

Interactive comment on “Upscaling of evapotranspiration fluxes from instantaneous to daytime scales for thermal remote sensing applications” by C. Cammalleri et al.

Anonymous Referee #1

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This paper compares the efficiency in upscaling instantaneous evapotranspiration fluxes (as they could be derived from TIR retrievals at the time of the satellite overpass) to the daily timescale for all AMERIFLUX sites, based on fairly easily scalable quantities: solar radiation, TOA solar radiation, net radiation and available energy.

The topic is not original, but the statistical analysis is interesting. The uncertainty on the EC measurements has been taken into account, which was, to my knowledge, not the case for many previous studies.

It confirms findings from many recent publications, but unfortunately: 1- Previous find-

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ings are not properly assessed: a. Delogu et al., 2012 (<http://www.hydrol-earth-syst-sci.net/16/2995/2012/hess-16-2995-2012.pdf>) have tested methods based on EF and actual to potential ET ratios; b. Delogu et al., 2012 also tested the diurnal shape of EF proposed by Hoedjes et al., 2008 and found that it greatly improves the outputs of the EF method (Delogu et al., 2012, Table 5, cf. P7335L14); 2- The paper is not well put into the context of RS data: for instance, little is said about the scaling methods based on available energy (which is rather tricky in presence of fluxes whose diurnal variations are not phased with solar radiation, such as the soil heat flux, and is not easily inferred from Remote Sensing data alone); the paper uses an observed available energy and not one derived from RS; there is a great amount of uncertainty in deriving the diurnal course of available energy from remote sensing data, this should be assessed; this limits the operational applicability of the method, as it is said at the end of the conclusion section (P7340, L23); moreover, you only assess daytime reconstruction; however, interpolation between two successive clear-sky days is also crucial for practical applications to High Resolution TIR imagery; It could have been useful for future missions in the TIR domain to investigate not only the impact of the time of satellite overpass, but also the revisit frequency; 3- The focus of the paper is on the diurnal cycle reconstruction; the typical diurnal variations of the four scaling factors are mentioned but not illustrated or systematically investigated for the AMERIFLUX dataset; the shape of those variations could explain some of the biases; in particular, it could have been useful to study whether there is a relationship between, say, the presence of water stress, and the diurnal shape of the main driving factors such as the ratio between the actual and reference evapotranspiration rates, or EF.

Detailed comments: P7328L9-11: no, Delogu et al. 2012 use several years of data for 3 sites in Mediterranean climates. They also focus on clearsky days only. P7331L11: why did you use a R_s/R_{TOA} ratio instead of a ratio between global and clear-sky irradiances? P7336L16: “may be related”