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Hydrology and Earth System Sciences Discussions



# *Interactive comment on* "Temporal variations of evapotranspiration: reconstruction using instantaneous satellite measurements in the thermal infra red domain" *by* E. Delogu et al.

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Of most concern, however, is that some non-standard SF and EF approaches were applied and that may have significantly influenced the outcomes. The SF results are so poor in Fig 5 in comparison with typical seasonal retrievals using SF methods that I wonder if there was an error in the computation. One would expect the simulated and observed fluxes to reconverge every few days whenever there was a clear-sky acquisition (since it was assumed that the instantaneous fluxes were perfectly retrieved). It might have been better to test some standard techniques using these great datasets,

so that it is easier to distinguish errors due to missing data from errors in methodological assumptions.

Underperformance shown in Fig. 5 is mostly due to the interpolation of SF from one date to the other; as it is pointed out in the paper, interpolated SF between two successive clear days, usually associated with high available energy levels, tends to underestimate evaporation during an overcast day where available energy is much lower and thus, for similar soil moisture conditions, the resulting SF much higher. A comment strengthening that point will be added in a revised version.

The EF method is standard, and the SF method is based on a classic combination equation.

Why not test EF first using the observed RN and G to define daily AE, then compare this "best case" scenario with results obtained using the simplified AEd approach ?

This corresponds to a “best case” scenario which is not tested because the choice is made to focus the study on remote-sensing methods. Only method which could be easy to implement in a RS process have been presented, to keep the paper within reasonable size.

For SF, why not test an approach like that used by R. Allen in METRIC, where the scaling flux is a standard reference ET for grass or alfalfa? It is not clear why a detailed energy balance model is required to specify the scaling PET... RefET is a much more accessible datastream (less demanding than EF methods), and does not require much ancillary input. There are other simplified RefET methods like Makkink promoted by Henk de Bruin. Or a comparison between simple scaling fluxes (RefET, Priestley-Taylor, Makkink) could have been performed. This would also allow an assessment of when it is important to account for advective components in the scaling flux, or whether a PT method typically suffices. It is not clear to me that the results presented here are not specific to the choice of PET method, rather than the merits of the SF approach in general.



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We did not test a method based on reference evapotranspiration since the model used (an extension of the combination equation) is better suited to model the maximum evaporation of a given surface, especially by taking into account its real vegetation extent. It is therefore a better candidate as a reference for a given surface than the general ET0 formulation, valid only for a reference cover. Moreover, this model requires the same amount of inputs than the ET0 model except for an information on the true vegetation cover (through LAI or NDVI products) which is easily derived from remote sensing. The model is evaluated and performs fairly well.

We disagree on the fact that EF method is more data-demanding than RefET: it requires information on the actual radiation budget, easily deduced from remote-sensing data, and an estimate of the soil heat flux whereas RefET and PET equations require many meteorological inputs which are more difficult to assess routinely.

Simplified equations such as Priestley-Taylor or Makkink could perform well in temperate regions (cf. Jensen, 1990) but are less well suited in more arid regions where water is a limiting factor. These regions are target areas for remotely sensed evapotranspiration estimates based on TIR data, while other remote sensing methods could perform well in temperate regions less prone to water shortage.

Interesting that the clear sky #s don't decrease between 10AM and 2PM, contrary to what is typically held to be anecdotally true. It would be interesting to expand on this study and that of Lagouarde using global flux datasets, under different climatic conditions.

Our conclusions are in agreement with the work carried out by Lagouarde et al. (2012) for historical climatic data at five locations in France (Fig. 1)

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 1699, 2012.





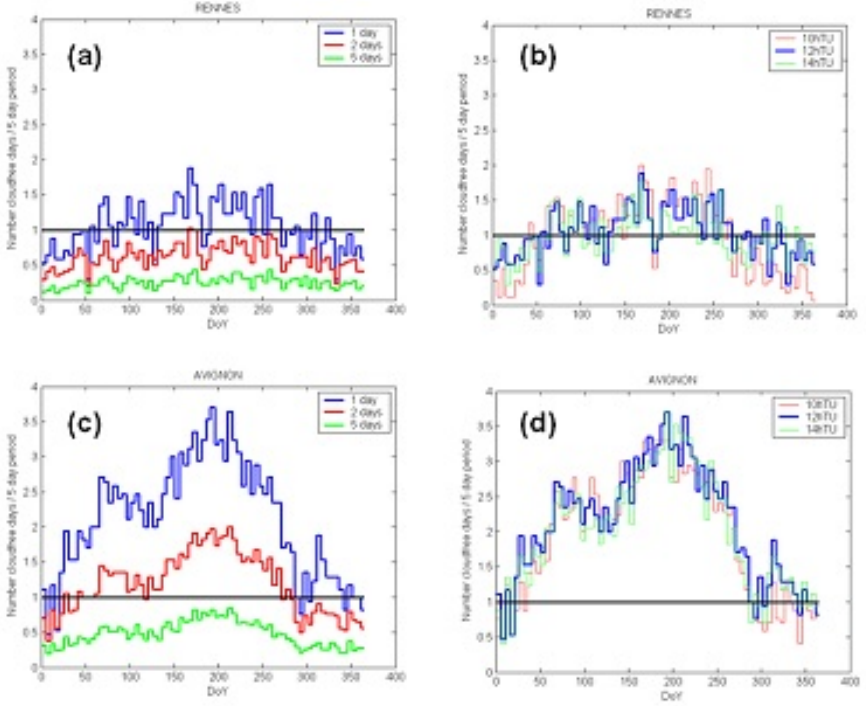


*Figure 3-3. Impact of the revisit (1 or 2 days) on the availability of data per 5 days periods (a: Rennes, c: Avignon) for an overpass time at 12:00 UT. Impact of acquisition time (11h, 12h, 14h) for Rennes (b) and Avignon (d). The black line indicates the threshold of 1 available data per 5 day-period.*

**Fig. 1.**



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