Characteristics and fluxes of Emerging contaminants from 40 rivers around the Bohai Sea, China

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Emerging contaminants (ECs) are a category of newly identified contaminants met partial or all properties of Persistent Organic Pollutants (POPs), and thus has drawn a great deal of attention. Bohai Sea is one of the most polluted coastal water in China, and riverine discharge is the major source/pathway for most pollutants. In this study, water samples from 40 rivers around the Bohai Sea were collected in August, 2013. Water were filtrated through 0.7 μm glass filter and extracted by liquid-liquid extraction. Both particulate and dissolved phases were analyzed for 21 flame retardants, 17 pesticides and 16 organophosphorus compounds.

For chlorinated and brominated flame retardants, most compounds were below the detection limits, whereas Dechlorane Plus (DP, range: 0.25~426.8, geomean: 13.6 ng/L), Decabromodiphenyl ether (0.23-10456, 7.40 ng/L), Decabromodiphenyl ethane (0.04-4650, 0.72 ng/L) and anti-Cl_{11}-Dechlorane Plus (0.020-15.3, 0.54 ng/L) were the predominant compounds, and they dominantly presented in the particulate phase. However, most of the current-used pesticides (CUPs) and historical-use pesticides (HUPs) were presented in the dissolved phase. Dicofol (0.006-31.6, 2.4 ng/L), Endosulfan Sulfate (0.04-28, 2.2 ng/L) and Chlorpyrifos (0.34-30.7, 1.7 ng/L) were the predominant CUPs. HCHs (0.32-29.3, 2.0 ng/L) were widely detected in all rivers and β-HCH (0.17-19.3 1.2 ng/L) was the dominant species. For OPs, the dominant compound was tri(1-chloro-2-propyl) phosphate (TCPP) (5-921ng L^{-1}, 186 ng L^{-1}), followed by three chlorinated alkyl phosphates (tri(2-choroethyl) phosphate (TCEP) (1.3~418 ng L^{-1}, 88 ng L^{-1}), triethyl phosphate (TEP)(BDL~350 ng L^{-1}, 42 ng L^{-1}), and tri-iso-butyl phosphate (TiBP)(0.2~218 ng L^{-1}, 13 ng L^{-1}). Combined with the hydrological data, the fluxes of these emerging organic pollutants are estimated.