

SVC007-10

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Bearing of Cr-Spinel in Basalt from Shatsky Rise on Primitive Melt Composition and Temperature

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Basalt from two of six sites drilled on Shatsky Rise, a Jurassic ridge-centered oceanic plateau in the NW Pacific, contains Cr-spinel. The two sites, U1346 and U1349, were respectively drilled near the summits of Shirshov and Ori massifs during IODP Expedition 324 in 2009, and despite intense alteration the rocks geochemically are the most primitive and least differentiated from all the sites of Shatsky Rise. The spinel is usually enclosed in altered olivine, but by and large has itself escaped alteration. From it, a general idea of the compositions of primitive and near parental melt compositions as well as melt temperatures can be estimated. Spinel at each site analyzed by electron microprobe has a limited range in $\text{CrNo} = 100 \cdot \text{Cr} / (\text{Cr} + \text{Al}) \sim 50$ at Site U1346 and lower, ~ 20 , at Site U1349, but at each site spinel $\text{MgNo} = 100 \cdot \text{Mg} / (\text{Mg} + \text{Fe}^{2+})$ is variable. Comparison with other spinel and experimental data indicates that spinel from U1349 crystallized at a pressure of ~ 1 GPa, but from a range of moderately to strongly differentiated liquids with $\text{MgO} \sim 9$ to 4%, and at potential temperatures (at 1 GPa) of ~ 1250 C. Aluminous spinel with highest MgNo resembles some found in abyssal tholeiites from Siquiros Fracture Zone on the East Pacific Rise. Similar mixing occurred at U1346, but at lower pressure. The liquids at both sites had MORB-like TiO_2 contents but a somewhat wider range of oxidation states, to both higher and lower $\text{Fe}_3\text{No} = 100 \cdot \text{Fe}_3 / (\text{Fe}_3 + \text{Al} + \text{Cr})$ in the spinel. The final lavas to erupt at two places on Shatsky Rise thus had neither high (picritic-liquid) MgO contents nor high potential temperatures during the earliest stages of their crystallization histories.

Keywords: oceanic plateau, chromian spinel, basalt, temperature, parental composition