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Comment

Interactive comment on “The effect of changes in rainfall on the response of the water table to a major alley farming experiment” by S. L. Noorduijn et al.

S. L. Noorduijn et al.

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Dear Reviewer,

On behalf of all co-authors, I would like to thank you very much for providing insightful comments and suggestions on our submission to HESS. We have carefully considered all your comments and we will be including them in the preparation of the revised version of the paper. This is an outline of how we have considered your comments and we would appreciate any additional comments or suggestions that you may have to help us in the preparation of the revised version:

C1669

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Relation to previous paper: As you have rightly pointed out this current paper is strongly driven by the findings from Noorduijn et al (Ecological Applications). It is in fact very complementary to the Ecological Applications paper, in that it provides a quantification of the effects of perennial belts on the water table in the context of observed changes towards drier climate. Findings of the previous paper are presented to provide the reader with the necessary background to understand the overall purpose of the large scale experiment. We will provide a clear explanation of the difference in the focus of the two papers in the revised version.

Climate Analysis: A cumulative deviation from the mean of the monthly rainfall is presented as an indicator of the variability and trends in annual rainfall over 100 years in the area. Further analysis of rainfall trends might be achieved by the inclusion of winter and summer rainfall trends. However, direct correlation between the water table fluctuations and rainfall amount did not provide any insight into the impacts of the alley farming experiment. A more detailed hydrograph analysis using the HARTT model or multiple regression analysis is not possible due to data gaps and the insufficient frequency of monitoring in the middle part of the data record. Also the shallow nature of the water table at this site prohibits these techniques from being useful (Ferdowsian et al 2001). Some discussion is included on the impact of high rainfall years on the annual fluctuation of the water table. There is no indication of the use of ANOVA as part of this paper and has therefore not been reported.

Groundwater controls Due to the limited ecohydrological data present for the site it has been hard to infer the various impacts from evaporation, interception, and transpiration. The most reliable proponent of the water balance at the experimental site is transpiration which is indirectly inferred from above ground biomass measurements for each of the belt widths. However ponded water evaporation (infiltration excesses), bare soil evaporation and interception are all also contributing to the declines in groundwater, it is however difficult without the use of direct measurements (Bowen ratio etc) to quantify these. Quantification of transpiration is possible as we have a physical measure in

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biomass.

Assessment of impact. The impact of the trial on the water table is significant and as such changes will be made to the paper to reflect this. Some of the findings were described too qualitatively and have now been discussed more quantitatively to let the reader decide if the 0.9m impact at this site is significant.

We thank you again for your comments and look forward to your response.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 4563, 2009.

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