Geophysical Research Abstracts
Vol. 21, EGU2019-10930, 2019
EGU General Assembly 2019

Geodynamic constraints on the initiation of mélange diapirs from subducting slabs

Nicolas Berlie (1), Boris Kaus (1), and Horst R. Marschall (2)

(1) Institute of Geosciences, Johannes Gutenberg University Mainz, Germany (nberlie@uni-mainz.de), (2) Institute of Geosciences, Goethe University, Frankfurt am Main, Germany

Subduction zones represent an important part of the general volcanic activity and magma production on our planet. Numerous geochemical analyses have been performed over time on those magmas and the results suggest a mixing between the crustal components of the subducting slab and the mantle. The mixing process most likely takes place at the interface between the slab and the mantle wedge, where mélange rocks form comprising of crustal and mantle rocks and hydrous fluids extracted from the slab. This mélange layer would then evolve into diapirs and rise in the asthenosphere until it reaches melting conditions suitable for the creation of magmas. Here, we study the geodynamic feasibility of this process and the conditions that determine the size of the diapirs as well as the ability of the mélange to peel off from the slab and to form diapirs. We perform 2D finite element calculations focusing on two different setups to observe the initiation and later the evolution of the diapirs with time. Results confirm that this mechanism is feasible and we show how the spacing depends on the rheological and density parameters of the mélange layer and the overlying mantle.