

## NEW DATA ON THE EOPLEISTOCENE CATASTROPHIC CALDERA-FORMING ERUPTION IN KAMCHATKA

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The work presents new data on the giant caldera. **A new large caldera** (15×25 km), the Karymshina caldera, has been discovered in 2006 in southern Kamchatka [1]. Three complexes are distinguished according to consecutive stages of the caldera development: pre-calderian, caldera-forming and post-calderian. The pre-calderian stage (complex I) is assumed to have mid-Pleiocene age (3.4 – 2.6 myr). The caldera-forming stage (complex II) has Eopleistocene age (1.78 – 1.2 myr). The post-calderic stage (complex III) is dated to Lower and Middle Pleistocene (0.5 – 0.8 myr). An approximate **volume of material erupted** during the caldera generation was estimated to be **about 825 km<sup>3</sup>**, which makes **a weight of 2×10<sup>15</sup> kg**. This eruption should therefore be considered as the largest so far known to have occurred in Kamchatka and to be among the great eruptions worldwide [2]. **A tectonic uplift** (4 × 12 km × 200 m) interpreted as a resurgent dome has been reconstructed in the northwestern part of this caldera, bounded by straight northeast and northwest trending faults. Also **the boundary of a lake**, which had existed in the caldera to the South from the resurgent uplift, has been reconstructed.

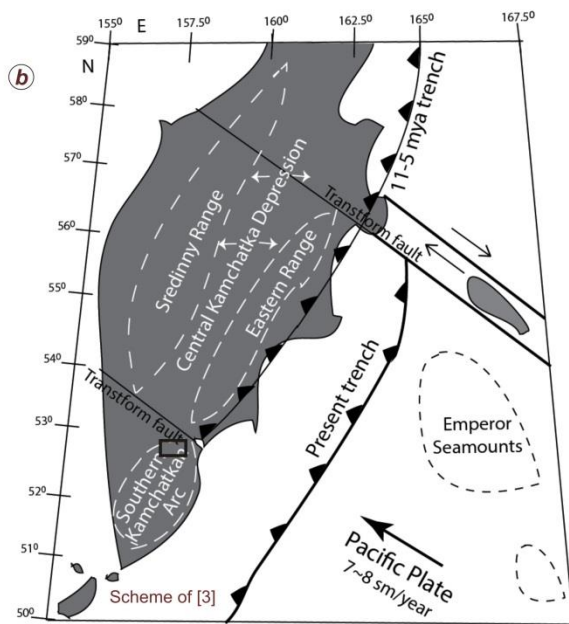
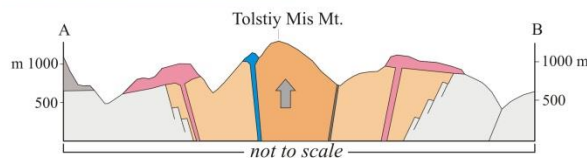
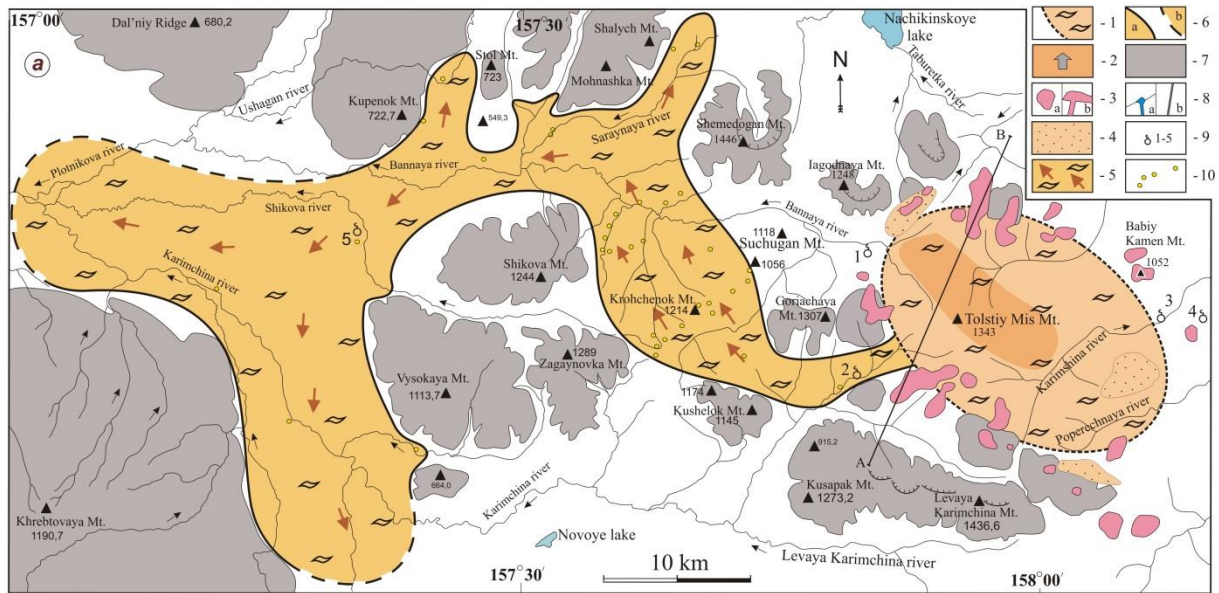
During fieldwork in 2012-2015 **a vast field of ignimbrites, traces of a large pyroclastic flow** associated with caldera Karymshina, **was mapped for the first time (fig. 1)**. Ignimbrites were found at a distance up to 35-40 km from the edge of the caldera. The maximum thickness of the flow exceeds **500 m**, the area of the pyroclastic flow deposits is **about 298 km<sup>2</sup>**, and their total volume is **84 km<sup>3</sup>**. It is mainly represented by ignimbrites and crystalloclastic tuffs related to the caldera-formation, which side with volcanic relics shaped the border of the structure at the pre-calderic stage. At the central part of the depression the total observed thickness of ignimbrite deposits reaches 1000 m.

