

Interactive comment on “Orientation dependent glacial changes at the Tibetan Plateau derived from 2003–2009 ICESat laser altimetry” by V. H. Phan et al.

Anonymous Referee #1

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Title: Orientation dependent glacial changes at the Tibetan Plateau derived from 2003 - 2009 ICESat laser altimetry

General comments:

In this study, the terrain slope and roughness are considered while comparing the elevation differences between ICESat and SRTM DEM. The glacial elevation changes are estimated for 15 different scenarios. Some methods and conclusions from this study are useful for examining the glacial elevation changes across the Tibetan Plateau. This study needs to improve combining the comments below and comments from Discussion online.

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1. What is the TP boundary used in this study (Figure 5)? Some important regions, especially in the Himalayas, is not included.
2. The authors need explain clearly how they convert the datum from ICESat and SRTM consistently.
3. The co-registration between ICESat and SRTM DEM is conducted before comparing between them? [Nuth and Kääb, 2011]
4. The GLIMS glacier outlines have spatial displacement. If you overlap GLIMS glacier outlines with Landsat images, it is obvious. This is important for this study. This offset could result in large error for estimating of glacier elevation changes.
5. The elevation differences derived from ICESat data in winter (February-March) and autumn (October-November) should be separated to examine their trends.
6. Also add comparison with field measurements of mass balance from [Yao et al., 2012] in regions A-H

In addition, some important comments from Andreas Kääb available at <http://www.the-cryosphere-discuss.net/8/2425/2014/tcd-8-2425-2014-discussion.html> also need response and incorporate in revisions.

Specific comments:

P1, L5, change "Tibetan Plateau" to "Tibetan Plateau (TP)" and use TP thereafter

P1, L1, Title: "...on the Tibetan Plateau derived from ICESat laser altimetry (2003-2009)"

P2, L5-6, The TP and surroundings, same with study area of this study, contain glacier area of ~100,000 km² [Gardner et al., 2013; Yao et al., 2012].

P2, L7, except for Karakoram region [Gardelle et al., 2012]

P2, L31, "footprint diameter of 70 m", add an important reference from [Zwally et al.,

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2002] here

P3, L21, "on the whole Tibetan Plateau" to "across the TP"

P3, L25-26, "water level" to "water level, volume and area" [Song et al., 2013; Zhang et al., 2013; Zhang et al., 2014]

P4, L6, "at" to "on"

P4, L19-20, "~5 m in horizontal and ~10 cm in vertical for slopes below 1 degree" add peer reviewed paper here

Table 1 could be removed.

Table 5, "Phan et al" to "this study", and "Neckel et al" to "Neckel et al, 2014"

Figure 2 could be removed.

Figure 3 caption "An example showing that. . ."

References

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