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Ophiolites in Mongolia: Overview

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Ophiolites are the best archives of the evolutionary history of ocean basins from their rift–drift and seafloor spreading stages to subduction initiation and final closure (Dilek and Furnes, 2014). Mongolia, the major domain of the Central Asian Orogenic Belt, represent the accretion-subduction belts with remnants of ophiolites. Ophiolites are distributed in the Northern, Western, South and Central Mongolia, and grouped into Neoproterozoic (Riphean), Early Paleozoic (Vendian-Cambrian) and Late Paleozoic. Neoproterozoic ophiolites are known in the north Mongolia, in the Lake-Tarvagatai orogenic system (Sishged (800 Ma?), Bayannuruu (571 Ma), Bayankhongor ophiolite (665 Ma), Khantaishir and Dariv (570 Ma), Agardag (569 Ma) and Jida (Dzida) ophiolites) In the Kherlen-Gobian orogenic system the Kherlen ophiolite (569 Ma), and in the South Gobian system Paleozoic Berkh Uul, Gobi-Altai, Gurvan saikhan-Zoolen (512~519 Ma), and newly described the Manlay (482~509 Ma), and Biluutiin Ovoo (503~523 Ma) ophiolites. The youngest age has the Adaatsag ophiolite (325 Ma) in the Khentei-Khangai orogen, and the Suliinkher ophiolite (367~344 Ma) in the Suliinkher (Solonker) megazone in South Mongolia. Review of ophiolites in Mongolia show that some ophiolites characterize the oceanic crust (Bayankhongor ophiolite), but many form in suprasubduction back arc/fore arc setting. In recent years, the data on the age and geochemistry of the individual components of ophiolite section have been obtained that makes it possible to reassess the time and duration of orogenic processes (Jian et al., 2014). These ophiolites suggest repeated accretion of arc assemblages in an environment similar to the present-day western Pacific Ocean. Geochemical analysis of peridotites from paleo-arc of accreted belts that are the ultramafic (mantle) part of ophiolite complexes (harzburgites and dunites) gives an idea of the composition of lithospheric mantle and allows to evaluate the physical and chemical conditions of the melting, the composition melts and the original mantle source. Geochemical data of ophiolite complexes (gabbro, sheeted dike, basalts and plagiogranites) show distinct arc affinity (lava types of MORB, IAT and boninite), indicating formation in suprasubduction zone environment (SSZ). Elevated LREE, LILE and depletion in HFSE (Nb, Ta) characteristic with many ophiolite complexes should be explain due to two processes: decompression melting of the mantle asthenosphere in the presence of water in suprasubduction zones and interaction of the previously formed oceanic lithospheric mantle with leaking arc melts.

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