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Discussions
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# *Interactive comment on* "Site specific parameterizations of longwave radiation" *by* G. Formetta et al.

**Anonymous Referee #1**

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The study evaluates the performance of site specific parameterizations of longwave radiation. Similar evaluations have already been done by other authors. What's special about this study are two points: 1) The model parameters have been randomly perturbed to analyze their sensitivity. 2) The site specific model parameters were also estimated with the help of multiple regressions against commonly available local and climatic variables. The results are interesting and definitely worth to be published in HESS after the following comments have been addressed:

Section 2: Please describe how the last and first hour of daylight was defined.

Section 4: There is hardly any discussion of the results. I suggest adding the discussion of the findings in the Result section.

Section 4.2: I miss a figure or table, which shows the variability of the site-specific



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model parameters for the different stations analyzed. This information is necessary in order to judge the sensitivity of the parameters on the different climates. Possibly this is reported in the mentioned supplementary material, which I could not find!

Section 4.3: You write “you start with optimal parameter set”. Is done for every station? Moreover, it might be worth mentioning that the all three parameters of model 10 seem to be quite robust.

Section 4.4: This section is really innovative and therefore its potential needs to be explored more. IN practice you often don’t have stations nearby, which can be used as a training set. I would like to see how a Ameriflux station in northern Alaska (Arctic) and South America (Tropics) performs with your currently used training set. Is there a specific reason you don’t show the RMSE for this section? Which models perform best in this section? As I understand the red bars in Figure 8 represent the same KGE values as the bars in Figure 4. A visual test with model 1 shows a disagreement for latitude class 30;35 and 35;40! Please explain.

Section 4.5: Did take into account the soil was snow covered for some time at some stations. Please discuss the effect of snow an your approach and how it influences your results?

Section 5:In the Conclusion section, I miss a focus on the actual results, i.e. the evaluation of the different site-specific parameterizations methods and the performance of the different models. For example, it is not enough to write “A broad assessment of the classic longwave radiation parameterizations clearly shows that the Idso (1981) and Brunt (1932) models are the more robust and reliable for all the test sites, confirming previous results”. First, I don’t “see” this. Please add information based on RMSE or KGE (however this should not be done in the Conclusion section). Second, add the references, which seem to confirm your results.

Minor Comments:

L1: Performance of site specific parameterizations. . ..

L15: for L in SMs

L29: I guess data also!

L44: water vapor deficit

L46: Be consistent - when using L you don't need to add downwelling or upwelling radiation.

L49: Instead of old references I suggest to replace it with newer ones, like doi:10.1007/s00704-012-0675-1 and doi:10.1016/j.coldregions.2013.12.004

L53-54: Why show the results only for this study?

L77: Delete "near surface" or replace with "screen level".

Table 1: The Monteith and Unsworth (1990) is missing in the Reference section, but I guess you mean Unsworth and Monteith (1975) anyway.

L103-105: Please reformulate. I suggest to make two sentences.

Figure 1: "incoming Radiation" in the LWRB box is confusing. Please replace with "Incoming Shortwave Radation".

L134: Why 0.6. Did you also test other thresholds?

L164: Could you please add some information about the used longwave instruments its measurement uncertainties.

L182-183: The reason is that the Konzelmann model was calibrated for the Greenland ice sheet, which has a totally different climate than you stations.

L225: For better understanding please link this part to the former section by changing the first sentence to: The just performed calibration procedure to estimate. . . requires. . .

L232: The URL is invalid: I suggest to add this information also to the supplementary material.

L244: figures (8) and (9)

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