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Interactive comment on "A Two-Station Seismic Method to Localize Glacier Calving" *by* M. J. Mei et al.

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This paper presents a method for detecting and locating calving events using local seismic observations. Localization of calving events has been challenging due to the emergent nature of seismograms produced by calving icebergs. Therefore I think that this paper will be an important contribution to the growing field of glacier seismology.

For the most part the paper is clearly written and easy to follow. However I do have some questions regarding the calculation of the time delay and the limitations of the method, and in some cases I think the paper could be expanded to address glaciological questions in more detail.

- When you attempted to cross-correlate the seismograms, did you use the entire seismogram (e.g., similar to what is shown in Figure 2) or just some subset of the seismo-

gram? If the former, one issue that might cause problems is that calving events often involve the detachment of multiple icebergs. I would guess that the calving events shown in Figure 2 involved 2–3 icebergs. If the latter, how did you determine what subset to pick? Also perhaps show what section of data you are using, or refer to Figure 12 when describing the section of data that you used. Its not clear exactly what data you are using.

- I understand that cross-correlating the seismograms did not give satisfactory results for the calculating the time delay. Did you also consider cross-correlating the envelope of the waveforms? I'm wondering if there is a more robust way of calculating the time constant that doesn't rely on an empirical constant.

- This studied focused on large, full-thickness calving events that occur on weekly timescales. These are events that, at least for focused studies on individual glaciers, can often be located using time-lapse or satellite imagery (as stated in the paper). Smaller calving events clearly occur more frequently. Admittedly, these smaller events may be insignificant for the total mass loss from glaciers like Helheim and Jakobshavn, but understanding the variability of these smaller events may provide insights into processes driving calving. If you decrease the STA/LTA threshold, can you detect and locate more events? If so, what sort of patterns emerge?

- Another way to expand the applicability of this method is to show that it works for regional seismic data. Full-thickness calving events at Jakobshavn Isbrae are detectable at ILULI (50 km away), SFJD (250 km away) and sometimes SUMG (400? km away), even when the calving events don't generate classic "glacial earthquakes". Have you tried incorporating regional seismic data into your method? Can a regional seismic network such as GLISN be used to detect and locate large calving events around Greenland (besides those that generate glacial earthquakes) using your methodology?

A few more minor questions:

- The authors state that calving at Helheim preferentially occurs on the north side of the

glacier. Is this where the glacier is thickest/fastest? Is this statement really just saying that full-thickness calving events only occur in that region?

- What is the date on the googleearth imagery used in the figures? Perhaps it makes sense to use newer imagery that was captured closer to the time of study (e.g., from Landsat 8)?

- I would guess that two or three icebergs calved during the events that appear in Fig. 2. What happens if you analyze each of the peaks in seismicity separately? Do you see calving propagating upglacier or across the glacier face?

- page 9, equation for radius of a circular fault: the equation contains \beta_0, but the text describing the variables only refers to \beta. Should these be the same thing?

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