



## Landslide Hazard Assessment in Geyser Valley

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Geyser Valley is located on the territory of Kronotskiy State Natural Biosphere Reserve (Kamchatka peninsula, Russia) and included in UNESCO World Natural Heritage Complex Object "Volcanoes of Kamchatka". Ecological tourism is developed actively in this region. A big landslide formed on June 3, 2007 in Geyser Valley. Fortunately the landslide did not cause human victims but it changed strongly valley landscape: the Geysernaya River was dammed up by landslide deposits; several geysers lost forever, several changed their hydrothermal regime. Capability of repeat of similar event definded the necessity of carrying out of landslide hazard assessment in Geyser Valley. Made researches included:

- field observation in valley of the Geysernaya River,
- remote sensing data interpretation,
- soil and rock sampling and study of physical and geotechnical characteristics (first time for this region).

Valley of the Geysernaya River is represented as an erosive V-shaped valley depth 300 m (in the top part) to 500-550 m (in the bottom part). The width of a valley in the Middle Geysernaya River is no more than 2 km.

Geyser Valley is developed in lake-volcanic weak rocks. Watersheds of the valley are covered by strong rocks (mostly siliceous effusive rocks), erupted in last stage of volcanic activity. A lake-volcanic series forms slopes of the valley in the middle and bottom part. A lake-volcanic series is composed of argillite with interlayers of conglomerates and sandstones. Argillites are hydrothermally altered and unsteady under humidifying. Water saturation causes their destruction in to plastic loams.

The humidifying of rocks is controlled by infiltration of superficial waters on one hand and by inflow of thermal waters from systems of tectonic fractures and faults on the other hand. Zones of intensive rise of deep thermal waters are marked by geysers fields.

Unique feature of an environmental conditions (a contrast relief; rocks unstable to the humidifying, covered by strong dense rocks; a specific regime of humidifying) predetermine wide development in boards of valley of the Geysernaya River different landslide types (rockfalls, topples, rotation landslide, block slide, debris flow, etc.).

As a result of the executed researches the inventory map of slope deformations development (slope failure) and landslide hazard assessment for the valley of the Geysernaya River (Geyser Valley) has been made.