Geophysical Research Abstracts
Vol. 15, EGU2013-13609, 2013
EGU General Assembly 2013

Plume type ophiolites in Japan, East Russia and Mongolia: Peculiarity of the Late Jurassic examples

Akira Ishiwatari (1), Yuji Ichiyama (2), and Erdenesaikhan Ganbat (1)

(1) Center for Northeast Asian Studies, Tohoku University, Kawauchi 41, Aoba-ku, Sendai 980-8576 JAPAN, (2) Kochi Core Center, JAMSTEC, Japan

Dilek and Furnes (2011; GSAB) provided a new comprehensive classification of ophiolites. In addition to the mid-ocean ridge (MOR) and supra-subduction zone (SSZ) types that are known for decades, they introduced rift-zone (passive margin) type, volcanic arc (active margin) type, and plume type. The last type is thought to be originated in oceanic large igneous provinces (LIPs; oceanic plateaus), and is preserved in the subduction-accretion complexes in the Pacific margins. The LIP-origin greenstones occur in the Middle Paleozoic (Devonian) accretionary complex (AC) in central Mongolia (Ganbat et al. 2012; AGU abst.). The Late Paleozoic and Mesozoic plume-type ophiolites are abundant in Japan. They are Carboniferous greenstones covered by thick limestone in the Akiyoshi belt (Permian AC, SW Japan; Tatsumi et al., 2000; Geology), Permian greenstones in the Mino-Tamba belt (Jurassic AC, SW Japan; Ichiyama et al. 2008; Lithos), and Late Jurassic-Early Cretaceous greenstone in the Sorachi (Hokkaido; Ichiyama et al, 2012; Geology) and Mikabu (SW Japan; this study) belts. The LIP origin of these greenstones is indicated by abundance of picrite (partly komatiite and meimechite), geochemical features resembling HIMU basalts (e.g. high Nb/Y and Zr/Y) and Mg-rich (up to Fo93) picritic olivines following the “mantle array”, suggesting very high (>1600oC) temperature of the source mantle plume. The Sorachi-Mikabu greenstones are characterized by the shorter time interval between magmatism and accretion than the previous ones, and are coeval with the meimechite lavas and Alaskan-type ultramafic intrusions in the Jurassic AC in Sikhote-Alin Mountains of Primorye (E. Russia), that suggest a superplume activity in the subduction zone (Ishiwatari and Ichiyama, 2004; IGR). The Mikabu greenstones extend for 800 km along the Pacific coast of SW Japan, and are characterized by the fragmented “olistostrome” occurrence of the basalts, gabbros and ultramafic cumulate rocks (but no mantle peridotite), suggesting tectonism in a sediment-starved subduction zone or a transform fault zone that transected the thick oceanic LIP crust. The Sorachi greenstones are associated with depleted mantle peridotite, and are covered by the thick Cretaceous turbidite formation (Yezo Group), and Takashima et al. (2002; JAES) concluded the marginal basin origin for the “Sorachi ophiolite”. We know that some oceanic LIPs were developed into marginal basins (e.g. Caribbean basin). The Late Jurassic-Early Cretaceous greenstone belts of Japan and eastern Russia may represent relics of a 2000 km-size superplume activity that hit the subduction zone and the adjacent ocean floor in NW Pacific.