

***Interactive comment on* “The role of Edge-Driven Convection in the generation of volcanism I: a 2D systematic study” by Antonio Manjón-Cabeza Córdoba and Maxim Ballmer**

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Antonio Manjón-Cabeza Córdoba and Maxim D. Ballmer, authors of the manuscript “The role of Edge-Driven Convection in the generation of volcanism I: a 2D systematic study”, thank the referee Prof. Jeroen van Hunen for his thoughtful comments. All the comments are useful and, upon consideration, have allowed (will allow) us to greatly improve the quality and content of the manuscript.

The main comments by Prof. van Hunen can be grouped in comments regarding the

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Discussion paper



thermal conditions; and comments regarding the structure of continents. In addition, this referee is concerned about the distinction between EDC and SSC.

Regarding the thermal conditions, we believe in the strength of our models and their suitability to study melting due to EDC at least until the generalized cooling that is a concern for Prof. van Hunen happens. We acknowledge, nonetheless, that an extended discussion about the initial conditions and the applicability of the models will improve the paper, as the referee suggests. That is why we add to this in the final version of the manuscript. We decided, however, against the explicit inclusion of increased internal heating in the models. As explained in our paper, our models, albeit simplified, are conservative. Including any additional energy source, being that internal heating or basal heating, produces melting via processes other than EDC, even if EDC causes melting to be focused near the continent-ocean transition.

In terms of the initial depletion profile for the continents (and the related rheological effect), we admit that our choice is rather arbitrary. That is why we have decided to clarify and justify in a more extended manner this part of the methods in the final manuscript. Regarding the potential rheological stabilization, the reviewer is bringing up a very valid point. In order to explore this issue, we have decided to run and analyze additional models with composition-dependent rheology.

Finally, in the new manuscript to be submitted as the final version, we better distinguish between EDC and SSC, since it was not clear in the original manuscript. To briefly summarize this issue: there are two peaks in the root-mean-square of vertical velocity over time; the first one corresponds to EDC and the second corresponds to the onset of full-blown SSC.

In addition to this general reply, a complete and detailed point-by-point final reply to Prof. van Hunen's comments will be submitted along with the final version of the manuscript, presumably in late October or early November.

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