The birth of a volcano: A nonlinear convective model for rock melting at the asthenosphere—Lithosphere boundary

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Abstract

Understanding the physical processes determining the melting of the lithospheric rocks is of crucial importance for investigate the volcanic dynamics and its related consequences. Rock melting occurs when a sufficiently high temperature is experienced by the rock solidus. The heat transfer from the asthenosphere to the lithosphere can be considered as the main mechanism responsible for the partial rock melting, and initiating magma generation. This heat transfer to the lithosphere is considered to be governed mainly by the convective motion inside the asthenosphere [**Jaupar2011**]. To describe this process from a mathematical perspective, we investigate a generalized of a nonlinear one-dimensional (1D) convective model, which represents a simplified model for the birth of a volcano, and already analyzed from an analytical viewpoint [**Godano2022**, **Vosteen2003**], is investigated; here, we solve numerically some physically meaningful initial and boundary value problems, and discuss the results.

References

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