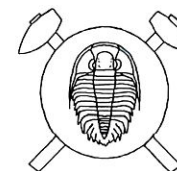


Evidence of active tectonic movements in Krušné Hory Mts. (NW Bohemia)



Údaje o současných tektonických pohybech Krušných hor (Czech summary)

(7 text-figs.)

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Two decades of deformation monitoring in the forefront of the ČSA Mine at the toe of Krušné Hory Mts. (NW Bohemia) accumulated a large amount of data. Different monitoring methods were used primarily to assess mining effects upon the stability of adjacent mountainous fault slopes, and to secure safety in the mining operations. Two survey galleries driven into steep hills of Jezerka and Jezeří, opened an insight deep into the massif of crystalline rock, and into its behavior during a relatively long period of deformation. Evidence about horizontal creep, and of several episodic events of about half-a-year duration has been obtained. Some of them were due to mining, other of natural origin only. These have had apparently no connection with seismicity. In the period after the year 1991 there are clear indications of episodic movements that can be interpreted only as of natural tectonic origin. The movements include slope uplifts, as well as strain changes in the marginal zone of the mountains.

Key words: Krušné Hory Mts., Bohemia, active tectonic movements, crystalline rock deformation, monitoring of deformations

Introduction

The problem of stability of mountainous slopes in the forefront of the ČSA open pit mine in the North Bohemian brown coal basin (Marek 1981, 1994; Rybář 1983, 1987; Rybář – Zmítka 1987; Zika et al. 1993) called for a decision to organize extensive monitoring of the forefront slope areas in the eighties. The monitoring covered partially sedimentary rocks of the basin, partially hard crystalline rocks of the mountains, where more sophisticated monitoring methods had to be applied to detect even small displacements. At the time when monitoring started mining operations were fully under way in the basin. Therefore, the original natural slope deformation state prior to mining could not be defined and calculations largely accepted an assumption that the massif was in a stabilized state without any horizontal tectonic pressure (Mejzlík – Mencl 1981, Košťák – Kudrna 1991). First objective of the monitoring in the crystalline was to register any possible tendency for slope sliding due to deep instability. As a possible direct effect of the unloading caused by mining at the slope toe, shear plane formation and block loosening in the depth or at the surface, was expected to be detected.

The monitoring system became the principal element of the emergency plan of the mine concerned – „Mine of the Czechoslovak Army“ – so called „ČSA Mine“. A large amount of data from very diverse sources of monitoring was collected during a period of about fifteen years, and put to different archives. This raised the idea of evaluating the data finally in a higher complexity.

Findings pertinent to the sedimentary rock strata of the marginal zone of the basin directly affecting mines, is going to be published separately (Rybář – Košťák 1998). This work deals with evaluation of data pertinent to the behavior of hard crystalline rock, which forms the major core of the massif.

The investigated area represents a marginal zone of Krušné Hory Mts. from Jezerka and Jánský Hills to Jezeří Castle (Fig. 1). The analysis of results, oriented to long-term effects had to consider two observation periods, not fully compatible: before and after the year 1990. Main results are based on data from the second period, when monitoring procedures were better standardized. Yet, even those from the first period are important, giving background to the resulting view.

Methods providing basic source of data

Main data contributions come from the following monitoring facilities:

- A) Two survey galleries Jezerka and Jezeří equipped with three precise geophysical Earth tide tiltmeters modified to check deformation tilts in the massif (Skalský 1996).
- B) Check of axial length increments in the galleries using precise tape extensimetry. The increments were registered on a series of selected sections approx. 10 to 15 m long, and covered the full length of the galleries (Händl 1996).
- C) Precise surface leveling on a track Mikulovice-Jezeří. The track comes through the marginal zone of the mountains (Kalvoda et al. 1994, Vilfmek 1996).
- D) TM71 three-dimensional extensimetric measurements in superficial slope fissures to check fissure opening and shearing (Košťák 1990, 1993).
- E) High precision long-distance measurements between strategic rock tops in the marginal mountainous zone using an electro-optical instrumentation (rangefinder – Kern Mekometer), (Jakubec 1991, 1996).

Obtained results have practical as well as scientific aspects. The main result concerns deformations in the marginal crystalline zone of the mountains.