

## Reply to reviewer#2, Mauri Pelto

Berthier et al (2017) provide a detailed update of the mass balance record of two large icefields in southeast Alaska and an updated method of determination. The geodetic mass balance based on ASTER images is a significant improvement over previous combined analysis use ASTER and SRTM. Particularly on the Juneau Icefield the record is validated against both field mass balance observations and laser altimetry. The results is a robust record. The paper also provides a detailed review of how the SRTM data proved unreliable due to variable C-band penetration of snow and firn. This is an important and concise update in approach that should be used to reassess other geodetic mass balance records that used best practices at the time, but may have this same correctable bias.

Specific Comments: The two different line numbers result from two different line numbering versions of the paper. Not sure which the authors will utilize.

40 or 45: Indicate that Lemon Creek Glacier is a WGMS reference glacier. Also separately note that the record to reflect that the Lemon Creek Glacier record from 2000-2016 is -0.56 m w.e. a-1 (WGMS, 2017).

**Reply: We now indicate in the introduction that Lemon Creek is a WGMS reference glacier. The 2000-2016 mass balance of this glacier is also compared to our ASTER-based estimates at the end of the Results section.**

65: Field observations of the ELA and mass balance do not support a slow down.

**Reply: Statement added in the introduction. "Field observations of the equilibrium line altitude and mass balance do not support a slow down (WGMS, 2017)."**

108 or 118: Taku Glacier (southern outlet of JIF)"

**Reply: text corrected.**

110 or 120: Should be reported that the most extensive thinning of the lower reach of JI glaciers is associated with lacustrine calving retreats on Field, Gilkey, Llewellyn, Meade, Mendenhall, and Tulsequah glacier (Pelto, 2017), which also notes that every outlet glacier retreated significantly except Taku Glacier. This supports the line 48 statement as well. On Stikine Icefield lacustrine and tidewater calving retreat during the study period occurred on Baird, Dawes, Great, Sawyer, South Sawyer, Speel and Wright Glacier.

**Reply: We believe that this is beyond the scope of the paper. Our goal is not to compare and try to explain the variability in individual glacier mass balances. Together with the reference noted by the reviewer, the issue has been addressed in detail in Larsen et al., GRL, 2015. The text is thus unaltered.**

146 or 156: Any thoughts on why the difference? This is in the terminus region for many glaciers including lake formation zone.

**Reply: We have no straightforward explanation for these differences. No such difference is observed for the terminus area of the Stikine icefield. We further note that the fraction of the glacier area covered by these terminus regions are rather small so that they do not count much in the overall mass budget. However, we reckon that they are important for process understanding.**

181 or 195: Separately note that the mass balance of Taku Glacier from 2000-2016 is -0.08 m w.e. a-1 (WGMS, 2017).

**Reply: Text has been modified to include the 2000-2016 Taku mass balance.**

Consider the value of citing Pelto et al (2008) pointed out the mass balance transition. "Surface mass balance was positive from 1946-1988  $+0.42 \text{ m a}^{-1}$ . This led to glacier thickening. From 1988-2006 an important change has occurred and annual balance has been  $-0.14 \text{ m a}^{-1}$ , and the glacier thickness has ceased increasing along Profile IV."

**Reply: This reference was added in the introduction.** *"This statement is also valid for Taku Glacier, for which the mass balance was positive ( $+0.42 \text{ m w.e. a}^{-1}$ ) from 1946-1988 and negative ( $-0.14 \text{ m w.e. a}^{-1}$ ) during 1988-2006 (Pelto et al., 2008)."*

Table 1: Should add column for the field observed mass balance for Taku Glacier and Lemon Creek Glacier.

**Reply: As glaciological mass balance are available for only two of the compared glaciers we prefer to mention them in the discussion text, not in the table.**

242 or 264: The linear correction used by Larsen et al (2007) would depend on the season of comparison.

**Reply: We are unsure what the referee means here. Our text is thus currently unaltered.**

249 or 271: remove "is linked to the"

**Reply: Removed. Thanks for spotting this.**

254 or 276: Winter balance observations on Taku Glacier support this seasonal amplitude.

**Reply: We modified the text, stating:** *"Assuming a seasonal amplitude as large as 10 m (a value in agreement with field measurements of the Juneau Icefield Mass Balance Program, Pelto et al., 2013), the slope of the regression"*

262 or 286: which is in agreement with the altimetry and field based assessments on a smaller sample of these glaciers.

**Reply: Statement added in the first sentence of the introduction.**

275 or 301: Is it worth elaborating for one sentence on the Tandem X issues? Also are the issues much reduced in summer for Tandem X?

**Reply: We simply added "**, *except if water is present in the snow and firn upper layers at the time of acquisition of the radar images"*