

Metamorphic fluids: Comparison of volatile (Marmarosh massif, Ukrainian Carpathians and Zermatt region, Swiss Alps)

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We have compared volatile of fluid inclusions of veinlet mineralization and enclosed green schists of the Marmarosh massif (Ukrainian Carpathians) and the Piemont unit (Zermatt region, Swiss Alps). Data received by the mass spectrometric analysis testify to that methane predominates in fluid phases of both metamorphic complexes (up to 98 vol. %), carbon dioxide and nitrogen are subordinated.

The concentration of carbon dioxide in the quartz veinlets and schists of the metamorphic rocks of Marmarosh massif reaches 35 vol. %. In some samples it is prevailing (62–92% vol. %). Only sometimes nitrogen is present (0.5–5 vol. %).

In metamorphic rocks of the Piemont unit the nitrogen content in the veinlets of calcite and enclosed schists reaches 13 vol.% whereas carbon dioxide: 1.2 vol. %.

Among metamorphic rocks of the Piemont unit one can observe samples with very low gas saturation and probable availability of nitrogen, carbon dioxide and methane. The absence of gas emission in some samples cannot fail to gain our interest to these data.

Obtained data confirm our previous studies of fluids of metamorphic formations of the Ukrainian Carpathians [1, 2]. Here, at a progressive stage of metamorphism methane predominates in their gas phase, and in rocks that underwent secondary changes due to imposing of hydrothermal-metasomatic processes of a regressive stage of metamorphism carbon dioxide and nitrogen are prevailing.

Similar regularities were also fixed in metamorphic formations of the Swiss Alps. Thus [3, 4], the progressive stage of metamorphism is characterized by the evolution of volatile in inclusions: nonmetamorphic zone – a considerable concentration of heavy hydrocarbons, a metamorphic zone – methane an first, then water and carbon dioxide; and the regressive stage: by unstable composition of gases in the case of their small concentration, a considerable nitrogen content against the background of carbon dioxide and methane, a low concentration of dissolved salts.

- [1] Kovalyshyn & Naumko (2001) *Alexandrov*, VNIISIMS 85–88. [2] Naumko *et al.* (2008) 7-th ECC, Lviv 77–79. [3] Mullis (1975) *Schweiz. Mineral. Petrogr.* **55**, 419-429. [4] Mullis (1979) *Bull. Mineral* **102**, 526-536.

Os isotope evolution of an oceanic intra-plate volcano: Tahiti-Nui (Society Islands, French Polynesia)

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Tahiti-Nui intra-plate volcanism (French Polynesia) is characterized by two main building-stages [1]. The first stage (1400 to 870 ka) is expressed by a weakly alkaline, slightly silica-undersaturated magmatism and Sr-Nd isotopic compositions that are close to the EMII isotopic component. Starting just after two major collapses of the volcanic edifice, the second stage comprises lavas evolving toward silica-undersaturated compositions and the associated evolution of ⁸⁷Sr/⁸⁶Sr and ¹⁴³Nd/¹⁴⁴Nd ratios suggest a gradual change in the source linked to a decreasing involvement of the plume from 850 ka to 450 ka [1].

In order to investigate the contribution of the mantle plume over time on the Tahiti-Nui volcanism, we have analyzed Os isotope compositions in lavas aged from 1400 to 450 ka. Rhenium-Osmium systematic is a powerful system to examine the decrease of the plume activity. So far, ¹⁸⁷Os/¹⁸⁸Os ratios are higher than 0.133 for lavas older than 870 kyr. In contrast, ¹⁸⁷Os/¹⁸⁸Os ratios for lavas from the second stage of volcanism (<850 kyr) are lower than 0.133. This indicates a decrease of ¹⁸⁷Os/¹⁸⁸Os ratios between the first and second periods of volcanism. Therefore the plume contribution on mantle source diminishes with time. This is consistent with observations done with Sr-Nd isotopes. Further Re-Os isotope data will be presented during the communication.

- [1] A. Hildenbrand *et al.* *Earth Planet. Sci. Lett.* **217** (2004), pp. 349-365.