Answers to Reviewer 1 (second iteration):

First of all, we want to thank the reviewer for the positive feedback and constructive comments on our manuscript. All comments have been taken into account and a list of answers and undertaken actions is given below. Answers are marked in "blue".

Comments by Reviewer 1:

I would like to thank the authors for addressing all of my comments, especially the quantitative validation of the derived TanDEM-X DEM mosaics.
I recommend the manuscript for publication pending some points below, as well as a final proofread on typos which I leave up to the authors.

Sorry for the issues. A spell and grammar check was carried out before resubmission.

Main manuscript
L 179 ff Please quantify the agreement of the TanDEM-X DEM mosaics with the independent reference data. Consider providing mean and standard deviation of the residuals between TanDEM-X DEM mosaics and IceBridge and REMA elevations.

According to the reviewer's suggestion, we added the respective values: "TanDEM-X to Operation IceBridge: mean offset of 0.12 m/a, RMSD of 0.34 m/a; TanDEM-X to REMA for 2013 and 2017: mean offset -0.47 m/a and RMSD of 3.11 m/a"

L 183 ff From my point of view, neither Figure S4 nor Figure S5 clearly support the assumption that the penetration bias increases linearly between 1800 and 2400 m a.s.l.. Please clearly point out that this assumption is a rough simplification, with reference to the current literature.

We agree with the reviewer and changed the wording to: "In order to correct for these potential offsets, we applied a simple correction approach, assuming a linear increasing penetration correction of dh for the elevation range from 1800 – 2400 m a.s.l. of up to 2 m, similar…."

Supplement
1. Please discuss the spread in Figure S2.

On page 2 of the supplement, the difference between the TanDEM-X and IceBridge data, leading to the spread in Figure S2 is described:
"In particular the offsets in *dh/dt* in the upper reaches of Leppard and Attlee Glacier lead to the strongly negative offsets (see Figure S1 and S2) and increased RMSD value. These areas of the AP plateau receive higher accumulation rates than the low-lying areas on the east coast (e.g. van Wessem et al., 2015). Subsequently, surface elevations can vary strongly on inter-annual but also sub-annual scales, depending on the accumulation rates and timing of data acquisition. On the other hand differences in the SAR signal penetration between the TanDEM-X acquisitions in 2013 and 2017 can also lead to such offsets.."

2. In Figure S4, the elevation differences between the TanDEM-X DEM mosaics and the REMA DEM show a slight increase at higher elevations for 2017, but not for 2013. Thus, this graph does not sufficiently support the assumption of a linearly increasing penetration bias at higher elevations for the study area.

The reviewer is right. However, we did not use Figure S4 to justify the penetration bias correction. As stated in the supplement, it just "…. supports our assumption of a potential SAR signal penetration offset between both acquisitions for elevated regions. (Note: The offsets are measured at

different locations and thus SAR signal penetration offset between our TanDEM-X coverage in 2013 and 2017 can not be derived from this data, since the SAR signal penetration can vary strongly on spatial scales, e.g. due to different accumulation rates or melt rates)…. “
Moreover, we adjusted the wording in the main manuscript, to more clearly state that our correction is a simplification and just an approach (see answer to comment above).