

Evolution of collapse valleys in karst – examples from the Carpatho-Balkanides of Serbia

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Abstract:

Development of valleys in karst is an issue which has not been sufficiently studied in karst surface morphology. THESE valleys are long linear forms whose orthogonal projections resemble normal valleys, but most of their characteristics are strongly influenced by karst process. In largest number of relevant references, this subject is either only briefly mentioned or completely lacking. This paper presents the examples of a particular type of valley in karst formed by cave ceiling collapse close to the topographical surface.

Karst of the Carpatho-Balkanides in eastern Serbia is characterized by uneven spatial distribution in several large massifs, but also in a large number of relatively small outcrops (patches and belts), which enable the development of contact karst and fluviokarst. Many morphological elements are of fluvial origin, subsequently modified by karst process.

Collapse valleys occur mostly at the downstream contacts (where a seasonal watercourse leaves limestones) or in karst/limestone belts. In the first phase, which is visible on the example of the Radovanska Reka, the river course sinks to the swallets in the riverbed and forms a blind valley. After sinking, the water flows through the tunnel cave, while largest part of the valley remains above the cave. The bottom of the dry valley is dissected by deep dolines, reaching almost to the cave roof. In this part of the study, the area was scanned by a multistation Leica Nova MS 50

(resolution 20 cm @ 10 m).

In the second phase, the doline bottoms reach the cave ceilings which develop holes at certain points, as it is case at the Zamna River valley. These hollows tend to enlarge with time, and the surface of the cave ceiling is reduced. The third, final phase is characterised by collapse of larger segments of cave ceilings. Only the natural bridges remain, as the remnants of former caves (e.g. in the Vratna River valley, Ravna Reka valley). These parts of valleys in karst are usually narrow, steep-sided, resembling classical gorges. A closer look to the morphogenesis of this type of valleys is discussed.

Key words: valley in karst, collapse valley, karst surface relief, Carpatho-Balkanides.