

Geochemistry and solute fluxes from volcano-hydrothermal system of Ketoy, Kuril Island arc

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Ketoy is a volcanic island in the middle of the Kuril Island arc. With an area of ~ 70 km² it consists of two volcanic structures of different ages. The younger Pallas cone (960 m asl) is characterized by a strong fumarolic activity with maximum temperature of 720°C (August 2016) and hosts a cold acid crater lake in the summit crater. The older Ketoy cone (1172 m) at the NE of the island is cut by the erosion crater that open to the east and known as a canyon of Gorchichny Stream. There is a strong hydrothermal activity within the canyon with boiling springs and steam vents. We present our data obtained during the fieldwork in August 2016 on the chemical (major and trace elements including REE) and isotopic (H, O, C, S) composition of thermal fluids from both Gorchichny canyon and thermal fields on the slopes of the Pallas cone. Thermal field of the Gorchichny Stream discharges acid Ca-SO₄ and near neutral unusual, Cl-poor, Na-Ca-SO₄ hot-to-boiling waters with TDS 2-3 g/L. Thermal field of the summit plateau at the base of the Pallas cone discharges acid Ca-SO₄ warm water that can be the seepage from the crater lake. Isotopic compositions of thermal waters are close to the meteoric water line but with a clear positive shift in both $\delta^{18}\text{O}$ and δD with a trend directed to the isotopic composition of condensates of fumarolic gases of the Pallas cone. For the first time the outflow rates of the draining streams have been measured and hydrothermal solute fluxes from the volcano-hydrothermal system have been estimated. The total hydrothermal flux of chloride and sulfate from Ketoy Island is estimated as 8.5 t/d of Cl and 30 t/d of SO₄. This work was supported by the RSF grant #15-17-20011.