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An "object-based" modelling approach to assess the influence of landscape management practices on a small agricultural catchment

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The simulation of hydrological fluxes within a catchment involves various processes with contrasted temporal and spatial scales. All these processes must be included into an integrated modelling of the catchment. The modeller must thus determine the governing processes and their representation within the model. He must also define a time and space discretization of the catchment, consistent with the characteristic time and space scales of each process. The discretization should also avoid to suppress singularities, such as ditches or hedges, which might play an important role in the catchment hydrology. To address this question, we propose an "object-based" modelling approach that consists of three steps: (1) for a given catchment, identification of the important hydrological objects; (2) modelling of each object with appropriate process conceptualizations, spatial and temporal scales; (3) coupling of these object-based representations to obtain a catchment-scale model.

This approach was implemented using the LIQUID modelling framework, in order to assess the influence of landscape management practices on the hydrology of the Fontaine du Theil catchment in Brittany (France, 1.28 km^2). The catchment scale model consists of modules representing the major hydrological processes in subsurface-drained fields, non-drained fields, hedgerows and in the river network. These modules use different process conceptualizations, from physically-based (Richards equation) to more conceptual capacity-based approaches. Their spatial extent respect the real shapes of the corresponding landscape features. The spatial cou-

pling between the modules is then realized through saturated flow exchange interfaces that are compatible with the different modules.

The first results are encouraging and show that the “object-based” modelling approach is relevant. The LIQUID modelling framework appears to be a promising tool to address the question of spatial and temporal coupling of hydrological processes.