Re-Os geochemistry and geochronology of the Ransko gabbro-peridotite massif, Czech Republic

JAN PAŠAVA[1], LUKÁŠ ACKERMAN[1,2]* AND VOJTĚCH ERBAN[1]

[1]Czech Geological Survey, Geologická 6, 152 00 Praha 5, Czech Republic
[2]Institute of Geology v.v.i., Academy of Sciences of the Czech Republic, Rozvojová 269, 165 00 Praha 6, Czech Republic (*correspondence: ackerman@gli.cas.cz)

The Ransko gabbro-peridotite massif is located in a transition zone between Moldabian and Kutná Hora crystalline unit of Bohemian Massif, Czech Republic. It represents a strongly differentiated intrusive complex with zoned structure which hosts low grade Ni-Cu-(PGE) ores. This mineralization is mainly developed close to the contact of olivine-rich rocks with gabbros, in troctolites, and to a much lesser extent in both pyroxene and olivine gabbros and plagioclase-rich peridotites [1].

We analyzed eleven samples of gabbro, troctolite, peridotite and Ni-Cu ore for Re-Os concentrations and Os isotopic ratios. Barren gabbro and troctolite have very low Os concentrations (0.02 to 0.1 ppb), high Re contents (0.6 to 2.4 ppb) and corresponding high Re/Os ratios. Their ^{187}Os/^{188}Os ratios display very variable strongly radiogenic values ranging from 0.4358 to 2.1372. This heterogeneity in Os isotopic ratios is most likely connected with different degrees of crustal contamination involved in the parent basaltic melt. The Ni-Cu low mineralized rock (peridotite, troctolite) and massive Ni-Cu-(PGE) ores have high Re (from 1.67 to 121.2 ppb) and Os (0.81 to 206.8 ppb) contents and consequently low Re/Os ratios (0.5 až 5.1). The subchondtritic to superchondritic ^{187}Os/^{188}Os ratios (from 0.1264 to 2.1372) show variable contribution of mantle- and crustal-derived ^{187}Os in Ni-Cu-(PGE) mineralization.

Four selected samples with suggested closure of the Re-Os system after emplacement of Ni-Cu mineralization have similar Os model ages and yield the Re-Os isochron age of 550 ± 49 Ma. This is in agreement with the results of [2] who suggested Lower Cambrian age of the Ransko massif based on geological and paleomagnetic studies.

[1] Mísař, Z (1979) *Canadian Mineralogist* **17**, 299–307.
[2] Marek, F (1970) *Věstník Ústředního Ústavu Geologického* **45**, 99–102 (in Czech with English abstract)

Cryptoendolithic colonization in the hydrating mantle along mid ocean ridges

V. PASINI[1,2]*, B. MÉNEZ[1] AND D. BRUNELLI[13]

[1]Dipartimento di Scienze della Terra, Università di Modena e Reggio Emilia, L.go St. Eufemia 19, 41100 Modena, Italy (*correspondence: valerio.pasini@unimore.it)
[2]IPGP, UMR CNRS 7154, 1 rue Jussieu, 75005 Paris, France
[3]Istituto di Scienze del Mare – CNR, Via Gobetti 101, 49100 Bologna, Italy

The basaltic oceanic crust and associated sediments are recognized to harbor an active microbial life involved in the geochemical fluxes between geosphere and hydrosphere while the underlying mantle-derived peridotitic lithosphere remains until now underexplored. Nonetheless, the progressive hydration of peridotite-forming minerals (i.e. serpentinization) releases great amount of molecular hydrogen, that constitutes a valuable source of metabolic energy for chemiolithoautotrophic microorganisms. Although recent studies have demonstrated the presence of extremophile microbial life at hydrothermal vents related to oceanic serpentinization, as illustrated at Lost City (Mid Atlantic Ridge, 13° N), the presence and the level of activity of hydrogen-driven subseafloor communities inside the hydrating mantle rocks are still under debate.

By implementing a suite of microspectroscopic and microimaging techniques (i.e. coupled confocal laser scanning microscopy and Raman spectroscopy, transmission and scanning electron microscopies on focused-ion-beam ultrathin sections) we evidenced the presence of deep endogenic organic-carbon accumulations that sign a past mineralizing bioactivity in deeply serpentinized mantle rocks collected along the Mid-Atlantic Ridge (6°03.3'N-33°25.4'W). These niches are constituted by chains of porous hydroandraditic garnets harboring polyhedral/polygonal serpentines and iron oxides. Their strict association with remnants of multiple organic polymers carrying biological functionalities and thermally-evolved carbonaceous matter, proves that cryptoendolithic life drives hydrogarnet dissolution and concomitantly serpentine ± iron oxides formation while sequestrating carbon through primary production. Mass balance shows these activities to be local source for Ca and a sink for Mg. Our results support the existence of deep ecosystems within the low-temperature hydrating mantle sustained by the process of serpentinization that mediate chemical fluxes from the Earth's lithosphere to oceans and potentially impact the overall chemical transfer between the Earth's mantle and the exosphere.