

Interactive comment on “On the factors influencing surface-layer energy balance closure and their seasonal variability over semi-arid loess plateau of Northwest China” by X. Xiao et al.

Anonymous Referee #1

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General

This paper analyzes the energy balance closure of eddy covariance data of the semi-arid climate change and environment observatory on the semi-arid loess plateau of Northwest China. The topic is interesting for HESS. It analyzes the energy balance closure with a special focus on some more recent developments that claimed to reduce the energy balance gap: (1) heterogeneity around the tower, (2) contribution of low-frequency turbulent fluxes, (3) methods to calculate the soil thermal flux. The authors show that indeed (1), (2) and (3) are able to reduce the EB gap, but at the same time the EB gap remains relatively larger, in spite of these corrections. Although the content

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of the paper is interesting, I think that the organization and presentation of the results (English) needs to be improved considerably before the paper can be published in HESS. As such, I believe that major revision is needed. However, in this review my comments are rather limited as I do not provide much editorial feedback. I recommend a native speaker for improving the English.

Detailed comments

Abstract, first sentence. An example of a sentence which is much too long (eight lines) and needs to be divided in multiple sentences.

Page 556, line 25, 26. Unclear.

Page 557, line 5. Skip “too”.

Page 557, line 6. “However, not until the late 1980s (...)”. Reformulate.

Page 557, line 8-10. Sentence should be improved.

Page 557, line 22. Better “land-atmosphere interaction” instead of “air-earth interaction study”?

Page 558, line 6-7. Why is this of much significance to improving land surface process parameterization schemes in models? You work with data but models inherently conserve energy.

Page 559. Line 24-25. What do you mean with “corresponding figures of 3.47% and 0.775 of the total”? This is not the correct expression.

Page 560, line 24. The variables u and T_s were not properly introduced.

Page 560, line 6-8. Why is the number of valid data so low if contributions of less than 50% were removed?

Page 560, line 12. The energy balance itself has not been introduced yet. I think this is necessary.

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Page 561, line 1-2. “There was deviation ΔT (. . .)”. Sentence very unclear.

Page 563, line 15-19. More recently, see also a multi-site study by Franssen et al. (2010, AFM) for the role of heat storage on energy balance closure.

Page 563, line 24-25. “And the average time is 30 min.” This is not a good sentence like this and should be integrated somewhere else.

Page 563, line 25-27. Sentence very unclear.

Page 564, line 1. “typical patterns of fine days”. What do you mean?

Page 564, line 5-6. The author should specify how the soil heat flux is analyzed in the context of the EB closure. The net surface soil heat flux integrated over a complete year will be close to zero. How can it account then for a comparable portion of the EB gap or net radiation? Probably you mean that for individual 30-minute periods the portion of the soil heat flux was calculated, and later averaged over the different periods. This should be clarified and precisely defined in the paper.

Page 565, line 13-14. “(..) meaning that the EBC took place (..). Sentence should be rewritten.

Section 4. I suggest to use as section title “Results and discussion”

Page 567, line 11-12. “In a similar way we analyzed the seasonal flux contributions in a range of z/L and wind directions in agreement, on the whole, with the above.” Reformulate sentence and specify: agreement of what?

Page 569, line 5. “the results are shown”

Page 569, line 20-23. Reformulate and explain. It is very unclear.

Page 570, line 8-10. Unclear what has been done. Modify sentence.

Page 570, lower part. All this information can already be found in Figure 3. Is it necessary to repeat all this in so much detail?

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Page 570, line 10-11. This is a very strange sentence and written as if EBC would be a physical property. Reformulate.

Page 571, line 24-25. “with EBC dropping from spring to winter”. What does this mean?

Page 571, line 26. “in lieu”. What doe sthis mean?

Page 572, line 5. “comparison”.

Page 572, line 17. The spring data are not optimal but “only” have the less missing data over the different seasons.

Page 572, line 23. I don’t think that the conclusions can be generalized for semi-arid climates. They hold for this particular region.

Page 573, line 14-15. Which other factors?

General. As indicated before, language needs to be improved at many more places. Some strange sentence constructions make the understanding of the paper difficult.

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