

Interactive comment on “Seasonal variations of glacier dynamics at Kronebreen, Svalbard revealed by calving related seismicity” by A. Köhler et al.

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This study introduces the method self-organizing maps (SOM) as an automated way to classify seismic events detected near a calving front. I believe this is the first use of SOM as a tool in glaciology, and the method shows great promise for future studies, and could/should also be applied to existing data sets to allow a direct comparison of the method and results in different glaciological environments.

I think that icequake seismologists would benefit from an additional section in this paper, namely a description and interpretation of the direct observations. The A discussion of the nominal size, style and character of calving at Kronebreen would substan-

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tially help to place the interpretation of glacier dynamics into context of existing work (e.g. Columbia Glacier, Bering Glacier, Icy Bay, Greenland etc : Walter, Amundson, West, O’Neel, Stuart, Qamar, Wolf and Davies). A figure summarizing the observational record, and showing the relationship between seismicity and observations is essential. Similarly, a description of the waveforms associated with calving (duration, impulsiveness, freq. content, presence of phases etc) should come before the description of classification. A discussion of how these signals compare to other papers that have used seismicity as a tool to monitor calving is also needed.

In agreement with Jason’s review I would appreciate better connections between this work and existing literature. Some of the references in this paper are can be elucidated much better using other papers. Missing references that should be included – O’Neel et al., 2010; Walter et al, 2010; Amundson and Truffer 2010

Minor comments: Title: Add hyphen between calving and related.

p.3293 L9 – reference to Ahn and Box w re to calving is strange as their work is focused on detecting changes in velocity. While time-lapse imagery may reveal changes in front position associated with flow or a calving event or series of events between photographs (which may be separated by hours of darkness), the technique is not generally suitable for analysis of individual events. p.3295 L4: Specify the response of the sensor – what is the peak frequency? p.3305 Section 5.4 should precede 5.3 as it defines the assumptions used to construct the time series in 5.3. p.3306 L15: What is a large event at Kronebreen? See the larger comments above. p.3306 L25 dataset should be plural p.3307. What happens in between the measurement periods? Does the terminus re-advance? Are the relative position reference lines the same for both years? p.3307-08. Why are the years so different? p.3308 L20-25. The claim that there are first and lower order controls on calving has been made by several authors (reviewed by Benn). Can you frame your results more in context of the existing literature, especially the O’Neel and others 2010 paper that analyses a 2 year dataset similar to this one. p.3310 L4: Reference to a in prep paper on such a large statement

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seems inappropriate. There are existing references that should be included here.

Interactive comment on The Cryosphere Discuss., 5, 3291, 2011.