AGU FALL MEETING

San Francisco | 12–16 December 2016

V11A-2762: Building the Record of late Miocene to Pleistocene Explosive Activity in the Kurile-Kamchatka Volcanic Arc: Initial Results and Challenges

Monday, 12 December 2016
08:00 - 12:20
Moscone South - Poster Hall

Large explosive eruptions are among the most extreme natural events and can produce hemispheric or even global catastrophic effects. One of the prerequisites of predicting future giant eruptions is the understanding of sizes and recurrence times of past similar events. Volcanism of the North Pacific arcs is highly explosive, which is attested by large nested calderas and numerous tephra layers in marine and terrestrial sediments. At the same time regional record of large eruptions for the pre-Holocene times is still fragmentary. Our ongoing research, now funded by the Russian Science Foundation grant #16-17-10035, is aimed at the compilation of the late Miocene-Pleistocene record of large explosive eruptions from the Kurile-Kamchatka volcanic arc and analysis of the long-term variations in the composition of erupted products. Our studies are based on (1) tephra and cryptotephra sequences from the sediments of northwest Pacific seas; (2) tephra findings in the northeast Asian mainland; and (3) proximal pyroclastic deposits in Kamchatka and Kurile Islands. Geochemical characterization of tephra is based on the analysis of volcanic glass, minerals, and enclosed melt inclusions by electron microprobe, laser ablation-inductively coupled plasma-mass spectrometry, and secondary ion mass spectrometry. Tephra ages are provided by age-depth models for sediment cores and correlations to 14C or Ar-Ar dated proximal deposits. Up to date we have identified ten major middle to late Pleistocene tephras correlating between marine and terrestrial sites over distances of 600-1800 km and likely presenting M>6 eruptions from Kamchatka. Forty more tephras presented by one finding each were found at distances of 400-1500 km from volcanoes and also correspond to large eruptions. Correlation of distal tephras to proximal deposits appeared to be a major challenge because the latter are poorly studied and often have altered glass compositions. We suggest that melt inclusions in minerals provide compositions close to glasses from plinian tephras and thus can be used for correlations. We are planning to extend our record down to late Miocene. The resulting database will serve as a reference for correlations of Kurile-Kamchatka tephras to their distal counterparts and provide a record of major explosive eruptions in the NW Pacific.

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