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Hydrology and Earth System Sciences Discussions

Interactive comment on " Modelling the hydrological behaviour of a coffee agroforestry basin in Costa Rica" *by* F. Gómez-Delgado et al.

Anonymous Referee #2

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General comments

The paper is based on important field studies, is thorough, well worked out and well researched, and certainly deserves publication. Indeed, it could be discussed whether it advantageously could have been split in two publications, one concentrating on the field studies and measured water balance, ond one on modelling.

The coupling to Hydrologic Environmental Services is a bit problematic, as neither the field study nor the modelling has direct applications in an HES context. There is no paired catchement with other AF practises (or "natural" conditions), and the model has no parameters that relate directly to AF practises, vegetation cover or other relevant

field parameters that would make the model a natural choice for predicting changes in relevant HES variables (streamflow, erosion) under varying AF practise.

Specific comments

The model algorithms take much space in the paper, and could be considered organised in an annexe.

Uncertainty and sensitivity analysis is addressed at two separate places in the paper (3.3, 5.1.2 and 5.1.3) - it could be considered to combine these sections.

In 5.2.3 estimated evaporation is compared with other studies in terms of percentage of rainfall. It would be more relevant to discuss this in absolute values (mm/y).

As indicated above - the opinion of this referee is that section 5.3 could be dropped from the paper, alternatively some of it could be incorporated in the general description of the catchment. To the extent that the connection between agroforestal practices and HES is discussed in this section, it is not founded on neither the field study data nor the modelling results.

Technical comments and corrections

References: Shuttleworth and Wallace 1985, and Hayami 1951, is missing in reference list.

I can not find references to Sooroshian & Gupta 1995.

Figures: Figs 5, 7 and 10 will be hard to read and interpret. One way to improve them would be to just display part of the time period, by selecting a representative/interesting couple of months the graphs would be more readable and carry more information (in particular on the performance of the model during the sharp flood peaks).

Language: Generally good. A few suggestions for improvement:

3039/24: The total ETR in 2009 accounted for 818 mm (25% of R) ... -> ... amounted

HESSD

7, C1514–C1516, 2010

to ...

3039/26: It remained alway below ... -> It always stayed below

3042/19: The Kolmogorov-Smirnov test revealed that the distribution of residuals is not normal (which is not desirable). Drop (which is not desirable) - it is ambigous, and anyhow modelled runoff residuals for small catchments are never normal - desirable or not.

3046/4: This was pointed out by preliminary measurements ... -> It was indicated by preliminary measurements

Other:

3021/27: but showed a monthly deviation of +-100 mm around the historical regime. According to the fig 2 the deviation is up to 250 mm.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 3015, 2010.