



Distribution and protection of cryogenic relief mesoforms on Kraví hora Mt. in the Novohradské hory Mts.

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Abstract

The aim of this work is to introduce the cryogenic relief mesoforms' distribution on Kraví hora Mt. located in the Novohradské hory Mts. Kraví hora Mt. (953 metres) is situated in the north-eastern part of the Novohradské hory Mts. and belong from among the highest peaks on the Czech side of the Novohradské hory Mts. This article is also devoted to the protection of the most interesting cryogenic relief mesoforms and describes some possibilities which could ensure the preservation to Kraví hora Mt. (according to the nature preservation system in the Czech Republic).

Keywords: frost weathering, cryogenic relief mesoforms, Kraví hora Mt., the Novohradské hory Mts.

Klíčová slova: mrazové zvětrávání, kryogenní mezofomy reliéfu, Kraví hora, Novohradské hory

1. Introduction

The Novohradské hory Mts. have become a centre of interest for the public, investors and environmentalists as a result of the process of European integration. Their unique qualities and position along the border with Austria are of particular importance. The Novohradské hory Mts. create an unique area which has been until today almost untouched by the influence of human, industrial and agricultural activities. Because of this many rare plant species and natural formations can still be found in this area.

The geomorphological unit Novohradské hory Mts. is a part of the Šumava Subprovince. Their bigger part is placed on the Austrian side and is called the „Waldviertel“. The altitude of the Novohradské hory Mts. reaches more than 1 000 metres. The highest mountain, Viehberg (1 111 metres) is on the Austrian side, while on the Czech side the highest mountain is Kamenec (1 072 metres). The location of the Novohradské hory Mts. in terms of the Czech Republic and their basic geomorphological division is shown on the Fig. 1.

2. Methods

The distribution of the cryogenic relief mesoforms on Kraví hora Mt. was specified by geomorphological inventarization methods according to Kirchner, Krejčí (1996) and Kirchner, Roštinský (2007). The article characterizes cryogenic relief mesoforms and dwells on their potential protection.

The first phase was the evaluation of source materials related to local geological and geomorphological

conditions. These characteristics were depicted on basis of a geological map at a scale 1 : 50 000 (www.geology.cz). Information about geomorphological conditions can be also found in older specialized literature, for example in Demek (1964, 1972c) or in Chábera (1972, 1982).

The second phase was focused on field research. The area of research was widened on Kraví hora Mt. surroundings. A topographical map at a scale 1 : 25 000 (a map list number 33 – 133 Horní Stropnice) was used. The local mapping of Kraví hora Mt. and its surroundings was based on detailed geomorphological mapping methods as described Bezvodová et al. (1985), Demek et al. (1972b). At Kraví hora Mt. itself GPS mapping was performed according to Voženílek et al. (2001) using Garmin GPS V Deluxe and further simple measuring devices (telemeter HD 150, measuring tape) were used to describe rock forms and their properties. For the measurement of the structure elements of the geologic basement the geological compass was used. The photodocumentation was an important part of the field research. The Létal's legend (Létal, 1998) was used for the geomorphological plans processing.

The third final phase was devoted to evaluation of source materials gained during the field research. This article specifies the localization, the basic geological profile, macro and mesoforms of relief, structural characteristics of the elements, the influence of human activity and proposal for protection of cryogenic relief mesoforms. Destructive and alluvial relief forms are terminologically and genetically classified according to Demek (1972a), Demek et al. (1987), Rubín et al. (1986), Summerfield (1991) and Thomas and Goudie (2000).

