

Vladimír Čech

**Spatial differentiation of georelief from the point  
of view of attractivity for tourism (on the example  
of the karst georelief of the Galmus mountains)**

---

**Introduction**

In georelief research, its genesis, spatial differentiation and geomorphological processes there is hardly any attention drawn to other aspects of this part of the landscape sphere of the Earth. It mainly refers to interdisciplinary approach involving geography or other scientific disciplines. Georelief often acts as a dominant factor in the structure of physical-geographical landscape and significantly influences its other parts. The importance of georelief is also seen in shaping the overall image of landscape from the viewpoint of human perception of the land. Because of heterogeneity of georelief, human being perceives individual types of land differently in terms of attractivity for tourism.

The aim of this report is to select the types of georelief from the point of view of attractivity for tourism in Galmus Mountains. This typisation has been conducted on the basis of proposed criteria of perceptive evaluation of territorial georelief with the utilisation of information about spatial differentiation of georelief and morphometric indicators.

**Location and georelief of the study area**

From the geomorphological differentiation point of view, Galmus Mts. are part of geomorphological subunit Hnilecké vrchy Mts. and geomorphological unit Volovské vrchy Mts. (Mazúr-Lukniš 1986).

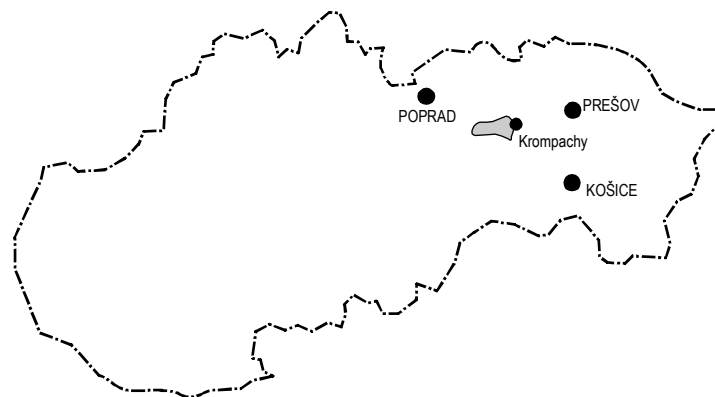


Fig. 1. Location of the Galmus Mts. in Slovakia

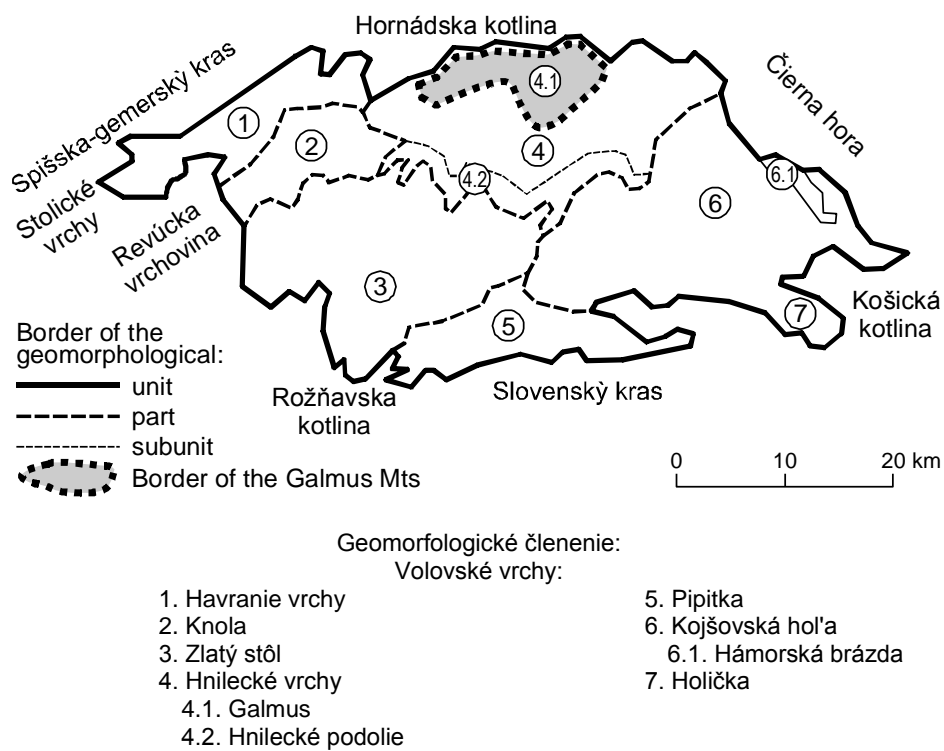


Fig. 2. Location of the Galmus Mts. in the geomorphological differentiation of Slovakia (Mazúr, Lukniš 1986)

