Geophysical Research Abstracts
Vol. 21, EGU2019-4986, 2019
EGU General Assembly 2019

Evaluating the presence, transport and fate of emerging POPs in a Mediterranean wetland protected area.

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As well as many of Mediterranean wetlands, the Albufera Natural Park is severely affected by anthropogenic pressures. The presence of emerging persistent organic pollutants (POPs) as perfluoroalkyl substances (PFASs) and organophosphate flame retardants (PFRs) in the different environmental compartments of this characteristic coastal wetland is required for understanding their transport, accumulation and fate. These compounds are widely used in industry as surfactants, plasticizers and anti-foaming agents and as additives in electronics, lubricants and paints, among others. Environmental sampling included 12 surface water samples, 19 sediment samples, 26 wastewater samples and 10 fish.

Tris(2-chloroisopropyl) phosphate (TCIPP) and perfluorooctane sulfonate (PFOS) were at the highest concentrations in surface water, sediment and fish. Maximum PFOS concentrations in surface water did not exceed the maximum allowable concentration established by the European Union Directive 2013/39/EU. Thus, it would be necessary to carry out more sampling campaigns since the mean concentrations in this study (31.6 ng/l) were higher than the annual average value set by this law.

Higher levels of target compounds (mainly PFASs) in wastewater effluents compared to influents suggested both formation from precursors during treatment and poor removal efficiency. The wastewater treatments plants (WWTPs) were identified as an important but not unique point source of these emerging POPs to the environment. Similar concentrations found in WWTPs in the north (most populated) and south areas as a counterpart of the higher levels of these compounds in water of the north side suggest the existence of additional diffuse sources.
In fish and sediment, PFOS and TCPP were the compounds found at the highest frequency and concentration. The EU environmental quality standard (EQS) for PFOS in biota is 9.1 μg/kg, wet weight. However, the mean PFOS level found in our samples was 30.4 μg/kg (wet weight) — over 3 times the standard. The low concentrations of PFRs in fish may be due to their easier metabolisation by organisms.

Acknowledgements
This work has been supported by the Spanish MINECO and the ERDF through the project CGL2015-64454-C2-1-R (ECO_2risk-dds) and the University of Valencia through the project (UV-INV-AE15-348995).