

SPATIAL COMPOSITIONAL VARIATIONS IN QUATERNARY VOLCANICS FROM THE NORTHERN KURIL ISLANDS, RUSSIA

O.V. Kuvikas^{1,2}, M.Nakagawa², G.P. Avdeiko¹, V.A. Rashidov¹

¹ *Institute of Volcanology and Seismology FEB RAS, Petropavlovsk-Kamchatski, Russia.*

² *Department of Natural History Science, Graduate School of Science, Hokkaido Univ., Japan.*

The Northern Kuril Islands form the part of Kuril-Kamchatka volcanic arc. Approximately steady-state subduction beneath the islands occurred since the late Miocene (Avdeiko et al, 2006). We newly determined major and trace element compositions of number Quaternary rocks from 7 subaerial and 3 submarine volcanoes (Fig. 1) - to demonstrate systematic changes in magma genesis across arc. Peculiarities of whole-rock chemistry, and petrography of these rocks enable us to divide of all volcanoes into five main groups. These volcanic groups have good correlation with geological data. Each unit of the volcanic group is characterized by narrow range of chemical variations (Fig. 2). These five groups are as follows.

Chikurachki, Tatarinov, Lomonosov, 1.3 volcanic group:-

These volcanoes locate at the front zone. The lowest contents of incompatible elements (e.g. Rb, Ba, K) are typical. Rocks are Ol-Cpx bearing Opx basaltic andesite.

Fuss, Antsiferov volcanic group:-

It locates at the intermediate zone. The rocks show higher contents of incompatible elements. Hbl-Cpx-Ol-bearing Opx andesite are commonly characterized by the presence of hornblende phenocryst.

Ebeko volcanic group:-

It locates at the northern part of Paramushir island. Rocks show intermediate contents of Rb, Ba, K₂O, Rb/Zr. Compositional area vary in average data from typical front volcanoes to intermediate volcanoes. The rocks are Ol-Cpx-bearing Opx basaltic andesite.

Alaid, Grigorev volcanic group:-

These volcanoes locate at the back arc zone. The rocks show highest contents in K₂O and Rb. In addition this group is characterized by the highest contents of Nb. Compared with other volcanic groups, these group have the largest eruptive volume (150 km³). The rocks are Ol-bearing Cpx basalt.

1.4 volcanic group:-

This volcano is situated at the distance of more than 250 km from the trench. Two types of rock occur in this volcanic group: Cpx-bearing Hbl andesite and Cpx-basalt. The basalt is characterized by low contents of Rb, Ba, K₂O, whereas the andesite show highest contents of incompatible elements.

These results and previous data (Bindeman and Bailey, 1999; Churikova et al, 2001) generally show that regular enrichment of LILE (e.g. Rb, K, Ba) and depletion HFSE (e.g. Nb, Zr, Y) in volcanic rocks depend from the slab depth. However, there exist several anomalies, such as in Alaid and 1.4 groups, which would not be explained by a simple subduction model. In order to discuss in detail, we are now determining REE and Sr-Nd isotopes.

Reference

- Avdeiko et al., 2006: *Petrologiya* 14 (3): 248-265.
 Bindeman, Bailey, 1999. *EPSL* 169: 209-226.
 Churikova et al., 2001: *Journal of petrology* 42(8): 1567-1593.
 Martynov et al, 2009: *Science about Earth. Letters of FEB RAS* 4: 17-23.

