The cellular automata for modelling of spreading of lava flow on the earth surface

Alexandra Jarna and Juraj Cirbus

Institute of geoinformatics, Faculty of Mining and Geology, VŠB – technical University of Ostrava (sasenka.j@gmail.com)

Volcanic risk assessment is a very important scientific, political and economic issue in densely populated areas close to active volcanoes. Development of effective tools for early prediction of a potential volcanic hazard and management of crises are paramount. However, to this date volcanic hazard maps represent the most appropriate way to illustrate the geographical area that can potentially be affected by a volcanic event. Volcanic hazard maps are usually produced by mapping out old volcanic deposits, however dynamic lava flow simulation gaining popularity and can give crucial information to corroborate other methodologies.

The methodology which is used here for the generation of volcanic hazard maps is based on numerical simulation of eruptive processes by the principle of Cellular Automata (CA). The python script is integrated into ArcToolbox in ArcMap (ESRI) and the user can select several input and output parameters which influence surface morphology, size and shape of the flow, flow thickness, flow velocity and length of lava flows. Once the input parameters are selected, the software computes and generates hazard maps on the fly.

The results can be exported to Google Maps (.klm format) to visualize the results of the computation. For validation of the simulation code are used data from a real lava flow.