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MORPHOGENETICAL ASPECTS OF COLLAPSE DOLINES AND OPEN PITS IN THE KARST OF THE VENETIAN FORE-ALPS

MORFOGENETSKI VIDIKI UDORNIC IN ODPRTIH BREZEN V KRASU BENEŠKIH PREDALP

UGO SAURO[1]

[1] Università degli studi di Padova, Dipartimento di Geografia, Via del Santo 26, IT-35123 PADOVA, ITALY, E-mail: sauro@ux1.unipd.it

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Ugo Sauro: Morfogenetski vidiki udornic in odprtih brezen v krasu Beneških Predalp

Avtor ugotavlja 6 vzrokov nastajanja udornic in odpiranja novih brezen v Beneških Predalpah: udor stropa, obglavljenje podzemeljske jame, povezava speleogenetskih procesov z dinamiko v epikrasu, polzenje polnila v jame, polzenje pokrova iz nevezane kamnine, odpiranje zaradi potresov. Tip krasa na obravnavanem ozemlju je površinski odraz razvoja odtočnih struktur v epikrasu.
Ključne besede: morfologija krasa, speleogeneza, udor, Beneške Predalpe, Italija.

Abstract UDC: 551.435.83(234.3)(450)

Ugo sauro: Morphogenetical aspects of collapse dolines and open pits in the karst of the Venetian Fore-Alps

The author found 6 reasons related to formation of collapse dolines and openings of karst shafts in Venetian Fore-Alps: a) collapse of the roof, decapping of hypogean cavity, speleogenesis and dynamics of the epikarst, swallowing of filling materials inside hypogean voids, swallowing cover of loose materials, opening by seismic shocks.
Types of karst structures are the superficial expression of the evolution of drainage structures in the epikarst.
Key words: karst morphology, speleogenesis, collapse, Venetian Fore-Alps, Italy.

In the Venetian Fore Alps karst collapse phenomena are well known by the inhabitants of the mountain areas. In the last decades of the 20th centuries, in the Lessini Mountains only at least two cattle have been involved in the sudden opening of new karst cavities.

The collapse dolines and the openings of some karst shafts are originated by different mechanisms. The following have been recognized:

a) collapse of the roof of hypogean cavities,
b) decapping of hypogean cavities as a consequence of the topographical surface lowering by erosional processes,
c) speleogenesis and opening of cavities in relation with the dynamics of the epikarst,
d) opening of cavities formed by the swallowing of filling materials inside hypogean voids,
e) swallowing cover of loose materials inside caves and open voids enlarged by karst processes; some covers, as conglomerates, etc., may be also affected by karst processes;
g) opening of small pits in intensely fractured rocky masses interested by seismic shocks.

The most typical collapse processes are linked with the accelerated morphogenesis and speleogenesis which occurs where different types of limestone come in contact. The karst speleogenesis and morphogenesis are accelerated, especially at the stratigraphical and/or tectonic contact between rock units different in their hydrologic behavior (Sauro, 1973, 1974). The best examples are represented by the contacts between the Biancone and the Rosso Ammonitico rock units. Biancone is a marly limestone of

