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Xenolithic and Ophiolitic Peridotites in Taiwan: implication to the boundary between the Eurasian Continent and the Philippine Sea Plates

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Xenolithic and ophiolitic peridotites around Taiwan are geochemically investigated to provide constraints on clarification of the boundary between Eurasia and Philippine Sea Plates in eastern Taiwan. Major-element contents show ETO ophiolitic peridotites fit to global ophiolitic and abyssal peridotites. But QSR ophiolitic peridotites from the Yuli belt is similar with orogenic peridotites. TSU ophiolitic peridotites are similar with that of ETO peridotites. Lutao and Lanyu xenolitic peridotites display LREE-enriched REE patterns with enrichment of LILE and negative HFSE anomalies in the spidergrams, typical of subduction mantle wedge characteristics. Both QRS and TSU ophiolitic peridotites from the Yuli belt display U-shaped REE patterns; the former show enriched LILE and LREE in the spidergrams with negative HFSE anomalies, but the latter have mainly enriched LILE and LREE without negative HFSE anomalies in the spidergrams. ETO ophiolitic peridotites show both LREE-depleted and U-shaped REE patterns. In terms of PGE concentrations, except for one Lutao and Lanyu xenolitic peridotites are cumulate, all other peridotites in this study are mantle residues which can directly reflect source mantle characteristics. The subchondritic $^{187}Re/^{188}Os$ and $^{187}Os/^{188}Os_i$ ratios reinforce that most of these peridotites are mantle residues but not cumulate. T_{RD} model ages yielded from $^{187}Re/^{188}Os$ and $^{187}Os/^{188}Os_i$ ratios of these Miocene-Pleistocene peridotites, ranging from 173-266, 614-726-915 and 1173-1296 Ma, are much older than their formation ages (QSR, TSU and ETO peridotites) or ages of host basalts capturing them (Lutao and Lanyu peridotites). Therefore, mantle source where ETO peridotites formed is LREE-depleted, whereas LREE-enriched mantle source is where Lutao and QRS peridotites were formed. Mantle source for TSU peridotites has both LREE-enriched and depleted features. In addition, ETO peridotites are abyssal affinities. Lutao and Lanyu peridotites are mantle-wedge origin above the subducted South China Sea plate in the Luzon Arc system. QSR ophiolitc peridotites from the Yuli belt are supra-subduction zone (SSZ) affinities. Some TSU peridotites are suggested their intermediate feature between the abyssal and SSZ affinities. Preliminary isotope results further show ETO, Lutan, Lanyu and QSR peridotites are definite Philippine Sea plate affinity, but parts of TSU peridotites might be involved with South China Sea affinity.