



Modeling potential laharc hazards related to ice-melting in case of unrest of Iztaccíhuatl volcano (Central Mexico)

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Iztaccíhuatl (5230m) is the third highest peak in Mexico covered by two glacier-systems: El Pecho and La Panza. The recent activity of its southern neighbour Popocatepetl (5452m) caused several lahars related to ice-melting within the last 10 years, and hit the nearby village of Santiago Xalitzintla twice.

The rapid glacier recession in the past decades, and particularly in recent years (more than 1/3 of the total area in the last 10 years), may be caused by local and global warming and/or could indicate an increasing heat flux from the plug dome of Iztaccíhuatl. In order to assess the hazard potential of glacier-related lahars on Iztaccíhuatl, the SRTM DEM (Digital Elevation Model from the Shuttle Radar Topography Mission, 2000) with 90m resolution and ASTER DEMs (Advanced Spaceborne Thermal Emission and Reflection radiometer onboard the Terra satellite) with a resolution of 30m and 60m were generated. The hydrologic modeling of the laharc flows was carried out with two topography-based mass-flow models (LAHARZ and MSF).

As a result, lahars simulated with the LAHARZ program would reach some nearby villages with volumes of 500'000 m³ (corresponding to 5% melting of the Ayoloco glacier, La Panza). This is confirmed by the MSF model which shows that flows would achieve settlements already at H/L-ratios (drop height to thalweg run-out distance) higher than 0.2, while sources of recorded lahars revealed possible values below 0.1.

The modeled flows show that lahar formation is possibly a serious threat to many villages close to Iztaccíhuatl. Related to an increased heat flux, the retreating glaciers

may indicate internal changes of the volcanic activity. Possibly, the glaciers will disappear before occurrence of any volcano-ice interaction. Nevertheless, due to the glacial recession and permafrost melting new instabilities develop on the steep flanks and fresh friable material may enhance the laharic hazard potential, either by ice-melting or precipitation.