Probabilistic volcanic ash dispersal modelling using PF3D: An example from Gunung Ciremai, West Java Indonesia

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Volcanic ash represents a serious hazard to communities living in the vicinity of active volcanoes in developing countries like Indonesia. Geoscience Australia, the Australia-Indonesia Facility for Disaster Reduction (AIFDR) and the Indonesian Centre for Volcanology and Geohazard Mitigation (CVGHM) have adapted an existing open source volcanic ash dispersion model for use in Indonesia. The core model is the widely used volcanic ash dispersion model FALL3D. A python wrapper has been developed, which simplifies the use of FALL3D for those with little or no background in computational modelling. An application example is described here for Gunung Ciremai in West Java, Indonesia. Scenarios were run using eruptive parameters within the acceptable range of possible future events for this volcano, granulometry as determined through field studies and a meteorological dataset that represented a complete range of possible wind conditions expected during the dry and rainy seasons for the region. Implications for varying degrees of hazard associated with volcanic ash ground loading on nearby communities for dry versus rainy season wind conditions is discussed. Communities located on the western side of Gunung Ciremai are highly susceptible to volcanic ash ground loading regardless of the season whereas communities on the eastern side are found to be more susceptible during the rainy season months than during the dry. This is attributed to prevailing wind conditions during the rainy season that include a strong easterly component. These hazard maps can be used for hazard and impact analysis and can help focus mitigation efforts on communities most at risk.