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# Delimitation of volcanic edifices for landscape characterization and planning

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The European Landscape Convention, recently adopted in Italy, indicates specific landforms to be selected as special protected sites. Active and inactive volcanic edifices, defined as the products of evolution of aggradational (lava effusion, pyroclastic deposition, magma intrusion) and degradational processes (erosion, deformation, gravitative phenomena), are one of the specific landforms to be protected.
In order to protect these sites, management and planning measures are to be defined and shared with the local communities. In the framework of the Regional Landscape Management Plan of Sardinia (Italy), a detailed study aimed at identifying and delimiting Cenozoic volcanic edifices was performed. The large geological and morphological variability of the volcanic edifices of Sardinia in terms of type, dimension, age, integrity (a measure of the wholeness and intactnes of the volcanic edifice), geology and paleomorphology of the substrate, does not allow the definition of an automatic procedure for extracting the boundaries to delimit the volcanic edifices. In addition, quantitative geomorphological studies in the field of volcanology are confined to specific volcano types, and landscape literature does not suggest any universal criteria for delimiting volcanic edifices, except for the use of the concave breaks in slope at their base (Euillades et al., Computers and Geosciences, 2013). As this simple criterion can be unequivocally applied only in the ideal case of symmetric cones or domes built up on a planar surface, we developed a multidisciplinary methodology based on the integrated analysis of geological, geomorphological and morphometrical data of each edifice.
The process of selection and delimitation of the volcanic edifices is the result of the following steps: i) a literature based delimitation of the volcanic edifice; ii) a preliminary delimitation through photo-interpretation and the use of geological criteria; and iii) a final refinement based on the use of DEM-based quantitative elaborations. This final step consists in the construction of maps of the angle of slope and of the surface curvature (concavity, convexity) generated by digital topographic maps in 1:10.000. In addition to this, morphological parameters were combined following the method proposed by Grosse et al. (Geomorphology, 2012) and a new algorithm based on a different combination of the morphometric parameters. The edifice boundaries are manually defined by cross-checking all the available data, and the results are discussed through the use of some examples.