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Prediction of the run out extents of the Slano Blato landslide for future debris flow events

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The Slano Blato landslide has a volume of about 1 mio m^3 and is located in the western part of Slovenia. It has been considered to be a potential natural hazard for the village of Lokavec for more than 200 years. Several mud flows, exhibiting a range of volumes and velocities, have originated from the landslide body since the year 2000, when the landslide was reactivated due to an intense rainfall event. A series of obstacles, including safety dams and deposition ponds, have been constructed for the remediation of the landslide. These obstacles are designed to absorb and contain future debris flow hazard.

A prerequisite to any risk analysis is to establish the vulnerability to the hazard event. The aim of this work is to simulate possible future debris flow scenarios in order to predict the run out distances, flow heights, impact pressures and potential effects on the downstream village buildings and infrastructure. The simulations were carried out using the RAMMS program (RApid Mass MovementS, www.ramms.slf.ch). A three dimensional terrain model of the landslide area and the downstream zones, with or without the inclusion of the obstacles, was made for the simulations and different scenarios concerning the released volume, the internal friction and viscosity of the sliding mass were studied.

The results indicate that low viscosity mudflows with a volume of 5,000 m^3 endanger some parts of Lokavec village. However, the simulations with volumes of 15,000 and 50,000 m^3 predict catastrophic effects in terms of either impact pressures or deposition heights for the majority of houses. Moreover, the simulations confirmed that the choice of the material properties (internal friction and viscosity), the characteristics of the release hydrograph, event location, and natural or man-made obstacles play major roles in the run out distances and impact pressures.