Geophysical Research Abstracts
Vol. 16, EGU2014-12993, 2014
EGU General Assembly 2014

Simulation of bacteria transport processes in a river with Flow3D

Kordula Schwarzwälder, Minh Duc Bui, and Peter Rutschmann

Chair of Hydraulic research and water recourses engineering, Technische Universität München, Germany
(schwarzwaelder@tum.de)

Water quality aspects are getting more and more important due to the European water Framework directive (WFD). One problem related to this topic is the inflow of untreated wastewater due to combined sewer overflows into a river. The wastewater mixture contains even bacteria like E. coli and Enterococci which are markers for water quality. In our work we investigated the transport of these bacteria in river Isar by using a large-scale flume in the outside area of our lab (Oskar von Miller Institute). Therefor we could collect basic data and knowledge about the processes which occur during bacteria sedimentation and remobilisation. In our flume we could use the real grain with the exact size distribution curve as in the river Isar which we want to simulate and we had the chance to nurture a biofilm which is realistic for the analysed situation. This biofilm plays an important role in the remobilisation processes, because the bacteria are hindered to be washed out back into the bulk phase as fast and in such an amount as this would happen without biofilm.
The results of our experiments are now used for a module in the 3D software Flow3D to simulate the effects of a point source inlet of raw wastewater on the water quality. Therefor we have to implement the bacteria not as a problem of concentration with advection and diffusion but as single particles which can be inactivated during the process of settling and need to be hindered from remobilisation by the biofilm. This biofilm has special characteristic, it is slippery and has a special thickness which influences the chance of bacteria being removed. To achieve realistic results we have to include the biofilm with more than a probabilistic-tool to make sure that our module is transferable. The module should be as flexible as possible to be improved step by step with increasing quality of dataset.