Solid Earth Discuss., 5, C4–C7, 2013
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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.

Anonymous Referee #1

Received and published: 12 February 2013

This an interesting and well written paper. The use of thermal imagery, calibrated by photographic data, is a good way to evaluate a method used on several other volcanoes - the estimation of effusion rate from rockfall counts or energy. This paper is very specific to part of a particular dome but it proves the relationship better than I have seen elsewhere and validates to a large extent assumptions made in more general circumstances.

There is no mention of the affect of weather on rockfall activity. It is intuitive that the stability of the dome will be influenced by very heavy rain and observations support this at Montserrat. I don't think this need affect the validity of this work but it would be

interesting if the authors addressed the issue. Was any weather data collected? Was there anecdotal evidence of increased rockfall numbers during tropical storms? Should rockfall numbers from these times be excluded from statistics or is the assumption that they would have happened anyway over the next few days?

Taron, J, Elsworth, D, Thompson, G, and Voight, B. 2007. Mechanisms for rainfall-concurrent lava dome collapses at Soufrière Hills Volcano, 2000-2002. Journal of Volcanology and Geothermal Research, Vol. 160, 195-209.

Matthews, A J, Barclay, J, and Johnstone, J E. 2009. The fast response of volcano-seismic activity to intense precipitation: Triggering of primary volcanic activity by rainfall at Soufrière Hills Volcano, Montserrat. Journal of Volcanology and Geothermal Research, Vol. 184, 405-415.

In section 5.3 it would be interesting to discuss the possibility of using the rockfall signals that coincide with eruptive events. This would increase the number of usable events and might be possible using a filter if the seismicity associated with the eruptive behaviour is long period, as suggested on page 18. If all the rockfall signals were filtered similarly then the ratio found between E' and V may well be preserved. If not it would be interesting to know. This would be a better method than the duration relation, if it worked.

Luckett, R, Baptie, B, and Neuberg, J. 2002. The relationship between degassing and rockfall signals at Soufrière Hills Volcano, Montserrat. Geological Society, London, Memoirs, Vol. 21, 595-602.

In section 5.3 or elsewhere the problem of saturation should be explicitly discussed. Energy estimations are going to be next to useless for the most significant events if these become large. Perhaps could use the nearest broadband instrument or install better telemetry at EZV4? The dependence upon a single station could also be a problem if this is proposed as a monitoring tool. Could briefly mention the possibility of calibrating other stations retrospectively using data from EZV4 if this station was down.

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Equation numbers are not correct. Equation numbers in the text have no corresponding equations while those equations shown have numbers that are not referred to anywhere.

References to Varley et al 2010 need to say whether they are to 2010a or 2010b.

Should be a reference to a paper describing the RESCO network.

4:1 Rose > Rose and Pattern

4:8 Ryan > Ryan et al

4:11 Smith > Smith et al

4:23 Not sure what small aspect ratio means - perhaps better to describe shape that is meant.

5:21 no need for though

5:23 no need for itself

6:1 no be

6:10 perhaps state more clearly that there is a continuum between rockfalls and density currents

7:2 Hort et al 2006 not 2005

10:3 Shearer, 2009 missing

10:11 Arambula > Arumbula-Mendoza

10:22 Hutchinson et al 2013 not 2012

11:12 of > from

13:17 not sure what hr is doing there

14:27 looks from the numbers as if C1 is masked by ash from lower down but C2 isn't.

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17:5 no need for represent

Calder et al 1999 not in text Cortes et al 2010 not in text Marquez et al 1999 not in text Saucedo et al 2010 not in text

Figure 5 would be more useful if zoomed into top of dome.

Figure 6 Cut off temperature should be temperature difference.

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