It has been unambiguously established that the volcanoes of mounts Goryachaya, Yagodnaya, Levaya Karymchina, etc., located out of the caldera, but close to the boundaries of the caldera, are older and must be considered as **evidence of a major volcanic phase that preceded the caldera generation**. It proved by the fact that the Karymshina rocks (mostly acid tuffs and ignimbrites) that fill the caldera in some cases lay on the lavas that compose the above volcanoes.

New data were obtained on the setting of the rhyolite domes widely abundant in the area of study. It was shown that they are mostly confined to the boundaries of the caldera and to the boundary of the resurgent dome situated in it. Most of the domes were emplaced much later following caldera generation, they have ages of 0.5--0.8 Ma, and they should be regarded as **a consequence of post-caldera volcanism**. The Karymshina caldera is found to have the largest scale in high-siliceous volcanism. Total volume and area of extrusions and related lava flows reaches 2.68 km<sup>3</sup> and 26.44 km<sup>2</sup>, correspondingly.

The structural setting of the **present-day hydrothermal systems** in the area of study has been revised. It was observed that all larger hydrothermal systems (the Bol'she-Bannaya, Karymshina, and Verkhne-Paratunka ones) **are confined to the boundaries of the Karymshina caldera**.

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**Fig. 1 a)** A summary map showing the boundary of Karymshina caldera, its internal structure and a large pyroclastic flow associated with the caldera. Note: (1) boundary of the Karymshina caldera and the deposits that fill it (only shown in cross-section); (2) resurgent uplift; (3) rhyolite extrusions and associated lava flows: (a) on map, (b) in cross-section; (4) areas of detected lacustrine deposits (tuff sandstone and tuff aleurolite); (5) pyroclastic flow; (6) border pyroclastic flow (a) identified during the field work, (b) supposed; (7) pre-caldera volcanoes; (8) small volcanic structures composed of basaltic lavas (a) and ore veins (b) located at edges of resurgent uplift; (9) thermal hot springs: 1 – Bol'she-Bannaya, 2 – Karymchina, 3 – Karymshina, 4 – Verkhne-Paratunka, 5 – Apachinskies; (10) – points sampling; **b)** General plate tectonic position of the Kamchatka and location of the Karymshina caldera (black rectangle).

## REFERENCES

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