

Interactive comment on “Impact vesiculation – a new trigger for volcanic bubble growth and degassing” by D. A. Rothery et al.

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Received and published: 3 January 2008

We thank the referees for their time. The function of our short paper is to draw attention to impact vesiculation as a credible phenomenon, which hitherto seems not to have been thought of. The post-doc who did most of the work has moved on to other things, and indeed funding ran out before the paper was completed, so we do not have the resource to undertake follow-up SEM studies or analysis of water content in rind and interior of the Stromboli bomb.

Here are some responses to specific points:

Anonymous referee:

The referee says that we underestimate the pressure changes needed for nucleation. However we have not, as claimed, misquoted Hurwitz and Novon (1994): in the 2nd

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paragraph of their abstract they report (in the presence of microlites) "modest nucleation was observed even after decompression by <1 MPa"

Experimental details (noted by Sahagian also), timings can be clarified as follows: if we held the 900 degree C samples at this temperature it took several minutes before they began to foam, and this process took a matter of several seconds. Removal of the furnace from around our samples in order to subject them to impact was done as quickly as possible, which took about 3 seconds.

The size of Figure 2: We agree that at natural printed size the bubbles in c and d are very small, but as this is published online it is possible for the reader to enlarge it whereupon the bubbles are seen very clearly.

Missing reference (oops!): Rittmann, A.: Der Ausbruch des Stromboli am 11 september 1930. Zeitschrift für Vulkanologie, 14, 47-77, 1931.

D. Sahagian:

This referee comments "magma is always decompressed first and THEN impacted." Not so! The 2nd paragraph of our section 2 suggests a mechanism for decompression when a rinded bomb hits the ground.

Lack of scale bars on figures 2 and 3. The scale is stated in their captions.

The presence of large bubbles only in the rind of the Stromboli bomb. Contrary to what the referee says, we DO treat this in the text (3rd paragraph of section 4). We are not necessarily convinced by our explanation, but that is not crucial to the occurrence of impact vesiculation.

If we were to submit a revised version we would address several of the above points and also split and rearrange the cumbersome final sentence of the abstract thus: Degassing caused by impact vesiculation can occur only at ground-level. Thus, where significant impact vesiculation has occurred, calculating the amount of erupted gas available for transport high into the atmosphere (through convection above the source

of a fountain-fed lava flow) by subtracting the volatile content of fluid inclusions from the volatile content of the resulting lava flow would be an overestimate.

However, "a SERIES of experiments" is singular, and so takes a singular verb (to agree with "series" rather than "experiments"), so we would make no change to the grammar there.

Interactive comment on eEarth Discuss., 2, 151, 2007.

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