

Supplementary Material for:

Asthenosphere-induced melting of diverse source regions for East Carpathian post-collisional volcanism

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This file contains:

- (1) a volcanological map of the Călimani area that shows the locations of the selected whole-rock samples; and
- (2) figures that illustrate features of the data complementary to those presented in the main text

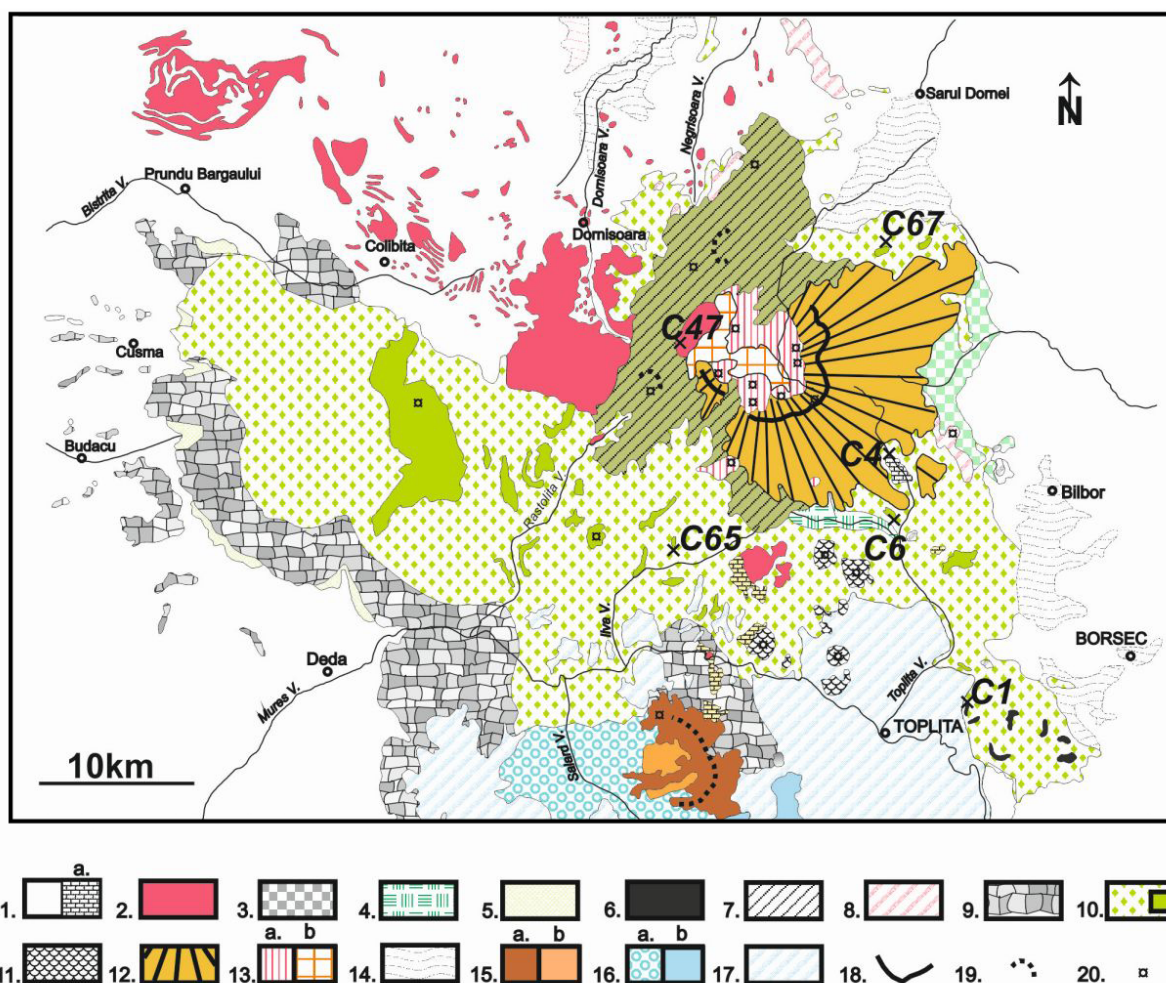


Fig. A1. Simplified volcanological map of Călimani and northern Gurghiu (Seghedi et al. 2005, and references therein) with sample locations (denoted by ×). 1 = Pre-volcanic basement (a = in the interior of the volcanic area); 2 = Early intrusions (basaltic andesites, andesites, microdiorites); 3 = Drăgoiasa Formation (dacites, rhyolites); 4 = Lomaș Formation (low-K andesites and dacites); 5 = Budacu Formation (andesites); 6 = Sărmaș basalt lavas; 7 = Rusca-Tihu stratovolcanic edifice (basaltic andesites and andesites); 8 = Aphyric andesite lavas; 9 = Rusca-Tihu debris avalanche deposit; 10 = Rusca-Tihu Volcaniclastic Formation with lava