Multidisciplinary study on the oceanic plate: implications from the research on petitspot volcanoes

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Petitspot is a cluster of small volcanic knolls on the oceanic lithosphere [1]. It is a kind of intraplate volcanism, similar to monogenetic volcanoes of alkaline basalts in continental plate, although there is no mantle upwelling beneath the eruption fields. Therefore, it is not related any OIB activities. The source region of the petitspot magma is expected not at very deep, but just around the boundary between the lithosphere and asthenosphere [2]. It is thought to be erupted through the small fracture on the oceanic lithosphere [1]. Petitspot volcanoes often include ultramafic xenoliths and xenocrysts that provide us many information about the chemical and physical properties of the lower oceanic lithosphere between 40 to 70 km deep without any affection of OIB [3-5]. Therefore, studiy on the petitspot volcanism and its ejecta is one of the most suitable research on the actual state of the oceanic plate [6, 7]. The multidisciplinary research including rock and sediment samplings, and surface and sub-seafloor geophysical surveys on the petitspot and the plain old oceanic plate around have been conducted since 2005 to reveal mechanism of the petitspot volcanism and background physics of the oceanic lithosphere and asthenosphere beneath the northwestern Pacific [6, 8-10]. However, the petitspot volcanism and its global activities are still unclear due to few rock and data samplings from the petitspot fields and the scarcity of the global detail bathymetry data.

Here we present the petrology of the ultramafic xenoliths, which shows less deformed, and the fertality and variation of the melt extraction, and the feature of the petistspot volcanism with geophysical and morphological features in the eruption fields found up to now. Then, we would like to propose the next step of the oceanic lithosphere.

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Time-related changes in the Si isotopic composition of Palaeo- to Mesoarchaean granitoids

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Archaean TTG magmas are regarded to have formed by melting of amphibolite or eclogite. They are succeeded by more potassic melts in the late Archaean, suggesting that the latter melts might have formed by successive melting of the earlier TTG gneisses. Here we use Si isotopes to test this model because the light Si isotopes are expected to be enriched in the residual Mg-rich phases [1,2]. The comparison of leucosomes and melanosomes from two amphibolitic migmatitic TTG gneisses from the Archaean Iisalmi block (central Finland) confirms an isotope fractionation linked to partial melting in the range of $\Delta^{30}Si$=+0.2‰ with the restite being isotopically lighter. Si isotopes determined on four different generations of granitoid plutons from the Barberton Mountain Land (South Africa) demonstrate a gradual $\delta^{30}Si$ change from -0.17‰ at 3.55 Ga up to +0.02‰ at 3.1 Ga, the earliest TTGs being close to products of mantle differentiation and I-A granite types [1,3], while the younger K-rich granites are isotopically heavier, in agreement with their derivation by melting of older TTG gneisses.

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