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Interactive comment on "A data set of world-wide glacier length fluctuations" *by* P. W. Leclercq et al.

Anonymous Referee #1

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The useful dataset is the result of a respectable compilation using the WGMS database as the backbone and a lot of individual glacier histories. The worldwide distributed 471 glacier records (from 1535 (!) until 2011) are segregated in 15 regions with a global coverage (exceptionCanadian Arctic). By far the biggest number (92) is coming from Central Europe (region 9) especially the Alps. Here and in the Southern Andes (55) we have the longest historic records, due to the big number of historical material. Fig.1 (p.4801) gives a good visual overview of 20 glacier length records from different parts oft the world. For the Hintereisferner (annotation 9) the literature is missing (could it be NICOLUSSI et al:?). Since a long time for the Austrian Alps it would be desirable to have more detailed individual glacier histories in the time before 1900 (LIA time 17th. to 19th. century). There are some excellent papers (e.g. PATZELT, NICOLUSSI) but

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figures of glacier length records are mostly missing. This is of course a general remark and has nothing to do with this paper.

The original goal of the data set was the reconstruction of climate, later the question of the glacier contribution to sea-level rise was added which needed the addition of length records of tidewater- (85) and calving-glaciers (19) in fresh water what was surely a good idea. But it is not clear that with this addition of chosen glaciers the sea-level rise can be estimated in a really representative way.

There are some interesting results mostly for the 20th century and beside of the general retreat in this time: On average, calving glaciers have had a much larger absolute retreat than the land terminating glaciers in the data set. However, the relative retreat of calving and non-calving glaciers has been very similar (at least after 1860 with a larger number in the data set). The Antarctica and Greenland regions differ from the global pattern. The calving glaciers in Greenland have on average nearly the same amount of length change as the land terminating glaciers. The relative length change of calving glaciers in Greenland is smaller than the relative length change of land terminating glaciers.

The response of a glacier to changes in climate depends on its climatic setting, the glacier geometry, in which the surface slope ist the most important factor, steep glaciers are less sensitive to climate change than gently sloping glaciers. Ice streams situated in a wet temperate climate are more sensitive to climatic change than glaciers in a more continental climate (e.g.Franz Josef glacier in New Zealand, a very sensitive glacier due to its maritime climate and geometry (ANDERSON et al 2008)).

The supplementary documentation starts with a very welcome updating of new length fluctuations of 13 glaciers in Novaya Zemlya until 2011 designed in majority by satellite images (Fig.S1).

In the extensive supplementary Table (S2), which as a whole gives a good overview, to a lot of glaciers there are often mentioned important literature, a good help for more

TCD
7, C2528–C2530, 2013

interested readers. But there are also some important missings e.g. just to mention two:

p.(S)12 Gorner Glacier: HOLZHAUSER, H. 2010: Zur Geschichte des Gornergletschers. Ein Puzzle aus historischen Dokumenten und fossilen Hölzern aus dem Gletschervorfeld. Geographica Bernensia G84 Bern. 253p.

P.(S)12 Grosser Aletschglacier: HOLZHAUSER, H. 1984: Zur Geschichte der Aletschgletscher und des Fiescherglетschers. Physische Geographie, 13. Zürich. 448p. For these glaciers the two titels are THE ultimative publications.

I can only support Leclercq and his team when they are finally writing (p.4791): "the climatic reconstructions based on glaciers would benefit from more long-term and detailed length records, especially from regions outside of Europe and South America."

Interactive comment on The Cryosphere Discuss., 7, 4775, 2013.