ABSTRACT

This monograph provides a systematic catalogue description of all 97 known submarine volcanoes and seamounts in the Kuril island arc, using materials collected during six voyages of the R/V "Vulkanolog". Some of these volcanoes were first found during the "Vulkanolog" voyages. Interpretations of their morphostructural features are based on echo sounding, seismic reflection profiling, and characteristics of the magnetic field. Compositions have been determined for 80 of the volcanoes, including petrographic and geochemical data, using dredged material. This is the first time such detailed description has been made for submarine volcanoes.

During concurrent study of subaerial and submarine volcanoes regularities in their spatial-structural distribution, transverse and longitudinal petrogeochemical, mineral, and isotopic zoning, and xenolith distribution in the lavas have been recognized. Volcanic activity is distributed in the frontal and rear-arc zones. In the area between these zones activity is weak. Concentrations of K, Rb, Ba, Sr, P, Be, La, Ce, Nb, Zr, U, Th, Ni, and Cr in similar volcanic rocks from the rear-arc zone are typically more than twice as higher as concentrations in rocks from the frontal zone, whereas concentrations of Fe and V are approximately twice lower.

The average $^{87}Sr/^{86}Sr$ for frontal and rear-arc zones are: Northern Kuriles 0.70322 and 0.70304, Middle Kuriles 0.70302 and 0.70295, and Southern Kuriles 0.70347 and 0.70306, respectively. $^{143}Nd/^{144}Nd$ ratios in lavas from the frontal and rear-arc zones also differ constituting 6Nd=9-10 and 7-8, respectively. Be abundances in the Kurile island arc lavas vary from $2.2\text{-}10^{6}$ at/g to $7.9*10^{6}$ at/g. No distinct correlati on has been revealed in Be abundances corresponding to the frontal and rear-arc zones. Acid and intermediate lavas from the volcanic front are characterized by two-Px phenochryst association while similar lavas from the rear-arc have amphibole- and biotite-bearing associations. Chemical composition of minerals in the two zones also differ. These data are used to develop a model for magma generation with two zones of magma generation related to two levels of volatile separation from the subducting lithospheric plate.