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Geoscientific
Model Development
Discussions

Interactive comment on "Simulation of land surface temperatures: comparison of two climate models and satellite retrievals" *by* J. M. Edwards

Anonymous Referee #1

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General comments

In this paper the assessment of two general circulation models is made using land surface temperature retrieved from satellite observations. Furthermore, the differences of the fields from both sources are discussed using the surface energy budgets taken from the model. The application of satellite data to validate general circulation models is interesting and novel and the ideas in the manuscript are very well organized so I recommend that the paper be published subject to minor revisions.

Specific comments

(A) As it is seen in Figure 1, the model outputs show that the results do not depend

on the masking value of 10% in the cloud fraction and this value is taken to extract the clear-sky data. But, do the fog areas meet the criterion of less than 10% in the cloud fraction and therefore they are considered as clear-sky?

(B) It is not clear in the text how the data (model and satellite observations) are filtered according to the 10% criterion. Which is the case? (1) First, the clear-sky points are chosen from the satellite images and afterwards these points are extracted from the model outputs or (2) the criterion of 10% is applied to both sources of data, independently. If the clear-sky points are taken from (1) then, what happens when both sources have different spatial (or temporal) resolution? If, on the other hand, the clear-sky points are taken according to (2), is it possible to find a clear-sky point in the satellite data but not for the model, and vice versa (it seems that this is happening in Figure 8, 3rd row, for instance)?

(C) Can the differences between model and observations (for instance in Figures 2 and/or 4) be related to the different sampling period (observations: 1996-2000 and simulations: 1983-1998)? Can the differences between the two models be explained because of the resolution chosen or the soil scheme used?

(D) The observed air temperatures in Figure 6 are taken from the CRU climatology (New et al., 1999) where the surface observations are interpolated with a high-accuracy method, to a regular mesh. Therefore, should an error bar be considered in Figure 6 to compare data from the CRU climatology to the satellite and/or model averages?

(E) In the particular case explained in Jimenez et al. (2008), the simulated temperatures in the valley were warmer than those observed from satellite images (NOAA),

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related to the chosen parameterization but also to the surface scheme and the physiographic fields. Can these facts also explain the differences between the two model outputs for the minimum temperatures? Can they also explain the differences in the budgets of the three locations in Figure 7?

(F) Figures 6 or 9 (for example) show that July is the odd month (too warm minimum and maximum temperatures), can the warmer minimum temperatures be related to the length of the night (it is too short for the development of colder areas in the model)?

(G) The monthly GPCP climatology in Figures 9, 11, 13 is built using satellite and surface observations for the period 1986-2000 at 2.5 degree resolution as it is described in Huffman et al. (1997). Should an error bar be considered as comment (D)?

Technical corrections

(a.1) Figures 2, 3, 4, 5: To help the reader I would put a label close to each plot as follows (for instance for Figure 2): (a) Retrieval (and in the next line the figure Top), (b) HadGEM2-A (and in the next line the figure Middle), ... I suggest the same for Figures 8, 10 and 12 and with a fast look the reader sees the month of each panel without reading the caption

(a.2) Caption Figure 6: In "... Crosses represent observations, diamonds ..." I would clarify a bit "... Crosses represent observations ("Air" from surface and "Surf." from satellite observations, respectively), diamonds ..."

(a.3) Captions Figures 8, 10, 12: To make the timing clearly I would put tics every 3 or

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5 hours in the x axis

(b.1) In the text, when a figure is referred use "in Fig." or "in Figure" or "in figure" but the same for the whole manuscript

(b.2) page 312: A table with the description of the data (observation and model runs) will be useful to better understand their main features (horizontal resolution, temporal resolution, period of time, ...). Which is the spatial resolution of the runs?

(b.3) page 315, line 2: Change "The lower panel of the figure shows..." to "The lower panel of Figure 1 shows..."

(b.4) page 315, line 2: The y label in Figure 1-bottom "temperature error" should be defined in the text or in the caption

(b.5) end of page 316, beginning of 317: Change "Figure 3 shows the differences between the clear-sky maximum and clear-sky minimum temperatures for January (model-retrieval)." to "Figure 3 shows the differences (model-retrieval) between the clear-sky maximum and minimum temperatures for January."

(b.6) page 317, line 7: "Figure 3 of GAMDT shows that the ..." Should you use AM2 or AM2D instead of GAMDT?

(c.1) references, page 325, line 27: Change "Alder" to Adler"

(c.2) references, page 326, line 4: An author is missing. The complete list is: Jimenez,

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M.A., Mira, A., Cuxart, J., Luque, A., Alonso, S., and Guijarro, J.A.

(c.3) references, page 326, line 28: The year of this reference (Sun, 2004, BLM) is 1999

Interactive comment on Geosci. Model Dev. Discuss., 2, 309, 2009.