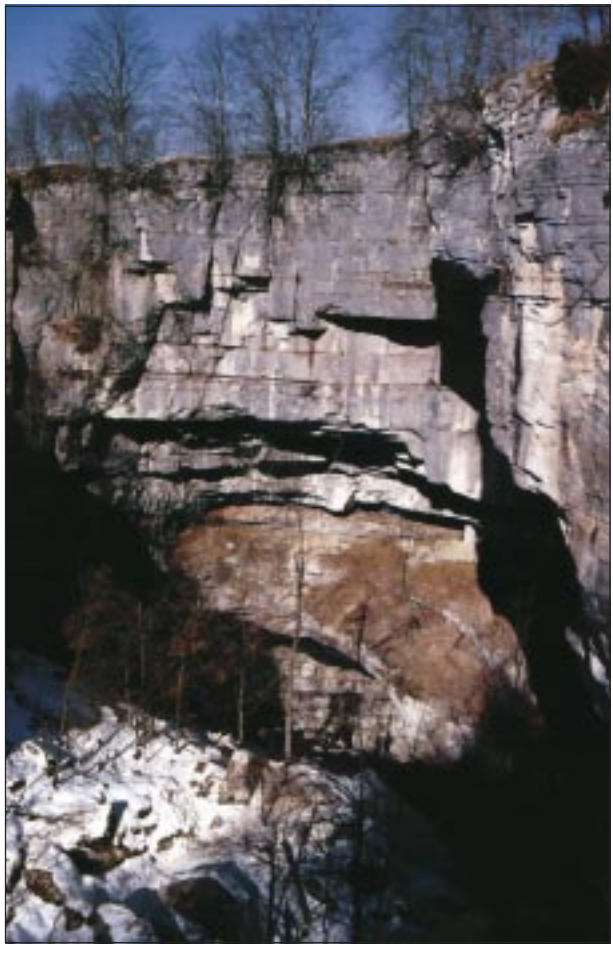

Fig. 1: The Covolo di Camposilvano, a large pit doline originated by the collapse of half of the vault of a great chamber, the residual part of which is communicating with the collapse pit, so the collapse pit is now a "karst window".

Lower Cretaceous; the Rosso Ammonitico of Jurassic age is a more massive and less fractured limestone.

Most of the dolines and vertical cave entrances in the upper part of the Lessini Mountains are located in well-defined morphostructural positions (Sauro 1973, 1974).

These types of karst structures are certainly the superficial expression of the evolution of important drainage structures inside the epikarst, linked with the transition between a dispersed circulation inside the Biancone, and a more focused diaclastic circulation inside the Rosso Ammonitico.

In the Fore-Alps, the phenomenon of collapse and of opening of cavities caused by the absorption of the fillings and occluding materials, mostly soil and colluvial sediments, are also relatively common.

In some areas the opening of small collapse pits has been also observed inside limestone masses strongly stressed by seismic shocks and in addition affected by karst processes. Here also trenches from surface rupture by earthquakes are present (Chelidonio & Sauro, 1996; Zampieri & Sauro, in print).

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Povzetek

Kraški podorni pojavi so prebivalcem gorskih področij Beneških Predalp dobro znani. V zadnjih desetletjih 20. stoletja sta samo iz gorovja Lessini znana najmanj dva primera, ko je bila prizadeta goved, ker se je nenadoma odprla kraška jama.

Vzroki za nastajanje udornic in za nenadna odpiranja novih kraških brezen so različni mehanizmi. Zaenkrat poznamo naslednje:

a) Udor stropa nad podzemeljsko jamo.
b) Obglavljenje podzemeljske jame zaradi znižanja topografskega površja potom erozijskih procesov.
c) Povezava speleogenetskih procesov in dinamike v epikrasu.
č) Odpiranje jam kot posledica polzenja polnila v podzemeljske votline.
d) Zaradi polzenja pokrova iz nevezane kamnine v jamo in širjenje odprtine s procesom zakrasevanja; tudi nekatere vrste pokrova, npr. konglomerat, so lahko podvržene zakrasevanju.
e) Odpiranje majhnih brezen v močno pretrti kamnini zaradi potresnih sunkov.

Najbolj tipični podorni procesi so v zvezi s pospešenimi morfogenetskimi in speleogenetskimi procesi na stiku različnih vrst apnenca. Procesi kraške morfogeneze in speleogeneze so pospešeni še posebej na stratigrafskem in oziroma ali tektonskem stiku kamninskih enot, ki imajo različne hidrološke lastnosti (Sauro 1973, 1974). Najlepši primer je stik kamninskih enot Biancone in Rosso Ammonitico. Biancone je spodnjekredni lapornati apnenec, jurski Rosso Ammonitico pa je bolj masiven in manj prepokan apnenec.

Večina vrtač in navpičnih jamskih vhodov v zgornjem delu gorovja Lessini je v točno določenem morfostrukturnem položaju (Sauro 1973, 1974).

Tak tip strukture krasa je gotovo površinski odraz razvoja pomembnih odtočnih struktur znotraj epikrasa, vezanih na prehod iz razpršenega odtoka v Bianconu in bolj sklenjenega toka po diaklazah v Rossu Ammonitico.

V Predalpah so razmeroma pogosti primeri udorov in odpiranja jam, ki jih povzroča polzenje polnila in zamaškov, predvsem iz prsti in koluvijalnih sedimentov.

V nekaterih predelih se opaža odpiranje majhnih udornih brezen v apnencih, ki so močno prizadeti zaradi potresnih sunkov in kraških procesov obenem. Tu je opaziti tudi površinske prelome, ki so jih povzročili potresi (Chelidonio & Sauro 1996; Sauro & Zampieri, v tisku).