Variation of Nd isotopic compositions for basaltic rocks of the ophiolites from the Central Asian Orogenic Belt –implication for a transition of subduction systems in the Paleozoic?

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Orogenic belts are formed either through prolonged subduction of giant oceans underneath continents (“exterior orogens”), such as long lived lateral accretion of ocean-floor fragments along “circum-Pacific accretionary/peripheral orogens” at the border of the Pacific oceanic plate, or alternatively by collision of continents after the closure of intervening small oceans (“interior orogens”), such as the “Alpine-Himalayan collisional/interior orogens” in the heart of the Pangean continental plates realm. The Central Asian Orogenic Belt (CAOB) is the largest orogenic belt in the world (e.g. Sengor et al., 1993; Windley et al., 2007), it shows geochemical features of exterior orogens, but its present location between northerly Siberian Craton and southerly Gondwana derived blocks implies a “*interior*” orogen.

In this study, we show that eNd(t) values increase from late Neoproterozoic to about 430 Ma and then suddenly dropped for basaltic rocks of the ophiolitic suites in the CAOB. We interpret that this change could be resulted from the change of subduction systems from an external ocean to an internal ocean. When magmatic activities in the Lake and Altai Mongolian terrane are examined, it was concentrated in the Lake Zone in the period of 450 to 600 Ma, while it mainly occurred in the Altai-Mongolian terrane in the period of 350 to 450 Ma, with a peak around 400 Ma. The former activity is characterized by high Ba/La ratios, while the latter activity was characterized by high Th/Yb ratios. The geochemical data may imply that the mantle source for the first subduction system was influenced by fluid from the subducted slab, while that for the second subduction system was influence by melt from the subducted slab. This may indicate that the subducted slab was cold during the external subduction, but the subducted slab was hot during the interior subduction. The magmatic activities in the east of this region, it shows similar two major periods as well, but a younging trend is obvious from west to east. This may indicate a rotation of these rocks in the CAOB, which possibly caused the transition from subduction of a external ocean to the subduction of an internal ocean.

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