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Structural control on the emplacement of contemporaneous Sn-Ta-Nb mineralized LCT pegmatites and Sn bearing quartz veins: insights from the Musha and Ntunga deposits of the Karagwe-Ankole Belt, Rwanda.

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Abstract

The Nb-Ta-Sn pegmatites and Sn quartz veins of the Rwamagana-Musha-Ntunga area in eastern Rwanda are part of the Mesoproterozoic Karagwe-Ankole Belt. These commodities are on a regional scale spatiotemporally associated to the early Neoproterozoic fertile G4-granite generation. Although a transition from the lithium-cesium-tantalum pegmatites to cassiterite–microcline–quartz veins has been observed in the Rwamagana-Musha-Ntunga area, the structural control and the paragenetic relationship between the mineralized pegmatites and the Sn bearing quartz veins is largely unknown. Consequently, this study investigates the occurrence of pegmatites and quartz veins and the structural and lithological controls on their emplacement.

The metasediments in the area are affected by a regional compressional regime with a shortening direction oriented N70E, which resulted in a N20W-oriented fold sequence. The Lake Muhazi granite is present in center of the Karehe anticline. The structural orientations of pegmatites and quartz veins show that two important factors control their emplacement. The first control is the reactivation of pre-existing discontinuities such as the bedding, bedding-parallel joints or strike-slip fault planes. In view of the regional structural grain in the Rwamagana-Musha-Ntunga area, this corresponds with abundant N20W-oriented pegmatites and quartz veins. The reactivation is strongly related to the lithology of the host rocks. The Musha Formation, which mainly consists of decimeter- to meter-scale lithological alternations of metapelite, metasiltstone and metasandstone, represents the most suitable environment for bedding reactivation. This is reflected in the predominance of bedding-parallel pegmatites and quartz veins hosted by the Musha Formation. Strike-parallel joints were mainly observed in the