Thermal non-equilibrium of porous flow in a resting matrix applicable to melt migration: a parametric study

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The authors have made substantial changes to their original submission and the resulting manuscript now presents their work in a much more useful manner. Thank you. I'm still a little confused as to the applicability of the choices of initial and boundary conditions to the Earth but understand that these were likely made to make the analytical solutions tractable and the authors do a good job investigating what effects these decisions make using their numerical models. I only have minor comments and questions.

Non-dimensional Numbers

The non-dimensional parameters controlling the system has now been reduced to Pe, φ and G and only Pe and G in the analytical case. However, models are still presented in terms of H. Even though this is just the reciprocal of G it would be great to use a single labeling system. G and H are also listed in table 1 as dimensional numbers but, I think, only discussed in their non-dimensional form (except maybe when discussing the scale length L). Even though primes are explicitly dropped this might be a little confusing.

Initial & Boundary Conditions

The dependence on G' (or H') really emphasized to me how dependent these solutions are on the initial and boundary conditions selected (I guess most problems are!). Though some discussion has been added to section 2.3 about the need to specify boundary conditions in general, this isn't really the kind of physical justification for this specific problem that I was hoping for. This model imagines an initially stagnant fluid in thermal equilibrium with a solid with a (Cartesian) conductive temperature profile. The fluid then moves and while the upper boundary allows advective outflow of heat in the fluid it maintains a fixed thermal gradient in both the solid and fluid while doing so. (All of this is much more clearly stated in the updated manuscript, thank you.) The analytical model then seeks the maximum thermal disequilibrium, which occurs in the early stages of the evolution of the model and at the top of the domain. I understand that these decisions were made to make the analytical solution possible but if there is a physical scenario in which this is likely then it would be great to discuss it in section 2.3.

The authors demonstrate numerically the effects that different initial and boundary conditions might have in section 5.1.2. This only seems to consider applying the same conditions to both the solid and fluid temperature. Have the authors considered applying different conditions to the two fields? This may make a more physical scenario possible. For example the fluid temperature could use the open boundary condition, mimicking fluid escape, while the solid could use a Robin condition relating the gradient at the top boundary to an imagined crustal conductive profile above the domain depending on the temperature at the top boundary, e.g. $\frac{\partial T}{\partial z} = \frac{T_{surf} - T}{h_{crust}}$. Admittedly this would introduce an extra parameter for the "crust" thickness h_{crust} and the surface temperature T_{surf}.

Time Evolution & Steady State

I appreciated the authors' efforts to clarify the time evolution in the figures by giving some time increments and distinguishing the lines a little. In many cases the total time was listed for all models. Could the authors confirm that in the time evolution figures (e.g. Figure 6) the steady state solution (as opposed to just the solution at an arbitrary final time) is included in all subplots?

Even More Minor Points

There are still quite a few small typos throughout the paper that should be corrected in the editing phase. Below are a few things that caught my eye:

- line 31: "On small scale" → "On a small scale"
- line 67: "or more general" → "or more generally"
- line 113: Perhaps introduce a new paragraph after "Primed quantities are non-dimensional."?
- line 179: is the second statement about resolution only necessary for a few of the numerical cases presented in figure 3?
- equations 21, 22, 23: G appears inconsistently italicized in these three equations (see line 331 also)
- equations 32 & 33: the non-dimensionalized prime is placed inconsistently throughout the variables in these equations, sometimes as a subscript and also as a superscript
- table 1, last line: "reference. respectively" → "reference, respectively"?
- figure 3: could figure S1 be incorporated into figure 3a to avoid having to reference a supplemental figure? Also, while figure 3 is necessary to show the numerical results could it reference figure 4 (and vice versa) as it (I believe) represents slices through the latter?