Geophysical Research Abstracts
Vol. 20, EGU2018-497, 2018
EGU General Assembly 2018

Assessment of the fate and the ecotoxicological risk of the antibiotic Sulfamethoxazole in an extreme high altitudinal catchment: GREAT-ER model application.

Denisse Archundia (1,3), Laurie Boithias (2), Celine Duwig (3), Marie Christine Morel (3,4), Gabriela Flores (3,5), and Jean Martins (3)

(1) Erno-Conacyt, Instituto de geologia, environment, Hermosillo, Mexico (darchundia@geologia.unam.mx), (2) Géosciences Environnement Toulouse, Université de Toulouse, CNES, CNRS, IRD, UPS, France, (3) Univ. Grenoble Alpes, CNRS, IRD, Grenoble INP, IGE, F-38000 Grenoble, France, (4) CNAM, Laboratoire d′analyses chimiques et bioanalyses, Paris Cedex 3, France, (5) Ministerio de Medio Ambiente y Agua, La Paz, Bolivia

Antibiotics are considered as emergent contaminants that can induce adverse effects in terrestrial or aquatic organisms. Antibiotics' environmental fate still misunderstood relating to the difficulty to measure all involved processes.
Few studies have characterized pharmaceutical residues in the extreme conditions of the Andean Altiplano. Sulfamethoxazole (SMX) was observed recently in surface waters within the studied catchment. This study is the first attempt to model antibiotic compounds in the arid high-altitudinal conditions of the Andean Altiplano.
We tested the ability of the GREAT-ER model in simulating SMX concentrations in surface waters in the environmental context of the Bolivian Altiplano, assessed the sensitivity of predicted environmental concentrations (PECs) to variations in SMX consumption patterns, removal by Waste Water Treatment Plant (WWTP), and contamination attenuation by rivers and evaluated the ecotoxicological risk posed by SMX occurrence in the surface waters of the Katari catchment.
No data was available about local consumption of SMX, thus we calculated an apparent local SMX consumption. The model predicted the general spatial pattern of SMX concentrations. The sensitivity analysis conducted showed that pharmaceutical consumption was the parameter that most influences environmental concentrations. Hence, considering the real local SMX consumption is necessary to obtain more accurate estimates. No contaminant abatement was observed during the wet season, supporting the idea that non-point sources, such as runoff and remobilization processes, play an important role during that season. During the dry season, the abatement capacity was 91%, suggesting that natural attenuation is high during low flow. An improvement of the characterization of water dynamics is essential to improve the accuracy of PECs, particularly during the wet season relating to the extreme flow variations in the catchment. The ecotoxicological risk assessment associated with SMX presence showed that the most exposed areas in the basin are related to urban influence; therefore a better use of antibiotics could help reducing river water contamination.