

Strong hydrothermal eruption 600 BP inside Golovnin caldera, Kunashir Island, Kurile arc

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Hydrothermal explosions are difficult to predict and thus they pose serious hazard to visitors of hydrothermal areas. Here we present results of mapping of airfall deposit of strong prehistoric hydrothermal eruption that was the latest eruptive event in the limits of Golovnin caldera in the southern part of Kunashir Island, Kurile arc. This caldera was formed 30 Ka BP (Razhigaeva et al. 1998) that was followed by extrusion of two dacitic lava domes in the central part of the caldera. The studied hydrothermal eruption occurred at active hydrothermal area located at the southern foot of the Vostochny (Eastern) lava dome. This eruption formed a 350-m wide and 40 m deep crater surrounded by low-profile ring of the ejected material. Part of the crater is occupied by 17-m-deep Kipiashee Lake having intensive hydrothermal discharge on its bottom. The ejected material is represented by yellow-white and yellow-brown poorly sorted sandy gravels and sands with admixture of clay. This clastic material was formed by fragmentation of hydrothermally altered pumice tuffs (former sediments of the intracaldera lake). The airfall deposit has nearly circular distribution around the crater. The deposit thickness decreases from 5-7 m at the crater rim to 5 cm on the distances 2-3 km; thickness half-distance (b_t) is estimated as 4.1. Volume of the deposit calculated by the method of Fierstein and Nathenson (1992) is 0.007 cub.km. Radiocarbon dating of soil buried directly under the deposit provided calibrated age 1300-1420 AD. This eruption can be considered as a model for future hydrothermal explosions inside the Golovnin caldera. This study was supported by grant of Russian Science Foundation #15-17-20011.