

Interactive Comment on „Integrated response and transit time distribution of watersheds by combining hydrograph separation and long-term transit time modeling“

GENERAL COMMENTS

In this paper, a new modelling approach is presented that integrates Isotope Hydrograph Separation (HIS) and the Instantaneous Unit Hydrograph (IUH) for a more realistic description of transit and response time of water in catchments at different time scales. The method is applied in three Andean catchments with different characteristics to show the influence of landuse on hydrological response and solute transport.

In chapter one a good introduction regarding the topic of the paper is given. The chapter two could be more compressed. In the chapter 2.1 I would expect some information about the landscape e.g. slope inclination or altitude since among other factors the landscape has also a great influence on runoff processes and response. Also the locations of the precipitation stations and of other technical equipment should be shown in figure 1. Regarding the determination of the oxygen isotopic composition of the water samples it would be interesting what type of instrumentation was used. Chapter 2.2 is written very clear and gives a good explanation respectively definition of the different terms which is important for the following results.

The results in chapter 3 are explained very well. The explanation of the reasons for different runoff coefficients and portions of pre-event water is very clear. In addition to the given explanations I would like to note that a comparison of event 2 and 5 (see table 2) in the catchment BB would be very interesting since the antecedent precipitation is very different, but the portion of event water is very similar. In my opinion it is also important to know if the runoff response of the single catchments is variable or steady. At page 14 in line 7-10 I disagree with the explanation that the antecedent precipitation of event 12 is low since in my opinion a total precipitation amount of 66 mm up to 95 mm in three days is very high. As the aim of the paper is analyzing the influence of landuse on water movement in a catchment I can understand the authors focus on landuse. But also other influencing factors such as soils or landscape should be taken into account.

Regarding the analysis of the catchment response during single events the illustration of time series of runoff, precipitation and oxygen isotopic measurements (event and pre-event water) of the three catchments during one typical rainfall-runoff event would be very interesting.

In the discussion chapter the authors connect their results to other studies in a critical way. I agree that the resolution of sampling has a very high influence on the results especially for the shorter time scales. But if you consider the difficult circumstances of water sampling in such countries I guess the authors have a good basis with the collected dataset. The result that old water is pushed out of the wetlands during an event is very important and can be proved very good with the dataset explained in this study.

SPECIFIC COMMENTS

Page 12, line 3: I think a break of 2 hours between two rainfall events is very short to distinguish two events. Could you give an explanation for this short break, please.

Figure 2: Please explain the abbreviations pdf and cdf in this figure for all other figures by writing probability density function (pdf) and cumulative density function (cdf).

TECHNICAL COMMENTS

Figure 1: Please add the locations of the precipitation stations.

Page 4, line 10: Please erase the reference Botter et al. 2010 in the brackets since it is mentioned four lines above in the same sentences.

Page 8, line 10: Please erase the comma between Kirchner and et al.

Page 16, line 21: Please change Kichner to Kirchner

FINAL OPINION

In my opinion this paper can be published in respect to the explained comments. It is fluently written and contains a very large experimental dataset which enables the authors to estimate the influences of different factors on water movement in three catchments.