

Interactive comment on “Seasonal and annual mass balances of Mera and Pokalde glaciers (Nepal Himalaya) since 2007” by P. Wagnon et al.

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General comments

In this study, authors performed evaluation of glacial variation by field based method. Measured surface velocity, surface mass balance and thickness in higher altitude area is very valuable data in Himalayan region. And this kind of field measurement data is essential for validating recent mainstream of remotely sensed glacier study in Himalaya. Although discussion part of this manuscript might be short and weak, I strongly hope for publishing this valuable field based study after revising manuscript.

I recommend to evaluate spatial distribution of surface elevation change using Pleiades and SPOT HRS derived DEMs. It enables several validation of your evaluated result.

C1550

Specific comments

P3344/L10–11: Could you show me the mean and standard deviation of density?

P3344/L12: In Figure 1, the number of stakes looks like 38. If stakes of outside Mera Glacier included, it is 45. Please check it.

P3344/L22: Does the points surface mass balance at outside of Mera Glacier also included in this glacier-wide mass balance calculation?

P3345/L6–8: Mass balance as a function of altitude with regression line in Pokalde Glacier should be also shown like Mera Glacier (Figure 3). The figure also enables to judge the uncertainty of mass balance gradient in Pokalde Glacier with narrow elevation range (*P3351/L20–21*).

P3346/L3: How many stakes did you use? Is it careless mistake?

P3346/L4: Please include information about GPS instrument and accuracy in specification. Is the DGPS measurement accuracy ± 0.1 m? (*P3346/L21*)

P3347/L4–P3348/L8: I recommend you to evaluate surface elevation change between Pleiades-1A DEM in 2012 and SPOT5 HRS DEM in 2011? If you evaluate spatial distribution of elevation change, you can validate mass balance gradient and kinematic ice flux combination with elevation change and field measured ice density (*P3344/L10*).

P3347/L18–26: Extent of DGPS track is important information for readers to evaluate reliability of co-registration. Could you include track of DGPS measurement and footprint of SPOT HRS derived DEM and HRG image in Fig.1?

C1551

P3347/L27–P3348/L2: How much RMSE value of the 25 GCPs in triangulation processing?

P3350/L7–8: Does it mean Recco reflector brown away?

P3351/L3–7: Figure about spatial distribution of mass balance make easy to understand the relation between aspect and mass balance. Could you make new figure about it?

P3351/L19: Although, you mentioned drier climate makes mass-balance gradient large, Is is inverse? I think mass-balance gradient tend to small in drier region.

P3354/L8–12: Could you show me the area in figure. This is critical information for evaluating reliability of ice flux in eq.(3).

P3354/L25–26: Accumulation area used to calculation of eq.(3) might be helpful for judging reason of the bias. And surface elevation from remote sensing DEMs would also helpful for validating this result.

P3354/L27–P3355/L4: This sentence is difficult to understand. I might misunderstand it. Does it mean that relatively large ablation made ice flux large in last one or two decades, and then recent small ablation make ice flux small (although it has time lag due to response time)? However, if we consider recent negative trend of glacier-wide mass balance, glacier thickness was larger than now in last one or two decades. It means glacier flow was higher in last one or two decades.

P3355/L23: It is difficult to say it from only one data (Nov. 08 – Apr. 09). The assertion should be weakened. (ex. append phrase like a "further observations are necessary to confirm it")

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P3357/L6–7: Did you mention it is due to small area right?

P3357/L21–23: The reason of bias has not yet clarified. You should weaken the assertion.

P3367/Table 2: To evaluate uncertainty of mass balance gradient in Pokalde Glacier, additional information is necessary (the standard deviation calculated from 2 data is nonsense). As I noted previously, please make figure about mass balance as a function of altitude with regression line in Pokalde Glacier.

P3372/Figure 3: The particular one point (noted in P3351/L7–9) is indistinctness. If you add spatial distribution of mass balance as my previous comment, it is not necessary to color.

Technical corrections

P3369/Figure 1: Label text of coordinates, contour line of Pokalde Glacier are too small. Label of Namche Bazar is hidden by subset image of Pokalde Glacier. There are several stake outside of Mera Glacier.

Interactive comment on The Cryosphere Discuss., 7, 3337, 2013.

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