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# Investigating production and melt extraction in the deep crust through numerical modelling: case study of the El Oro Complex in Ecuador

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The El Oro Complex, in the southwestern part of Ecuador, represents a tilted crustal section of metasediments from the Ecuadorian forearc. Its lower part was partially molten due to a gabbroic magma emplacement during a brief event of 5 million years in the Triassic period. This event led to the formation of an S-type pluton, the Marcabelí granitoid. Such a short-lived episode provides an excellent opportunity to gain a better understanding of the mechanisms underlying the formation and transport of melt in the continental crust, spanning deep to shallow regions. Previous works provided constraints on the thermal history of this metamorphic episode and suggested a possible contamination of the granitoids by the gabbroic magma [1]. It is therefore crucial to quantify the possible contribution of the melt produced by the metasediments and the gabbro.

To this end, we combined a thermal model with thermodynamics to simulate partial melting and melt extraction for different scenarios during the Triassic metamorphic history of the El Oro Complex. Temperature and assemblages are simulated at each timestep and melt is extracted from the model using various liquid percolation threshold values. Several models were made to explore important parameters such as: (1) variations in protolith composition (2) the amount of water which affects the degree of partial melting, (3) contamination with various quantities of gabbroic melt. These models allowed us to explore the potential effects of each scenario on the composition and volume of the resulting melts. Additionally, they will serve as a foundation for developing reactive transport models based on a two-phase flow. The findings of our simulations are compared with field data to gain insights into the melting history of the El Oro Complex and to discuss the source of the Marcabelí granitoid.

*References :*

[1] Riel et al. (2013) Lithos 156-159

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