



## **Geochemical evolution of Bolshaya Udina, Malaya Udina, and Gorny Zub Volcanoes, Klyuchevskaya Group (Kamchatka)**

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The Klyuchevskaya group of volcanoes (KGV) located in the northern part of Kamchatka has the highest magma production rate for any arc worldwide and several of its volcanoes have been studied in considerable detail [e.g. Kersting & Arculus, 1995; Pineau et al., 1999; Dorendorf et al., 2000; Ozerov, 2000; Churikova et al., 2001, 2012, 2015; Mironov et al., 2001; Portnyagin et al., 2007, 2015; Turner et al., 2007]. However, some volcanoes of the KGV including Late-Pleistocene volcanoes Bolshaya Udina, Malaya Udina, Ostraya Zimina, Ovalnaya Zimina, and Gorny Zub were studied only on a reconnaissance basis [Timerbaeva, 1967; Ermakov, 1977] and the modern geochemical studies have not been carried out at all. Among the volcanoes of KGV these volcanoes are closest to the arc trench and may hold information on geochemical zonation with respect to across arc source variations. We present the first major and trace element data on rocks from these volcanoes as well as on their basement. All rocks are medium-calc-alkaline basaltic andesites to dacites except few low-Mg basalts from Malaya Udina volcano. Phenocrysts are mainly olivine, pyroxene, plagioclase and magnetite, Hb-bearing andesites and dacites are rarely found only in subvolcanic intrusions at Bolshaya Udina volcano. Lavas are geochemically similar to the active Bezymianny volcano, however, individual variations for each volcano exist in both major and trace elements. Trace element geochemistry is typical of island arc volcanism. Compared to KGV lavas all studied rocks form very narrow trends in all major element diagrams, which almost do not overlap with the fields of other KGV volcanoes. The lavas are relatively poor in alkalis,  $\text{TiO}_2$ ,  $\text{P}_2\text{O}_5$ ,  $\text{FeO}$ ,  $\text{Ni}$ ,  $\text{Zr}$ , and enriched in  $\text{SiO}_2$  compared to other KGV volcanics and show greater geochemical and petrological evidence of magmatic differentiation during shallow crustal processing. Basement samples of the Udinskoe plateau lavas to the east of Bolshaya Udina volcano have similar geochemical composition (trace element enriched high-K basaltic andesites and andesites) and similar eruption age of 274 ka [Calkins et al., 2004] as typical plateau lavas below the northern KGV. This research was supported by RFBR-DFG grant # 16-55-12040.