Solid Earth Discuss.,
https://doi.org/10.5194/se-2019-14-RC1, 2019

Solid Earth
Discussions

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

Anonymous Referee #1

Received and published: 11 March 2019

I revised the manuscript "On the link between Earth tides and volcanic degassing" by Dinger et al., submitted to Solid Earth (EGU).

This is an interesting paper. The manuscript reports a model of a simplified magmatic system response to tidal stresses. The model provides evidences that the effects of periodical signals (i.e., tidal forces) may enhance bubble coalescence in the magma thus explaining periodical changes in volcanic gas emissions.

The paper is clear, well written and right to the point. The subject is of general interest and, as far as I am aware, no significant portions of the manuscript have been published elsewhere.

The manuscript needs minor revisions before publication. Specifically, I have the fol-

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Discussion paper

lowing main area of concern with the manuscript:

General comments Assumptions of the model: There is ample evidence that the transition from an explosive eruption regime to an effusive regime can be due to magma losing gas to fractured country rock during storage and/or ascent towards the surface. As a consequence, the gas volume fraction exhibits complex variations with height and with horizontal distance from the walls, which is not compatible with closed system degassing. I believe that the here proposed model tacitly assumes that 1) tidal stresses do not affect the wall-rock permeability and 2) tidally induced gas loss from wall rocks cannot explain the observed periodic variations of volcanic degassing. Maybe, these points should be explicitly discussed (see also Manga et al., 2012 Changes in permeability caused by transient stresses: Field observations, experiments, and mechanisms, Reviews of Geophysics 50 (2)).

- the max. vertical tidal acceleration a0 reported in table 1 has the dimension of a velocity. Any consequences on the reliability of the model? Just a typing error?

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