

LATE STAGE MELT MIGRATION IN THE ABYSSAL MANTLE

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ABSTRACT

Abyssal dunite harzburgite complexes have now been studied in detail at three locations. Two of these, one at 15°05' N on the MAR and one at Hess Deep in old EPR mantle exhibit the characteristics of shallow mantle melt transport with melt mass decreasing. Their characteristics include sharp contacts and lack of equilibrium with the enclosing mantle harzburgites, evidence of decreasing mantle temperature in the mineralogy of spinel and olivine, and a REE pattern in equilibrium with ordinary MORB.

Both complexes are located far from a transform fault or ridge segment end. By contrast, the 15°20'N harzburgite-dunite complex contains dunites with characteristics reflecting aggregation of compositionally very diverse melts and

increasing melt fractions. In particular, spinel and olivine compositions are consistent with partial melting in ascending mantle peridotite, and REE patterns in discrete diopsides in both harzburgites and dunites indicate equilibrium with a wide, overlapping range of partial melts. The 15°20' harzburgite-dunite complex is located at the inside corner high of a major large offset transform fault. These contrasting characteristics may reflect partial melting at depth in the asthenospheric mantle beneath the ridge axis, followed by focussed flow of melt in the shallow lithospheric mantle beneath the ridge center after the aggregation of MORB from the fractional melts formed at depth.

