

Passive sampling - a tool for targeted screening of emerging pollutants in rivers

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A screening of more than 300 pollutants such as pharmaceuticals (analgesics, psycholeptics, antidepressants, antibiotics, beta blockers), PCPs (UV blockers, musk's, repellents), illicit drugs, pesticides, perfluorinated compounds and their metabolites at 22 monitoring sites throughout the Czech Republic was conducted in 2013. POCIS samplers were used in this study. Two types of passive samplers (pesticide and pharmaceutical POCIS) were deployed for 14 days in May and in October, 88 samples were collected in total. In total 265 and 310 target compounds were analyzed in pharmaceutical and pesticide samplers respectively. The chemicals of interest were extracted from the passive samplers according to standardized procedures. LC-MS/MS and LC-MS/HRMS methods were applied for analyses of extracts. 150 of 310 (48%) and 127 of 265 (48%) analyzed substances had been found in pesticide and pharmaceutical samplers respectively. 27 substances (pharmaceuticals, PCPs, pesticides, caffeine, nicotine metabolite cotinine) occurred at all sampled sites, additional 39 substances (pharmaceuticals, PCPs, pesticides) occurred at more than 17 (75%) sites. One of perfluorinated compounds (PFOA) occurred at 68% of sites, whilst one of illicit drugs (Methamphetamine) was found at 61% of sites. The highest number of contaminants found in one POCIS at a single monitoring site was 111. The concentrations varied from nanograms to thousands of nanograms per sampler. Emerging contaminants occurring in highest concentrations (> 1000 ng/sampler) were BP-4 and PBSA (UV blockers), caffeine, DEET (insect repellent), imidacloprid (insecticide), telmisartan (hypertension drug) and tramadol (analgesic). Monitoring in the Czech Republic has demonstrated that many target compounds enter river waters and a number of these compounds reach high concentrations.