Geochemistry of Paleoproterozoic mafic magmatism in the South Siberian post-collision magmatic belt

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The South Siberian post-collision magmatic belt was formed during the final stage of the Siberian craton assembly and possibly related to its incorporation into the Paleoproterozoic supercontinent. This belt is mainly composed of ca. 1.88 – 1.84 Ga granitoids and felsic volcanics. Coeval dolerites, gabbro and mafic volcanic rocks located all over the South Siberian post-collision magmatic belt, but are subordinate in volume. The mafic intrusions are represented by dykes of dolerites, composed dolerite–granite/rhyolite dykes, mafic – ultramafic and gabbro–diorites massifs. Moreover, there are mafic volcanic rocks within some volcano-plutonic associations. We assume that such variety of mafic magmatism is characteristic for the post-collisional extension setting, where different scenarios of mafic magmatism are possible. Compositionally, all dolerites, gabbro and mafic volcanics are sub-alkaline and alkaline rocks. In multi-element diagrams, all studied mafic rocks display negative Nb-Ta anomalies, but they have varying $(Th/La)_{pm}$ ratios >1 and <1. Most of them are characterized by near zero or negative εNd(t) values. We hypothesize that majority of the mafic rocks have been generated from lithospheric mantle source with a subduction-derived (enriched) component and sometimes from mantle source contaminated by continental crust. The exceptions are rare dolerites and volcanics of the Birusa block with positive εNd(t) values, which could be produced from depleted asthenospheric mantle related source and possibly with input of a mantle plume related source. Geochemical and isotopic data of most dolerites, gabbro and mafic volcanics of the South Siberian post-collision belt reflect a composition of Paleoproterozoic subcontinental lithospheric mantle with subduction related geochemical affinities under the southern part of Siberian craton, which could be produced during subduction processes before the Siberian assembly.

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