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Self-purification capacity of an urban lowland stream- an attempt to identify drivers for in-stream transformation processes of organic micropollutants

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Urban rivers receive increasing amounts of pharmaceuticals and personal care products from treated waste water. The mix of substances and their chemical properties are diverse. Different internal and external factors determine the self-purification capacity of a river, such as sediment characteristics, flow conditions, solar radiation, temperature, presence of macrophytes, and the microbial community. Hence, the degradation varies in space and time and is compound-specific. In the present study we are striving to identify the influence of temperature, radiation and discharge on individual transformation rates of 25 substances in an in situ experiment. The transport and fate was investigated along two adjacent stretches (1.6 and 3.1 km long, respectively) of River Erpe, located in the east of Berlin, Germany. Water parcels were followed down the river using diurnal fluctuations of electrical conductivity as an intrinsic tracer for solute transport. Water samples were taken hourly for 48 hours, accompanied by continuous data logging of water-level, -temperature and electrical conductivity. They were collected at two (April) and three (June) stations downstream of a wastewater inflow. In June the experiment was conducted twice, before and after the first stretch was cleared of macrophytes. The set of compounds was analysed by a newly developed direct injection-ultra high performance liquid chromatography tandem mass spectrometry method. Degradation rates of single water-parcels are related to water temperature, global radiation and discharge by multiple linear regression to identify a significant influence of these factors on the fate of individual compounds.