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Hydrology and Earth System Sciences Discussions

Interactive comment on "Anomaly in the rainfall-runoff behaviour of the Meuse catchment. Climate, land use, or land use management?" *by* F. Fenicia et al.

F. Fenicia et al.

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We thank 'Referee 1' for his helpful comments on our paper. We shall take into consideration his suggestion in the preparation of a revised paper. Our reaction to his comments is given below.

Reviewer comment: The authors only focus on the Meuse basin and do not relate their work to other studies on attribution of trends/ fluctuations/ anomalies in discharges in other river basins. It would be great if the authors can refer to similar studies in other river basins in the Introduction and discuss their results in the context of these studies

as well in the Discussion.

Authors reply: We thank for this suggestion, and we shall try to investigate in further detail what has been done on this aspect and relate our work to it.

Reviewer comment: The model description is not very clear. For instance; what is the temporal scale of the model? What is the time period? What is the spatial scale? Did the authors use a lumped model or a semi-distributed approach? Which discharge stations have been used in the DYNIA approach and is the number stations consistent with the spatial scale of the model? How are observed land use changes (e.g. from deciduous to coniferous forest) included in the model? Has any validation been done?

Authors reply: Some of the answers to these questions are given in the text. However, we shall try to be more schematic and comprehensive in the model and methodology description.

Reviewer comment: Most important general comment is the attribution of changes in the hydrological response of the Meuse basin (the aim of the paper). The authors claim (see e.g. p. 1805, l. 4-6 and also the title) that both land use changes and changes in land management are likely causes of observed changes in the hydrological behaviour of the basin. Changes in land management (through ages of trees) have been investigated in some way although indirectly through the relation between calibrated parameters (with some very general objective function) and the discharge. Land use changes seem not to be included at all. Also changes in the hydrological response is a very relative term; changes with respect to what?

Authors reply: our assumption is that model parameters represent integrated proper-

HESSD

5, S1381–S1383, 2008

ties of the catchment, which are physically meaningful. Being the model lumped and conceptual, it is difficult to transparently associate parameters to catchment properties. However, some speculations can be done. We can hypothesize that land use may influence the partition of rainfall into infiltration and runoff, the time of concentration of the basin, the evaporation amounts, while it will be less effective on the groundwater catchment dynamics. The only significant trend that appeared from the analysis is related to the lag time of the system, which decreased substantially. This leads to the hypothesis that land use change and management such as improved drainage from the field and construction of roads and sewer systems may be the reason for it. The change in hydrological response is a term that we shall better specify in the revised paper. It basically refers to the fact that temporal dynamics of the rainfall runoff relation of the catchment cannot be described with a fixed combination of model parameters.

We also thank the reviewer for the specific comments, which will be taken into consideration in the revision process

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 5, 1787, 2008.

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5, S1381–S1383, 2008

Interactive Comment