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Hydrology and Earth System Sciences Discussions

Interactive comment on "Constraining model parameters on remotely sensed evaporation: justification for distribution in ungauged basins?" *by* H. C. Winsemius et al.

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General comments

The work presented in the paper addresses relevant scientific questions within the scope of HESS. The authors present an approach that uses remotely sensed evapotranspiration to improve parameter constraints in a hydrological model. This is an important and emerging field of research and has a wide scope for application in ungauged basins across the world. I believe the paper is well written and has potential for publication after the following points of concern are addressed.

1.To focus of the paper is on the procedure that constrains the parameter distributions. I would suggest adding more information on the hydrological and physical functioning of the basin. To assess the results it would be useful if a monthly water balance for each major land use would be included. I understand this information is not readily available, but I believe that even by using public domain data a general overview could be presented. This would facilitate interpretation of the results.

2.The conceptual model is a simplified version of the HBV model. To my opinion the model and the stratification is oversimplified. Only two model parameters (Ip and Smax) are used and a basin covering an area of 150 000 km2 is stratified in only five zones. The strength of RS algorithms such as SEBAL is foremost the high spatial resolution, which is not optimally used when only five zones are used. I understand the risk of equifinality, however constraining more parameters at a higher spatial resolution would be legitimate to my opinion. I would suggest to evaluate whether this is feasible and if not I would suggest to devote a substantive part of the discussion to this topic.

3.The authors have used SEBAL evapotranspiration to constrain model parameters for transpiration. How did the authors take into account the evaporation component?

Specific comments

P2293 The title is not clear. I suggest changing to justification for distributed parameters

P2294 l8 Precipitation is the largest water balance term

P2294 l9-10 How to the model results provide better understanding of the information density of RS ET?

P2294 l15-20 It seems strange that wetlands are suffering from moisture stress

P2293 l27 Replace 2 with two

P 2297 l21-25 Major issue in this study was that streamflow was regulated mainly by

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reservoirs and thus unsuitable for calibration of natural hydrological processes.

P2298 l3 Replace space with remote sensing

P2299 l1-3 I would suggest adding a number of references that show validation results for SEBAL.

P2299 I suggest adding water balance information on the major zones here.

P2300 l1 Rephrase a great deal with large amounts

P2300 l2 carrying capacity of the rivers

P2300 l8 This is a METRIC publication

P2300 l5 An error has been made H = 0 is true for the cold (wet extreme) pixel.

P2302 l5-10 There must be public domain data sources available that provide better land use information (e.g. AfriCover)?

P2302 l19-31 This sentence is confusing. What do you mean with information density of evaporation data?

P2302 l23 an should be and

P2303 Although very important the physical meaning of parameter Ip is not described in the manuscript.

P2306 There is a very clear bi-modal distribution of Ip for the riverine land use. This is however not discussed.

P2306 l15-25 A more likely explanation for the high Smax is that SEBAL consistently overestimates evapotranspiration over forested areas. This has been found in earlier studies and this should at least be discussed here.

P2307 l15 How does RS ET constrain the model structure?

P2308 l8 distributed instead of distribute

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Figures

Fig 2. The figure is unclear. I suggest a raster image of the DEM with the isohyets superimposed. The overview map of Africa can be smaller.

Fig 3. I would suggest splitting the figure in two figures and enlarging both.

Fig 4. Discuss bi-modal distribution in top right figure.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 5, 2293, 2008.

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