VOLCANISM, UPLIFT AND EROSION IN AND AROUND THE DANUBE BEND, NORTH HUNGARY

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In spite of a number of hypotheses proposed, a reliable, widely accepted explanation for the region called Danube Bend in North Hungary is still missing in the scientific literature. This area, which hosts the rocky, terraced, arcuate gorge of the Danube River, lies between the mid-Miocene Börzsöny and Visegrád Mountains. There are at least two problems that should be addressed: what is the reason for the origin of the river gorge and why it is so regular (arcuate) shaped? The available hypotheses for these questions include (a) the synchronous uplift of the mountains and downcut of the river, (b) the epigenetic type of the valley originating from a previous meander, (c) existence of crosscutting tectonic lines in the area. No hypotheses have been put forward in relation to the original volcanic relief.

In our recent volcanological work, we have confirmed that an amphitheatre caldera (cf. Keserűs Hill caldera of Cholnoky 1937[1]) exists in the Visegrád side of the gorge, open towards the river (fig 1). Radial dips of interbedded ash and reworked deposits between block-and-ash flow breccias support the existence of a deeply eroded but still visible volcanic cone. No large-volume ignimbrites responsible for a possible caldera formation have been found, however (cf. Karátson et al. 2001[2]). Instead, small-scale debris avalanche deposits and lahar deposits have been mapped in both sides of the Danube River, N of the caldera (Karátson 2001[3]). We propose that the caldera should have been formed due to dome-forming and dome-collapse events that destroyed the northern sector of the Keserűs Hill volcanic edifice. These events could be similar to those identified in the partly coeval Börzsöny Mountains (Karátson and Németh, 2001[4]).

The link between the volcanic activity and subsequent relief evolution may have been as follows. The sector collapse(s) of the Keserűs Hill volcano and the existence of coalesced ring plains S of the South Börzsöny volcanic centres resulted in a negative topography. Since the volcanism occurred in the Badenian archipelago, a narrow strait could exist between the two mountains. The appearance of the Danube in the late Pliocene is also due to this low

topography. The arcuate shape of the gorge is rather due to the distribution of original volcanic landforms (e.g., position of eruption centres, debris-avalanche hummocks) than development of a large meander or „tectonic lines". Subsequent uplift of the volcanic mountains, supported by unevenly elevated reef limestones (of Badenian age) and by Pleistocene terrace levels have progressively accentuated the topographic contrasts: till present times, at least a 250-300 m elevation difference has been produced.

Keywords: volcanic debris avalanche, lahar, debris flow, caldera, ignimbrite, block-and-ash flow

References

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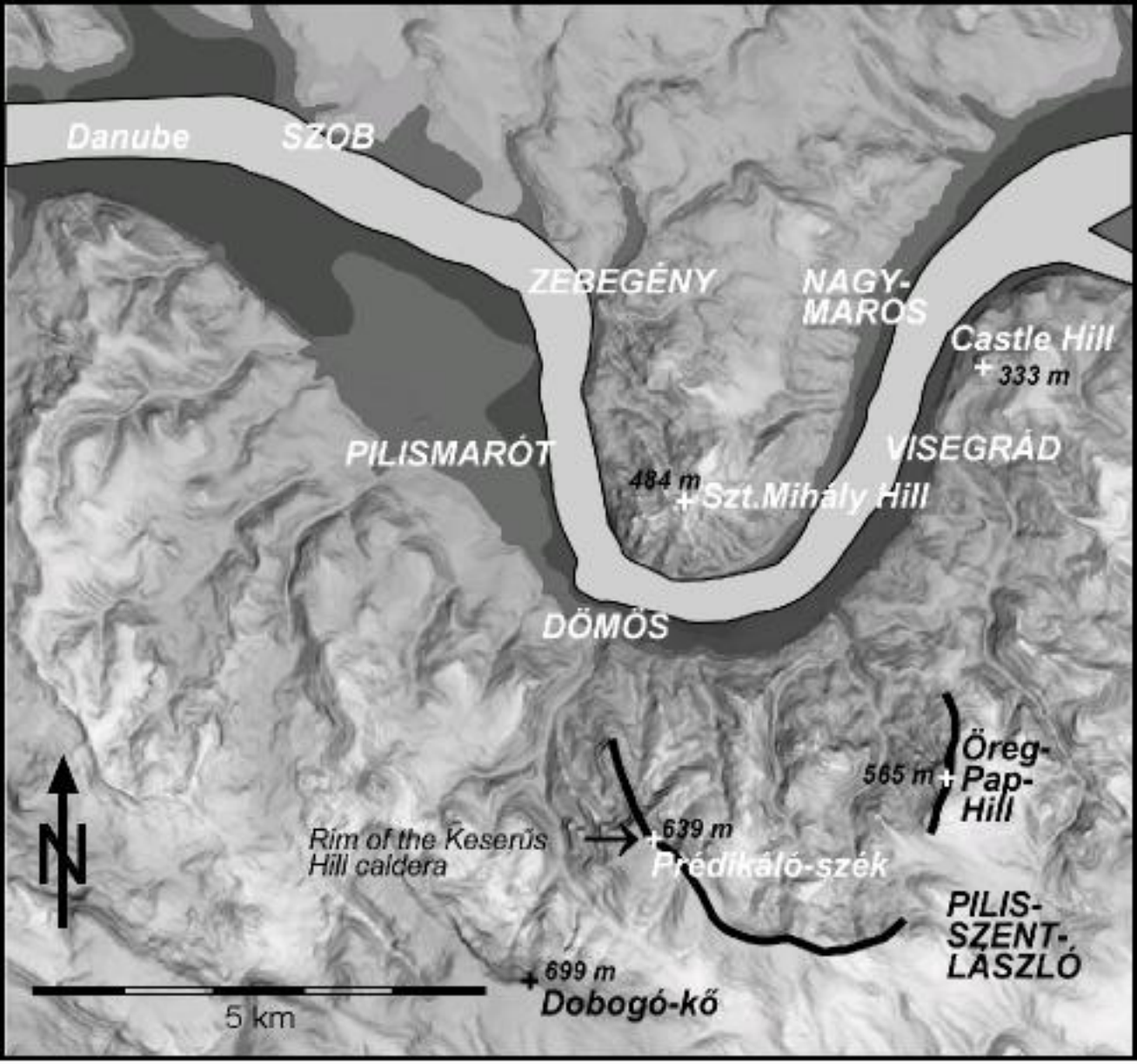

Fig. 1
Digital terrain model of the northern part of the Visegrád Mts. Note the darker pattern around the proposed caldera, and its relationship with the shape of the Danube bend.