

Interactive comment on “On the link between Earth tides and volcanic degassing” by Florian Dinger et al.

Nolwenn Le Gall (Referee)

n.gall@ucl.ac.uk

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In this paper, the authors present a model quantifying the impact of Earth tides on volcanic gas emissions, by enhancing bubble coalescence. This model has the merit of being the first of its kind. The paper is well written and the model clearly exposed, although I have made some comments and minor technical corrections, see below.

General comments: (1) While clearly exposed in the text and in Appendix A, the major simplifications of the model make its applicability questionable. (2) It would be good to add a figure on the flux of volcanic gas emissions and its variation regarding tidal pattern, as well as to give some numbers (eg measured volcanic gas ratios) in the text. This would better illustrate the periodic tidal impact on volcanic degassing, which is at

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the core of this paper.

Specific comments: (1) The locations of the two volcanoes chosen to illustrate the model could be added in the text for information, lines 23-24 p.3. (2) Why using the solubility model of Liu et al. (2005) determined for rhyolitic melts, as your model deals with basaltic and andesitic compositions (eg Table 1)? Similarly, why introducing a comparison with a rhyolitic composition (lines 9-10 p.10)? (3) Is there any order of magnitude that could be given for magma displacement, line 20 p.7? (4) Lines 22-23 and 30 p.8. In natural magmas, bubble sizes can also follow exponential and mixed exponential–power law distributions. I would tend to suggest that in the case of your model, considering equilibrium degassing and the importance of bubble coalescence, the best estimate of the bubble size distribution may not be a power law (eg Le Gall and Pichavant, 2016, JVGR). (5) Line 6 p.9. Diffusion-driven volatile degassing could also take place in contact with the host rock. The volatiles could be lost from the magmatic melt by diffusion.

Technical corrections: (1) Delete vapour line 10 p.8, as you are talking about the melt phase (with dissolved volatiles) and not the gas phase. (2) You could also delete the word vapour line 12 p.8. (3) Line 5 p.10, the brackets can be deleted.

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