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The impact of frost action and nivation on relief formation of Velebit Mt. (Croatia)

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Although the Velebit is a relatively low mountain, situated in the moderate climate zone, there exist periglacial processes in relief modelling in its highest part. Their appearance is caused by interdependance of geological, geomorphological, climatic, vegetational and pedological influences, but also long antropogenic and zoogenic influences which accelerate the influence of periglacial processes in the relief modelling. Among periglacial forms the features which originated from the activity of nival and frost processes can be singled out.

The Velebit Mountain has been attracting scientist since the 18th century (Hacquet 1785) who research its geomorphological characteristics, only in the middle of 20th century Poljak (1947) and Rogić (1958) in their works paid attention to the problems of periglacial modelling of relief of the Velebit Mountain. In respect of the problematic of this work, the main way of researching has been connected with the terrain investigations.

At the highest parts of the Velebit mountain (above 1400 m a.s.l.) besides the karst and derasion processes there are periglacial processes which are of great importance for relief modelling. In respect of intensity and lasting of periglacial processes, the climatic elements are very important.

The border position of the Velebit Mountain between the coast and inland area is expressed by the climatic characteristics of the mountain ridge. During the cold half of the year in the higher parts of the Velebit (above 900 m a.s.l.) there is a frequent appearance of cold, ice-cold and chilling days, which cause the freezing of water in the rock fissures and appearance of the cryogenic process. Although the daily oscillation of the air temperature during the winter months at Zavižan (1594 m a.s.l.), and espe-

Fig. 1. The avalanche accumulation (South Velebit)

Fig. 2. Stone rivers (stream) in the sinkhole (South Velebit)

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cially Baške Oštarije (924 m a.s.l.) is only about 2°C, because of frequent oscillation of the temperature around 0°C there is dissolving and refreezing and, due to that, the strong mechanical wearing out of the rocks appears.

There are two main winds which dominate in the Velebit area. Bora, dry, stroking and cold wind, most frequent on the SW slope and warm and moisture Jugo on the SE slope. Despite of large amount of snow, due to influence of those winds many parts of Velebit Mt. stay uncovered (without termic protection). These uncovered parts are more exposed to the frost action.

In periglacial modelling of relief the structural characteristics of the rock complex are of great importance, especially a density of appearance of the primary and secondary fissures and holes, and also the inclination of the layers. The domination of layers (mostly of carbonate sediments) which incline toward sea with general direction of NW-SE is at the highest parts (above 1200 m a.s.l.) of the mountain.

The snow moving in the shape of avalanche is mostly expressed on the slopes with inclination from 30° to 60°. On the slopes covered by wood vegetation, as well as on the ones without it where slope inclination is mostly less than 30°, there is a slow creeping of the snow cover. On the slopes overgrown by wood vegetation, because of the snow cover weight which creeps down the slope and because of the suffosional activity of the water (snow-water, but also the other precipitation) there is bending of the trees at their basic part. On the slopes without wood cover with the slope inclination over 30° the appearance of the snow avalanches is frequent (Perica et al. 2002). Their appearance can be found at the highest range on the SE slope of the South Velebit. There can be found the avalanche accumulations – cone, at the foot of slopes which, can be detect by the mixture of unsorted karst and wood fragments and stone blocks (Fig. 1).

Cryofraction and solifluction are the most expressive of all periglacial processes. The cryogenic process is most frequently connected with escarpments, sinkholes, hollows and uvalas of karst polje at the highest parts of the Velebit mountain. Due to the ice contractions along the fissure there is breaking of the stone complex the extracted parts of which and the influence of gravitation are being accumulated at the footslopes, at the bottom of sinkholes, hollows and uvalas of karst poljas, in the shape of talus cones, colluvial cones and colluvial fans (Fig. 2).

Literature

Belij, S., 1986. Primerljivost kraškega, glacijalnega in periglacijalnega procesa v reliefu južnega Velebita. Acta Carstologica, Ljubljana.

Perica, D., Lozić, S., Mrak, I., 2002. Periglacial Relief in Velebit Mountain area. Geoadria, Zadar.

Perica, D., Lozić, S., Mrak, I., Lončar, N., Trajbar, S., 2004. The influence of snow and frost on relief formation in the Paklenica National Park, Croatia. Paklenički zbornik, 2.