Geophysical Research Abstracts
Vol. 14, EGU2012-9672, 2012
EGU General Assembly 2012

Modelling of agricultural diffuse pollution and mitigation measures effectiveness in Wallonia (Belgium)

C. Sohier , D. Deraedt, and A. Degré
Univ. Liège, GxABT, Gembloux Agro-Bio Tech, Soil - Water Systems, Gembloux, Belgium (catherine.sohier@ulg.ac.be)

Implementation of European directives in the environmental field and, specially, in the water management field, generates a request from policy-makers for news tools able to evaluate impact of management measures aiming at reducing pressures on ecosystems.
In Wallonia (Southern Region of Belgium), the Nitrate Directive (EEC/676/91) was transposed into the "Walloon action plan for nitrogen sustainable management in agriculture" (PGDA1) in 2002. In 2007, a second plan was launched to reinforce some topics (PGDA2). Furthermore, the goal of "good quality" of surface waters and groundwater imposed by the Water Framework Directive poses new challenges in water management.
In this context, a "soil and vadose" hydrological model is used in order to evaluate diffuse pollutions and efficiency of mitigation measures. This model, called EPICgrid, has been developed at catchment scale with an original modular concept on the basis of the field scale "water-soil-plant" EPIC model (Williams J.R., Jones C.A., Dyke P.T. (1984). A modelling approach to determining the relationship between erosion and soil productivity. Transactions of the ASAE. 27, 129-144). The model estimates, for each HRU identified into a 1km^2 grid, water and nutrients flows into the plant-soil-vadose zone system (Sohier C., Degré A., Dautrebande S. (2009). From root zone modelling to regional forecasting of nitrate concentration in recharge flows – The case of the Walloon Region (Belgium). Journal of Hydrology, Volume 369, Issues 3-4, 15 May 2009, Pages 350-359).
The model is used to make prospective simulations in order to evaluate the impact of measures currently performed to reduce the effect of diffuse pollution on water surface quality and groundwater quality, at regional scale.
Response of the soil-vadose zone to agricultural practices modification is analyzed for the deadlines of the Water Framework Directive: 2015, 2021 and 2027, taking into account two climatic scenarios. Simulations results showed that actual measures are not sufficient in some areas and that new actions are necessary.
The EPICgrid model was also used to evaluate effectiveness of further measures that could be implemented in order to reduce agricultural diffuse pollution. The increasing of catch crops in vulnerable zones has shown a limited impact in the Walloon context. The modifications of agricultural practices such as crop rotations or mineral fertilizing amounts have shown a more significant impact on water quality.
Furthermore, the farmers' practices are evaluated each year by a measuring campaign of the soil nitrogen residue after harvest. These data allow us to improve the representativeness of the EPICgrid model in areas in which agricultural practices largely differs from regional statistics.