intercalations (andesites, basaltic andesites); 11 = Peripheral Domes (andesites and dacites); 12 = Călimani Caldera lava flows (andesites); 13 = Post-Călimani-Caldera rocks: a = monzodiorites, diorites, b = andesites, dacites; 14 = Upper Pliocene–Quaternary sedimentary basins; 15 = Jirca volcanic edifice: a = andesites, b = diorites; 16 = Fâncel-Lăpușna pre-Caldera rocks: a = volcaniclastics, b = andesite and basaltic andesite lavas; 17 = Fâncel-Lăpușna Volcaniclastic Formation (andesites, dacites); 18 = Caldera rim according to present topography; 19 = Crater rim according to present topography; 20 = Volcanic vent

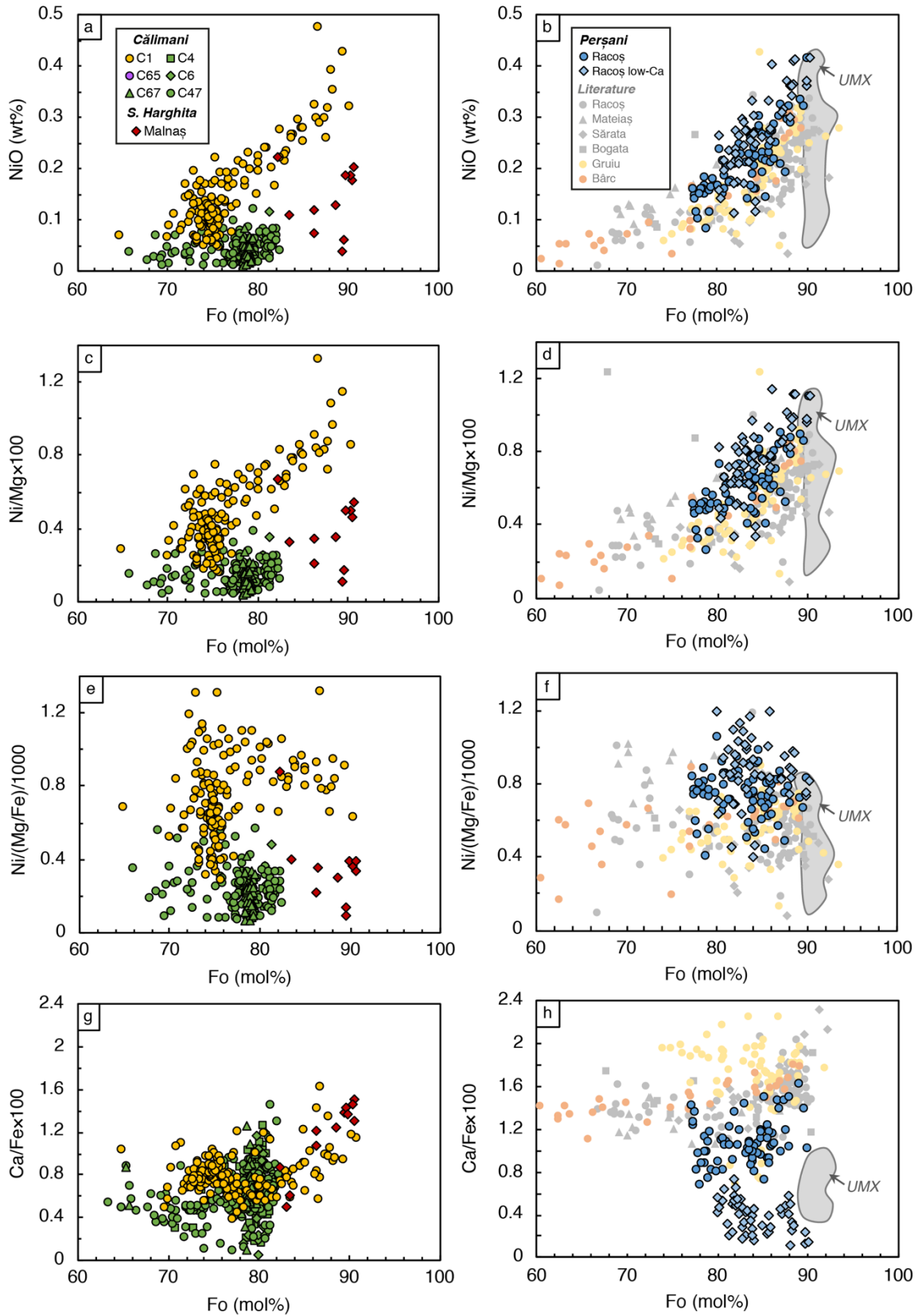


Fig. A2. Major-element compositions of the studied olivine phenocrysts. Forsterite (Fo; mol%) versus NiO content (wt%), Ni/Mg, Ni/(Mg/Fe) and Ca/Fe at (a, c, e and g) Călimani and Malnaș (Southern Harghita) and (b, d, f and h) Perșani (Racoș and other localities). UMX = olivines from ultramafic Perșani xenoliths (Vaselli et al. 1995; Falus et al. 2008). Published Perșani olivine data are from Vaselli et al. (1995) and Harangi et al. (2013)

