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'Understanding volcanoes and society: the key for risk mitigation'



3D printed volcano models: Hands-on hazard communication

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Effective volcanic hazards communication plays a key role in rising awareness of volcanic risk on the potentially affected population and helps the management of local communities during volcanic unrest and eruption. 3D printed models can help convey information about volcanic hazards and have advantages over traditional 2-dimensional maps. First, people can often pinpoint their location and specific geographic features more easily on a physical model than on a map. Second, physical volcano models are effective tools for communicating risk, because volcanic hazards, such as ash flows, landslides, and lahars are so closely related to the morphology of the terrain. In addition, models can be 3D printed in color with the hazard information built right in. Digital elevation models (DEMs) are sufficient data sets to produce high-quality 3D models of entire volcanoes. Once the data is acquired, building a 3D printable model tailored to the specific needs of individual projects is relatively easy and affordable. The educational scope of using such models is broad, and its intuitive and hands-on character makes it an especially powerful tool to convey volcanic hazards to children. During a field campaign at Popocatépetl volcano, Mexico, we successfully included 3D printed casting molds of the volcano in an awareness workshop at a school located on the flanks of the volcano. In two-hour sessions, children first crafted their own miniature 3D models of Popocatépetl using plaster, and then used diluted finger paint to explore the effects of topography on the pathways of volcanic mass flows or pyroclastic density currents. This way, children can understand in a playful way how volcanic hazards might affect them, and make first-order assessments of high-risk areas themselves. In a broader educational context, 3D models are a useful tool to demonstrate volcanic hazards to students, also in areas not directly affected by volcanic activity.