

Interactive comment on “Technical Note: Monitoring streamflow generation processes at Cape Fear” by Flavia Tauro et al.

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We thank Referee #1 for the detailed review of our work, and would take this opportunity to make clearer our project scope and to provide some preliminary responses to the major comments raised by the Referee.

The main objectives of the present technical note are to present an experimental “hybrid” hillslope plot and to assess whether or not this plot is adequate for studying basic hydrological processes (Page 3, Lines 9-10: “In this paper, we assess the feasibility of studying streamflow generation processes in the “intermediate” experimental settings of Cape Fear”). The suitability to investigate hydrologic phenomena is assessed by evaluating the response of Cape Fear to precipitation events. The described proof-of-concept experiment does not aim at discovering new knowledge. However, despite

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inevitable limitations imposed by limited natural soil structure, artificial boundary conditions, homogeneous soil etc., the well-known response of the setup suggests that the plot can be adopted to examine basic hydrologic phenomena. The proof-of-concept experiment presented in this tech-note is not employed to deeply unravel streamflow generation processes. Conversely, in the future, comprehensive studies, including several replicates of each experiment, will be carried out by using fluorescent dye tracing and camera systems to address specific research questions. To better highlight the scope of our work, in the new version of the manuscript, we will more clearly state the objective and modify the title to “Technical Note: Monitoring hydrological processes at Cape Fear”.

We deem the presented material pertinent to the requirements of HESS Technical Notes to “report new developments [...] and novel aspects of experimental [...] methods and techniques which are relevant for scientific investigations within the journal scope”. As acknowledged by Referee #1, in the manuscript, it is shown that there is “good potential [...] to utilize this experimental setup to examine some basic surface hydrology and erosion phenomena”. Therefore, the manuscript should be in line with the scope of HESS Technical Notes.

We agree with Referee #1 that the literature cited in the Introduction can be considerably improved. In the current version of the paper, we have focused on “hybrid hill-slope” studies, that are closely related to our setup. We plan on including important contributions, such as publications on the “variable source area” concept as well as on interactions of pore water pressure generation and slope stability, in the new version of the manuscript.

With specific regards to the proof-of-concept experiment, Figure 13 depicts the normalized water content measured by the soil moisture probes. The probes located in the downstream area of the plot (DS and DD) monitored higher values of soil-water content than the upstream probes. This was consistently found throughout the year. In particular, in the five days preceding the experiment, recorded water contents are

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within 3% of values relative to January, 29th at 10 am. We will include a comment on antecedent soil moisture conditions in the revised version of the paper. In response to rainfall, water content sharply increases in the downstream shallow soil layer and it slowly raises in the deeper layer. As expected, this behavior suggests the occurrence of saturation excess overland flow and, therefore, the feasibility of observing basic drainage formation in the plot.

While we will address each comment raised by Referee #1 in detail upon receiving all reviews, we would like to emphasize that future studies will focus on the effect of diverse surface covers on basic surface hydrology. We thank Referee #1 for advising that dealing with rather small sub-plots may not be representative of the concept of hillslope experiment. We will opportunely design the experimental setup and present multiple replicates for each test in future contributions.

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