Age, geochemical and Sr-Nd isotopic study of granitic and volcanic rocks in the Sikhote-Alin Orogenic Belt (Russian Far East) and its bearing on regional tectonic evolution

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The Sikhote-Alin Orogenic Belt in the Russian Far East is an important Late Mesozoic to Early Cenozoic accretionary orogen related to the subduction of the Paleo-Pacific Ocean. In order to study the tectonic evolution of this accretionary orogen and associated felsic-dominated magmatism, we carried out zircon U-Pb dating, whole-rock geochemical and Sr-Nd isotopic analyses on granitoids and volcanic samples from the Primorye region of southern Sikhote-Alin. The zircon dating revealed three episodes of granitoid emplacement: (1) Permian in the Khanka Block, (2) Early Cretaceous in the middle accretionary terranes, and (3) Late Cretaceous to Early Cenozoic in the eastern coastal area. Felsic-dominated volcanic rocks that covered all tectono-stratigraphic terranes were deposited during 80-57 Ma. The Cretaceous-Paleogene felsic magmatism represents the most important tectonothermal event in the Sikhote-Alin belt. Whole-rock geochemical data indicate that most granitoids and volcanic rocks are I-type and likely generated in a supra-subduction setting. Their initial $^{87}Sr/^{86}Sr$ ratios range from 0.7048 to 0.7114, and $\varepsilon_{Nd}(t)$ values vary from +1.7 to -3.8 (mostly < 0). Thus, the geochemical and Sr-Nd isotopic data suggest that the felsic magmas were generated by partial melting of source rocks comprising mantle-derived juvenile component (subducted basalts of accretionary complex) and recycled crustal component. The geochemical and isotopic differences between intermediate and felsic volcanic rocks may be explained by crustal assimilation during magmatic differentiation. In addition to the Sikhote-Alin belt, Cretaceous to Early Cenozoic felsic magmatic rocks occur widely in the southern Korean peninsula, Japanese islands and Russian Far East, along the coastal regions of the Okhotsk and Bering Seas. These rocks constitute an extended magmatic belt along the continental margin of NE Asia. This belt can be considered as a Phanerozoic Silicic Large Igneous Province (SLIP), and its generation was not related to plume activities but was attributed to subduction of the Paleo-Pacific Ocean.