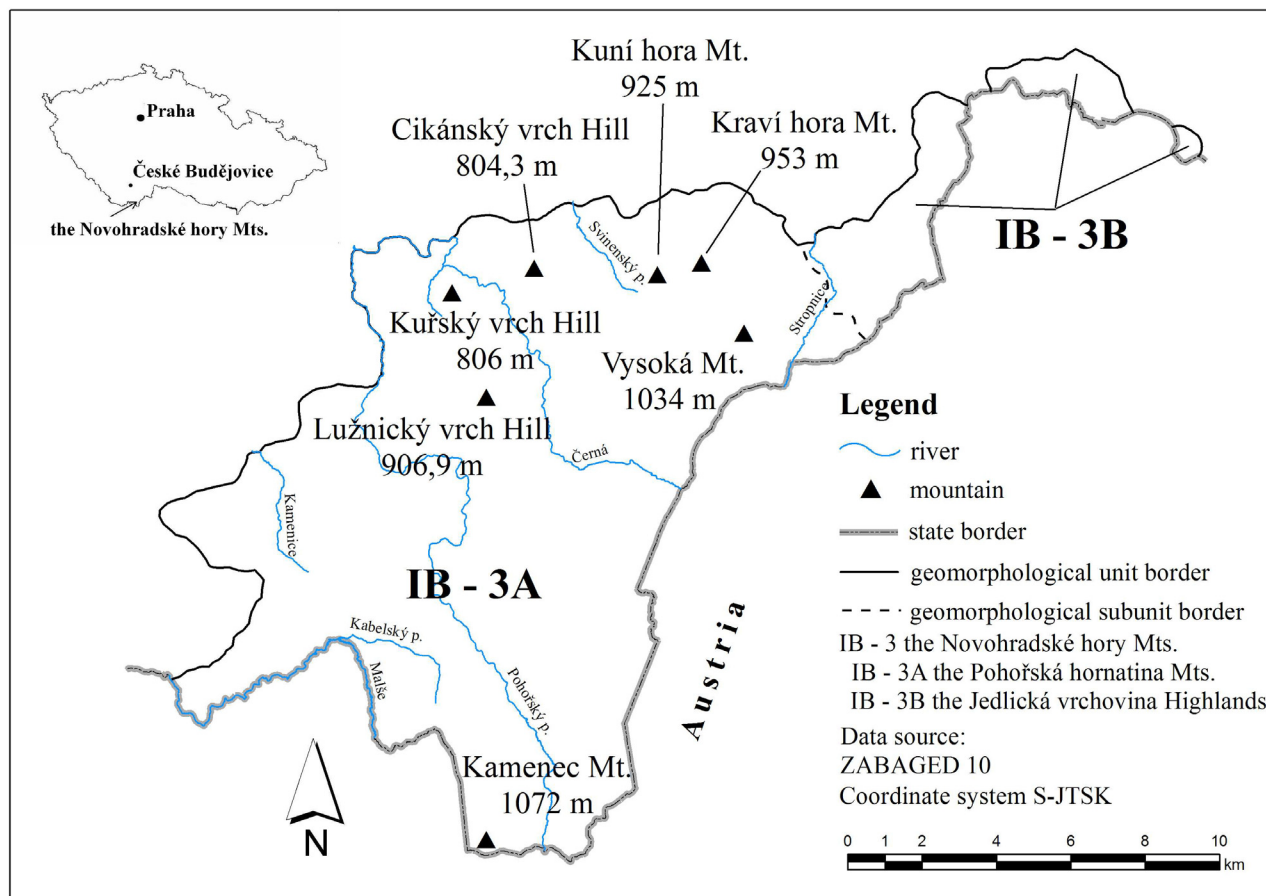
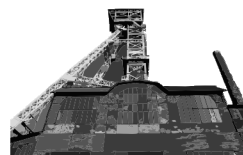


Fig. 1: The location map of the Novohradské hory Mts. in terms of the Czech Republic and their basic geomorphological division

Source: Jiří Rypl

3. Result – Kraví hora Mt. (953 metres)

3.1 Localization

The peak of Kraví hora Mt. itself is situated 500 m west of the village Hojná Voda, nearby the Austrian border in the Hojná Voda's cadastral area. As for the geomorphological hierarchy, the locality is placed in the south-eastern part of the geomorphological subunit called the Pohořská upland which belongs to the geomorphological unit called the Novohradské hory Mts. (Demek, Mackovčín, eds. 2006).

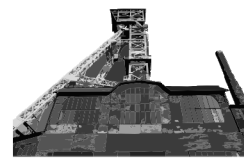
3.2 Basic geological characteristics

The Novohradské hory Mts. area make part of several basic geological units. Late Varian magmatites of Central Moldanubic Pluton are of the largest extension here. These are represented by several different types (Weinsberg granite, Freistad granodiorit and Mrákotín granite). The cordiritic gneiss and unbulitic migmatites partially cover late Varian magmatites of Central Moldanubic Plutone (as original plutone mantle

remains). The Weinsberg granite forms the Kraví hora Mt. locality itself.

