**Hydrology and
Earth System
Sciences
Discussions**

Interactive comment on "Mapping daily evapotranspiration and dryness index in the East African highlands using MODIS and SEVIRI data" *by* Z. Sun et al.
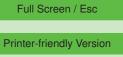
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The main objective of the paper was to demonstrate an implementation of the Sim-ReSET model to estimate daily ET in east African highlands. The combined use of MODIS and SEVIRI is creative. The approach is sound and the results are encouraging.

The following points may need to be addressed in full or partially for better understanding of the capability and limitations of the method.

1) It is not clear why a dryer area (less than 320 mm rainfall) was chosen for the

validation. Especially, the title specifically talks about the east African highlands which are generally wetter than the validation site. Also, not clear what each of the 16 or so data points represent in time. Are they daily averages of some period? If data was collected on a daily time step from July to December, not clear why not use most of the data. How about other years?

2) If flux tower is not available in the highlands, the use of a water balance approach should be attempted so one can evaluate the performance of the model in more complex regions.

3) Figure 3: Also, not clear why the actual ET is only posted on a scale of 0 to 4 mm while the potential ET is up to 7 mm. One would think some well-watered areas would also have ET at a potential rate such as the Sudd; it could even be more depending on the reference crop type. An explanation is requested on the absence of pixels that have as high ET rate as the ETo. Is the reference ET standardized to some crop, clipped grass or alfalfa?

4) It would be great to see monthly and seasonal total ET for the region. With all the problem of cloud, it is hard to read the spatial pattern on a daily time step. Is there a plan to fill cloudy pixels, especially if we can assume 8-day ET fractions are stable over a certain period?

5) The authors should also refer to similar indices by other researchers such as the evaporative stress index (ESI) from ALEXI model and also the water requirement satisfaction index (WRSI, originally developed by FAO).

6) There are also other similar models that combine MODIS-based ET fractions with weather data sets, implemented for drought monitoring in east Africa. Although not the scope of this paper, a comparison between their approach and one based on reference ET generated from data assimilation models such as GDSAS should be encouraged.

7) I also wonder if assuming a constant lapse rate is valid. Did they check if this rate

behaves similarly from month to month? Other researchers have found that it varies from time to time and so a temporal varying lapse rate may be more appropriate.

8) Page 6290, last line: are the 0.1 and 0.4 applicable for the region? Agricultural bare soil vs desert bare soil?

9) Why use 16-day NDVI and 8-day LST. Why not use the 8-day NDVI? Or the NDVI is not that sensitive.

10) Not clear on the statement that the Dryness Index is operational. Is it running operationally and the results posted on the web?

Please also note the supplement to this comment:
http://www.hydrol-earth-syst-sci-discuss.net/7/C2752/2010/hessd-7-C2752-2010-supplement.pdf

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 6285, 2010.