IGNEOUS PROVINCE ARE SIMILAR TO ISLAND ARC BASALTS?

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STATEMENT OF THE PROBLEM

Permo-Triassic Siberian Traps Large Igneous Province (STLIP), comprising volcanic and intrusive rocks from the Siberian Platform and West Siberian Basin (Fig. 1), is the most voluminous (>10^6 km^3) among known Phanerzoic large igneous provinces. Tholeiites and alkaline rocks with subordinate ultrabasic alkaline, intermediate and acidic rocks make up the STLIP (Fig. 2a). According to TiO_2 - MgO diagram, tholeiites and alkaline basalts can be subdivided into low-Ti and high-Ti series (Fig. 2b). Here we focus on rocks with TiO_2 < 0.4 wt% (where Ti=TiO_2 and Mg=MgO). The deviation from the discrimination line in Fig. 3 calculated as TiO_2=3.45 - 0.0317 x MgO (Fig. 2c). In rocks abundant in the STLIP. They are remarkably different from both the ocean-island-basalts (OIB) and enriched-middle-oceanic-ridge basalts (E-MORB), instead they resemble island-arc-basalts (IAB) (Fig. 3), which origin is related with melting of water-rich upper mantle above subduction slabs. The question is why large portion of the intra continental STLIP basalts are IAB-like? Do they have any links to Permian-Triassic subduction processes? What is the mechanism of this link?

DISCUSSION

Permian, Siberian part of Pangaea was surrounded by subducting systems (Fig. 4). We suggest that subducting slabs brought water into the continental mantle. Experimental data show that superhydrous minerals are stable at fast subducting slab conditions within two nitie regions at about 410 and 660 km discontinuities (Fig. 5 right). Fast subducting slabs can not penetrate through the 660 km discontinuity, because they attain positive buoyancy (Fig. 5 left). Therefore, slabs that stagnated in the transitional mantle will enrich the mantle in water. With heating slabs up the water will be released due to decomposition of the superhydrous minerals, followed by tetrasaturation of the upper mantle and consequent voluminous melting (Fig. 6).

REFERENCES