Ophiolites in Japan: A review at 2009

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The Japanese Islands constitute an integral part of the circum-Pacific orogenic belt. The Japanese ophiolites range from early Paleozoic to Cenozoic in age, and are arranged so as a younger one occupies a structurally lower position and as a whole generally younging toward the ocean (i.e. toward SE). In SW Japan, for example, the early Paleozoic Oeyama ophiolite thrust on the Permian Yakuno ophiolite, which in turn covers the Permian and Jurassic accretionary complexes, and the Tertiary Setogawa-Mineoka ophiolite mélange occupies the lowest structural position as a part of the Shimanto accretionary complex forming the hanging wall of the subducting Philippine Sea plate. The Japanese ophiolites also show wide petrologic diversity. For example, mantle peridotite is L-type and cumulates are Pl-type in the Poroshiri ophiolite (Hokkaido, Cretaceous?), H-type and Cpx-type in the Yakuno ophiolite (SW Japan, Permian), and DH-type and Opx-type in the Horokanai ophiolite (Hokkaido, Jurassic). The Phanerozoic multiple ophiolite belts with downward-younging superposition and wide petrologic diversity, such as in Japan, are common along the Pacific coast such as in the Koryak Mountains, NE Russia and the Klamath Mountains, California/Oregon, USA. The circum-Pacific ophiolites commonly accompany high-P metamorphic rocks at their bases. Recent discoveries of high-P metamorphic rocks (blueschist and eclogite) from the Izu-Bonin-Mariana (IBM) forearc area in association with ophiolitic rocks closely resembling their on-land counterparts indicate intra-oceanic subduction zone origin of the ophiolite-blueschist association. On the other hand, peculiar rocks such as meimechite, ferropicrite and olivine spinifex basalt of Permian age are recently found in the greenstones in the Jurassic accretionary complexes in Japan, suggesting large igneous province (LIP, e.g. oceanic plateau) origin of these greenstone bodies. The Japanese ophiolites and greenstones represent products of large-scale, mechanically different magmatic activity in the suprasubduction zone and oceanic plate, respectively. Future work will reveal the transition mechanism from the ophiolite-forming (non accretionary) setting to the accretionary setting accumulating thick duplex pile of sedimentary rocks, probably related to the subduction of oceanic LIP.