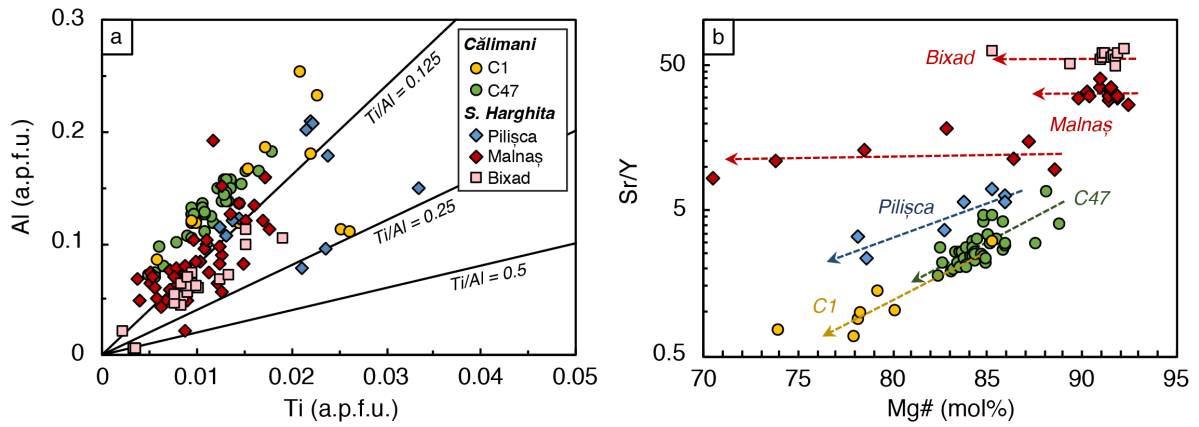


Fig. A3. Compositions of clinopyroxene phenocrysts from Călimani and Southern Harghita (Pilişca, Bixad and Malnaş). **a** Ti versus Al (atoms per formula unit (a.p.f.u.) based on 6 oxygen). Mg# (Mg/(Mg+Fe) in mol%) versus **b** Sr/Y. Fractionation trends are shown as dashed lines with arrows

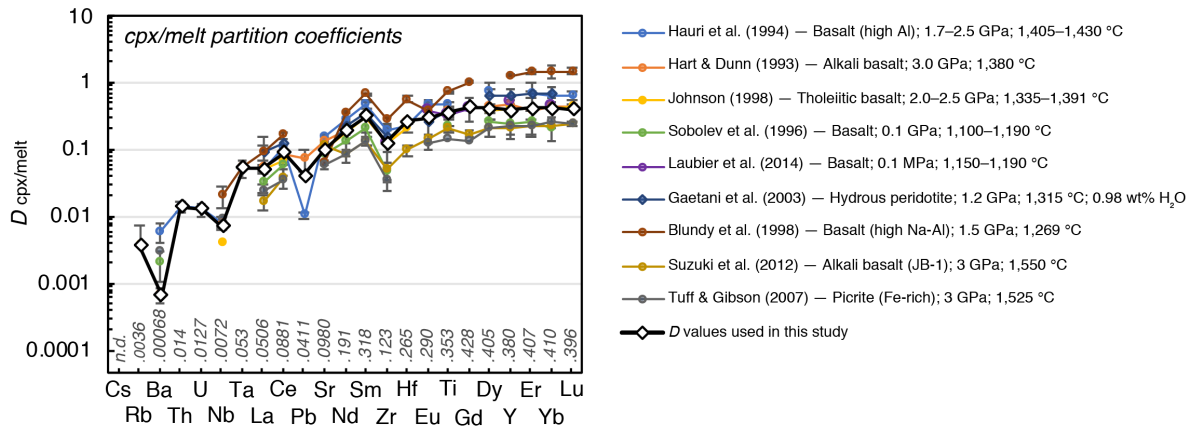


Fig. A4. Compilation of experimentally determined clinopyroxene/melt partition coefficients ($D_{\text{cpx/melt}}$) for basaltic systems (Hart and Dunn 1993; Hauri et al. 1994; Sobolev et al. 1996; Blundy et al. 1998; Johnson 1998; Gaetani et al. 2003; Tuff and Gibson 2007; Suzuki et al. 2012; Laubier et al. 2014). The D values used in this study (tabulated at the base of the plot) were either calculated, by averaging published values for a given element, or, in case few or disparate values were reported, selected from a single study

