Subslab mantle of African provenance infiltrating the Aegean mantle wedge

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Modelling parameters

The composition of the components used in the modelling of source mixing, sediment addition and melting are shown in the Table (trace element concentrations in ppm):

Component	Zr	Nb	Yb	Hf	Th	$^{143}Nd/^{144}Nd$	$^{206}Pb/^{204}Pb$	$^{207}Pb/^{204}Pb$
Aegean Depleted Mantle	5.5	0.1485	0.365	0.17	0.0079	0.5131	18.30	15.475
Sub-slab Enriched Mantle	8.48	2.91	0.29	0.25	0.18	0.512931	18.746	15.620
EMS sediment	229.08	31.45	3.50	5.61	8.51	0.512510	18.9999	15.6784

Aegean Depleted Mantle (ADM): the ADM component is based on depleted MORB mantle (DMM) from Workman and Hart (2005) with slightly increased Zr and Hf contents to obtain a better fit with the most depleted Santorini samples. There is no direct control on the isotope composition of this component and thus a composition similar to Atlantic N-MORB was adopted.

Sub-slab Enriched Mantle (SSEM): the SSEM component is derived by estimating the source composition of the Quaternary Kula alkali basalts. These alkali basalts represent melts of the sub-slab (African) lithospheric/asthenospheric mantle and do not show evidence for interaction with the Anatolian SCLM (Aldanmaz et al., 2015; Grützner et al., 2013). Rare-earth element (REE) patterns of these alkali basalts do not indicate HREE fractionation through residual garnet or amphibole in the source, but are consistent with shallow (<60 km) spinel stability field melting. The source composition of these basalts was calculated assuming that the Kula alkali basalts (sample 26-wav from Chakrabarti et al., 2012) represent 2 % partial melts of a lherzolitic mantle (Aldanmaz et al., 2006; Sölpüker, 2007). For these calculations, the following parameters were used: incongruent batch melting (Zou and Reid, 2001) of a DMM source modal composition (Workman and Hart, 2005), the melting reaction “0.82 Cpx + 0.40 Opx + 0.08 Sp = 1.0 melt + 0.30 Ol” for spinel lherzolite at 1 GPa (Kinzler and Grove, 1992) and the partition coefficient compilation from White (2013; p. 293). The resultant SSEM source agrees well with the “Western Anatolian Mantle (WAM)” source of Aldanmaz et al. (2000; 2006).

Sediment addition and melting: a hybrid, mixed ADM-SSEM source is generated by bulk mixing of the ADM and SSEM mantle components. Sediment addition was modelled by adding a 1 % fluid phase derived from Eastern Mediterranean Sea sediments (sample AMS-011 from Klaver et al., 2015) to the mixed ADM-SSEM source, using fluid/solid partition coefficients (4 GPa, 900 °C, residual rutile) from Kessel et al. (2005). For the ADM source (Santorini), Pb and Nd concentrations of DMM (Workman and Hart, 2005) where used, whereas for the enriched SSEM source (Nisyros), a Pb content of 1 ppm was assumed. Melting of the sediment-metasomatized mixed ADM-SSEM source was modelled as variable degrees of incongruent batch melting (Zou and Reid, 2001) of a spinel-lherzolite source with a DMM modal composition (Workman and Hart, 2005) according to the melting reaction “0.82 Cpx + 0.40 Opx + 0.08 Sp = 1.0 melt + 0.30 Ol” for spinel-lherzolite at 1 GPa (Kinzler and Grove, 1992) and the partition coefficient compilation from White (2013; p. 293).

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Data Sources

This supplementary material lists the sources of the data shown in Figures 2 and 3. Literature data were filtered so to only include samples for which complete trace element data are available. In order to minimise the effects of fractional crystallisation and assimilation, samples with >57 wt.% SiO_2 are excluded. High-precision ICPMS and isotope dilution (ID) data are used for the Zr/Nb vs. Zr/Hf diagram (Figure 2b); these references are shown in **bold**. Only samples for which both Pb and Nd isotope compositions were determined, are included in Figure 3.

Santorini

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Nisyros

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