The northern peripheral parts, interfering with Hornádska kotlina Basin and valley of Slovinský potok Brook on the east, are mostly built of diverse complex of Palaeozoic rocks of Gemicum and Meliaticum with the dominance of shales, sandstones and volcanic rocks. These rock formations gave the basis for the creation of upland and highland georelief with remains of planated surfaces. The territory is also known for ore mining (Slovinky, Poráč, Rudňany) with a rich history of copper and ore mining which manifest themselves in plentiful mining anthropogenic forms – dumps, setting pits, setback depressions etc. (Kroková 2005). The central part of the mountain range is built by different wide Triassic limestone-dolomite complexes of the Silicicum. Here, the georelief is formed by karst with a system of preserved (Galmus, Slovinská skala) and several tectonically destroyed karst plateaus with remains of a Middle-Mountain Planated Surface and steep slopes with a gradient of georelief above 35°. The area north of these plateaus contains N–S oriented fluviokarst valleys, flowing into the Paleogen of Hornádska kotlina Basin, forming gorges in some parts. The plateaus are covered by karst georelief with the occurrence of several exokarst (karrens, dolines, etc.) and endokarst (caves, abysses) geomorphological forms. The studied area includes two biggest plateaus – Galmus and Slovinská skala which are separated from each other by the valley of Poráčsky potok characterized by gorges and canyons with steep slopes and system of rock walls and rock debris in the upper parts (Čech 2004). The highest point of the area of Slovinská skala is quite a dominant (1014 m a.s.l.) on the equable plateau.

### **Methodology**

Considering the selection process of evaluation of attractivity for tourism, certain criteria from Mazúr-Lukniš (1981) work were applied. The methodology in this work was modified for the area of interest and one criterion was added. Criteria were divided into two groups (Čech 2005):

- 1) objective features, type and shape of georelief,
- 2) characteristics of georelief based on subjective human perception.

The second group includes the characteristics: attractivity of view, visibility and accessibility. The actual gradient of georelief, hypsometric

rates, basic physiognomy of forms and diversity and contrast of georelief (sculptural diversity) refer to the first group. The first six mentioned criteria were divided into three levels with increasing point value. The last criterion (sculptural diversity) has 10 levels. In the first group (besides sculptural diversity) the increasing point value has been raised one point at each level. The double-point difference was applied in the second group of criteria. The last criterion, sculptural diversity and contrast of georelief, has individual status. Although the group of indicators are genetically conditioned, the criterion of perception of georelief from the segmentation and diversity point of view has been also taken into consideration. Based on that, the point value was increased to 2 points. The exception is georelief with rock walls that modify georelief and increase its attractiveness (the increasing point value has been raised three points at each level).

1. Real inclination of georelief:
  - 0° – 12° ..... 1
  - 13° – 30° ..... 2
  - 31° and more ..... 3
  
2. Hypsometric layout:
  - 475 – 650 m a.s.l. .... 1
  - 651 – 825 m a.s.l. .... 2
  - 826 – 1014 m a.s.l. .... 3
  
3. Basic physiognomy of georelief forms:
  - plane linear forms ..... 1
  - concave forms ..... 2
  - convex forms ..... 3
  
4. Attractivity of view:
  - low ..... 1
  - medium ..... 2
  - high ..... 3
  
5. Visibility:
  - within one georelief form ..... 1

– within two georelief forms .....	3
– within three and more georelief forms .....	5
6. Accessibility:	
– easy access by land .....	1
– medium-difficult access by land .....	3
– difficult access by land .....	5
7. Sculptural diversity and contrast:	
– little diverse, flat, plain sculptures .....	1
– mildly differentiated, irregularly corrugated sculptures of mountains, alluvial plains .....	3
– mildly to moderately differentiated, concave sculptures on the surface of karst plateaus .....	5
– mildly to moderately differentiated convex sculptures on the surface of karst plateaus .....	7
– mildly to moderately differentiated, smoothly carved, erosional-denudational sculptures .....	9
– medially differentiated, carved, erosional-denudational sculptures .....	11
– strongly differentiated, carved, erosional-denudational sculptures.....	13
– contrasting, erosional-denudational sculptures with local rock forms .....	16
– medially contrasting, erosional-denudational sculptures with moderate occurrence of rock forms .....	19
– strongly contrasting, erosional-denudational sculptures with predominance of rock forms .....	22

Acquired attributes were subsequently marked onto the map of georelief forms. The point values were summarised and areas in the range of 7 to 46 points were determined and divided into three main types and various subtypes from the point of view of attractivity for tourism according to morphological characteristics and attractivity of the view.

