

Noble Gases evolution during crustal anatexis

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El Hoyazo volcano (Betic Cordillera, SE Spain) is a highly favourable natural laboratory to study the links between magmatic processes occurring at depth and eruptive events at the surface. This is mainly because El Hoyazo has a complex geodynamic setting in a region of lithospheric plate convergence (Africa and Iberia), but also because it preserves crustal xenoliths within its dacitic lavas.

Although present in trace amounts, noble gas isotopes are often more reliable and less ambiguous recorders of their source than the major volatile species. This advantage derives from their chemical inertness, such that noble gas isotopic and elemental fractionations are strongly coupled to their source and modified only by physical processes during magma ascent and eruption. In particular the noble gases in El Hoyazo samples trapped in both glass, and fluid/melt inclusions within xenocrysts, provide essential and novel information on: (i) how volatiles evolve during partial crustal melting at depth, and (ii) their response to the anatexis process itself, including crustal assimilation and magma mixing mechanisms during interaction of the extracted felsic melt from the pelitic crust, into the mafic magma. In addition, xenolith noble gases offer new clues into how noble gases are transported and added at depth prior to eruption of magma at the surface.

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