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Detrital Chromian Spinels from Japanese Islands; Their Occurrence and Tectonic Significance

KEN-ICHIRO HISADA[1], SHOJI ARAI[1]

[1] *Graduate School of Life and Environmental Sciences, University of Tsukuba, Ibaraki 305-8572, Japan*

[2] *Department of Earth Sciences, Kanazawa University, Kanazawa 920-1192, Japan*

Chromian spinels are contained in upper mantle peridotite and Mg-rich igneous rocks. In general, their contents are less than a few %, but their occurrence and chemistry provide us important geological information. The chromian spinels are also one of representative heavy minerals, which suggest us petrology of the source rocks and its tectonic setting. There are, however, few works dealing with such a provenance study using detrital chromian spinels. The reasons seem to be caused by complex petrogenesis and suffered alteration on chromian spinels. Recently Arai et al. (in press) insist that the Cr# (= Cr/(Cr+Al)) of chromian spinels is very useful for discrimination between ocean floor rocks and island arc ones. We have investigated occurrence and tectonic significance of detrital chromian spinels from Japanese Islands for more than ten years. We could confirm the occurrence of detrital chromian spinels from various belts and/or rock units ranging from the middle Paleozoic to Cenozoic; Kurosegawa Belt, Southern Kitakami Belt, Hida-marginal Belt, Joetsu Belt, Maizuru Belt, Northern Shimanto Belt, Southern Shimanto Belt, Kiroko mélange, Izumi Group and Kenseki formations. Among them, the Kurosegawa and Hida-marginal Belts have been known as major strike-slip zones in Japanese Islands. The strike-slip zone is principally made of serpentinite mélange. Both belts are now traceable longitudinally in the inner and outer parts of SW Japan side by side, and they might be built once as a single serpentinite mélange belt. Thus, the Kurosegawa and Hida-marginal Belts united Asian continent with the Jurassic to Cretaceous accretionary complex. The occurrence of the detrital chromian spinels from the both belts indicates intermittent protrusion of serpentinite and/or peridotite to the earth surface. The detrital chromian spinels from these belts and rocks have common characteristics. Cr# ranges from 0.2 to 0.9 and Mg# (=Mg/(Mg+Fe2+)) ranges from 0.2 to 0.7, but the concentrated parts fall into 0.4 to 0.6 in Cr# and 0.5 to 0.7 in Mg#. Fe3+ is characteristically low (less than 0.1 in Cr-Al-Fe3+ diagram), and TiO2 wt % is also lower than 0.5. These lines of evidence suggest that Japanese Islands have been located in the edifice of the arc-trench system since the Silurian times.