

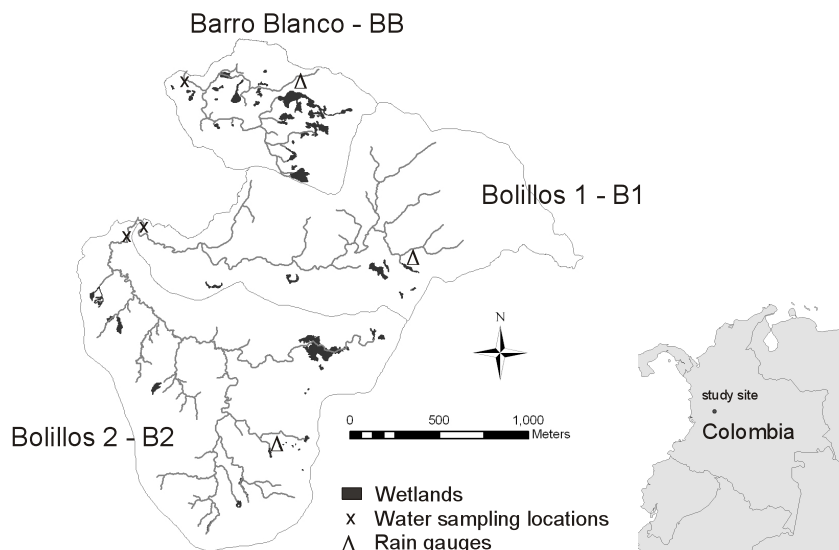
Responses to comments of Referee #3 to the paper “Integrated response and transit time distributions of watersheds by combining hydrograph separation and long-term transit time modeling”

Comment:

.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.

Response:

Agreed. In chapter 2.1. we will added some details about the catchments such as elevation, annual precipitation and the altitude location of the rain gauges (as already suggested by reviewer #2).



Regarding the determination of the oxygen isotopic composition of the water samples it would be interesting what type of instrumentation was used.

As mentioned by the response to reviewer #1 we will add the details in the revised manuscript.

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 2 is low since in my opinion a total precipitation amount of 66 mm up to 95 mm in three days is very high.

We will add some thoughts about the comparison of event 2 and 5. We will change the wording for the antecedent precipitation for event 2 – for us, low was a relative comparison, but we agree that in absolute terms it is 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.

Agreed. However, since the paper focused on land use differences, what we have done is to downplay small land use differences that may not be the main explanation of large differences in catchment responses. For example the 6% of area in wetlands in catchment BB was found to be the main explanation for differences between BB and the other two catchments, but since no much information is provided on other critical factors, we have toned down its significance. The other factors, like soil and landscape were very similar among the catchments (as will be highlighted in chapter 2) and therefore we believe that landuse is the main factor influencing the water movement.

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.

We have done this and already explained in the response to reviewer #1.

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.

The reason why we chose breaks of two hours to distinguish between events is the frequency distribution of precipitation over time. We noticed that with rain breaks of less than two hours, the new precipitation event had a lower intensity, which could be associated with it being part of the same event, while after breaks of two hours or more, the new rain could have higher intensity which could be called a new event. Since the events are mostly convective events, the events separated by more than 2 hours we clearly different. On the other hand, a minimum of 2 mm of precipitation was defined as the minimum amount of rain in an event, given that it is around the minimum amount of rain that produces a response in the streams.

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).

Will be Revised.

TECHNICAL COMMENTS

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

Revised

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.

Revised.

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

Revised.

Page 16, line 21: Please change Kichner to Kirchner

Revised.

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.