### Typisation of georelief for tourism

Based on the results of the above mentioned evaluation procedure, 3 basic types and 6 subtypes of georelief from attractivity for tourism point of view were determined in the study area of Galmus Mts. according to morphological characteristics and attractivity of the view.

**1. Georelief with low attractivity for tourism** – final point value ranges from 7 to 20 points. This kind of georelief has normally very low or even none recreational potential. According to morphological characteristics and attractivity, it is divided into two subtypes:

**1.1. Monotonous, flat georelief with low attractivity of the view** – the attractivity value for tourism ranges from 7 to 10 points. The real gradient of georelief in this subtype belongs to category of 0–12°. Altitude ranges from 475 to 650 m a.s.l. The subtype is formed by flat linear forms. Visibility is normally within one or two georelief forms. As far as accessibility is concerned, it is an easily accessible landscape. In the sense of criterion of sculptural diversity, this subtype is formed by flat, plain georelief forms of little variety which is anthropogenically influenced by cattle pastures in some places. It inheres in alluvial plain of Poráčský potok Brook.

**1.2. Monotonous, flat to medium corrugated georelief with low to medium attractivity of views** – the attractivity value for tourism ranges from 11 to 20 points. The real gradient of georelief is in category of 0–12°, locally even more. Altitudes range from 651 to 825 m a.s.l., with even higher values locally. The subtype is formed mainly by flat and plain forms. These are mainly remains of Middle-Mountain Planated Surface in karst plateaus. Attractivity of the view is normally low, but increases on the periphery of open plateaus with views into the valleys. Visibility is normally within one georelief form, or even more on the periphery of plateaus. Landscape is of medium-difficult to difficult accessibility considering altitude and remoteness.

**2. Georelief with medium attractivity for tourism** – point value ranges from 21 to 35. This type includes karst plateaus of concave and convex karst geomorphological forms. The introduced type is divided according to morphological characteristics and attractivity of the view into two subtypes:



Photo 1. Poráčsky potok Brook in Poráč valley. Type 1 Georelief with the low value of attractivity for tourism. Subtype 1.1 monotonous, flat georelief with low attractivity of views



Photo 2. Remains of Middle-Mountain Planated Surface on karst plateau Slovinská skala. Type 1 Georelief with low attractivity for tourism. Subtype 1.2 monotonous, flat to medium corrugated georelief with low to medium attractivity of views



Photo 3. Karst ridges on Galmus plateau. Type 2 Georelief with medium attractivity for tourism. Subtype 2.2 medially differentiated, convex georelief with medium attractivity of views.

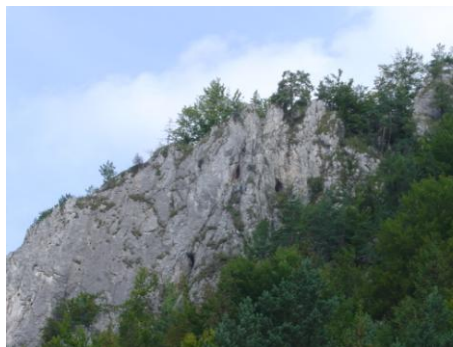


Photo 4. Rock formations in Poráč valley. Type 3 Georelief with high attractivity for tourism. Subtype 3.2 very strongly differentiated, contrasting georelief with high attractivity of views

**2.1. Mildly differentiated, concave georelief with low to medium attractivity of views** – the attractivity value for tourism ranges from 21 to 27 points. The real gradient of georelief is in category of 13–30°.

Attractivity of view is normally low to medium. Visibility is within one or two georelief forms. Altitude ranges from 800 m a.s.l. above. The landscape is of medium-difficult to difficult accessibility. It inheres in the area of karst geomorphological forms on karst plateaus, which are generally concave in shape (dolines, uvalas, paleovalleys, karst depressions).

