# Geomorphometric analysis of the scoria cones of the Chaîne des Puys

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Since the early 2000s, the DTMs have been increasingly used for morphometric studies, especially in volcanological research. The most common volcanic edifices for GIS analysis are the monogenetic scoria cones, because they are relatively symmetrical forms. With high-resolution LiDAR data we studied cone parameters, such as aspect, area, cone and crater height/width ratio, slope, volume. To create an even more accurate study of the non-symmetrical shape, we used the polar coordinate transformation (PCT) introduced by Székely & Karátson (2004). The study area is a type example of a scoria cone alignment. In the Chaîne des Puys, there are 48 scoria cones and 8 lava domes that can be analysed even including some slight asymmetric shapes.

The area has been well-studied by geologists for centuries e.g. Desmarest (1771), Scrope (1825), and because of the modern high-resolution of the used LiDAR data, our quantitative geomorphology results are as accurate as possible, and can be compared with results and conclusions in the literature.

The easiest way to investigate a roughly circular geometric shape is to designate a symmetry center. Using this, we look at the topographic data in a radial way. The PCT which is quite suitable for morphometric calculations, is a one-to-one transformation where the original Cartesian coordinates (X,Y in meters) are mapped to radial distance (m) and azimuth (°) values.

Our goal is to compare the morphometric parameters and lithologic features with the age of the cones. We calculated mean and average values and created images in the transformed coordinate system. As a result of the comparison we found a clear relationship between erosion and age.

Székely, B. & Karátson, D. (2004): DEM-based morphometry as a tool for reconstructing primary volcanic landforms: examples from the Börzsöny Mountains, Hungary, Geomorphology 63:25-37.