Geophysical Research Abstracts
Vol. 17, EGU2015-2805, 2015
EGU General Assembly 2015

Cotransport of dense colloids and viruses in three-dimensional porous media

Vasileios Katzourakis (1) and Constantinos Chrysikopoulos (2)

(1) University of Patras, Civil Engineering Department, Greece (billiskatz2@gmail.com), (2) School of Environmental Engineering, Technical University of Crete, 73100 Chania, Greece (cvc@enveng.tuc.gr)

A three-dimensional numerical model was developed to investigate the simultaneous transport (cotransport) of dense colloids and viruses in homogeneous, water saturated, porous media with horizontal uniform flow. The dense colloids are assumed to exist in two different phases: suspended in the aqueous phase, and attached reversibly and/or irreversibly onto the solid matrix. The viruses are assumed to exist in four different phases: suspended in aqueous phase, attached onto the solid matrix, attached onto suspended colloids, and attached onto colloids already attached onto the solid matrix. The viruses in each of the four phases are assumed to undergo inactivation with different rates. Moreover, the suspended dense colloids as well as viruses attached onto suspended dense colloids are assumed to exhibit a "restricted" settling velocity as a consequence of the gravitational force; whereas, viruses due to their small sizes and densities are assumed to have negligible "restricted" settling velocity. The governing differential equations were solved numerically with the finite difference schemes, implicitly or explicitly implemented. Model simulations have shown that the presence of dense colloid particles can either enhance or hinder the horizontal transport of viruses, but also can increase the vertical migration of viruses