[EE] Evening Poster | S (Solid Earth Sciences) | S-MP Mineralogy & Petrology

[S-MP36]Crust-Mantle Connections

convener:Yoshihiko Tamura(R &D Center for Ocean Drilling Science, Japan Agency for Maine-Earth Science and Technology), Osamu Ishizuka(Geological Survey of Japan, AIST), Chris Conway
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A paradigm of the solid Earth geochemical cycles is that the Earth's crust forms by melting of the Earth's upper peridotitic mantle. A new study relates crustal thickness to magma type in the Izu-Ogasawara (Bonin) and Aleutian oceanic arcs, which suggests that continental crust (andesitic magma) is produced only when the crust is thin, thus only in oceanic arcs. How diverse is the spectrum of primary melts and which factors may contribute to its variations? What is the influence of crustal processing vs. primary magma diversity in creating the diversity of the Earth's crust? The session seeks to explore the crust-mantle connections among ophiolites, at divergent and convergent plate boundaries and within-plate (or ocean island??) settings based on volcanology, petrology, geochemistry, geophysics, geochronology, and geodynamics studies.

[SMP36-P02]The origin of alkali basalts in Nanjing area, eastern China

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Neogene to Quaternary alkaline basalts are distributed around Nanjing area, eastern China, about 2000 km to the west of Japan Trench. Previously, the origin of volcanism was attributed to a plume upwelling originated in the deep earth like the ocean island basalt since this area is detached from a subduction zone and the alkaline basalts are geochemically indistinguishable from ocean island alkaline basalts. However, since the Pacific Sea Slab in the mantle transition zone beneath Nanjing area has been found by seismic tomography (e.g., Fukao *et al.*, 1992), the influence of stagnant Pacific slab has been considered as a potential origin for the alkaline basalts. In this study, we measured whole-rock major and trace element compositions of the Nanjing basalts by an X-ray fluorescence spectrometer (XRF) and major element compositions of phenocrysts in these basalts by electron probe micro analyzer (EPMA) and discussed the source mantle compositions of the basalts.

Whole-rock MgO and SiO_2 contents and FeO*/MgO of the Nanjing basalts are 3.3 – 12 wt%, 42 – 54 wt%, and 1.1 – 2.2, respectively, showing relatively differentiated compositions. Nanjing alkaline basalts are rich in whole-rock FeO* content (7.8-14.5 wt%) and poor in CaO (4.1-9.3 wt%) and Al_2O_3 contents (13.1-17.8 wt%), being plotted in the end-member compositional field of Cenozoic alkaline basalts in China. Especially, the extremely high-FeO, low-CaO, and low-Al_2O_3 samples are separated from compositional fields of melts originated in peridotites or fractionated melts from the partial melt of peridotites, suggesting mafic lithology for their source mantle lithology.

Nanjing basalts commonly contain olivine and clinopyroxene phenocrysts and relatively differentiated samples have small amount of plagioclase phenocrysts in addition to olivine and clinopyroxene. Magnesium number ($Mg\# = 100Mg/(Mg + Fe)_{mol}$) of clinopyroxene phenocryst cores range from ~70 to 91, but most clinopyroxene phenocrysts have Mg# ~ 80. Forsterite content ($Fo\# = 100Mg/(Mg + Fe)_{mol}$) of olivine phenocryst cores range from <60 to 92 and show strong two peaks at ~80 and ~90. Especially, high Fo# (>85) olivine phenocrysts contain 2000 – 3500 ppm Ni, which is higher than olivine

compositions crystallized from melts originated in peridotite (Sobolve *et al.*, 2007).

These discriminating whole-rock and mineral compositions of the Nanjing alkaline basalts imply that these alkaline basalts are originated in pyroxenite source mantle. Sobolev *et al*. (2005) considered eclogites originated in a recycled oceanic crust in an upwelling mantle from core-mantle boundary as the origin for large volcanisms in intraplate tectonic settings such as Hawaii. Beneath the eastern margin of the Eurasian continent, harzburgite plumes derived from the Pacific stagnant slab have been suggested to ascend together with oceanic crust in the stagnant slab from the mantle transition zone to form a non-peridotite partial melts. Origin of the Nanjing alkaline basalts could be explained by the same model.