

Interactive comment on “Improvement of surface albedo parameterization within a regional climate model (RegCM3)” by Y. Bao and S. Lü

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Dear Mr(s). Helvoirt,

Thank you for your comments. My replies are as following:

Paragraph 2.3: Is there any initialization period of the simulation? Is the time period of the simulation long enough to draw reliable conclusions? Why 60 km resolution (explain)? What is the time resolution of the saved results? From figure 6b it is visible that it is 3 hours: mention in the text.

R: (1) In this paper, the first month simulation of the total 27 months (starting from 1 May 1999 through 1 September 2001) in mother domain are taken as the spin-up time(or initialization period). I have a little discussion about it in my previous work, and found

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in a RegCM3 simulation from 1 May, the system bias will reduce to a stable condition after one-month simulation. From this side, I think my results with a one-month spin-up time period are acceptable.

(2) There is a common sense that RegCM modeling with 60 km resolution can basically represent the regional climate characteristics (I can show you some paper later if you want). Also with the resolution, I can easily make the nesting simulation with 20km (There is some rule like the defaulted ratio between resolution of mother domain and nesting domain is equal to 3). Now the Abdus Salam International Centre for Theoretical Physics (ICTP) has taken 50 km as the standard resolution to make the benchmark experiment. Does it make any sense?

(3) I save my results every 3 hours. It's very convenient to change the output frequency for different kind of output (like ATM, SFC, RAD). I was supposed to write out the data every 1 hour for getting more smoothly diurnal cycle, but had to give it up for the storage space problem. I'll mention it in the text.

Paragraph 2.4: Why is surface air temperature used for validation? Explain.

R: There are two reasons I choose surface air temperature for validation. Firstly, just as I mentioned in introduction, albedo has a close relationship with air surface temperature. It directly determines the solar radiation absorbed by surface, which in turn affects the energy balance, then the air surface temperature. For the reason, I think it is reasonable and also convictive to represent simulated results due to modified albedo scheme via a validated air surface temperature.

Secondly, Air surface temperature is a basic variable of model output, while RegCM3 always have some problem of it. In East Asia, there is several-degree cold bias in air surface temperature simulation. One of my targets is improving the air surface temperature simulation in RegCM3 with the modified albedo parameterization.

Type errors: P1653, line 2 : meso- scale =>meso-scale. P1654, line 9: factor=> factors.

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P1654, line 26, second=> secondly. P1655 line 25, evapor-transpiration => evapo-transpiration. P1658, line 13: Research indicate => Research indicates. P1659, line 16: Pleatau => Plateau. P1661, line 5: latend => latent. P1665, line 7: that => remove it. P1665, line 22: albeo => albedo. P1665, line 28: model => models (2x). P1676, figure 6: where is figure 6d? Remove link, or insert figure.

R: I'm sorry to make so many mistakes in my English writing. I'll make a total revised edition for that and upload it after discussion. I'm very sorry for the inconvenience for the missed figure 6 (d). I had it in my previous versions, but cannot find it in the discussion version. Now I have some technical problem I cannot fix. When I try to upload a 2-page figure, things in last page are always missing. I have asked the editors for some help. I have uploaded part of figure 6 (including (d)), please check. I'll insert it into the revised manuscript after open discussion. If you have any questions, please feel free to contact with me.

Thanks for your time and effort.

Yan Bao

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 1651, 2009.

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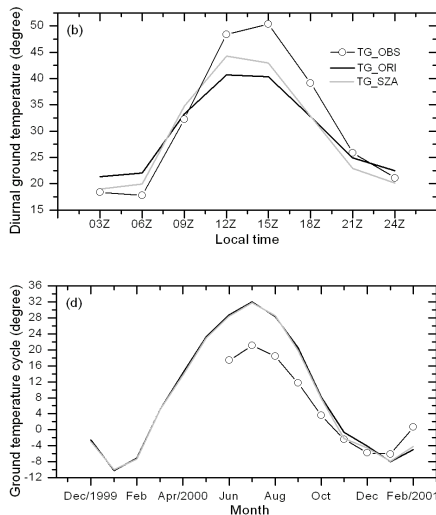


Fig 6 Diurnal and seasonal energy cycle (Units: Wm^{-2}) and air surface temperature (Units: Degree) at Dunhuang Gobi. Fig (a) Energy budget diurnal cycle (b) Ground temperature diurnal cycle (c) Energy budget seasonal cycle (d) Ground temperature seasonal cycle. Marks 'TG' means ground temperature; '_OBS' mean the observations, others on the panels have the same meanings with Fig 4

Fig. 1. Fig 6. Diurnal and seasonal energy cycle and air surface temperature at Dunhuang Gobi