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Amphibole-breakdown melting in the lithospheric mantle

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We present evidence for peritectic melting of amphibole in a suite of spinel-lherzolite mantle xenoliths from the Dreiser Weiher in the West-Eifel, Germany (e.g., [1]). The xenoliths are fresh, unaltered and consist of mostly primary olivine, orthopyroxene, clinopyroxene, chromite spinel, and additional numerous pockets that contain partially melted pargasitic amphiboles that are surrounded by unaltered glass, euhedral secondary clinopyroxene, olivine, spinel, and voids. Thin sections of the xenoliths were analysed for major and trace elements, using electron microprobe and laser ablation ICP-MS. Both EPMA and LA-ICPMS analyses were done using spot analyses and element mapping.

We conclude that the partial melts were formed by a peritectic reaction that consumes amphibole and produces clinopyroxene. A second reaction occurred when the partial melt reacts with primary orthopyroxene to form secondary Mg-rich olivine and lower Cr/Cr+Al spinel. We will present a detailed analysis of the major and trace element signatures of the primary mantle amphiboles, the partial melt, and the secondary mineral phases. Fig. 1 shows a phase map of a representative amphibole-bearing melt pocket in the xenolith.

[1] Ban, Witt-Eickschen, Klein *et al.* (2005), *Contrib Mineral Petrol* 148, 511–523.