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Pharmaceuticals and PCPs in groundwater: Results from French National screening

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In 2011, the French Ministry of Ecology and the Water and Aquatic Environment National Office have implemented a national screening campaign in groundwater focused on occurrence of “emerging” organic contaminants with various potential uses and origins.

Among the 411 Organic compounds (OC) targeted, 131 pharmaceutical products, 13 life style products and 10 cosmetics have been selected and measured in in 2011 during two sampling campaigns (at high and low water levels), representing 960 measurements per compound.

Thirteen pharmaceuticals have been detected with quantification frequencies up to 1%. Amongst them, some are expected such as carbamazepine and acetaminophen while others are less expected such as metformin and tramadol. Concerning personal care products and life style products, caffeine is the most frequently OC detected (40%) with cotinine (6%). Although the concentrations of octocrylene, propylparaben and galaxolide can reach 60 ng/L, 103 ng/L and 120 ng/L respectively in some sites, their occurrences, at the national-scale, are lower (below 1%). By contrast, other musks are rarely detected but their concentration may exceed 400 ng/L, with a maximal concentration level of 1.3 µg/L for musk ketone.

Quantification frequencies obtained in this study are comparable with those of previous studies [1-3] with similar choices concerning sampling strategy and targeted molecules. The impact of these criteria and of reporting levels on quantification frequencies will be discussed.

1. Loos, R., et al., *Pan-European survey on the occurrence of selected polar organic persistent pollutants in ground water*. Water Research, 2010. **44**(14): p. 4115-4126.
2. Teijon, G., et al., *Occurrence of emerging contaminants, priority substances (2008/105/CE) and heavy metals in treated wastewater and groundwater at Depurbaix facility (Barcelona, Spain)*. Science of the Total Environment, 2010. **408**(17): p. 3584-3595.
3. Standley, L.J., et al., *Wastewater-contaminated groundwater as a source of endogenous hormones and pharmaceuticals to surface water ecosystems*. Environ Toxicol Chem, 2008. **27**(12): p. 2457-68.