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Geomorphometric comparative analysis of Latin-American Volcanoes

Sergio Camiz[1,2], Maurizio Poscolieri[2*], Matteo Roverato[3]

[1]Dipartimento di Matematica "Guido Castelnuovo", Sapienza Università di Roma - Italy
[2]CNR - Istituto di Acustica e Sensoristica "O.M. Corbino", Roma - Italy
[3]IGC Instituto de Geociências, Universidade de São Paulo - Brazil

Keywords: *DEM*, geomorphometric classification, topographic gradients, volcanoes

*e-mail corresponding author: maurizio.poscolieri@idasc.cnr.it

Abstract

The geomorphometric classifications of three groups of volcanoes situated in the Andes Cordillera, Central America, and Mexico are performed and compared. Input data are eight local topographic gradients (i.e. elevation differences) obtained by processing each volcano raster *ASTER-GDEM* data. The pixels of each volcano *DEM* have been classified into 17 classes through a *K*-means clustering procedure following principal component analysis of the gradients. The spatial distribution of the classes, representing homogeneous terrain units, is shown on thematic colour maps, where colours are assigned according to mean slope and aspect class values. The interpretation of the geomorphometric classification of the volcanoes is based on the statistics of both gradients and morphometric parameters (slope, aspect and elevation). The latter were used for a comparison of the volcanoes, performed through classes' slope/aspect scatterplots and multidimensional methods. In this paper, we apply the mentioned methodology on 21 volcanoes, randomly chosen from Mexico to Patagonia, to show how it may contribute to detect geomorphological similarities and differences among them. As such, both its descriptive and graphical abilities may be a useful complement to future volcanological studies.

Keywords: Geomorphometry, ASTER-DEM, Local topographic gradients, Classification, Comparison, Volcanoes, Andes, Central-America, Mexico.