Eocene granites in South Sakhalin, Russian Far East: Correlation with the Hokkaido Island

JIA-PING LIAO1, BOR-MING JAHN1, IGOR ALEXANDROV2, PAN ZHAO1,3, VITALY IVIN2, SUN-LIN CHUNG1,4

1 Department of Geosciences, National Taiwan University, Taipei 10617, Taiwan
2 Far East Geological Institute, Far East Branch, RAS, Vladivostok, 690022 Russia
3 Department of Geosciences, University of Tübingen, Tübingen, 72074, Germany
4 Institute of Earth Sciences, Academia Sinica, Taipei 10529, Taiwan

The granitic rocks from South Sakhalin provide clues to examine the crustal evolution of its composite accretionary terranes and correlation with that of the Hokkaido Island. Two mid-Eocene granitic plutons in South Sakhalin show markedly different geochemical characteristics: (1) the Okhotsk granites that intruded into the Ozersk terrane from 44 to 42 Ma are ferroan and alkali-calcic, and have transitional I- and A-type features, and (2) the Aniva granites that intruded into the Tonin-Aniva terrane at 41-40 Ma are peraluminous, magnesian and calc-alkaline, typical of S-type features. The Sr-Nd-Hf isotopic ratios of both plutons suggest a common magma origin from partial melting of mixed sources with a dominant juvenile mantle component and a subordinate crustal component of the accretionary complexes. They have εNd (T) values of +3.7 to +0.5 and initial 87Sr/86Sr ratios of 0.7046 to 0.7055. The Hf isotopic data of most zircons show εHf (T) values from +16 to +5. We argue that the I/A-type Okhotsk and S-type Aniva granites can be correlated to the mid-Eocene granites in Hokkaido with similar isotopic signatures. We attribute the granitic magmatism (44-40 Ma) in South Sakhalin to a tectonic transition from supra-subduction to strike-slip and post-accretionary processes in the junction of the Asian continent, the Pacific plate, and the Sea of Okhotsk plate.