

Distribution of tephra deposits and reconstruction of parameters of the 1973 basaltic explosive eruption of Tyatya volcano, Kunashir Island, Kurile Arc.

Belousov A., Belousova M., Kozlov D.

The 1973 basaltic explosive eruption of Tyatya stratovolcano in Kunashir Island belongs to the most significant historical eruptions of Kurile Arc. This eruption lasted 14 days and occurred from two groups of vents sequentially formed at the opposite slopes of the volcanic cone: two small maars were formed at the northern slope during first hours of the eruption, and then explosive activity continued at the south-eastern slope where large scoria cone was formed (Markhinin et al., 1974). Poor weather conditions limited eyewitness observations of the eruption course. To reconstruct the eruption dynamics we have completed mapping of the 1973 tephra deposits. The resulted isopach and isopleth maps (showing the deposit thickness and maximal size of pyroclasts) were used to calculate parameters of the explosive activity and volume of the erupted tephra (methodologies of Carey and Sparks, 1986; Wilson and Walker, 1987; Pyle, 1989; Fierstein and Nathenson, 1992). During the first maar-forming, phreatomagmatic stage of the eruption 0.008 km^3 of tephra (composed mostly of fragmented country rocks) was ejected. Height of the eruptive cloud achieved 4-6 km (with wind speed up to 10 m/s) with tephra discharge $2 \times 10^5 \text{ kg/s}$; duration of the stage 20 hours. During the second scoria cone-forming, magmatic stage of the eruption 0.07 km^3 of tephra (mostly juvenile material with 52-54% SiO_2) was ejected. Its most intensive subplinian-ultrastrombolian phase lasted approximately 36 hours, height of the eruptive cloud achieved 6-8 km (with wind speed up to 10-20 m/s), and tephra discharge $8 \times 10^5 \text{ kg/s}$. Total volume of the erupted tephra including 0.03 km^3 (volume of largest tephra cone) comprised 1.1 km^3 , that is two times less than previously published estimates. Volcano explosivity index (VEI) of the eruption is 3; total volume of the erupted magma (tephra + scoria cone volumes recalculated to density 2800 kg/m^3) comprised approximately 0.05 km^3 . This work was supported by a Russian Science Foundation grant # 15-17-20011.