

Interactive comment on “Evaluation of an extreme-condition-inverse calibration remote sensing model for mapping energy balance fluxes in arid riparian areas” by S.-H. Hong et al.

Anonymous Referee #1

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Summary: The authors present an application of SEBAL to semi-arid riparian regions in the US West. The study design is appropriate to the problem and the presentation of methods and results is clear throughout. I am not a SEBAL user, but my impression is that this paper will present a useful case study and a number of useful application tips for users of that system. Since SEBAL is a widely used model and semi-arid riparian zones are of particular interest for ET analysis I believe that publication of this paper in HESS is justified.

That said, I admit that I find the paper disappointing in some respects, as indicated in my major comments below. My overall impression is that the paper as it is currently

C6034

written provides a technical resource for SEBAL users, but that the authors have missed the opportunity to put their analysis into the broader context of semi-arid riparian hydrology, or at least the broader context of available ET methods and datasets in these regions.

Major comments:

1. I find it odd that so many ET methods and products are listed in the introduction, yet the paper only presents internal analyses. It would be very interesting to know how the calibrated SEBAL estimates from this study compare to available ET estimates from MODIS (MOD16 and/or the UW product for CONUS), ALEXI, NLDAS, or other available datasets. Indeed, I had really hoped that in reading the paper I would learn whether calibrated SEBAL performs substantially better than other methods or publicly available products in these regions. As it stands I find it difficult to interpret the reported error estimates, since I have no reference for what constitutes a good or bad estimate of turbulent heat fluxes for these locations.

2. The title and introduction indicate that this paper is motivated by the problem of estimating ET in semi-arid riparian areas. The selection of study sites is consistent with this goal, and in some sections the presentation of results touches on matters relevant to riparian areas. But overall the very lengthy results section and the conclusions have very little to say about riparian zones. Instead various details of SEBAL calibration and bias correction are explored without any explanation as to how or why the results are specific to / informative of / generalizable across semi-arid riparian zones. Instead the paper becomes a list of specific lessons learned and recommendations for SEBAL, some of which are semi-arid specific but others of which seem not to be. I would urge the authors to present a more compelling synthesis of their results as they inform study of semi-arid riparian zones. Alternatively, if the results are more generalizable then the authors could consider removing the semi-arid focus and reframing the paper in terms of its technical contribution to SEBAL applications.

C6035

Minor comments:

Introduction p. 13482: The inclusion of NLDAS and LIS in the discussion of satellite-derived ET estimates is misleading. NLDAS ET estimates are the product of land surface models that simulate ET prognostically, while LIS is a software framework that supports LSM simulations with data assimilation. Neither is really a satellite-derived ET product in the way that the other listed analyses are. If the review of "ET products" is to include prognostic modeling systems alongside diagnostic energy balance methods then the authors should make a clear distinction between the two.

Introduction p. 13484: The statement that "If SEBAL performs well under these challenging conditions, it is likely to perform well in most arid and semi-arid regions" requires further justification. I understand that short fetch and sub-pixel thermal contrasts make riparian areas difficult, but riparian areas also present a strong ET signal that is absent in most semi-arid regions and that might make RS detection easier.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 13479, 2014.