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Numerical modelling of the lahars generated during the 2015 eruption at Volcán Villarrica (Chile)

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The Villarrica or Rukapillan is one of the most active volcanoes in South America. In Chile it is the volcano with the highest risk to human life and infrastructure. An eruption on 3rd of March 2015 triggered several lahars that affected four different valleys, where they caused the destruction of touristic infrastructure and parts of the local road network. Adequate numerical simulations of such events can build an important basis for risk management. Various software tools are available to accomplish such task, each of which has its potentials and limitations. This work compares two sets of numerical simulations of the lahars that occurred in the valley Zanjón Seco during the 2015 eruption. The first set is conducted with *r.avaflow*, a physically-based open-source simulation framework for mass flows and process chains which runs in the GRASS GIS environment. The second is realized with *Laharz*, a statistically-based tool which runs in an ArcGIS environment. Strengths and weaknesses of both simulation tools in regard to the adequate reconstruction of the observed lahar events reproducing such volcanic hazards are discussed. For this purpose, the model outputs are evaluated against the lahar deposits mapped in the valley and qualitatively compared with each other.