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SESSION TITLE: T51H. The Origin of Intraplate Volcanism: Hotspots, Nonhotspots, and Large Igneous Provinces III Posters

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ABSTRACT BODY: The Mesozoic evolution of the Neotethys-Eastern Mediterranean between the African-Arabian and Eurasian continents was accompanied by intermittent eruption of alkaline-transitional basalts in Arabia. The causes of the prolonged volcanism remain controversial, whether related to the arrival(s) of mantle plume [1] or prolonged far-field extension of the passive continental margin [2]. In addition, the source(s) of the volcanism is not well constrained, as previous conclusions were drawn before recent understanding of the origin of intraplate magmas — (i) melting of hydrous metasomatic veins within the lithospheric mantle [3] or (ii) melting of an incompatible-element enriched peridotite source ± eclogites in the presence of CO_2 [4, 5].

The Mesozoic basalts (ankaramites and transitional basalts) from the Coastal Ranges, NW Syria analysed in this study were dated at 106.3 ± 0.2 Ma and 103.4 ± 0.3 Ma (bulk-rock $^{40Ar}/^{39}Ar$ ages), representing the last instance of Mesozoic intraplate magmatism in the Levant region. Isotopic and geochemical analysis reveals distinct compositions between the two lava series (ankaramites: $\varepsilon Nd_{(t)}$ = 5.1–5.6, $^{87}Sr/^{87}Sr_{(t)}$ = 0.70293–0.70302, $^{187}Os/^{188}Os_{(t)}$ = 0.227–0.242; transitional basalts: $\varepsilon Nd_{(t)}$ = 4.0–4.6, $^{87}Sr/^{87}Sr_{(t)}$ = 0.70320–0.70424, $^{187}Os/^{188}Os_{(t)}$ = 0.392; and lower SiO_2, higher TiO_2, Nb/U, Nb/Th, Nb/La and Ce/Pb in the ankaramites). Fractional crystallisation and assimilation-fractional crystallisation modelling suggests minor roles for both processes during the evolution of the lavas, despite the generally high Os isotopic ratios. The modelling also precludes derivation of one lava series from the other, suggesting that the isotopic and geochemical distinctions must be inherited from the source. It is interpreted that the chemical characteristics represent a greater component derived from metasomatic amphibole-rich veins in the source region. Both the ankaramites and transitional basalts were generated from this metasomatised source which contained veins of metasomatic cumulate and a peridotitic host within the lithospheric mantle. A contribution from deeper mantle sources or an anomalously hot mantle (e.g. arrival of a mantle plume) is not required to explain the data, which are more likely the result of melting of a metasomatically hydrated lithospheric mantle at relatively low temperatures during times of Levant regional extension.

[1] Segev and Rybakov (2010) J. Geol. Soc. 167, 731;
[2] Laws and Wilson (1997) J. Geol. Soc. 154, 459;
[3] Pilet et al. (2008) Science 320, 916;
[4] Dasgupta et al. (2007) J. Petrol. 48, 2093;
[5] Dasgupta et al. (2010) EPSL 289, 377.

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