# A chemical and boron isotopic study of tourmaline from pegmatites in the Bihar Mica Belt, India

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The Bihar Mica Belt (BMB) at the northern margin of the Chhotanagpur Gneissic Complex in eastern India comprises high-grade supracrustal rocks and associated granitic gneisses. The pelitic schists host numerous S-type pegmatites which occasionally show internal zonation. The origin and evolution of these pegmatites have remained a topic of much debate [1]. Tourmaline is a ubiquitous phase in the metasediments, veins, granites and pegmatites. Here, we use the major, trace, and boron isotope composition of tourmaline along with thermobarometric and geochronological studies to constrain the petrogenesis of pegmatites in the BMB. Upper amphibolite facies metamorphim of the pelites stablized the assemblage muscovite + biotite + quartz + garnet + tourmaline ± sillimanite ± K-feldspar. Tourmalines in the different litho-units of the BMB are of schorl composition. Those from the metapelites and pegmatites have higher Mg, Al, Co and Ni while those from quartz veins have higher Ca, Na, K, Li, Be, Zn, Mn, Ga and Pb. The $\delta^{11}B$ of tourmaline from the different units (metapelites: –9.8 to –14.2‰; pegmatites: c. –12.5‰; tourmalinites: –13.6 to –14.1‰; quartz veins: –13.6 to –14.5‰) is indicative of primarily continental source for B. The B isotopic variations in tourmaline from the metapelites, pegmatites and quartz veins indicate changing fluid compositions which can be explained by processes involving fluid-mica fractionation during progressive dehydration of phyllosilicate minerals [2]. Boron isotope zoning with $\delta^{11}B$ of –14.2‰ in core to –11.3‰ in the rims of some tourmaline grain in metapelites may be suggestive of Rayliegh fractionation under limited excess B concentration [3] or alternatively progressive mixing with $^{11}B$-rich fluid.

[1] Misra and Dey (2002) *J Geol Soc India* **59**, 363 – 377, [2] Wunder et al. (2005) *Lithos* **84**, 206 – 216, [3] Meyer et al. (2008) *Contrib Mineral Petrol* **156**, 259 – 267.