

The role of DEM resolution on ballistic distribution using the BALLISTA model at Merapi Volcano

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Introduction - Merapi Volcano is located in Central Java, Indonesia, and it is certainly one of the most active volcano in the world, with eruptions characterized with dome-collapse pyroclastic flows and lahars every five years. In 2010, the volcano produced its largest known eruption for the last 1,000 years, draping the summit and the South-East to South-West sector in pyroclasts and ash. Although it played a minor role in the eruption hazards, volcanic ballistics accompanying the eruption have blanketed the upper slopes, providing a good archive of the ballistic deposition zones during the eruption.

Nevertheless, simulations have limits, especially when they are run over poor resolution DEMs, and it is important to therefore understand the role of the DEM resolution as a limiting factor, but also to understand when too much information is not necessary anymore.

Methodology - Using the Ballista model at Merapi Volcano (Indonesia) the authors have tested the role of different resolution DEMs on the model results and whether or not it had an effect on the model results. To do so, the model was run with the same parameters on a DEM with 1 m, 2 m, 3 m, 4 m, 5 m, 7 m, 10 m, 15 m, 20 m, 30 m, and 50 m horizontal resolution. Similar work was reiterated using a Gaussian noise over the vertical dataset as low resolution in X Y dataset also results in poorer accuracy and not just a sum of a group of data into one single value.

Results -The results show variation in the general dispersion of the ballistics, depending on the model resolution, although no clear threshold could be identified. The location of the ballistic impacts change in the details, as concentration due to medium-size ridges and gullies become negligible and invisible with lower resolution DEM.

Keywords: DEM resolution, hazard modelling, Merapi Volcano