

Volumetry of two segments of the Carpathian Neogene/Quaternary volcanic chain using SRTM elevation data: implications to magma output and erosion rates

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The newly available Space Shuttle Radar Topography Mission (SRTM) elevation database was used to obtain volumetric data of two segments of the Inner Carpathian Volcanic Chain: the Late Miocene-Quaternary Calimani(Kelemen)–Gurghiu(Görgény)–Harghita(Hargita) mountains (CGH) and the Late Miocene Slánské(Szalánci)–Tokaj mountains (ST) segment. Volumes (1) based on surface extension of volcanic rocks have been completed by (2) calculations for subsurface masses and (3) erosionally removed volcanic material.

Subsurface volumes are significant in only the ST segment; in contrast to CGH which is bordered mostly by subsiding basins. Representative cross-sections of valleys of the volcanic edifices have confirmed that erosion of volcanic material has been significant in both segments (approximately 20 % of the present-day volumes). In contrast, summit lowering, albeit it can amount to several hundred meters in height, has negligible volumetric contribution.

Total volumes of the CGH and ST segments are 1563 and 650 km³, characterized by 104 and 47 km³ average edifice volumes, respectively. Magma output rates in the CGH and ST segments are found to be very similar (165.5 km³/Ma on average), corresponding to moderate activity of subduction-zone stratovolcanoes. The largest stratovolcanic structures in the CGH, however, meet the size of the major subduction-zone volcanoes. Average migration rates of volcanism for 1 km-long sections are similarly ca. 3.0 km³/Ma in both the CGH and ST segments.

