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Solid Earth
Discussions

Interactive comment on "Quantification of magma ascent rate through rockfall monitoring at the growing/collapsing lava dome of Volcán de Colima, Mexico" *by* S. B. Mueller et al.

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I have read this interesting, well written, and well organized paper with great pleasure. The manuscript tackles the interesting problem of assessing mass wasting phenomena - in this specific instance small scale rockfall events - at lava dome volcanoes. The techniques employed by the authors - Photographic and Thermal Imaging, and Seismic Monitoring - are well established. The present study, however, makes a rather original use of these methods and thus clearly deserves publication. The results and some of the practical implementation presented in this manuscript are only relevant to Volcan de Colima. However, as discussed by the authors this type of study could be extended

with relatively minor efforts to other lava dome volcanoes.

In summary, I would suggest manuscript publication after very minor revision. COMMENTS.

SPECIFIC/COMMENTS:

My major specific comments are about seismic data analyses.

1. How have seismic data been analysed? It would be nice if details of seismic data processing were provided in one place. For instance, what type of filtering is applied to the data and why. Why seismic units are "seismic network counts" rather than m, m/s, or m/s**2? This is trivial data processing but it would help comparison with other volcanoes.

2. The issue of saturation of the seismic signal (short-period, 16-bit stations) for larger events should be discussed as most of the methods discussed in this paper could not be applied if seismic signals become "clipped".

3. Was any attempt made to calibrate the seismic energy based methods using different seismic stations? This would be a nice addendum to the paper, and relatively quick to perform. It would be interesting if it could be verified that relations similar to those found for EZV4 hold true at other stations.

Calibrating the method for use with other seismic stations is crucial as the authors propose the technique as a monitoring tool. It would be appropriate, before stating the good potential of the technique as a monitoring tool, to assess such potential in all respects.

Please, be aware that calibrating the method for other seismic stations requires:

- Considering site amplification (e.g. using spectral ratio of coda of regional earthquakes) - Considering path effects (distance/frequency dependent signal attenuation)

4. It would be nice to see one of the signals that have are not used because coinci-

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dent with explosive events. Is there anything that can be done to "deconstruct" these

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waveforms to separate the explosion part (likely a VLP signal) from the mass wasting phenomena (likely in the 3-9 Hz band)?

MINOR COMMENTS/EDITS:

- Some of the references in the text are not exact. E.G. Ryan, 2010 should be Ryan et al., 2010. There are a few others in the text. Please, revise and fix.

- Abstract. Remove the bit about hazard management. Not really relevant here. The results in this paper do not provide an actual, immediate, tool for immediate hazard assessment and (risk) management.

- page 4, lines 18-19. Is this relevant to the paper?

- page 4, line 23. What are small aspect ratio bodies? Wide and relatively flat? Explain further.

- page 5, lines 28-29. Rephrase. The word "dome" used 5 times in the same sentence.

- page 6, line 6. The equations cited do not seem to exist.

- page 12, line 2. Give details of sharpening and/or other digital imaging processing procedure. This seems necessary as the authors state that sharpening allows resolving details down to 20 cm ("blocks larger than 20 cm"). From the text seems that sharpening is necessary. If this is the case, it should be explained how it was performed.

- page 18, lines 23-26. Why does the frequency domain representation of the seismic signal allow precise determination of the rockfall duration? Rockfalls are pretty obvious in the time domain too, and they some of the easiest signals to identify from visual inspection.

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Interactive comment on Solid Earth Discuss., 5, 1, 2013.