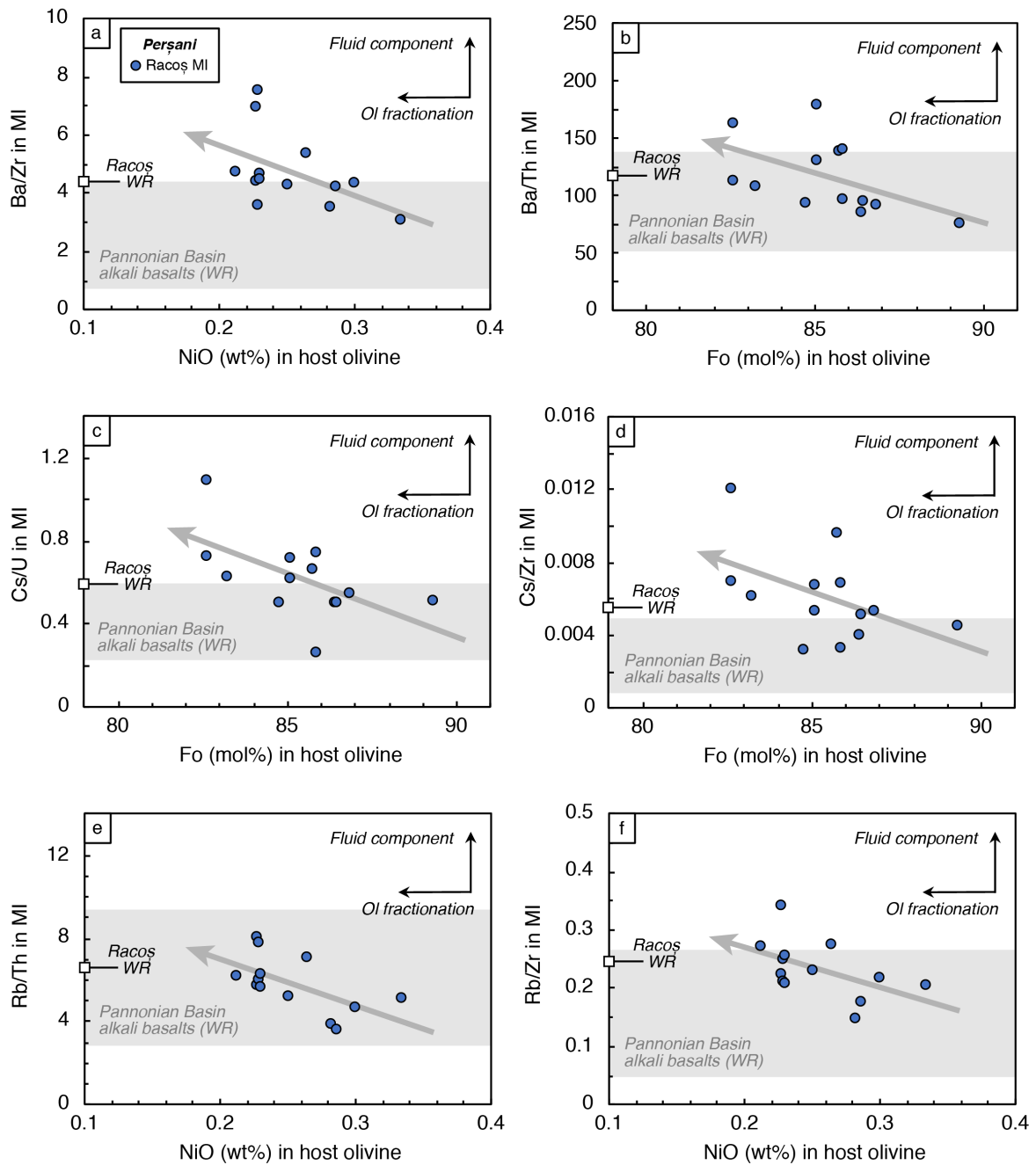


Fig. A5. Fractionation indices (Fo in mol% and NiO in wt%) of host olivine against **a** Ba/Zr, **b** Ba/Th, **c** Cs/U, **d** Cs/Zr, **e** Rb/Th and **f** Rb/Zr in primitive Racos olivine-hosted MIs. Shown for comparison are the trace-element ratios of Racos whole-rocks (WR; Downes et al. 1995; Harangi et al. 2013) and those of the Pannonian Basin alkali basalts (grey field; MgO > 8 wt% and SiO₂ < 52 wt%; Harangi et al. 2015, and references therein). Black arrows illustrate directions expected for melts affected by olivine fractionation and/or fluid enrichment alone. Grey arrows indicate linear trend lines

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