

Interactive comment on “The effect of effective rock viscosity on 2D magmatic porosity waves” by Janik Dohmen et al.

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The authors of the manuscript have used numerical modeling to tackle the question of the rheology of a two-phase magmatic mush. The question they want to answer is fully in the scope of Solid Earth. They built on their previous study on the question (Schmeling et al, 2012) and go further by testing the effects of the viscosity laws they have proposed on the propagation of solitary porosity waves in a 2D setting. They can conclude that even considering "realistic" rheologies, the transport of melt through porosity waves is a likely process in magmatic mushes. They well describe their methods and assumptions and in this framework their results seems sounds. I believe nevertheless that the manuscript could be improved by clarifying some parts and adding more developments (see my listing below).

C1

Line 121. The chosen boundary conditions are neglecting the effect of the propagating wave. I agree that as long as the wave is far from the boundary this effect can be neglected but the question is always “how far is far enough?”. A more developed paragraph on this point would improve the trust of the readers on the model results. Maybe the comment “The upper part of the wave in this example fits very well while the lower part is slightly wider.” (line 228) is related to boundary affects.

Sometimes the author has used the term "phase velocity" and sometimes he has used "wave velocity/velocity of the wave" . This makes the discussion more difficult to follow and should be clarified.

Line 405. It is stated that the effect of the background porosity is different from results of 1D model (Richard et al, 2012): high background porosity inducing narrower waves instead of larger ones. I don't understand this difference and I think that this manuscript would be the right place to investigate this "dimensional" effect.

Lines 415 & 418. Results are discussed in terms of matrix disaggregation threshold. As seen in Schmeling et al. (2012) the disaggregation porosity is strongly model dependent and thus should be used carefully. In the conclusion, I would suggest to give more details on the input parameters and on the actual value of the disaggregation porosity of the cases that are discussed.

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