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Hydrology and Earth System Sciences Discussions

Interactive comment on "Evapotranspiration computed by Darcy's Law: Sudan case study" *by* O. A. E. Abdalla

Anonymous Referee #1

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The paper presents the application of Darcy's law to compute evapotranspiration over a small area in the central part of Sudan. The method is interesting to monitor a very complex term "evapotranspiration", with limited input data. However, the input data needs to be accurate and assumptions must be fulfilled.

The central weakness of the obtained findings that the final results hasn't been validated against any other value to confirm their reliability. The derived evapotranspiration were 1.25 mm/year and 1.2 mm/year over the Bara and Kosti basins, respectively, i.e., about 0.003 mm/day. As given in the paper the annual rainfall in the area ranges between 200 and 450 mm/year. Since the rainy season in the area extends for about 3 months, it allows growth of seasonal vegetation, which also contributes to evapotranspiration from the basins. Seasonal vegetation is used for cattle grazing, a typical activity of the local nomads in Central Sudan. A simple water balance of the area

implies that rainfall should equalize evapotranspiration if other components of the hydrologic budget terms are neglected. I.e. evapotranspiration should be in the range of 200 to 450 mm/year, which is much larger than the estimates given in the paper of 1.25 mm/year.

The author may need to re-check the method, and/or the embedded assumptions. The derived estimates of evaporation need to be verified against another method or other values. The literature shows that remote sensing emerges as a new technique for estimating evapotranspiration over large area, see e.g. J. of hydrology 289 (2004) 145-164 for a similar application on a large area located at a short distance of this study area. The author may need to cite literature on similar application of Darcy's law for evapotranspiration estimates.

The paper can be accepted for publication in HESS if the above-mentioned concerns are considered.

Other comments and corrections;

1. Sudan is a very large country and has varying climates ranging from desert to equatorial forests. The title could be more specific, if modified to Ĕ. : Central Sudan case study. 2. Better replace mm/a to mm/year to express rates per year. 3. p. 1788, line 19, to compute for Ĕ, delete for. 4. p. 1788, line 25, Heinl et al., 1993; change to Heinl and Thorweihe, 1993 5. p. 1789, line 2, Heinl et al., 1993; change to Heinl and Thorweihe, 1993 6. p. 1788, line 2, EL Tohami change to El Tohami. 7. p. 1788, line 13, Hatton et al., 1990; change to Hatton and Vertessy, 1990 8. A general comment on figure captions that they are very long. I would be better to make them brief and insert the detailed clarification within the text. 9. p. 1794. Why large variations on the hydraulic conductivity in the same basin. Could you provide physical interpretation for that. 10. Fig. 3, Fig. 5 and Fig. 6, lines are very thin, and font is very small, better improve to be readable. 11. Fig. 6, replace two head arrows with single head when pointing to specific item. 12. p. 1797 the conclusion is too short to summarize the main

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Interactive Comment

findings.

Interactive comment on Hydrology and Earth System Sciences Discussions, 2, 1787, 2005.