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# Crustal and tectonic evolution of accretionary orogens in NE Asia: evidence from geochronological and geochemical study of granitoids and comparison with the Central Asian Orogenic Belt

Jahn, Bor-ming[1], Zhao, Pan[1], Liao, J.P.[1], Wu, J.T.[1], Usuki, M.[1], Alexandrov, I.[2]

1. Department of Geosciences, National Taiwan University, Taipei, Taiwan 106 (bmjahn@ntu.edu.tw)

2. Far East Geological Institute, Far East Branch, RAS, Vladivostok, 690022 Russia

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The Northeast Asian Orogenic Belt (NAOB) is a Mesozoic-Cenozoic accretionary orogenic collage, and it constitutes the northern and principal part of the "Nipponides" [1]. The orogenic style of the Nipponides has much in common with that of the Central Asian Orogenic Belt (CAOB) or the "Altaides" [1, 2]. The tectonic framework of the NAOB was formed in Mesozoic and Cenozoic, and it continues to evolve along the modern Pacific arc-trench systems. Generally, an oceanward younging of tectonic units may be discerned, but such a simple pattern is disrupted in many places by extensive strike-slip faulting, most of which is left lateral. In this talk, the issue of crustal evolution in the sector of Sikhote-Alin, Sakhalin and Japanese Islands will be discussed based on the geochemical and isotopic analyses of granitoids that intruded in various tectonostratigraphic terrains.

The majority of granitoids in the NE Asian Orogenic Belt formed from Jurassic to late Cenozoic, with Cretaceous as the dominant period of granitic magmatism and tectonothermal events. A few Early Paleozoic granitic rocks (500 to 450 Ma) have been identified in SW Japan (Kurosegawa Belt) as well as in NE Japan (Kitakami Belt), among them the ca. 500 Ma diorites and tonalites of southern Kitakami are the oldest rocks in Japan and interpreted as the first TTG crust of proto-Japan [3]. Cretaceous granitoids are widespread in Sikhote-Alin [4] and Japan. However, granitoids were emplaced only in the Cenozoic in Sakhalin (ca. 44 - 42 Ma) and Hokkaido (45, 37 and 18 Ma) [5]. Most granitoids from Sikhote-Alin have $I_{Sr}$ = 0.7040 to 0.7083, and $\varepsilon_{Nd}(T)$ = +3.0 to -6.0 (mostly 0 to -5). The Sr-Nd isotopic data fall within the range of granitoids from SW Japan (0.704 to 0.712; +5.0 to -13.0), and the data of Cretaceous granitoids from Sikhote-Alin and SW Japan overlap almost completely. Cenozoic granitoids of Hokkaido are characterized by $I_{Sr}$ = 0.7044 - 0.7061, $\varepsilon_{Nd}(T)$ = +1.0 to +4.7, and Sm-Nd model-1 ages = 400-1000 Ma. This is remarkably similar to the Sakhalin granitoids with $I_{Sr}$ = 0.7047 – 0.7050, $\varepsilon_{Nd}(T)$ = +2.8 to +3.7, and model-1 ages of 700-1100 Ma. The isotopic data suggest that the granitoids were generated by partial melting of sources with mixed lithologies, including subducted accretionary complexes and probably

some hidden Paleozoic to Proterozoic basement rocks. The Nd isotopic data also suggest a proportion of 30-77% of juvenile component in the generation of Sikhote-Alin granitoids, whereas the proportion is much higher for the Cenozoic granitoids of Hokkaido and Sakhalin (about 65-95%). In any case, a significant amount of juvenile crust has been produced and added to the NE Asian Orogenic Belt.

Geological correlation between Sikhote-Alin and Japan, and between Sakhalin and Hokkaido, has been proposed by many workers based various criteria [6]. The present work supports the general scenario. However, the significant difference between SW Japan and NE Japan in their crustal composition and probably tectonic evolution has to be reckoned. The two geologic entities might have evolved in very different ways.

A brief comparison of crustal evolution in the NAOB and CAOB will be presented. (Supported by MOST 104-2913-M-002-005, Taiwan)

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