Subcrustal CO_2 flux measurement in the Hranice hydrothermal Karst

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In the Hranice Karst (Czech Republic) the term thermomineral karst was introduced to the international literature [1]. This active thermal karst is developed in the sequence of Paleozoic limestones as a result of deep influx of thermal water charged with subcrustal carbon dioxide (CO_2). Gas origin is also supported by helium isotopic ratio in water-gas mixture [2]. The carbon dioxide concentration in Zbrašov aragonite cave atmosphere reflects seasonal temperature variation and is well documented and described for the last 30 years [3].

Measurement techniques

CO_2 flux measurement was performed in 2009–2010 using accumulation chamber equipped with infrared analyzer in the Hranice field area. CO_2 flux was measured in the Zbrašov aragonite cave system during the summer 2010. The cave atmosphere was suck out to get permanent flow of CO_2. This status was hold for 6:27 hours. Chemical and isotopic composition of selected gas samples were determined in the laboratory by gas chromatography / mass spectrometry.

The average CO_2 concentration was 2.529% and flux ranged from 74 to 125 $g.m^{-2}.d^{-1}$ reflecting venting of subcrustal CO_2 in the Hranice area. In the Zbrašov aragonite cave the CO_2 concentration in the atmosphere varies from 0 to 85% with measured constant flux of 32894,45 $g.m^{-2}.d^{-}1$.

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Ophiolites of the Kuznetzky Alatau Ridge (SW Siberia) as a possible ancient crust fragments of the Paleoasian Ocean

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An assessment of initial stages of the Paleoasian Ocean opening is still a matter of researcher's argument. Besides it assumes a quite long time interval which, according to the geodynamic reconstructions within Altay-Sayan folded area, ranging from 700 to 1000 Ma. One of the reasons for doubts about geochronology evaluation of the ophiolitic suite fragments is isotopic data absence for the rocks with ultrabasic and basic composition which are oceanic crust and lithospheric mantle standard.

Ophiolites of the Kuznetsky Alatau Ridge trace an ancient suture zone formed as a result of the collision of few arc island terrains on the active margin of Siberian continent during the Late Cambrian and Early Ordovichian time (530-480 Ma). Their absolute ages was recently estimated by the Sm-Nd mineral isochron for the amphibolite (694±43 Ma) and results of U-Pb dating of zircons from the plagioriolite spaitly associated with ocean basalts (544±8Ma). According to regional geological conclusions the real temporal range of ophiolite forming is about 500 Ma (from Early Cambrian to Late Riphean time). Our data of Sm and Nd isotopes for the whole rocks of mantle hyperbasites and ultramafic-mafic rocks are close to ancient boundary of these rocks.

The Sm-Nd isochron based on the three whole rock samples of harzburgite, chromitite and dunite has a slope corresponding to the age 947±51 Ma at MSWD = 1.18. But the 6-point regression line based on the whole rocks magmatic peridotites and gabbroides of toleitic series is a more reliable. Its slope corresponds to the age 943±39 Ma at MSWD = 0.966. In particular the restitic ultrabasites correspond to the characteristics of the strongly depleted backarc basin -type mantle substrate. Their model age calculation with using modern depleted mantle model certainly suggests a younger initial substrate. For the "restitic" ultrabasites T (DM) values range from 760 to 866 Ma, whereas for "magmatic" rocks these values corresponds to the real isochron age of 945-1000 Ma. These data confirm a possible geochemical heterogeneity of ultramafic-mafic complexes in the suture zone of the thrust-folded systems.

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