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Tracking Sn-mineralization across the magmatic-hydrothermal transition: a case study on the Kedron stock in southwestern New Brunswick (Canada)

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Southwestern New Brunswick hosts a series of Late Devonian satellite plutons, including the Sn-Zn-Cu-In North Zone at Mount Pleasant, all linked to the larger Saint George Batholith. One of them, the Kedron stock has been drilled extensively by Billiton Metals in 1984, as well as Geodex Minerals in 2007/ 2008 in search of exogranitic and endogranitic Li-Sn-W-Mo-Bi-In-mineralization but was never examined in terms of petrogenesis.

Despite Kedron only representing a small stock, it remarkably exposes different styles of mineralization in a continuum from magmatic to hydrothermal stages. This includes: (i) magmatic disseminated Sn-Li-Nb-Ta-mineralization hosted in a fluorite-rich (≤ 7 vol.%) leucocratic rare-metal granite and two subvolcanic dykes, (ii) Sn-W-bearing endogranitic greisens in the apical portions and (iii) fracture-controlled hydrothermal Cu-Zn-Pb-lodes intersecting the hornfelsized Silurian metasediments, evidenced by cordierite and andalusite. Among these, tin occurs in association with Cu-Zn-Pb-In-Bi, forming a zonation from high temperature Sn- to low temperature Cu-Zn-mineralization [1], although this metallogenic sequence may be overprinted by post-emplacement hydrothermal fluids. In the subvolcanic dykes fluid circulation led to the formation of a stockwork-like system of fluorite-sulphide-bearing greisen veins.

To reconstruct the evolution of the Kedron system from its magmatic to hydrothermal stages and better constrain the processes responsible for the different mineralizations, it is crucial to define a detailed paragenetic sequence. Hence, a series of polished thin sections were prepared to establish a relative time sequence for petrogenesis and alteration stages. Petrography was achieved using classical and scanning electron microscopy, with a focus on mineralization such as zones where disseminated cassiterite amounts to 3 vol.% in the granite. In addition, cathodoluminescence was used to unravel the zonation patterns recorded in comb quartz layering and magmatic quartz. Major-element analysis was carried out with electron probe microanalysis, while trace-element compositions were obtained from laser ablation-inductively coupled plasma-mass spectrometry. In addition, we plan to undertake measurements of δ^{122} signatures on cassiterites from different petrological domains.

Ultimately, the detailed textural and petrographical study coupled with geochemical data allows to reconstruct the evolution of the Kedron stock and to track Sn-mineralization across the magmatic-hydrothermal transition.

[1] Shcherba (1970), *International Geology Reviews* 12, 114-150.