Petrogenesis and Geological Significances of Ultramafic Rocks in Hongseong Area, Gyeonggi Massif, South Korea

著者	Rajesh V.J., Oh C.W., Kim S.W., Arai Shoji
journal or publication title	Promotion Envirnmental Research in Pan-Japan Sea Area -Young Researchers' Network- : Abotract
page range	2-3
year	2006-03-08
URL	http://hdl.handle.net/2297/6497

Petrogenesis and geological significances of ultramafic rocks in Hongseong area, Gyeonggi Massif, South Korea

V.J. RAJESH [a], C.W. Oh [a], S.W. Kim [a] and S. Arai [b]

(a) Department of Earth and Environmental Sciences, Chonbuk National University, Chonju, 561-756, SOUTH KOREA
(b) *Department of Earth Sciences, Graduate School of Natural Science and Technology, Kanazawa University, Kakuma, Kanazawa 920-1192, JAPAN*

The Hongseong area of the western Gyeonggi Massif, South Korea is characterized by several isolated ultramafic bodies, which are lenticular and serpentinized, within the granitic gneiss. The bodies have been highly deformed and metamorphosed under eclogite to greenschist facies conditions; however, isolated spinel and olivine grains show no evidence of recrystallization and are considered vestiges of igneous assemblages. Therefore, the core compositions of these spinel and olivine grains were used to deduce the petrogenesis and tectonic environments of the Bibong, Baekdong, and Singok ultramafic bodies within the Gyeonggi Massif. In the spinel Al_2O_3 (wt.%) versus TiO_2 (wt.%) diagram the majority of spinels fall in an overlap area between the fields of the suprasubduction zone peridotites and mid-ocean ridge peridotites. In the Fe^{3+}–Cr–Al atoms per formula unit (a.p.f.u) diagram all the spinel compositions fall within the high-P alpine peridotite and ophiolite fields. In the spinel Mg# versus Cr# diagram, most of the spinels fall within the fore-arc peridotite field. In the olivine spinel mantle array (OSMA) diagram, most of the harzburgites overlap a region between the abyssal peridotite and oceanic subduction zones. The high forsterite (Fo) content of the olivine and moderate to high Cr# (Cr/Cr+Al) of the spinel suggest that these ultramafic bodies formed as mantle residues left after higher degrees of partial melting of the fertile mid-ocean ridge basalt (MORB) mantle. Furthermore, the high Cr and low Ti of spinels and high Fo content (>89) of olivine indicate that the harzburgites derived from a suprasubduction zone environment. Moreover, the metabasites closely associated with the harzburgites in Bibong and Baekdong have island tholeiite affinities. The key trait of ophiolite is its emplacement in a suprasubduction zone, passive continental margin, island arc, or accretionary prism, which can only occur at convergent margins where buoyant material is positioned beneath the oceanic lithosphere. Many ophiolite sequences contain a range of igneous compositions and a variety of chemical and crustal components from MORB or identical lavas, island arc tholeiites, and boninites. Based on the various discrimination diagrams discussed above, we demonstrate that the serpentinized lenticular ultramafic bodies of the Hongseong area have characteristics of high-P alpine-type peridotites, suprasubduction zone peridotite, and MORB-like affinities and were emplaced into the fore-arc region of a subduction zone. The spinel and olivine compositions resemble the serpentinized harzburgites reported from other ophiolite sequences and fore-arc regions of subduction zones. Although we could not trace a well-developed ophiolite sequence in the Gyeonggi Massif, the lenses of ultramafic bodies, metabasites, and amphibolites (metamorphosed gabbros/diabases) and their close association with the granitic orthogneisses in the Hongseong area may represent probable ophiolitic remnants. This is the first report of serpentinized harzburgites with ophiolitic affinities in the Gyeonggi

Massif. This finding substantiates the existence of a collision zone in the Gyeonggi Massif. Furthermore, this Korean Peninsula zone is an exact counterpart of the Triassic Dabie-Sulu ultrahigh pressure (UHP) collision belt in North China.

[i] Email: rajeshvj@chonbuk.ac.kr
[b] Email: ultrasa@kenroku.kanazawa-u.ac.jp