

Interactive comment on “Response of “Glacier-Runoff” system in a typical monsoonal temperate glacier region, Hailuogou Basin in Mt. Gongga of China, to global warming” by Zongxing Li et al.

A. Gelfan (Editor)

hydrowpi@aqua.laser.ru

Received and published: 6 November 2007

The paper is devoted to the response of Hailuogou glacier (China) to the climate change. By the use of the different data bases, the authors have studied and discussed sensitivities of variations in glacier retreat, mass balance and runoff to the observed changes in the mean annual air temperature and (to a lesser degree) precipitation during the last decades.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

Principle Comments

1. There are quite a few investigations dealt with the retreat of China glaciers and, specifically, Hailuogou glacier due to the climate changes in the XX century. Most of these works are mentioned in the paper, some of them (e.g. Ding Yongjian et al., 2006; Dyurgerov, 2002) are not. Be that as it may, almost all the data on Hailuogou retreat, which are discussed mainly in 4.1 Section and presented in Table 1, has been already published (for example, in Shen Yongping, 2004). However, there is no any new interpretation of these observations; the authors have restricted themselves to enumeration of the well-known values of Hailuogou glacier retreat. As far as I know, only the information for the last two years (March 2004-June 2006) out of 76 years of Hailuogou glacier retreat observations is original in the paper. At the same time, the glacier retreat during the last two years, which is much more intensive (50 m/year) than registered over the XX century, is not interpreted and discussed in the paper.

2. Time lag of the glacier retreat responded to temperature fluctuation is estimated in the paper as 10 or 20 years, depending on warm phase; (page 3400). To me, these estimations look questionable because of the two following circumstances. 1) To estimate the time lag, it is necessary to have corresponding time series of the mean annual temperature and the glacier retreat variations for the period under consideration (76 years). However, only 6 values of the glacier retreat are available during this period. I can not understand how the authors could estimate the desired time lag by these data. 2) On the basis of correlation analysis of continuous long-term series of mountain glacier observations over the world, Dyurgerov and Meier (2000) concluded that annual changes of mountain glacier volume can be considered to be almost simultaneous with annual changes in weather; (p. 1410). The estimations presented in the reviewed paper are quite different from (Dyurgerov Meier, 2000) and should be more justified.

3. The authors have analyzed sensitivity of the mass balance (MB) to the global warming on the basis of the mass balance data which were simulated by the method of

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

glacier mass balance using the hydrometeorological data. In other words, sensitivity of simulated data to temperature variations has been analyzed where the latter were used as inputs for simulations. In this case, strong negative correlation coefficient between MB and temperature variations reported in the paper ($r=-0.96$ for the last 45 years) can be caused by some assumptions of simulation method (e.g. assumption that MB varies in inverse proportion to the temperature) rather than reflecting natural relations between these variations. My confidence to the values of the correlation coefficient would be higher if the accuracy of MB simulations had been confirmed in the paper by the comparison with either measurements or some independent simulations for Hailuogou glacier. To my knowledge, such data are available for some periods (e.g. Ding Yongjian et al., 2006; Dyurgerov, 2002).

4. It is reported in the paper that the annual mean runoff for the period of 1999-2004 is almost doubled in comparison with that for 1994-1998. Increasing in the ablation rate is considered in the paper as the main reason for such runoff changes. It is difficult to see any confirmation of this statement because the glacier ablation data are available (page 3398) and shown (Fig. 4a) for the period of 1990-1994 only. Also, and more important, the result itself looks questionable to me that such a dramatic increase of the glacier runoff can be caused by the climate change only. As far as I know, influence of climate change on runoff from glaciers over the world is estimated as much smaller than that reported in the paper. Xie Zichu et al. (2001), for example, studied climate change impact on runoff changes for many glaciers in China and reported that discharge-increasing rate of glacial runoff is small.

Ding Yongjian, Liu Shiyin, Li Jing, Shangguan Donghui. 2006. The retreat of glaciers in response to recent climate warming in western China. *Annals of Glaciology*, 43, 97-105.

Dyurgerov M., Meier M. F. 2000 Twentieth century climate change: Evidence from small glaciers. *PNAS*, 97(4), 1406-1411

[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)

Dyurgerov M. 2002. Glacier Mass Balance and Regime: Data of Measurements and Analysis University of Colorado Institute of Arctic and Alpine Research Occasional Paper No. 55 Editors: Mark Meier (INSTAAR), Richard Armstrong (NSIDC)

Xie Zichu, Feng Qinghua, Liu Chaohai, 2001. A modeling study of the variable glacier system- using the southern Tibet as an example. Journal of Glaciology and Geocryology, 24(1): 16-27

Various technical errors exist in the paper regarding illustrations and references which I consider as minor in view of the above-listed weaknesses of the paper. The aforementioned remarks are, in my opinion, a matter of principle and relate to the basis of the problem studied in the paper. In spite of the paper addresses relevant problem within the scope of HESS, the results obtained by the author look not valid, and I can not recommend the paper for publication.

1. Does the paper address relevant scientific questions within the scope of HESS? YES 2. Does the paper present novel concepts, ideas, tools or data? NO 3. Are substantial conclusions reached? NO 4. Are the scientific methods and assumptions valid and clearly outlined? NO 5. Are the results sufficient to support the interpretations and conclusions? NO 6. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientific (traceability of results)? NO 7. Do the authors give proper credit to related work and clearly indicate their own new/original contribution? NOT COMPLETELY 8. Does the title clearly reflect the contents of the paper? YES 9. Does the abstract provide a concise and complete summary? YES 10. Is the overall presentation well structured and clear? THERE ARE SOME UNCLEAR ILLUSTRATIONS 11. Is the language fluent and precise? NOT COMPLETELY 12. Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? 13. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? NO 14. Are the number and quality of references appropriate? NOT COMPLETELY 15. Is the amount and quality of supplementary material appropriate? NO

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 4, 3395, 2007.

HESSD

4, S1353–S1357, 2007

Interactive
Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

S1357

EGU