



An opening magmatic fissure: structural pattern of its termination

Egor A. Zelenin (1), Andrey I. Kozhurin (1,2), Tatiana K. Pinegina (2), and Polina G. Mikhaylyukova (3)

(1) Geological Institute of RAS, Moscow, 119017, Russia, (2) Institute of Volcanology & Seismology of FEB RAS, Petropavlovsk-Kamchatsky, 683006, Russia, (3) Moscow State University, Moscow, 119991, Russia

Volcanic zones of Kamchatka bear two types of active faults and fractures. Faults of the first type are tectonic, so they are long-living with net offset growing with time by repeating movement. Faults of the second type could be termed volcano-tectonic as they couple with or are caused by eruptions and thus move just once.

Authors have explored and described a NE-SW-striking fissure on the SW side of Gorely plateau in the South Kamchatka volcanic zone, which conducted magma 200 years ago (Selyangin, Ponomareva, 1999). The fissure depression is filled with basaltic-andesite lava. The 900 meters long southern terminus of the fissure is situated on the hill slope and therefore not overlapped with lava. The fissure ending is an asymmetric graben, deeper at its west side, up to 300 m wide and bounded by two nearly parallel normal faults. The graben floor is gradually deepening to the north, away from the terminus, down to 9-10 m. Bounding faults are perfectly expressed in topography, thus providing a rare opportunity for determination of fissure parameters. Both faults dip at 80-85°, that gives approximately up to 3 m of perpendicular extension and the same thickness of the dyke beneath. Vertical movements on the western and eastern bounding faults were accompanied by horizontal components, left-lateral and right-lateral, respectively. There are also several transverse north-facing scarps breaking the graben floor and not extending beyond its limits. The observed deformations altogether suggests simultaneous sinking of the graben floor and northward compensating movement of masses into the graben.

Tectonic landforms we studied illustrate how strain could be compensated at the end of an opening fissure and provide some insight into similar settings at a regional and even global scale.