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Morphometric analysis of volcanic structures using digital elevation models and models developed from radar images in the Apan volcanic field, México.

Jesús Octavio Ruiz Sánchez[1], Jesús Eduardo Méndez Serrano[1], Mariana Patricia Jácome Páz[2], Nelly Ramírez Serrato[2], and Nestor López Váldes[3]

[1]Universidad de Guadalajara, Centro Universitario del Sur, Mexico (joctavio.ruiz@alumnos.udg.mx)
[2]Instituto de Geofísica. Universidad Nacional Autónoma de México, UNAM (jacome@igeofisica.unam.mx)
[3]Facultad de Ciencias. Universidad Nacional Autónoma de México, UNAM (nestorlopez@ciencias.unam.mx)

The present project aims to make a preliminary assessment of the volcanic risk represented by the Apan Volcanic Field (CVA). The methodology was divided into two parts. In the first, Digital Elevation Models (DEM) published by official sources were used to identify unreported structures and perform morphometric analysis of previously dated structures. In the second stage, a new DEM was developed from interferometric methodologies to compare the results with those obtained from official sources. Two SAR satellite images from the SENTINEL-1 satellite of ESA's Copernicus program were used. Being the first of October 14, 2021, leader image, and the second of October 26, 2021, slave image. These images were processed in ESA's SNAP software. For the morphometric analysis, volcanic structures have been classified into three major categories: Young cones (0.18 Ma - 0.5 Ma), Intermediate cones (0.5 Ma-1 Ma), and Old cones (1 Ma-3 Ma). From the official DEM analysis, 243 volcanic structures were reported within the study area with a preliminary predominance of structures that fall in the range of old cones, 4 areas with a higher concentration of volcanic structures were detected in which some highly populated localities are found. In addition, demographic parameters were used for a better preliminary risk assessment in the study area. Official and Radar images DEMs were used for the morphometric analysis and the results were compared with the previously published models. Finally, it was concluded the importance of the CVA by comparison with other two Mexican volcanic fields CVA represents a moderate volcanic risk, for which a greater number of studies and monitoring in the area is recommended. This project provides a new understanding of the volcanic hazard and risk associated with the CVA and the development of the surrounding social environment.