

Finite Element Modeling of Volcanic Ballistic Impacts in Soft Ash and on Buildings - a Hazard Approach

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Volcanic eruptions, such as the phreatic eruption of 2014 at Ontake Volcano can produce large number of ballistics, which often turn into craters near the summit of the volcano, and which can have devastating effects on buildings.

In the present contribution, the authors have performed a visual analysis of the ballistic impacts at the summit of the Ontake Volcano on building materials and in soft clastic sediments and reproduced the time of impact between the ballistic and the impacted material.

The simulation was performed with the ANSYS engineering suite using andesite material for the projectile and timber and aluminum sheets to work on the impact on building. The timber planks had a 20 mm thickness and the aluminium sheets 0.5 mm. They were anchored along two parallel edges to simulate the supporting carpentry. Results reproduced the erosion of the impacted materials as observed in the field, with different effects depending on the penetration angle.

On the ground, the ballistic impacts recreated realistically the craters observed around the summit of the Ontake, showing an interesting feature of plastic decompression at the point of impact, allowing the projectile to slightly rebound.

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