# Continental intra-plate basalt genesis at the Chaîne des Puys (Massif Central, France)

ILKA C. KLEINHANNS*[1], KRISTINA EICHHOLZ[1], RONNY SCHOENBERG[1]

[1]University Tuebingen, Department of Geosciences, Wilhemstrasse 56, 72074 Tuebingen, Germany
*kleinhanns@ifg.uni-tuebingen.de

The Chaîne des Puys (French Massif Central) is among the youngest intraplate volcanic chains in Europe. It consists of ca. 80 monogenetic volcanoes along a chain that stretches for 80 km in N-S direction but is only 3-4 km wide. The volcanic activity started with an early low-volume phase around 90 ka ago. Continous volcanism occurred over the next 60 ka with a general increase in intensity and spiked around 30 ka when the largest magma volumes were erupted. During this complete volcanic period basaltic and basanitic melts were produced in the mantle [Boivin et al. 2017], from which they ascended through the entire, overlying crust. With time, however, small shallow crustal magma chambers were developed, resulting in the formation of more evolved magmas. A final eruption period from 15-8 ka produced the whole range from undifferentiated basaltic/basanitic to highly differentiated trachytic magmas [Boivin et al. 2017].

The continous production of primitive magmas for nearly 90 ka offers a unique possibility to study the evolution of the mantle source below the Chaîne des Puys. In this study we examine geochemical and Sr-Nd isotope systematics focussing on basaltic/basanitic and trachybasaltic magmas with $SiO_2$ between 45-49 wt% and MgO from 8 to 4 wt%. Trachytic magmas from the youngest eruption phase with $SiO_2$ >60 wt% and MgO <1.3 wt% were investigated to assess the influence of crustal assimilation.

Primitive magmas did neither undergo large-scale fractional crystallisation nor significant assimilation during their ascent through the overlying crust, indicated by a constant Hf/Sm of 0.67±0.04 and Nb/Th of 12.59±0.90, respectively. In combination with a Nb/Ta of 17.75±0.39 and Zr/Hf of 44.33±1.04 this points to an OIB-type mantle source [Condie 2003, Pfänder et al. 2007]. Radiogenic isotopic signatures show, however, small variations from 0.70337 to 0.70406 for $^{87}Sr/^{86}Sr$ and 2.18 tp 4.05 for εNd, which are well-correlated ($R^2$ 0.75). We interpret this as small-scale mantle heterogeneities below the French Massif Central.

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Condie 2003: G-cubed 4(1), 1-28
Pfänder et al. 2003: EPSL 254 (1-2), 158-172