

2005 Salt Lake City Annual Meeting (October 16–19, 2005)

Paper No. 127-17

Presentation Time: 1:30 PM-5:30 PM

LOW-AL, FERRIAN TOURMALINE AS A SIGNATURE OF FORMER EVAPORITE DEPOSITS: AN EXAMPLE FROM THE NEOPROTEROZOIC METAEVAPORITES OF CENTRAL NAMIBIA

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Tourmalinite from a metaevaporite sequence in the Neoproterozoic Duruchaus Formation of central Namibia contains tourmalines with chemical and textural features that are excellent recorders of their environment of formation. Unlike most other metaevaporitic deposits, this Namibia tourmalinite exhibits only minor deformation and a low-grade (middle greenschist) metamorphic overprint. The tourmalinite, part of the Nosib Group (~800-1000 Ma), forms a finely laminated unit ca. 1 m thick within a sequence of quartzite, mica schist, dolomite, and carbonate breccias. Monoclinic molds several mm long in the tourmalinite may be the sites of former gypsum crystals. Sedimentary rocks of the Duruchaus Formation have been interpreted by other workers as representing lacustrine, playa lake, fluvial, and non-marine evaporite deposition. Fine-grained tourmalines (<0.01mm) display complex chemical zoning with local core-to-rim oscillations. The most distinctive chemical feature is the low Al content (4.32-5.53 apfu), which is largely offset by an inverse correlation with Fe, implying Fe³⁺ substitution for Al³⁺. The tourmalines are sodic [Na/(Na+ Ca+ X-vacancy) = 0.88-1.0 apfu], consistent with coexistence of albitic plagioclase. Compositional variations generally follow a trend between dravite or "oxy-dravite" and povondraite. The complex zoning and Fe³⁺-rich compositions imply a high fluid flux of B-rich tourmalinizing fluids and relatively oxidizing conditions. Based on a very high boron isotope value ($\delta B^{11} = +18.3\%$) for this tourmaline, we suggest that the tourmalinite formed during diagenesis by the incursion of B-rich marine evaporitic waters into a former non-marine evaporite sequence. Compositions of the Duruchaus tourmalines are similar to those of other, more deformed and metamorphosed metaevaporitic tourmalinites (e.g., Proterozoic Houxiangyu borate deposits, Liaoning, China) and of tourmaline in the cap rocks of salt domes (e.g., Challenger dome, Gulf of Mexico).

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Session No. 127--Booth# 93

[Petrology and Volcanology \(Posters\)](#)

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