Subduction initiation in Proterozoic: geochemistry of mafic-ultramafic plutonic suite from Eastern Sayan ophiolites, Siberia

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Eastern Sayan ophiolites (Central Asian Orogenic Belt, Siberia), also known as Dunzhugur ophiolites, formed around 1020 Ma [1] and obducted onto Early Precambrian Gargan block before 790 Ma [2]. We studied ophiolitic rocks from Ospin and Ilchir massifs to the East from Dunzhugur area. Plutonic rocks are wherlite-pyroxenite-gabbro-gabbro-norites in both massifs with some websterites and orthopyroxenites in Ilchir. Their MgO content ranges 9 to 38% and TiO_2 is less than 0.1%. Clinopyroxene is diopside with 1.0-2.5% Al_2O_3, 0.05-0.2% TiO_2, and Mg# ranging from 87 to 93 both in Ospin and Ilchir massifs. Spinel shows slightly different chemistry in Ospin (Cr# ~ 53-65, Mg# ~ 36-58) and Ilchir (Cr# ~ 77-81, Mg# ~ 41-50) but low TiO_2 (< 0.3%) in both massifs. Thus, Cpx-Sp chemistry corresdonds to low-Ti ophiolitic cumulates. Cpx controls trace element level, which is ~ 0.3-1 times of primitive mantle for HREE in most rocks. The rocks show negative Nb-(Zr-Hf)-Ti anomalies and positive Sr and Pb spikes. In Ospin rocks, REE patterns vary from flat to slightly LREE-depleted, LREE enrichment is rare. In Ilchir massif, LREE-enriched rocks are more common, but some samples with flat REE or LREE depletion are still present. All geochemical data suggest that crystallization of Ospin plutonics was mainly from island arc tholeiite (IAT), whereas Ilchir plutonic rocks crystalized from both IAT and LREE-enriched boninite. These volcanic counterparts have been found in Ilchir massif. Volcanic rocks from Eastern Sayan ophiolites are boninites, IAT, and andesites [1,3 and our data]. The association of TiO_2- and trace element-depleted ultramafic to mafic cumulates, boninites and IAT is typical in subduction initiation setting as documented in Izu-Bonin-Mariana forearc and some SSZ ophiolites like Troodos.

[1] Khain *et al*. (2002) *EPSL* **199**, 311-325. [2] Kuzmichev *et al*. (2001) *Precam. Res*. **110**, 109-126. [3] Sklyarov *et al*. (2016) *Russ. Geol. Geophys*. **57**, 127-140.