A Mechanism of Sliding Deformations of Volcanoes and their Possible Catastrophic Development on the Example of the Kuril-Kamchatka Region

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Over 100 cases were registered in Kamchatka and Kuril Islands when the volcanoes were destructed by giant landslides, the majority of which were of Holocene Age.

By mechanism of formation, volcanic landslides can be grouped into three basic types: (1) displacement of volcanic strata (sliding, cutting-off); (2) liquefaction of rocks composing volcano slopes (landslides – flowing and plastic); (3) deep gravitational compaction (crushing) of volcanic strata, horizontal stresses in which are weakened by steep slopes, erosional and abrasional entrenchments with formation of block-type landslides (landslides of pressing out, subsiding).

An active development of a sliding process is progressed by a large height (to 2000-3000 m), steep slopes (30-40°, sometimes to 90°), a large thickness of volcanic strata and often with buried ice and weak rocks, sloped stratification, availability of deeply entrenched valleys of temporary and constant water streams, a rapidly increasing load upon the top part of a volcano due to a growth of extrusive dome and eruption, presence of hydrostatic and hydrodynamic pressures, an earthquake and tectonic motions, densely occurred volcanic-tectonic rupture dislocations, a magma pressure in a feeding channel and stratum intrusions.

Of the highest hazard are deep block-type landslides.