Geophysical Research Abstracts
Vol. 20, EGU2018-18813, 2018
EGU General Assembly 2018

Opasny Canyon – a natural archive of data on the large explosive eruptions from the Gorely caldera complex (Southern Kamchatka, Russia)

Aleksei Rogozin (1), Vladimir Leonov (1,4), Vera Ponomareva (1), Maxim Portnyagin (2,3), Anastasia Plechova (3), and Evgeniy Klyapitsky (1)

(1) Institute of Volcanology and Seismology (IVS) FEB RAS, Petropavlovsk-Kamchatsky, Russia (alekseiras@yandex.ru), (2) GEOMAR Helmholtz Center for Ocean Research Kiel, Kiel, Germany, (3) V.I. Vernadsky Institute of Geochemistry and Analytical Chemistry, Moscow, Russia, (4) † Deceased

A detailed study of the lava-pyroclastic sequence exposed in the walls of the Opasny ("Dangerous") Canyon at the western slope of the Mutnovsky volcano (Southern Kamchatka, Russia) has allowed us to identify four pumice and ten welded tuff units. Only some fragments of the canyon walls have been studied earlier (e.g., Seligman et al., 2014) because even in summer they were partly covered by snowpacks. In recent years, most of the snowpacks have melted, which made it possible to carry out continuous tracing of rocks horizons exposed in the >70 m high canyon walls. During our field investigations, we managed to describe and correlate the sections of the upper, middle and lower parts of the canyon and to compile a summary section of major pyroclastic units. High-precision electron microprobe and laser-ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) analyses of pumice and welded tuffs have allowed us to identify all of them as the products of the Gorely caldera complex, which neighbors Mutnovsky volcano from the northwest. Modern intra-caldera Gorely edifice is a shield volcano however, our findings highlight the importance of this eruptive center as a source of powerful middle-late Pleistocene explosive eruptions. Geochemical correlation of pyroclastic horizons with distal tephra layers found in the North Pacific sediment cores allowed us to determine the ages of the eruptions based on age models for the cores (Rea et al., 1993, 1995). The oldest pumice tuff exposed at the bottom of the Opasny Canyon was emplaced ∼350 ka BP, which is consistent with the 361±8 ka Ar-Ar date obtained on the welded tuff north of the Gorely caldera (Bindeman et al., 2010). Two upper pumice horizons were erupted 160-180 and ∼30 ka BP in agreement with their stratigraphic position above welded tuffs Ar-Ar dated at 227-332 ka (Seligman et al., 2014).
This work was supported by the Russian Science Foundation grant #16-17-10035.

References

Bindeman, I.N., Leonov, V.L., Izbekov, P.E., Ponomareva, V.V., Watts, K.E., Shipley, et al. (2010). Large-volume silicic volcanism in Kamchatka: Ar–Ar and U–Pb ages, isotopic, and geochemical characteristics of major pre-Holocene caldera-forming eruptions. J. Volcanol. Geotherm. Res. 189, 57-80. doi: 10.1016/j.jvolgeores.2009.10.009

Rea, D.K., Basov, LA., Janecek, T.R., Palmer-Julson, A., et al. (1993) Proceedings of the Ocean Drilling Program, Initial Reports, Vol. 145.

Rea, D.K., Basov, I.A., Scholl, D.W., Allan, J.F. (Eds.) (1995) Proc. ODP, Sci. Results, 145: College Station, TX (Ocean Drilling Program).

Seligman, A., Bindeman, I., Jicha, B., Ellis B., Ponomareva, V., Leonov V. (2014) Multi-cyclic and isotopically-diverse silicic magma generation in an arc volcano: Gorely eruptive center, Kamchatka, Russia. J. Petrology 55 (8): 1561-1594, doi:10.1093/petrology/egu034