Geochemical and isotopic analyses of non-volcanogenic hot springs in central Japan

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The main aim of this study is to contribute to better understanding of fluid processes occurring in subduction zones with a comprehensive framework involving slab-derived fluids to near-surface fluids such as seawater, meteoric water and hot spring waters.

Our previous geochemical research on the Arima-type brine, anomalous non-volcanogenic hot springs with extreme high $^3He/^4He$ (e.g. [1, 2, 3]), identified and characterized the concentrated 'source' brine in a robust multi-elemental/isotopic space, and so far, supports the idea that NaCl-CO_2-rich aqueous fluids, which are possibly slab-derived fluids originated from subducting oceanic crusts, might have uprisen from a deep part of the forearc region and might supply solutes, gases and water itself to the brine.

While several other studies estimated the contribution of slab-derived fluids to island-arc magmatism (e.g. [4]), in non-volcanic or forearc regions, their involvements have been hardly found.

Therefore we extended our research area from the Kinki district in southwest Japan to forearc regions in central Japan, where two different slabs have been subducting, which might imply that one could expect involment of two different slab-derived fluids. Along the Median Tectonic Line, which divides the adjacent forearc region in two, there are several non-volcanogenic hot springs, some of which are thought to be classified as the Arima-type brine. Here we present the results of our geochemical and isotopic analyses of these hot springs in forearc regions in central Japan.

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Structure and compositions of zircon grains from lower unites of Norilsk lava section

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We intend to perform high precision absolute dating of lower unites of Norilsk volcanic section in order to understand evolution of Siberian flood basalts and their relation to P-T mass extinction [1]. For that purpose we picked up zircon grains from lower unites of Norilsk volcanic suit: Ivakinskaya (Iv), Severminskaya (Sv), Gudchikhinskaya (Gd) and Tuklonskaya (Tk) units. Here we report the first data on the structure and composition of 275 zircons grains obtained by CL, EPMA and LA ICP-MS techniques.

The studied zircons were subdivided into three groups. The group 1 (almost 70% of studied grains) includes euhedral grains with thin oscillatory zoning, group 2 (25% of population) consists of euhedral grains with low fluorescent cores surrounded by oscillatory zoned rims, and group 3 (5% of population) contains almost unzoned rounded low fluorescent grains. The groups 1 and 2 show week compositional zoning with slight decreasing of REE concentration towards the rim. They include the following minerals shown in the order of decreasing frequency: apatite, sphene, feldspars, crystalized melt, ilmenite and quartz. They possess relatively high Th/U ratios (0.3-2), are enriched in HREE and are similar to zircons of magmatic origin [2, 3]. Group 3 zircons have low Th/U ratios (0.05-0.25), are markedly depleted in HREE suggesting equilibrium with garnet and are likely of metamorphic origin.

We conclude that zircons of group 1 and 2 were likely crystallized *in situ* in basaltic flows and are good candidates for absolute dating.

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