Answer to H. Gao (Referee #2)

H.Gao:

This paper reports a case study to investigate the impact of initial soil moisture on hydrological response. Although many similar experiments have been carried out in tremendous papers, I still believe that this kind of field experiments shall be encouraged for publication in hydrological journals, because experiments and observations are fundamental to test or reject our scientific hypotheses. But considering the quality of the writing, further revision is needed for consideration to publish in HESS.

Response:

We want to thank you for your review of the manuscript and for appreciating the usefulness of our study. Considering your comments and also those of the other Reviewers, we agree to revise the manuscript according to the comments given.

1. This paper is too long with too many details. The abstract shall be shorten. Introduction looks okay, but more literature shall be discussed as mentioned by previous two Reviewers. There are too many details in the Results and Discussion. Particularly, the Conclusions have two pages, which is absolutely not necessary.

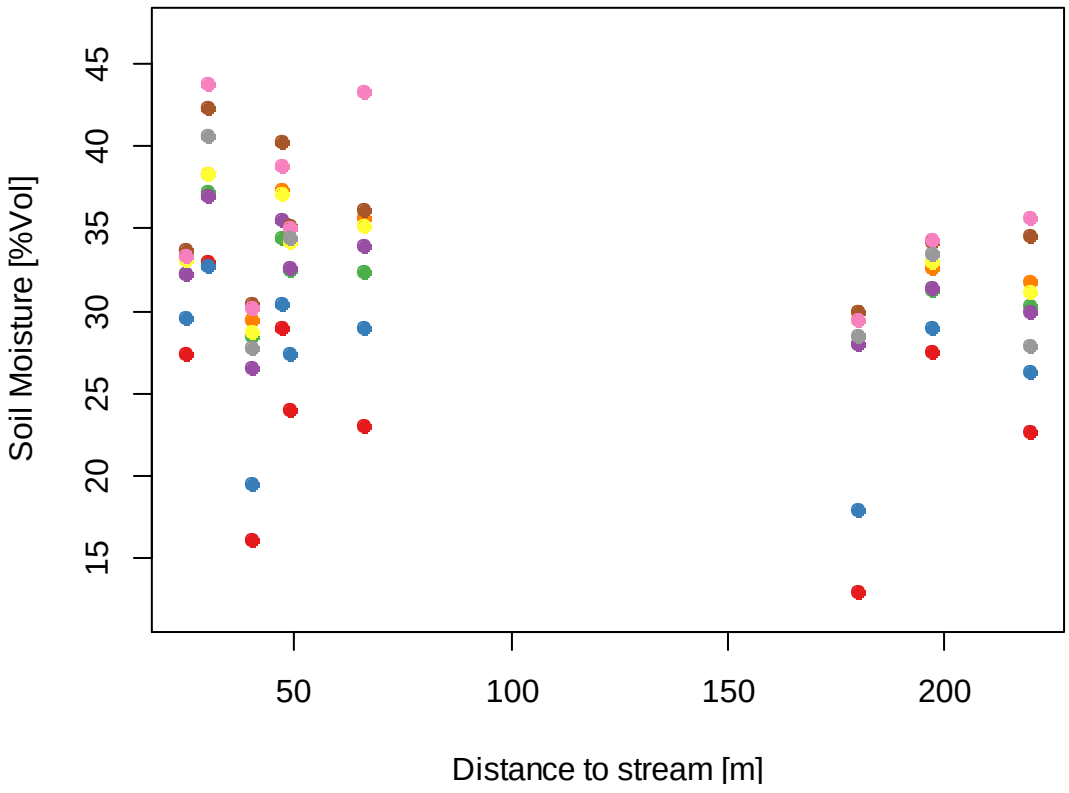
We agree that the manuscript can be shortened. We will shorten these sections as proposed. Also, as recommended by Reviewer 1, we will omit figures 2,12 and 13, possibly also 5 and 7, and try to combine figures 3 and 4.

We will consider the literature proposed by Reviewer 1 and L. Brocca, the author of short comment 1. Thank you for the further literature recommendations that you provided. We will also refer to these articles.

2. For the science part, the authors missed an important factor while discussing the relationship between soil moisture and hydrological response – the topography. As we all know, as hydrologists, topography has great impact on initial soil moisture and runoff generation. For example, hillslopes, riparian areas, and plateau have significantly different runoff generation mechanisms (cf. Seibert et al., 2003; Savenije, 2010; Gao et al., 2014). Figure 1 shows that many continuous soil moisture observations are located in the areas near the channel network, right? This means that the observations are mainly reflecting the soil moisture dynamic on riparian areas. This can explain the immediate response of rainfall – soil moisture – runoff. But what is happening on hillslopes? What is the impact of topography on your conclusions?

We agree that topography plays an important role in the relationship of soil moisture and the hydrologic response. It is true that we only mention it among other factors that determine runoff generation. In our study we decided to focus on land use rather than on topography as our initial hypothesis was that –in our catchments - land use and the associated different soil types determine this relationship more than other factors such as topography and geology etc.

Following your comment, we looked into the relationship between topography and initial soil moisture. There seems to be no direct relationship between the distance to the river and the plot mean soil moisture. That is illustrated by the following figure where every point represents the plot mean of initial soil moisture (the different colors of the points represent the different events).



We agree that it is not ideal that the locations of the measurements are clustered in the south of the Gazel catchment close to the stream and not evenly distributed in the catchment. This is due to practical reasons (e.g. protected sites for the installation of the probes available at Le Pradel, linked with the urgency of on-alert measurements that had to be completed before the rain started, which was always challenging). The distance of the continuous soil moisture measurement sites at le Pradel is > 40 m for all sites. As the stream is incised into the bedrock, all measurement sites are at a considerably higher elevation than the stream bed. They do represent hillslopes that are not connected to the river via influent groundwater. Only two of the three sensors installed in the north of the catchments are located in grasslands that might be connected to the river during rain events. Concerning the three landscape units that are defined by topography in the reference you provided (Savenije 2010), measurement sites represent these units very well as there are measurement sites in riparian areas, on hillslopes and on plateaus. We will include this information in a revised version of the manuscript.

We agree, that this is not evident from figure 1, which is misleading in this regard and we thank you for pointing this out. We will improve figure 1 by providing a closer zoom into the area in the south of the Gazel catchment, inserting a scale bar in the zoom and by providing information on the land use of the sites of the measurement sites. Your comment is in agreement with the comment of Reviewer 3 who also demands a more detailed map, so we will provide a revised figure which hopefully helps to better characterize the measurement sites.