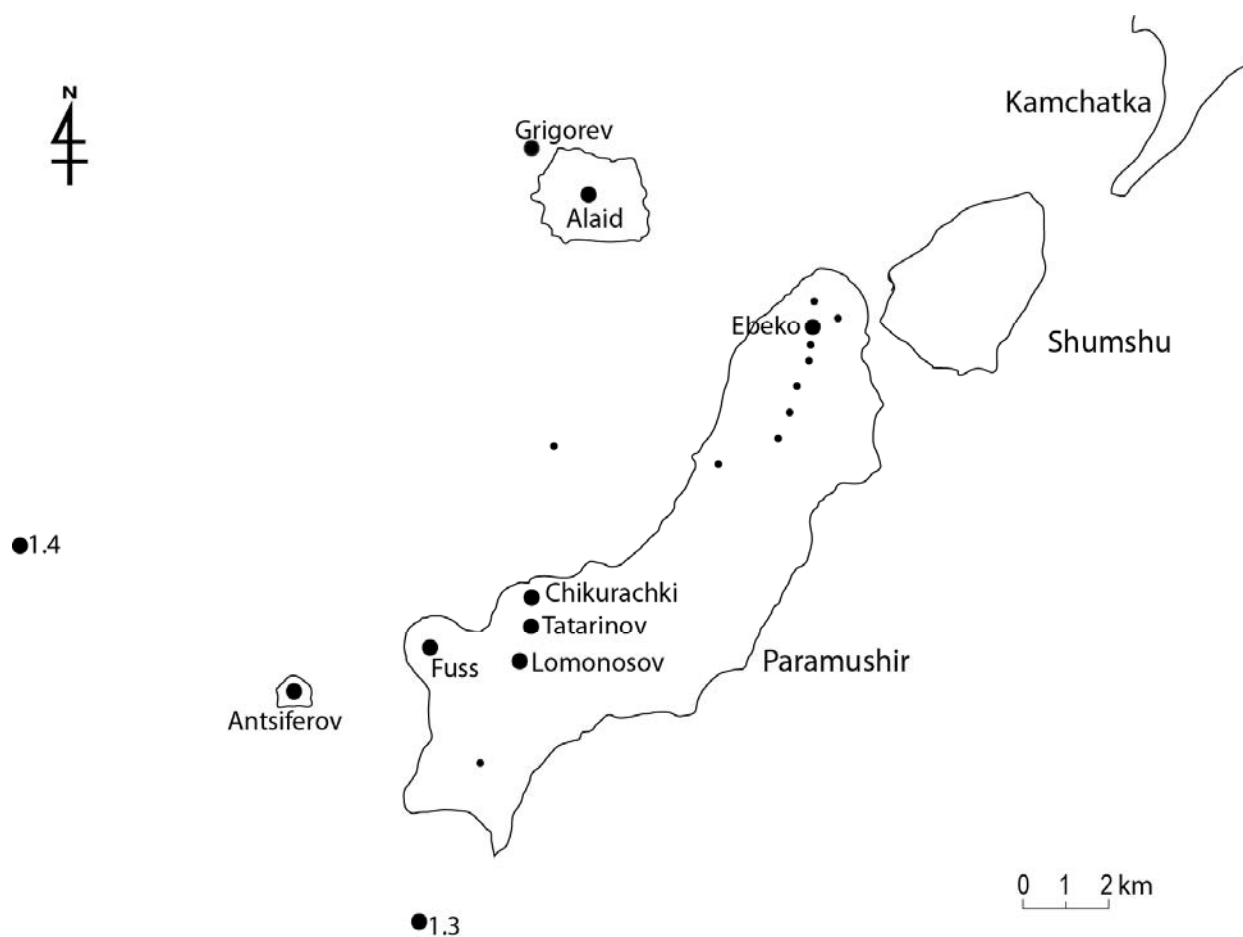


Figure 1. Schematic map of the Northern Kuril Islands.

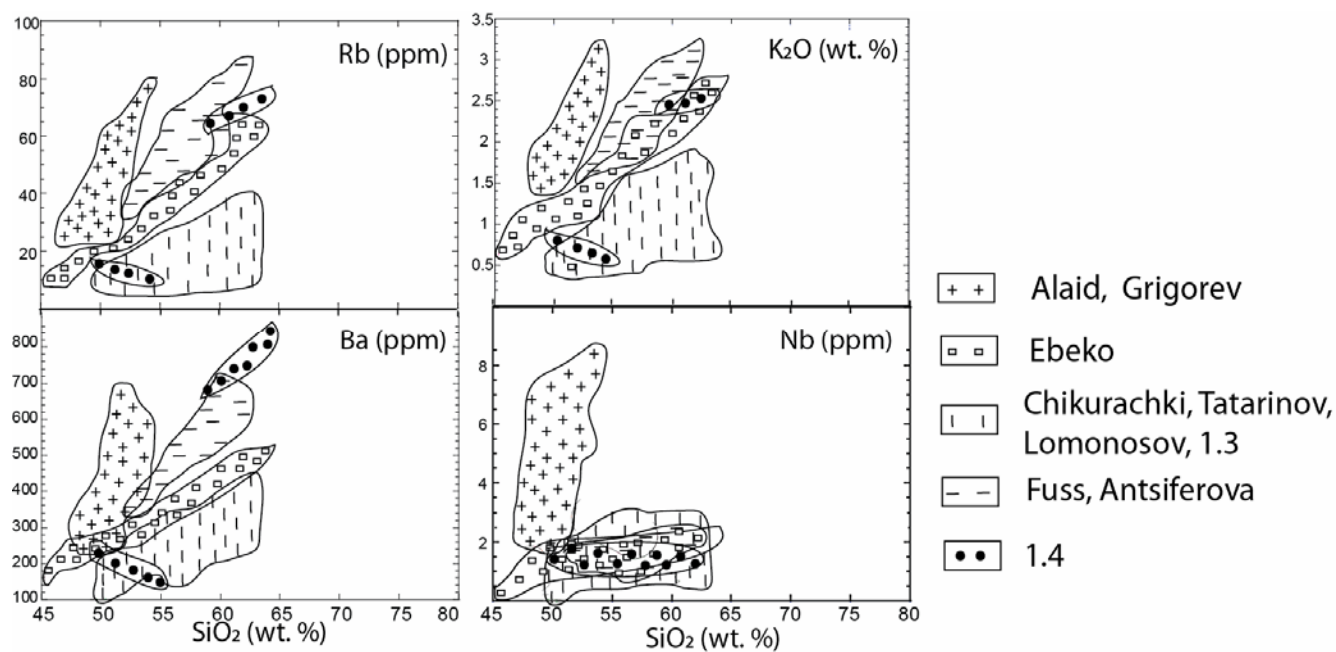


Figure 2. Harker's diagrams. Variations of major and trace elements in the volcanic rocks from the Northern Kuril Islands.