成熟島弧深部の岩石学：タルキートナ島弧深部
The uppermost mantle section of a matured arc: an example from the Talkeetna Arc, Alaska

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There are many studies on arc volcanic rocks (e.g., Kimura et al., 2014 G-cubed) and several detailed studies of arc lower crustal sections (recent reviews in Jagoutz & Kelemen AREPS 2015; DeBari & Green, Ch 5, Brown & Ryan eds., Arc-Continent Collision, 2011). However, studies on arc mantle materials have been limited and are mainly from mantle xenoliths captured in arc volcanos (e.g., Arai & Ishimaru, 2008 J. Petrol.; Benard et al., 2017 GCA), together with studies of exposed, residual peridotite and ultramafic cumulates at the base of the Kohistan arc section in NW Pakistan (Garrido et al. 2007 Geology; Bouilhol et al 2009 Lithos, 2011 Geology, 2011 Chemical Geology). The Talkeetna arc, Alaska, is an accreted arc section from volcanic sequence to mafic-ultramafic rocks (DeBari & Coleman, 1989 JGR; Kelemen et al. 2003, 2014 ToG). The lowest section of the Talkeetna arc, i.e., peridotite bodies, mainly consist of lherzolite to harzburgite with minor amounts of dunite (including chromitite layers) and pyroxenites (clinopyroxenite, websterite and orthopyroxenites). We examined the petrology of these lithologies in the context of arc root evolution. Most pyroxenites are present along the contact between residual peridotites and overlying, gabbroic crust. They are interpreted as remnants of a much thicker layer of igneous pyroxenite, most of which became unstable and foundered into the mantle wedge (Jull & Kelemen 2001 JGR; Greene et al. 2006 J. Petrol.; Kelemen et al. 2003, 2014 ToG). Locally, pyroxenites cut lithological boundaries in residual peridotites. Petrological characteristics and major element compositions of minerals in the harzburgites and lherzolites underlying the pyroxenites are consistent with their origin as residues of partial melting, fluxed by slab-derived fluids/melts, followed by variable extents of reactive melt transport and melt extraction. The very sharp contacts between the host pyroxene-bearing peridotites and dunites, coupled with mineral compositions, indicate that the dunites formed by interaction with the host peridotites and arc-related melts in conduits of focused melt transport.

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