



The use of digital outcrops to study monogenetic volcanoes: Case study at Croscat volcano (Garrotxa Volcanic Zone, Spain)

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During the last years, it has been demonstrated that the study of outcrops with difficult or completely restricted access can be carried out by means of digital representations of the outcrop surface. Furthermore, the study of digital outcrops may facilitate visualization of the features of interest over the entire outcrop, as long as the digital outcrop can be analysed while navigating in real-time, with optional displays for perspective, scale distortions, and attribute filtering. In particular, Terrestrial Laser Scanning (TSL) instruments using Light Detection And Ranging technology (LIDAR) are capable of capturing topographic details and achieve modelling accuracy within a few centimetres. The data obtained permits the creation of detailed 3-D terrain models of larger coverage and accuracy than conventional methods and with almost complete safety of the operators. Here we show digital outcrops may be useful to perform the description of the internal structure of exposed volcanic edifices. A further advantageous application is the estimate of erosion rates and patterns that may be helpful in terms of hazard assessment or preservation of volcanic landscapes. We use as an example of application the Croscat volcano, a monogenetic edifice of the La Garrotxa volcanic field (Spain), which quarrying jobs have exposed the internal part of the volcano leading to a perfect view of its interior but making difficult the access to the upper parts. The Croscat volcano is additionally one of the most emblematic symbols of the La Garrotxa Volcanic Zone Natural Park being its preservation a main target of the park administration.