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Pesticide pollution in a sandy aquifer draining a 250 ha watershed

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The context of this study is the contamination of groundwater by pesticides, especially atrazine and two of its degradates, deethylatrazine and deisopropylatrazine at the Brévilles spring in the Parisian Basin. Because of the frequent detection of atrazine in groundwater at concentrations exceeding the European Union drinking water limit (0.1 μg/L), the agricultural use of atrazine in France is forbidden since 2003. Consequently, the behaviour of atrazine substitutes in the environment has to be studied. At the scale of a 300 ha sandy aquifer with only diffuse pollution and a limestone unsaturated zone deeper than 30 m on 62% of the watershed, the objectives of this study were to i) assess the risk of groundwater contamination by acetochlor, the substitute of atrazine used in the catchment, and 2 of its major degradates (ESA and OA), ii) analyse the impact on the groundwater quality of the end of atrazine application since April 1999, and iii) provide a conceptual representation of the watershed for later modelling of pesticide fate. Two study scales have been chosen: the experimental plot, and the entire watershed.

At the scale of the experimental plot, the detection of acetochlor and its degradates in the deep horizons of 2 contrasted and representative soils of the watershed shows that these compounds are potential groundwater contaminants. At the watershed scale, the pesticide concentrations in groundwater have been monitored at the spring for 45

months. Acetochlor and its degradates have not been quantified, contrary to atrazine and deethylatrazine whose concentrations at the spring remain higher than the potability limit, even though application of atrazine has been stopped since April 1999 (Morvan *et al*., 2006). The conceptual representation of the watershed has been made by spatially distributing several parameters influencing pesticide fate, notably i) soil hydraulic properties, by identifying 15 typical soil horizons in the watershed and measuring for each one water retention and hydraulic conductivity, and ii) soil organic carbon stocks, by analysing the influence of the clay stock, the fine earth mass and the land use.

Morvan X., Mouvet C., Baran N. et Gutierrez A., 2006. Pesticides in the groundwater of a spring draining a sandy aquifer: temporal variability of concentrations and fluxes. Journal of Contaminant Hydrology 87, p. 176-190.