Geophysical Research Abstracts
Vol. 19, EGU2017-16885, 2017
EGU General Assembly 2017

Water and chemical budgets in an urbanized river system under various hydrological conditions

Natacha Brion (1), Vincent Carbonnel (2), Marc Elskens (1), Philippe Claeys (1), and Michel A. Verbanck (2)

(1) Vrije Universiteit Brussel, Analytical, Environmental and GeoChemistry, Brussels, Belgium (nnbrion@vub.ac.be), (2) Universite Libre de Bruxelles, Department of Water Pollution Control, Brussels, Belgium

Since historical times, riversides are preferential settlement places for human life and activities, ultimately leading to the development of Cities. Available water resources are not only essential to ensure human's vital functions, they are also used for the production of food, goods, and energy, as transport routes and as evacuation ways for domestic and industrial waste products. All these activities profoundly modify natural water circulation as well as water quality, with increased hydrological risks (floods, droughts,...) and chemical hazards (untreated sewage releases, industrial pollution,...) as consequence. An extreme example of strongly modified river system is the river Zenne crossing the city of Brussels. In and around the city, the river together with its connected navigation canal, determine a small vertical urbanized area (800 km^2) combining extreme land-use landscapes. While the southern upstream part of this area lies in a region of intensive agricultural activities, the central part is occupied by a dense cityscape including a forested area, and the downstream part is mainly under industrial influence. In this context, we established a box-model representation of water and selected polluting chemicals (N and P, biological oxygen demand, and a selection of metals, pesticides and PAHs) budgets for the studied area under variable hydrological conditions. We first have identified the general distribution of water and pollutant tracers in the various background sources of the system: waters in streams located in the very upstream parts of the catchment, and untreated and treated sewage. Secondly we have assessed the distribution of water flows, and pollutant tracer concentrations at the boundaries of the studied water systems for different stable hydrological conditions and during flood events. Finally we will discuss water budgets and pollution tracer budgets for a yearly average hydrological situation and for dry and wet weather conditions in order to understand hydrological effects on the transport/transfer/retention of water and pollutants in highly human-impacted modified streams.
Results from this study were obtained in the framework of the OSIRIS research project (INNOVIRIS Anticipate 2015-2019).