Distribution of radon anomalies over the Choustník fault zone (Central Bohemia)

Plošná distribuce Rn-anomálií v nadloží choustnické zlomové zóny (Czech summary)

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(8 text-figs.)

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For the detailed study of the areal distribution of radon concentrations over a fault zone the locality Katov (Tábor area) was selected on the basis of the preliminary studies. The area is crossed by one of expressive fault structures of the central part of the Bohemian Moldanubicum, the so-called Choustník fault. The radon concentrations in the soil air were measured by the method of alpha cards , the uranium and thorium concentrations at the same points by a field gamma-spectrometer GS-256. The distribution of Rn, U and Th anomalies in a known geological setting shows that the highest Rn concentrations need not be localized directly above the U-enriched source rocks but are preferentially bound to the overburden of fault zones. At these places the increased radon values do not form a continuous belt, but a linear belt of several relatively well marked maxima. Such a type of the distribution of radon anomalies is probably caused by the upward Rn migration along minor extension structures, arranged en echelon, and originated due to the recent stress field. It seems that the radon migration has probably an impulsive character in time, which could be interpreted as a reflection of the possible episodic character of the recent tectonic movements.

Introduction

The radon migration was studied in several geologically and structurally well investigated localities in the central part of the Bohemian Moldanubicum with the aim to define main geological factors affecting the intensity of the radon emanations [Krešl et al. 1992, in print a,b]. On the basis of these preliminary results one suitable locality (Katov, Fig.1,2) was selected for the detailed study of the areal distribution of the radon concentrations in the ground air in the overburden of a fault zone. A similar study was performed over deep seated U-mineralization body [Fleischer et al. 1980], as well as in relatively homogeneous postglacial sandy sediments [Kristiansson – Malmqvist 1982]. Studies on the detailed areal distribution in the overburden of fault zones are almost absent in the literature. Therefore, such a study over suitable tectonic structures can add new information for solving complicated problems of the upward radon migration mechanism along the fault zones, whether the character of radon emanation is impulsive or continual and for defining its basic endogenetic and exogenetic factors.

Geological setting

The locality Katov (Fig.1,2) was selected for the detailed study of the areal distribution of radon concentrations over a fault zone on the basis of our preliminary studies [Krešl et al. 1992, in print a,b].

The central part of the studied area (of the size 100 x 100m) is crossed by one of the expressive fault structures of the central part of the Bohemian Moldanubicum, the so-called Choustník fault (Fig.1). This fault zone passes in the azimuth 30–40° with the variable dip around 80° to NW as well as to SE. Its thickness varies from 30 to 100 m, decreasing to 20 m in the vicinity of Katov. The filling is variable, in the northern part being formed by dykes and lodes of hydrothermal quartz with the thickness up to 40 m (locality Mlýny, see Krešl et al. in print a,b), in the southern part near Katov by crushed and mylonitized rocks, sometimes by ultramylonites with frequent fault clays of the thickness up to one meter.

The studied locality is situated in the area where the Choustník fault is manifested by intensive cataclasis and mylonitization of a small body of two-mica orthogneisses with tourmaline (Blaník type), concordantly bedded in two-mica paragneisses, and partly also by cataclasis of the Variscan two-mica granite with tourmaline. Mylonitization of the two- mica orthogneisses is here accompanied by a partly hydrothermal alteration with scarce manifestations of U-mineralization on joints (verified by field works provided by Czechoslovak Uranium Industry, Houska 1980).

The sedimentary cover of the studied area consists of silty-gravel sandy residuum (sample RA-3, Fig.3), while only a small part of the cover in the SE and NW part of the polygon consists of sandy-silty residuum (sample RA-4, Fig.3).