

Boron isotopes in tourmaline of the Darasun gold district, Transbaikal region, Russia

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The Darasun gold district, Transbaikal region comprises three deposits: Teremkyn, Talatui, and Darasun, where gold-bearing quartz veins are hosted in metagabbro and granitoids. Tourmaline a common gangue constituent in these deposits is oxy-dravite, povondraite, dravite, and schorl. We report here B-isotope compositions of tourmaline from veins in metagabbro and K-rich granodiorite, as well as in a breccia pipe at the margin of granodiorite porphyry. The B-isotope composition of tourmalines from the Darasun goldfield as a whole covers a wide range from -15.7 to +11.2‰, with distinctive differences among the three deposits. The $\delta^{11}\text{B}$ value in the Teremkyn tourmalines varies from -15.7 to +2.5‰. The inferred $\delta^{11}\text{B}$ value of initial fluid at Teremkyn deposit is about -12‰, which suggests granitic rocks as the B source. However, mixing with isotopically heavy B from the local metagabbro, as suggested by the high Ca contents in tourmaline, is also possible. The $\delta^{11}\text{B}$ value of tourmaline from Talatui is -5.2 to -0.9‰. Taking into account the fluid inclusion temperature in vein quartz (ca. 400°C), the inferred $\delta^{11}\text{B}$ value of fluid (-2.5 to +2.2‰) suggests a B source from the host metagabbro. At Darasun, tourmaline from the breccia pipe ($\delta^{11}\text{B}$ -6 to -5‰) is suggested to have precipitated from a ¹⁰B-depleted, residual fluid derived from granitic rocks. The vein-hosted tourmaline I ($\delta^{11}\text{B}$ -0.1 to +1.5‰) could have crystallized from a strongly fractionated residual fluid derived from granitic rocks, but mixing with gabbro-derived fluid probably occurred as well. The B-isotope composition of tourmaline II (-4.4 to -1.1‰) and III (-11.4‰), suggests an influx of a separate fluids.