Geophysical Research Abstracts
Vol. 19, EGU2017-12186-1, 2017
EGU General Assembly 2017

Contaminant dispersion of a point release in wetland flow dominated by bank wall effect

Ran Gao, Xudong Fu, and Zi Wu
State Key Laboratory of Hydroscience and Engineering, Tsinghua University, Beijing, China

We have shown that due to the non-uniform initial release of contaminant in the wetland flow with a free-water-surface, there is an additional longitudinal displacement for the plume (Fu et al., 2016, Journal of Hydrology, 532: 37-45). Given that it is important for modifying the classical one-dimensional Taylor dispersion model in order to predict the contaminant concentration distribution, in this paper we study the typical case of point source release in the wetland flow dominated by bank wall effect. The Taylor dispersion coefficient and the additional longitudinal displacement are analytically deduced by the method of concentration moment, and then validated through comparisons with both asymptotic solution and numerical simulations. Compared with the previous results, it is shown that the initial stage for the contaminant transport as characterized by the defined dimensionless time is much shorter, during which the additional displacement develops with time towards its asymptotic value. However, the additional longitudinal displacement continues to play an important role in affecting the transverse concentration distribution, and its effects are explored in terms of the damping factor α.