

## Isotopic and geochemical features of formation of volcanic rocks of the southern part of the Sakhalin island

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Under the federal project «Geological mapping at 1:1,000,000 scale» volcanic rocks of southern part of the Sakhalin island were studied by U-PbSHRIMP, K-Ar, Sm-Nd and LA-ICPMS methods. In this study the volcanic rocks were classified based on the isotopic and geochemical data (major, trace and the REE elements). The new data show, that the basalts of studied area represent the three magma series: tholeiitic, the calc-alkaline and sub-alkaline. The petrological characteristics and genesis of volcanic rocks closely relate to dynamic conditions of their formation. Tholeiitic basalts of Tonino-Aniva zone (Vavaysky unit) exhibit low  $K_2O$  (0.57),  $TiO_2$  (0.44) and  $Al_2O_3$  (11.5%). Despite the fact that a positive value  $\epsilon Nd = 6.6$  indicates a significant contribution of mantle component, high Ba (702 ppm) and Nb-Ta minimum indicates lithospheric component in the sources of these rocks. Such geochemical features characterize subduction zones or ensimatic island arcs. Basalts Sm-Nd age (195-145 Ma) corresponds with the Jurassic time of the convergent interaction of the Asian continent with oceanic plate. Vavaysky sub-alkaline and alkaline basalts (trachyandesite basalt and picrobasalt) display high  $TiO_2$  (2.3-3.9%) and highest incompatible trace elements (Zr, Nb, Ta, Hf) contents,  $\Sigma REE = 210-267$  ppm. Basalt geochemical enrichment occurred under the influence of mantle injection in an environment of continental rifting on the Asian continental margin. This event took place in the Early Cretaceous (Berriasian-Barremian) after the termination of subduction. Early Cretaceous high-alumina calc-alkaline basalts (West-Sakhalin zone) exhibit high  $Al_2O_3$  (16-21%) and high Ba, K, Sr, Rb contents. Nb negative anomaly on spidergram indicates continental margin island arcs. Basalt Sm-Nd age  $142 \pm 29$  Ma ( $\epsilon Nd = 4.6$ ) corresponds with the Barremian-Albian age of existing island-arc system along the eastern margin of Eurasia. This age corresponds to the U-Pb age ( $127.7 \pm 1.4$  Ma) of the youngest populations of detrital zircons from sandstones Vavaysky unit. Its sedimentation occurred simultaneously with the volcanic process.

Miozen-pliozen andesites (Aniva volcanic complex) are characterized by low  $TiO_2$  (0.2-0.9%), higher contents of Ba, Sr, Zr, Hf, and Ta Nb shortage. Their formation took place in back-arc spreading condition. Andesites K-Ar age (15+1 Ma) and concordant U-Pb ( $13.5 \pm 0.2$  Ma) is consistent with the time of completion of the Japan Sea rifting