

Interactive comment on “New lessons on the Sudd hydrology learned from remote sensing and climate modeling” by Y. A. Mohamed et al.

Anonymous Referee #1

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This paper deals with two major different topics: 1) Estimation of the Sudd evaporation, and 2) Regional climate modelling and impact of Sudd wetland on Nile hydroclimatology.

The article addresses central questions of high scientific importance and deals with an area of little infrastructure and weak data availability.

The critical point of this article is that all major information and conclusions were recently already published by the same authors in other journals/articles:

[1] The evapotranspiration part was published and in detail discussed in Mohamed et al., (2004) “Spatial variability of evaporation and moisture storage in the Swamps of the upper Nile studied by remote sensing techniques”, Journal of Hydrology 289, pp. 145-164

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Regional climate modelling part was published twice:

[2a] Mohamed et al. (2005): Impact of Sudd wetland on the Nile hydroclimatology”, Water Resources Research 41, W08420

[2b] Mohamed et al. (2005) Hydroclimatology of the Nile: results from a regional climate model, HESS SRef-ID: 1812-2116/hessd/2005-2-319

Behind this background the differences between this paper and [1], [2a], and [2b] should be clearly elaborated. It should become obvious what the additional “new lessons” with respect to the other publications are and why an additional new article is justified.

1) The link between the two individual topics addressed in this paper (i.e. SEBAL ET-remote sensing and RACMO modelling) is the use of SEBAL derived heat fluxes to adjust and tune the RACMO model (section 4.2). However, no results are presented how the quality of RACMO in describing the energy and water balance of the Sudd region is improved. Instead, [2b] is cited (section 3.2 in [2b]). But again, also in [2b] no comparison between original RACMO settings and adjusted RACMO setting are provided.

2) Using roughly 3-4 satellite images each month to derive monthly ET rates raises the question: how good is an ET estimate that arises from a satellite overpass (order of seconds) and extrapolates to a monthly value. It is weakly accepted in the community that the evaporative fraction is more or less constant for one day (in spite quite controversial meanings about that fact can be met). However, to interpolate between the three daily values to monthly values seems very questionable, in particular as only cloud free days can be used for SEBAL analysis.

3) The “new lessons” obtained by extension of 1 year SEBAL ET-analysis [1] to 3 years [this article] should be elaborated. In particular the question must be raised, if calculation of “average monthly values” is sound, when the sample consists only of 3

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members (i.e. the 3 years 1995, 1999, 2000).

4) The comparison between the DRA and CTL scenario (Jonglei canal scenario) seems to be the major point in publication [2a]. What is different to section 4.2 in this article? What are the new lessons?

5) A further central question is: what is the quality of the RACMO model to reproduce precipitation in the Sudd region? RACMO is used in 50x50 km² resolution and no comparison to the Sudd region, only to larger regions in the surrounding is given in [2b]. The three meteorological stations used, are more than around 400 km away from each other and in completely different climatological areas than the Sudd itself. It would be interesting to know whether these data are also used to feed SEBAL? How representative are these averaged station values for describing the Sudd hydroclimatology? What is the quality of RACMO to reproduce the values at these stations?

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