

Diapiric serpentinite seamount

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Serpentinite diapiric seamounts have been only reported from the forearc area of the Izu-Ogasawara-Mariana arc-trench system in the world. Petrological characteristics of mantle peridotites constituting those seamounts were summarized in comparison with other trench region peridotites. Mantle peridotites drilled from the Conical seamounts during ODP Leg 125 (Site 779) have distinctive compositions both in bulk rock chemistry and mineral chemistry. Their compositions suggest that they underwent a higher degree of partial melting (more than 30 %) that is related to island arc volcanism in the mantle wedge. Most of compositions of mantle peridotites collected by submersibles from other serpentinite seamounts in the Izu-Ogasawara-Mariana forearc have also similar compositions to those from the Conical seamount. It indicates that most mantle peridotites from the seamounts are of residues derived from partial melting in the high degree during the island arc volcanism.

On the other hand, mantle peridotites recovered from the southern Mariana exhibit wider chemistry including more fertile peridotites, suggesting that they are of residues derived from relatively lower degrees of partial melting. It is probable that they are related to the volcanism during the formation of the back arc basin. Furthermore, although mantle peridotites of the Tonga forearc are considered to be derived from a layered sequence from the upper crust through the lower crust to the upper mantle rather than serpentinite seamount, they have wider compositional range than those of serpentinite seamounts, that is, they are suggesting wider degrees of partial melting range. The Remnant Mantle Diapir (RMD) hypothesis was previously proposed for origin of the mantle peridotites constituting serpentinite diapiric seamounts. It is plausible that part of RMDs constitutes the serpentinite seamounts.