Dupal signature recorded in quartz-garnet clinopyroxenite xenolith from sub-Ontong Java Plateau mantle

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A wide variety of mantle xenoliths in 34 Ma alnöite in Malaita, Solomon Islands have been regarded as fragments of the lithosphere beneath the Ontong Java Plateau (OJP); the largest oceanic plateau, located in the southwestern Pacific. Therefore, Malaitan xenoliths are an important resource for further constraining the origin of voluminous OJP volcanic activity during the Cretaceous, which is commonly attributed to a mantle plume. One of the major discoveries of our newly collected samples is the presence of quartz-garnet clinopyroxenite, which has not been recognized previously in xenolith suites derived from sub-oceanic mantle. The results of thermobarometric calculations revealed that this rock resided in lower lithosphere (ca. 110-120 km in depth). Since typical mantle perdotite cannot reproduce normative quartz-rich compositions under high-pressure conditions (>3.0 GPa), the rock does not represent a high-pressure cumulate derived from melting of peridotite. This argument implies such non-peridotitic material, most probably ancient subducted crust, was distributed within the OJP plume.

We focused on the Sr-Nd-Pb isotopic systematics of pure clinopyroxene and garnet separated from the quartz-garnet clinopyroxenite. Acid leaching with HCl, HF, and HNO_3 was made prior to analysis. Sr and Nd isotopic ratios for these minerals are not significantly different when age corrections for the host alnöite eruption are performed. This indicates isotopic homogenization within the xenolith is due to continuous isotopic exchange equilibria until host alnöite eruption. The initial Sr-Nd isotope ratios show enriched signatures relative to Bulk Silicate Earth estimates. Initial Pb isotopic compositions are characterized by low $^{206}Pb/^{204}Pb$ and high $^{207}Pb/^{204}Pb$-$^{208}Pb/^{204}Pb$ ratios, with significant deviations from the NHRL. These isotopic characteristics clearly resulted from the long-term radioactive integration in the source material having high Rb/Sr, U/Pb, Th/Pb Th/U and low Sm/Nd ratios, the characteristics which has been recognized as the "Dupal" anomaly. The lithological and isotopic signatures observed in this study strongly suggest that 1) the enriched reservoir in the deep mantle was a fragment of ancient crustal materials that had been recycled via subduction processes, and 2) the enriched materials have been brought to the lithosphere with the OJP plume, and finally reached the surface with the eruption of host alnöite.

High-resolution paleo-environmental changes in the Northwestern Pacific during the late Quaternary

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Sediment core MD01-2409 (41° 34' N, 141° 52' E) was collected at 975 m water depth on the continental margin off the northern Japan, during the IMAGES 2001 cruise. The core site is located near the gateway between the Pacific Ocean and the Japan Sea, which was isolated during the Last Glacial Maximum (LGM). In contrast, this site has been under the influence of Tsugaru warm current during interglacial times. One conspicuous feature in the core is occurrence of three sections of laminated layers during 9-11ka, 12-13ka, and 13-15ka.

High-resolution reconstruction of environmental change of the western North Pacific over the past 25 ka was conducted based upon oxygen and carbon isotope values of benthic foraminifera. *Uvigerina akitaensis* and *Nonionellina labradorica* were abundant throughout the core except the laminated layers. On the other hand, *Buliminella tenuata* and *Bolivina seminuda* occurred only in the laminated layers. These four species were used for isotopic analysis.

Oxygen isotopic values showed a progressive decrease from the last glacial to Holocene. $\delta^{18}O$ values of *U. akitaensis* fluctuated between 4.6 and 3.0 per mil. The maximum value was recorded at ~ 18ka. $\delta^{18}O$ values of *B. tenuata* and *B. seminuda* ranged from 4.3 to 3.1 per mil and 4.1 to 3.1 per mil at 8-15 ka, respectively. Carbon isotopic values showed different changes among species. $\delta^{13}C$ values of *U. akitaensis* fluctuated between –0.6 and –2.1 per mil during the last 25 ka. That of *N. labradorica* gave $\delta^{13}C$ values of –1.6 to -2.7 per mil in 15-8 ka. Both values indicated the negative shift at ~ 12 ka. This may reflect the Younger Dryas cold episode.