3.3 The characteristics of the main forms of relief

Kraví hora Mt. creates a bornhardt (fig. 2). On the top of Kraví hora Mt. is a castle koppie, which is about 100 metres long, 2 metres wide and 12 metres high. This top castle koppie is demarcated by a snow depression to the west and sharply drops to the tectonic slope to the east at an incline of over 20°. Two smaller castle koppies of about 30 x 4 x 4 metres can be found on the upper slope in the vicinity of the peak. Napoleon's head (fig. 3), a mushroom rock of about 4 x 4 x 10 metres, is located at the south end close to the top castle koppie. The next castle koppie is connected with the mushroom rock and its proportions are 100 x 2 x 15 metres. The cryogenic plane below this castle koppie merges into the block field on the west denudational slope which has an inclination between 10° - 20°. This plane is demarcated on the northeast side by three frost - riven cliffs of about 8 - 10 metres long and 6 - 8 metres high. It is approximately 370 x 100 metres and is connected to the snow



depression. We can assume that both the castle koppies and the mushroom rock were formed as a one complex

during the Pleistocene.



Fig. 2: Kraví hora Mt. and Vysoká Mt. from Mandlstein Mt. (Austria)

Source: Jiří Rypl

On the west denudational slope, at an altitude of 880 metres, there are two smaller frost-riven cliffs of about 8 metres long and 4 metres high. The two dominant block fields on the east tectonic slope are respectively about 200 and 100 metres long, and 100 and 30 metres wide. The castle koppie (approximately 35 x 10 x 15 metres) with the cryogenic plane (70 x 60 metres) rises to an altitude of 880 metres, close to the southern cap stone of both slopes. The cryogenic plane is demarcated by discontinuous frost – riven cliffs of about 150 metres long and between 1.5 – 3.5 metres high. At the base of the frost – riven cliffs there is also a relatively large block field (250 x 80 metres).

The north and the northwest slopes of Kraví hora Mt. are relatively complicated. At first sight it seems that several frost – riven cliffs can be found here. Further

comprehensive research makes me suspect that they are structural outcrops. These structural outcrops were created along former ruwaries which were shaped by frost activities during the Pleistocene. These structural outcrops are situated at an altitude of 600 metres on the northern slope and the original ruwaries could have been about 150 metres long. One of the ruwaries runs to the northeast and two others to the northwest. These structural outcrops are completed by frost – riven cliffs that are 18 and 15 metres long and 8 and 6 metres high. A well established ruwary is situated at the top of Kraví hora Mt. where it drops down from the peak to the northeast. The ruwary is weathering and bipartite over a length of 150 m, with a maximum height of 8 metres. Both parts of the ruwary are well established. The geomorphological map of Kraví hora Mt. is shown on the Fig. 4.

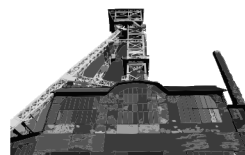


Fig. 3: The mushroom rock on Kraví hora Mt.

