recent surveys in various EU countries have indicated the presence of OTs in surface and sewage waters.
The objective of this work is to study the temporal evolution of butyl, octyl and phenyl tins in contrasted flow conditions, in the sediments and water column of an intermittent river reach located to the right of an extensive sewage treatment plant (STP). The study zone is a reach of the Vène river located in southern France. The Vène is a major tributary of the Thau lagoon which is an important shellfish farming site and thus very vulnerable to OT contamination.
Butyltin, trace metal and DOC concentrations were measured on water and sediment samples collected during two consecutive and contrasted hydrological years. The input and output of the STW was sampled in order to assess its impact on butyltin degradation and transformation. The results revealed the presence of butyltins at concentrations exceeding the EU and French pollution limits regularly. Very low concentrations of phenyltins were found in the water samples thus indicating that there is little use of OTs based pesticides in the area. The OTs concentrations were systematically higher during the wetter year, probably because of higher and more frequent wash off contribution to the reach and minimal dilution along the rivercourse. By contrast, the STW's impact in terms of OTs flux is more important during dry periods when there is less dilution in the river. Although the STW's outflows contained less OTs than the inputs, its efficiency in terms of OTs degradation could not be quantified from the available data as no information was available on the OTs concentrations in the deposited sediments of the lagoons. Future efforts will concentrate on a thorough analysis of OTs degradation within the STW.