**2.2. Mildly differentiated, convex georelief with medium attractivity of views** – the attractivity value for tourism ranges from 28 to 35 points. The real gradient of georelief ranges from 13–30°. Altitude is above 800 m a.s.l. The attractivity of view is medium. Visibility is normally within two, or locally even more, forms of georelief. Landscape is of medium-difficult to difficult accessibility. From the viewpoint of georelief forms, it includes karst geomorphological forms on karst plateaus, which are generally convex in shape (hums, karst ridges).

**3. Georelief with high attractivity for tourism** – point value of attractivity ranges from 36 to 46. This type covers areas in Poráč valley with slope rating above 31° and with the occurrence of rock forms that are clearly an increase in the attractivity of the area. According to their spatial distribution and attractivity of view, two subtypes were specifically determined:

**3.1. Strongly differentiated, contrasting georelief with medium or high attractivity of views** – attractivity value for tourism is 36–42 points. The real gradient reaches above 31°. Maximum altitude range is 651–825 m a.s.l. Attractivity of view is medium to high, visibility is within two, or even three and more georelief forms. Land accessibility is medium-difficult to difficult. It includes slopes of Poráč valley with gradient above 31° with local and moderate rock formations, mostly covered with vegetation.

**3.2. Very strongly differentiated, contrasting georelief with high attractivity of views** – attractivity for tourism is the highest. It is valued at 43–46 points. The real gradient values are above 31°. Altitude ranges from 651 to 825 m a.s.l., locally more. This subtype is specific for its high attractivity of views. Visibility is within three and more forms. Land is difficult to access. It covers slopes of Poráč valley with gradient of over 31° with predominance of rock forms that dominate above vegetation belt. Their presence is concentrated mainly in the area of upper plateau periphery of Galmus Mts. and Slovinská skala.



## Conclusion

Georelief typisation of karst plateaus in the territory of Galmus Mts. and Slovinská skala and middle part of Poráč valley presents an image of landscape from the human point of view via the georelief factor. Specifically, it suggests the measure of attractivity of individual forms and group of forms of georelief for the people. In this typisation, apart from objective characteristics of georelief, it also includes subjective factor of the observers' perception of the landscape. Based on typisation results, it can be asserted that despite relatively homogeneous type of karst georelief, it is possible to distinguish partial types from the viewpoint of different attractivity for tourism. The georelief least attractive for tourism is a monotonous, flat georelief of alluvial plain of Poráčsky potok Brook as well as area with remains of Middle-Mountain Planated Surface on karst plateaus. On the other hand, the highest attractivity can be observed in erosional-denudational slopes of Poráč valley with gradient above 31°, high variation and dominance of rock forms and high attractivity of views. These nearly coherent rock formations inhere mostly in upper periphery of karst plateaus.

## References

- Čech V., 2004, *Príspevok k poznaniu krasu v centrálnej časti pohoria Galmus* (Tribute to knowledge of karst in the central part of Galmus Mts.), *Geomorphologia Slovaca*, 4 (2).
- Čech V., 2005, *Geomorfologické pomery východnej časti Galmusu a Vlačskej kotliny a typizácia georeliéfu pre cestovný ruch. Rigorózna práca* (Geomorphological situation of eastern part of Galmus Mts. and fold Vlačská kotlina Basin and typisation of georelief for tourism. Rigorous thesis), KGRR, FHPV PU, Prešov.
- Krokusová J., 2005, *Analýza priestorového rozmiestnenia banských antropogénnych foriem v obci Slovinky* (Analysis of spatial arrangement of mining anthropogenic forms in Slovinky village), *Acta facultatis rerum naturalium Universitatis Comenianae, Geographica* 3, Bratislava.
- Mazúr E., Drdoš J., 1981, *Typizácia reliéfu pre cestovný ruch* (Typisation of relief for tourism), [in:] Mazúr E. et al., *Funkčná delimitácia reliéfu pre hospodárske využitie na príklade SSR* (Functional delimitation of relief for economic exploitation on SSR example), *Náuka o Zemi VII, Seria Geographica* 4, Veda Bratislava.
- Mazúr E., Lukniš M., 1986, *Geomorfologické členenie SSR* (Geomorphological classification of SSR), 1:500 000, 1. vyd., Slovenská kartografia, Bratislava.