Source: Jiří Rypl

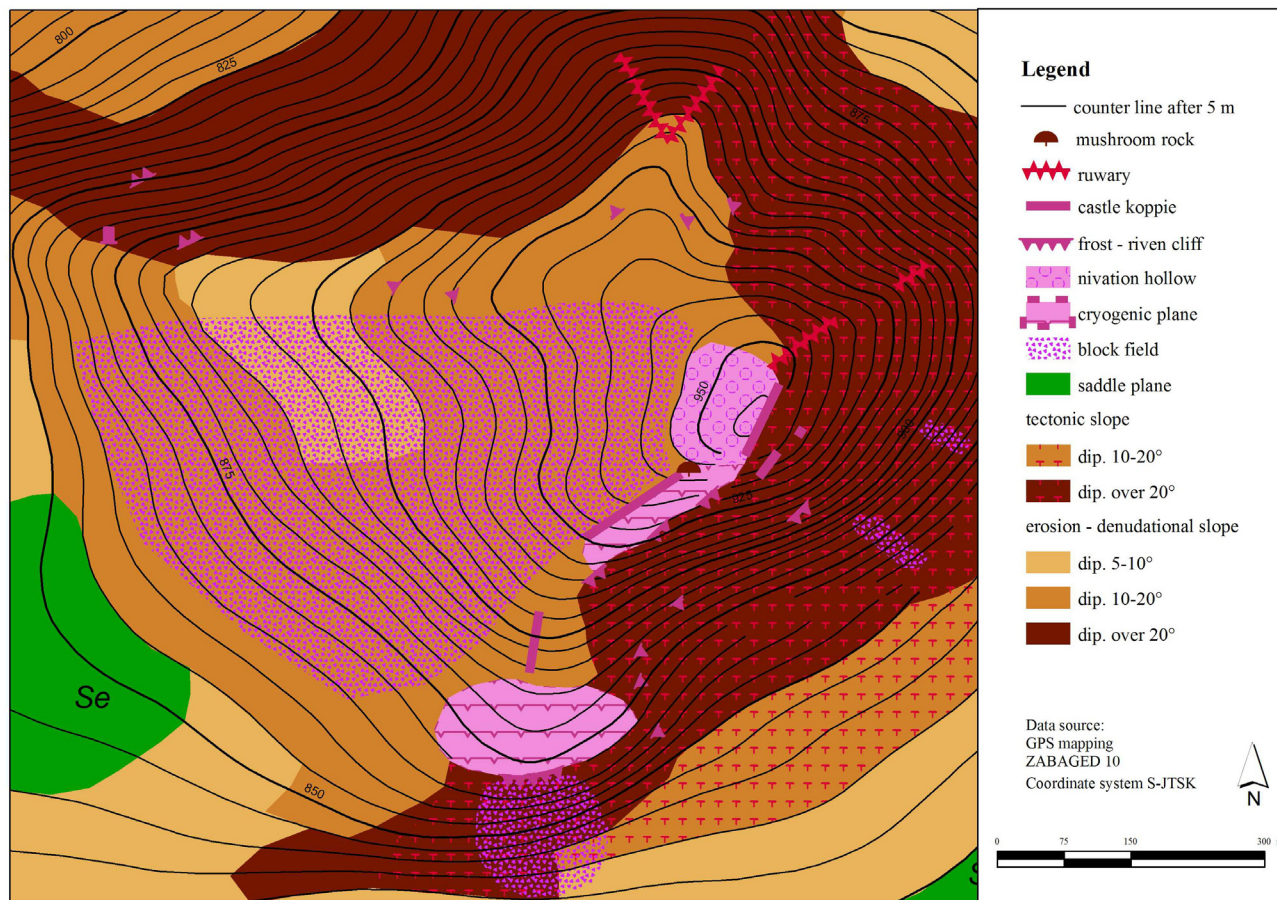


Fig. 4: The geomorphological map of Kraví hora Mt.
Source: autor's Jiří Rypl

3.4. The structural elements characteristics

102 measurements were performed to scan the fissure system at Kraví hora Mt. and according to these measurements the fissure diagram was constructed. The research has shown that the area disposes of almost ideally and regularly developed fissure system. The NW-SE direction (especially 140°) and the almost vertical direction NE-SW (40°) are dominant. Direction of these massive and morphologically significant fissures (some of them participate in division of the cryogenic relief mesoforms into big blocks) have been termed as a primary fissure system. A group of indistinctive fissures oriented in the direction of 10°, respectively 110°, makes a secondary fissure system. The fissure diagram of Kraví hora Mt. is illustrated in the Fig. 5.

3.5 The influence of human activities

Kraví hora Mt. is easily visitable from Hojná Voda. There is a hiking trail leading over the peak of Kraví hora Mt.. The trail is frequently used during summer and that's why the close surroundings of significant

cryogenic relief mesoforms (the castle koppie, the mushroom rock) suffer from subsoil disturbance. The mushroom rock is used by mountaineers. Mountaineers nailed down pegs and marked out the mountaineering path. On the peak of Kraví hora Mt. is often big amount of rubbishes by the tourists. There is the telecommunication tower so to which lead the concrete runway from south – east.

3.6 A proposal for the protection of the cryogenic relief mesoforms

In 2000 the regional authority in České Budějovice has declared the Novohradské hory Mts. a nature park. Unfortunately, this legal status does not give the cryogenic relief mesoforms situated in top part of Kraví hora Mt. (the mushroom rock, the castle koppie) enough protection. Account on that in 2002 the Czech Geological Survey has declared Kraví hora Mt. as geologically significant locality. Higher rate of protection will be a preparing declaration Kraví hora Mt. as natural landmark.

