Geophysical Research Abstracts
Vol. 12, EGU2010-8258-1, 2010
EGU General Assembly 2010

Modeling pesticide transfer during flood events in an agricultural catchment using the SWAT model

Laurie Boithias (1,2), Lobat Taghavi (1,2), Chantha Oeurng (1,2), Thierry Polard (1,2), Sylvain Ferrant (1,2), Séverine Jean (1,2), Jean-Luc Probst (1,2), Georges Merlina (1,2), Sabine Sauvage (1,2), José-Miguel Sánchez-Pérez (1,2)

(1) Université de Toulouse ; INPT ; UPS ; Ecole Nationale Supérieure Agronomique de Toulouse (ENSAT) Avenue de l'Agrobiopôle BP 32607 Auzeville-Tolosane 31326 CASTANET TOLOSAN Cedex, France, (2) Centre National de Recherche Scientifique (CNRS) ; Ecole Nationale Supérieure Agronomique de Toulouse (ENSAT) Avenue de l'Agrobiopôle BP 32607 Auzeville-Tolosane 31326 CASTANET TOLOSAN Cedex, France; laurie.boithias@ensat.fr

Pesticide monitoring, understanding of pesticide fate and pollution quantification have become major concerns in Europe since the introduction of the Water Framework Directive in 2000. Pesticides can be transported from agricultural catchments to stream networks in either the soluble or particulate phase, depending on their physicochemical properties (solubility, partition coefficient). Quick flood events therefore have a major impact on molecule transport. This study – part of the EU AguaFlash project (http://www.aguaflash-sudoe.eu/) – examined pesticide load dynamics in both the soluble and particulate phases and attempted to quantify their fluxes from various contributing compartments (surface runoff and subsurface and groundwater flows). The hydrological and water quality model SWAT (Soil and Water Assessment Tool, 2005 version) was tested at daily time step to assess the fate and transport of two pesticides with a wide range of solubility (Trifluralin and Metolachlor). SWAT was applied on an 1100 km^2 agricultural catchment (Save catchment, South-west France). The model was calibrated on discharge, suspended sediment, nitrate and pesticide data collected at the catchment outlet from March 2008 to March 2009, with weekly measurements during base flow and daily during flood events. Agricultural management practices (crop rotation, planting date, fertilizers and pesticide application) were entered into the model in a dominant simplifying land use approach (one rotation by sub-basin, same management operation dates throughout the catchment). Calibration for discharge fluctuations and suspended sediment and nitrate concentration variations was satisfactory. SWAT was able to accurately reproduce observed pesticide concentrations during base flows and peaks during flood events, despite the 'dominant land use' approximation being used and management practices inputs being averaged for the whole catchment. During the simulation period, simulated preferred pathway for pesticide transport from land area to stream network was surface runoff. In surface runoff, Trifluralin was mainly transferred in the particulate phase, while Metolachlor was mainly transferred in the dissolved phase. Flood events were responsible of most of pesticide transfer. In this case, both the Trifluralin and the Metolachlor were mainly transferred in the dissolved phase. These results are consistent with pesticides loads observed during flood flushes.