

Geochemical revisit of Archean Olondo greenstone belt in the Aldan Shield, Siberian Craton

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The Archean Olondo greenstone belt is located in the central part of the Olekma granite-greenstone terrains in the western Aldan Shield, the largest basement of the Siberian craton. It is composed of metamorphosed mafic-ultramafic to intermediate-felsic volcanic and plutonic rocks. ID-TIMS U-Pb dating on zircons separated from diorite of the gabbro-diorite-tonalite complex yields age of 3002 ± 5 Ma (Kovach et al., 2018). Protoliths of mafic meta-volcanic rocks comprise komatiitic and tholeiitic basalts, characterized by variable Mg# (0.44-0.74) representative of both differentiated and near-primary magma. Their tracer-element compositions are characterized by depleted to slightly enriched LILE and LREE patterns ($(La/Yb)_n = 0.6-1.2$) with flat to slightly fractionated distribution of HREE ($(Gd/Yb)_n = 0.8-1.1$), some are depleted in HFSE. It suggests either their mantle source might be influenced by subduction-related processes or result of crustal contamination. These mafic meta-volcanic rocks have positive initial $\epsilon_{Nd}(3.0)$ values of +0.1 to +3.9, indicative of heterogeneous depleted mantle with no significant crustal contamination. Microgneisses corresponding to intermediate and acid meta-volcanics (andesites and dacites) show LREE enriched patterns ($(La/Yb)_n = 5.6-19.2$) with moderate Yb contents (0.8-1.1 ppm), concave-down HREE distribution and strong Nb-Ta negative anomalies. They are characterized by moderate positive $\epsilon_{Nd}(3.0)$ values from +1.9 to +2.4 and Nd model ages $t_{Nd}(DM)$ of 3.1 Ga, indicating a mixed juvenile and recycled crustal source. The Archean Olondo greenstone belt is unique not only for the high proportion (> 30%) of mafic and ultramafic rocks, but also for its substantial intermediate rocks with subduction-related features, indicating modern plate tectonic such as subduction might be in operation in the Archean time.

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