The Cryosphere Discuss., 6, C1702–C1705, 2012
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The Cryosphere Discussions

Interactive comment on "The footprint of Asian monsoon dynamics in the mass and energy balance of a Tibetan glacier" *by* T. Mölg et al.

Anonymous Referee #1

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General remarks

This contribution seeks to gain a better understanding of the mass and energy balance of a Tibetan glacier by means of mass balance modeling. Because of the general interest in the response of Himalayan and Tibetan glaciers to climate change, it is a timely study, conducted with a physically based mass balance model that includes many of the processes thought to be important in this region. The authors use ground-based mass balance and AWS data from the Zhadang Glacier, along with climate modeling output to force and evaluate the modeling results. The model appears to perform well, and the authors apply parameter sensitivity tests to evaluate the climate sensitivity of the glacier. In addition, they assess the mass balance components during different phases of the Indian monsoon (onset, core, cessation), and conclude on the

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mass balance-effects of interannual monsoon variability.

The paper is very well written but pretty dense, containing a lot of detailed information. I had to read many sentences or paragraphs several times and go forth-and-back between text and figures to get all(?) the information. The figures are generally of very good quality and informative and the tables provide informative data as well. The only thing that bugged me is that the mass balance model as well as the climate modeling data, used to partly force the MB model, are not really described but merely referenced. I guess that's ok to do, but it requires the reader to pile up several more papers in order to understand the background. If the editors and authors don't have a problem with that, I think the paper will still stand out fine and be appreciated by those interested. Yet, elaborating a bit more on the modeling and the governing equations, even if it's partly repetitive with the previous work of the authors, would help the reader to follow without having to refer to several other papers, and potentially take along non-mass balance modeling experts, like me.

Minor comments

P3247

L10-12: Could you briefly describe the procedure? L18-22: These two sentences are unclear to me. Could you explain in more detail. Also, is reference to Table 1 for two numbers necessary? Maybe just give the depths, so I don't have to jump forth-an-back between text and figures/tables so often.

P3248

L1: 'final 76 days' – out of how many?

L2: How long is this gap? Can you fill the entire gap with data from the other station?

L6: Isn't it that there can be pretty strong melting during May, too?

L10: 'sufficient natural ventilation' – to result in what?

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L16: ‘obtain’ -> ‘estimate’ more appropriate?

L19: How often and when were stakes read?

P3249

L11: Again, could you briefly describe the method you refer to?

L12: Are there such strong altitudinal differences in the variable of interest?

P3250

L14-: Could add the respective letters of the variables?

L28: ‘the remaining subsurface layers are at. . .’

P3250

L3: Doesn’t the SRTM model have 90-m resolution here?

L6-L19: This was frustrating for me to read. If I would want to know, I’d have to read so many more papers. . . Why not add 1-2 pages to the paper and describe the model in more detail. Those not interested can skip the section.

L18: What do you mean by can be chosen? What did you chose to do?

P3252

L20: Why these specific thresholds?

L23-24: Instead of the range, you could give each date. It’s only three years, anyway.

P3256

L3: What do you mean by ‘the’ mid-latitude and subtropical VBP. Please explain.

L6: The glacier-wide MB stands a little out of context here.

L24: I think here you could also address some previous studies, like Rupper and Roe

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(2008, J. Climate), who performed rather simplified mass balance modeling. Do your modeling results support their findings, e.g., regarding sublimation, for example?

P3257

L19: That's a pretty wide range and doesn't really tell us much, does it?

P3258

L4: -0.20 - What unit?

Table 1

Caption: 'setting particular parameters' could be 'parameter setting'. 'The two radiation. . .albedo' – Is somehow unspecific to me. Table: I would probably prefer the column order to be: Instrument, variable, accuracy, usage. And also, for each variable one row. Finally, be consistent in using brackets or 'at' for the measurement height.

Table A1

You could try to make this table easier to read. For example, create a column for the reference and the constraint (meas/atmos) or assumption.

Figure 6a

The x-axis along with the data points suggests some continuous scale. Maybe use bars instead. In (b), can you give the dates for period 3?

Interactive comment on The Cryosphere Discuss., 6, 3243, 2012.