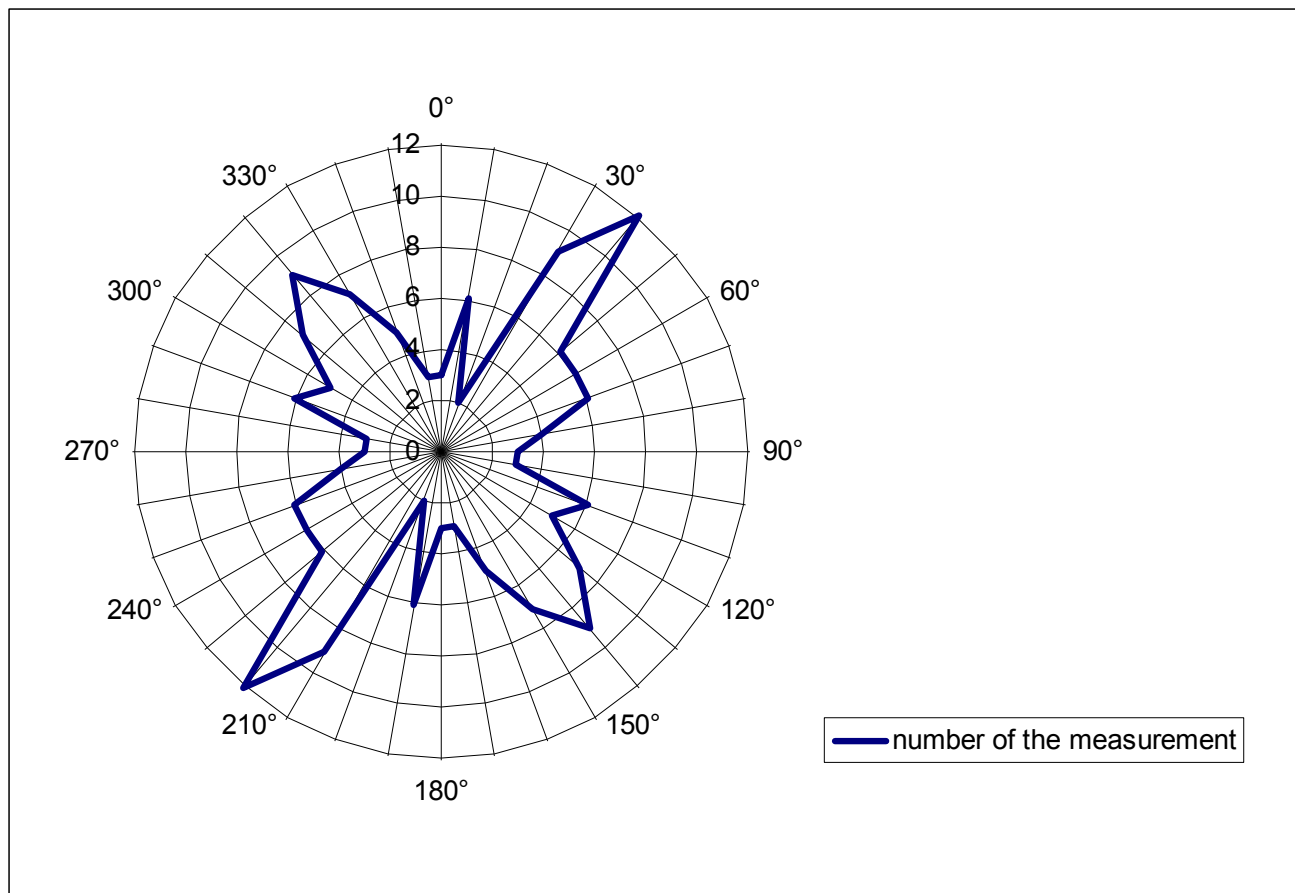
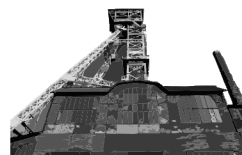


Fig. 5: The fissure diagram of Kraví hora Mt.

Source: autor's Jiří Rypl

4. Conclusions

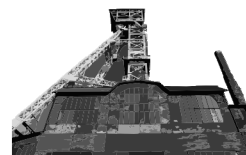
The source materials' completion important for the area's declaration a Protected Landscape Area showed a need of more detailed geomorphological research. In 2005 the Czech government refused to approve the Protected Landscape Area declaration. In consequence of this refusal more researches were realized (a detailed GPS mapping and geomorphological inventarization methods). The aim of that was to provide the most interesting localities of the Novohradské hory Mts. with more protection. Kraví hora Mt. belongs to these localities too (viewed from the aspect of basement and from the aspect of macro and meso relief forms). The author also tried to characterize the structural elements and the influence of human activities. Finally he proposed his own ways of cryogenic relief mesoforms protection.

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XXII SJEZD ČESKÉ GEOGRAFICKÉ SPOLEČNOSTI OSTRAVA 2010



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