

## ***Interactive comment on “Multi-objective regionalisation for lake level simulation, the case of Lake Tana in the Upper Blue Nile, Ethiopia” by T. H. M. Rientjes et al.***

### **Anonymous Referee #2**

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General comments: The content of the manuscript by Rientjes et al. fits most certainly within the scope of HESS. Ways to estimate the water balances of ungauged catchments based on similarities with gauged catchments are highly relevant. The aim of the paper was to improve the water balance of Lake Tana using two criteria for calibration. The paper is overall well written, though the grammar can be improved. The novelty value of the concepts and methods used, are however, limited. The paper presents an improvement of the earlier regionalisation done by Kebebe et al. 2006, SMEC (2008) and Wale et al. (2009). In comparison with the paper by Wale et al. 2009, the novelty of this paper consists mainly of using another method to estimate lake water evaporation

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(by the method developed by Su (2002) to estimate albedo  $S_u$ ) and by using longer time series. Doing so, the authors improved the closure of water balance from 5 to 2 %. This is a major improvement, as these last percentages are hard to gain, but otherwise the paper has limited contribution to development of new methods. I would like to make three strong recommendations for improving the manuscript: 1) Improving the description of method to estimate lake evaporation from albedo estimated by remote sensing and its results, 2) Adding a clear description of the methods used for validation (the word validation appears for the first time in result section) and 3) Adding an overview how well the physical characteristics of the gauged catchments resembled the ones of the ungauged catchment as the later ones were found in NW corner of the basin, they might be different from the others. The overview could be achieved by adding a table with the values used of the physical characteristics for each catchment and an area-normalized value for the whole basin. The area-normalized value would provide an important insight in the abundance of a certain physical property.

Specific comments: Title: Suggestion for title: Improved regionalization for lake level simulation of Lake Tana in the Upper Blue Nile, Ethiopia. Multi suggests more than two. Here two criteria are used for calibration

Abstract: The objective given in abstract P7342 L1 is not the same as in Introduction P7344 L13-14. Mention the methods used for calibration (for instance the two criteria for calibration) and validation in this study rather than discussing other studies in abstract L7-L10, L18 P7345 L9-L12 Add a references for the source of run-off data. Where are the gauged catchments found? P7346 L8:-9: Please clarify how consistency was analyzed. P7346 L20: Reference WRB, 2007 missing in reference list P7356 L6-L11, see comment on P7346 L8:-9, maybe add results in an appendix P7358 L19-L20 Normalized whiskers per definition 0-1? Why not for alpha P7359, L4 move to material and methods. P7360, L7-L8 'Therefore' not clear as relationship to VER is strongest? Table 5 is redundant as same information is given in table 6. Table 4 and 6, BETA and CFLUX are modeled with parameters with very low correlation, HI

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and PET, respectively, Isn't that worth discussing? Figure 3. X-axis and figure text not clear.

Detailed comments: P7344, L10 the study -> this study P7345 add 'of Ethiopia' -> highlands of Ethiopia P7346 L5 year missing: was updated in ? P7358 L6 do you mean 'calibration' or 'validation' here?; L27 Tthe->The P7347-P7349 Add units to all model parameters and equations P7350 L22-L25 Not clear, please reformulate P7351 L16-L17 move to line L11 where Qsim is used first time. P7353 L17: Land use ->Land Use; L19 NMS-> NMA; L26 reformulate 'that also is selected for this study' P7346 L24 Replace 'in' with 'by' Wale et al. P7347 Equations 1 and 2 concern snow, not relevant for this study Table 1. Maximum for CFLUX should be at least 2 Table 3 and 4 replace 'KF' with 'Kq'

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