The imbalance of glaciers after disintegration of Larsen B ice shelf, Antarctic Peninsula

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Supplementary Information

1. Cross section at gate of Crane Glacier

The figure shows the topography of the glacier base for cross section C1 of Crane Glacier which was used to compute the mass fluxes. The basis for retrieving this cross section is explained in the main manuscript.

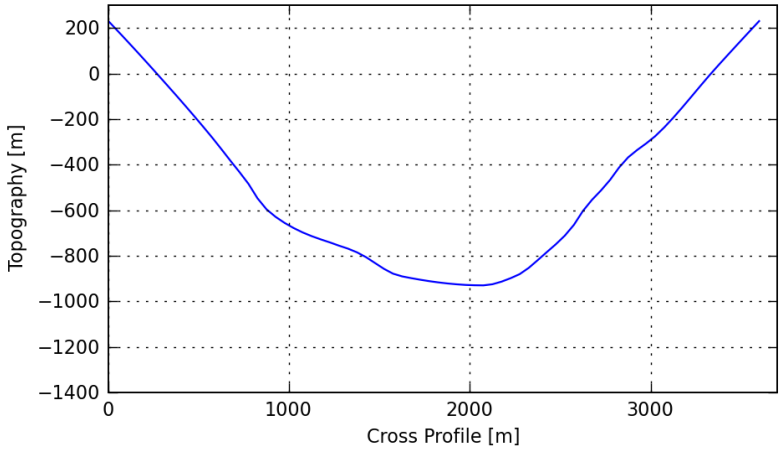

Figure S1. Bottom topography at Crane Glacier cross section C1.

2. Data on geometry of cross section of individual glaciers and estimated specific net balance

Table S1. Geometry of the flux gates and estimated specific net balance (b_n) for the Larsen B glaciers. For all glaciers (except Crane Glacier) a trapezoidal shape of the glacier is assumed. Length refers to the distance of the gate across the glaciers surface in 1995 and 1999. Slope is the angle of the slope of the glacier base orographically left (L) and right (R). For estimating the slope angle the cross-glacier velocity gradient from the 1995 and 1999 InSAR analysis was taken into account. The slope angle of Crane Glacier refers to the upper slope section (Fig. S1). H_c is the height of the cross section base (glacier thickness). “f” means the glacier is floating in the central part of the cross section.

Gate	Length (m)	Slope L/R (deg.)	H_c 95/99	b_n 95/99 kg m^{-2} a^{-1}	H_c 2008
H1	5620	15	490	1087	268 f
G1	6530	15	490	1087	268 f
E1	5590	10, 10	380	671	268 f
E2	8310	10, 10	350	671	268 f
PU1	3620	30, 20	640	569	625
J1	2580	30, 25	670	1087	496 f
J2	2530	35, 30	620	732	595
C1	3620	42.6, 40.5	1160	1087	764 f
MA1	2710	45, 45	950	371	945
ME1	2250	45, 45	950	347	930
PE1	2560	45, 35	900	350	880

3. Differences in retrieved mass fluxes versus the discussion papers

The numbers of the mass fluxes in the revised version of the manuscript differ from the numbers in the original paper. Reasons are on one hand new data used for the analysis, on the other hand suggestions of the reviewers to reconsider the spatial gradient of accumulation rate. The revised data base and the assumptions for inferring accumulation rates are described in the manuscript. Here the main changes versus the previous version are summarized:

- Basal topography at cross section at gate C1 of Crane Glacier. Previously we used an estimate based on ice sounding data from 2002. Ice sounding data from 2009 and 2010 campaigns question the reliability or representativeness of the derived 2002 ice depths. Therefore we decided to use the bathymetric data measured in the Crane fjord to estimate the cross section (Fig. S1). This results in 5% increase of the 1995/99 flux. Because of the larger depth in the centre of the profile the glacier it became clear that the central part of C1 was floating in 2008, resulting in reduced cross section area and 10% decrease of the flux compared to the previous estimate.
- For the glaciers not originating at the central ice divide the net balance, b_n, was previously assumed to be 20% lower than for Crane Glacier, accounting for the west - east decrease in snowfall. In the revised version we take into account the area altitude distribution for three glaciers connected with the central ice plateau, but not originating at the ice divide (Punchbowl, Jorum main and Jorum north). These glaciers cover together 14% of the total glacier area. For the three glaciers which are separated from the main plateau through a deep trench (Mapple, Melville, Pequod) b_n is inferred from the 1995/99 flux through the frontal gate. The shape of the gate is replicated assuming similar geometry as the frontal cross section at Crane Glacier.
- For Evans Glacier, which until 2007 was connected with Hektoria Glacier, ICESat surface elevation data, acquired along the gate E1 in November 2008, became

available. These data show that the lower glacier terminus had thinned considerably and was floating. We assume similar thickness for Hectoria-Green glaciers. This revised ice thickness results in a 2008 ice discharge for Hectoria, Green and Evans glaciers that is 22% lower than the previous value. For Jorum Glacier an ICESat profile was measured in October 2008 very close to the calving front, pointing out that also the frontal section of this glacier was floating. The revised 2008 ice discharge is 6.5% lower than the previous estimate.