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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Surface response to rain events throughout the West African monsoon" *by* F. Lohou et al.

Anonymous Referee #2

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The paper discusses an interesting data set and model evaluation focusing on the dynamics of surface evaporation around individual rain events in the Sahel area. The chosen diagnostics do tell a good story of these dynamics, and make sense. The manuscript is acceptable for publication apart from a set of minor comments, listed below.

- 18582-2: "a rain event" -> "rain events"
- .82-17: add "than observed"
- .83-14: worth referring to Guichard, F., L. Kergoat, E. Mougin, F. Timouk, F. Baup, P.Hiernaux and F. Lavenu (2009): Surface thermodynamics and radiative budget

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Interactive Discussion
Discussion Paper

in the Sahelian Gourma: Seosonal and diurnal cyclus; J. Hydrol. 375, 161-177, doi:10.1016/j.hydrol.2008.09.007

- .83-21: give a reference to this failure to simulate this in GSWP2
- .86-3: is “Sudanian” refering to a West African climate regime? I’m confusing it with the country Sudan
- Fig 2: “shifted above 1” not entirely clear
- .88-25: “to distinguish bare soil from vegetation cover”: not sure I understand what you mean. Do you reconstruct a fractional area bare ground from the ET/TR results?
- Why doesn’t fig 3 show the eddy correlation observations of EF?
- .89-27: for the models closure of the water balance can be ensured by taking an appropriate soil depth definition. For the observations the limited dynamical range in S can be related by missing dynamical features from deeper layers, not contained in the observations. Can that be a reason for the discrepancy?
- .92-10: the symbol tau_2 was not introduced yet, it’s a bit unclear in this context
- .93-24: Bare soil evaporation is said to be the dominant feature here. But I assume that also the transpiration activity slows down after a rainfall event. You do analyse this in Fig 7. It’s worth referring forward to this figure at this point.
- .94-4: “seasonal cycle of surface recovery” is a bit imprecise. Do you mean the seasonal cycle of the recovery time scale?
- Fig 6: does this strong relationship imply that one can describe the surface recovery well with just a single time scale?

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- .94-14 and legend Fig 7: “Rain are sorted in 2 categories”: a bit strange to sort “rain” into two surface type categories. What do you mean? Actually, you don’t discriminate along vegetation per se, but distinguish early from late monsoon conditions, where much more than only vegetation can be different (soil moisture, rain patterns, potential evaporation)
- .94-16: LAI = 0.01 seems to be a very low value to discriminate vegetation from bare ground. Is your result sensitive to this choice?
- Fig 8: why not plot the observations in as well (in color)?
- Fig 10: any reason why HTESSEL is such an outlier in TR/ET? I know ECMWF has been working on their bare ground evaporation module. Is this included in the simulations shown here?
- .99-3: “threeshold” -> “threshold”
- .99-7: you say the phenology is of interest, but as said above, other aspects of the hydrological budget also change drastically parallel to the phenology. How do you know the phenology is such a strong determinant?

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 18581, 2013.