

Interactive comment on “Mountain glaciers of NE Asia in the near future: a projection based on climate-glacier systems’ interaction” by M. D. Ananicheva et al.

Anonymous Referee #1

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General Comments to Ananicheva et al. Mountain glaciers of NE Asia

It was intriguing and exciting to learn about efforts to evaluate the response of glaciers to climate change in a part of the world, NE Asia, where little previous work has been done, and to compare continental and maritime glaciers in that region. The authors apply the ECHAM4 GCM scenario for 2040-2069 as a climate input while various techniques to interpret the response of the glaciers to this climate forcing are applied. The details of the mechanism behind the response of, for example ELA, to a changing climate are not provided but referenced to other studies and publications, many of which I was not familiar with. Because of this uncertainty in the actual details of methodol-

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ogy and the numerous assumptions and coefficients applied in the study, I was in constant anticipation of the point at which the authors would provide some extensive comparison of measured versus modeled. Unfortunately this never happened and the lack of this basic validation/verification represents my major concern with this manuscript.

I honestly could not follow the methodology used here. The authors state that they used measured meteorological data to determine ELA, and although there are certainly other authors who have attempted such correlations, this paper makes no reference to those studies and it should. The exact method used here was not explained. The authors go on from there to state that where the ELA was not known; it was assumed to be the mean of the highest and lowest point on the glacier. If the mean vertical mass-balance profiles were computed from climate scenarios then what does it mean to refer to an unknown ELA? How did those computed ELAs compare with the assumption that they would be located at the mid-elevation point on the glacier?

Other assumptions/approximations with which I struggled included the calculation of accumulation at the mean ELA from glacier inventory data or obtained from maps; - I have no way to evaluate the validity of such an assumption.

In the conclusion reference is made to calculating the glacier termini level for present and projected climate states but I did not see any discussion of the method used to accomplish this.

Overall I found this paper quite difficult to follow and it seemed somewhat disjointed at many stages. I would recommend a thorough edit with emphasis on eliminating or explaining the numerous assumptions and helping the reader step through a concise and clear description of the details of the methodology used.

Some detailed editorial comments and questions follow:

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1. There is mention of correlating ELA and glacier termini in the abstract but I didn't find any examples of how this was accomplished.
- 2) page two, second to last line; I don't think topography is an output;
- 3) page 3, given that temperatures are increasing in this region during winter and that proportionally more precipitation is falling as solid, it would be instructive to provide some data regarding these temperature increases. Is the region close to the point where continued warming would cause more precipitation to fall as liquid? In this context, some representative temperature and precipitation for the continental and maritime regions would be very instructional.
- 4) page 6, I would need more explanation of the assumption; The area share of elevations intervals occupied with ice is assumed at this stage of the work to linearly decrease with altitude while the glacier is retreating.
- 5) page 10, second line in 3.3, there are two variables C_p where apparently one should be A_p ?
- 6) page 13, it is not at all clear to me what it means for a glacier to keep up with climate change as apposed to simply responding to climate change,
- 7) Figure 2; should read versus altitude; rather than via altitude;
- 8) I am not sure how Figure 4 supports comments made in the text.
- 9) In table 1. there is a parameter; elevation diapason; but I do not know what that means.

Interactive comment on The Cryosphere Discuss., 2, 1, 2008.

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