Tungsten mineralization in East Tyrol – repeated recycling of W in the crust?

J. G. Raith[1], F. Altenberger[1], F. Hutter[2], J. Weilbold[3], C. Auer[3]

[1]Montanuniversität Leoben, Leoben
[2] GeoSphere Austria, Vienna
3 geo.zt gmbh, Hall in Tirol
e-mail: johann.raith@unileoben.ac.at

Geochemical tungsten anomalies and occurrences were discovered in the Lienz area in the 1980-ies during regional W prospecting campaigns (e.g., Neinavaie & Ronge 1985) and are summarized as "Polymetallic skarn district Drauzug-Gurktal nappe system Lienz-Hochstein" in the IRIS data base. Low- to medium grade metamorphic Austroalpine units were intruded by a pluton west of Lienz in the Oligocene (Edenwald intrusion, ≈30 Ma). A km-sized contact metamorphic aureole with metapelitic hornfelses developed around the composite intrusion especially at its western to southern contacts (Linner et al. 2013).

Three types of scheelite mineralization are distinguished in the region: (1) Strata-bound scheelite in low-grade metamorphic metabasites in the Early Palaeozoic Thurntal Quartzphyllite (disseminations, stringers, deformed quartz veinlets; e.g., Tafinalpe). The association of W-As (arsenopyrite) is specific for this type (Portugaller 2010); (2) Sulfide-scheelite skarn mineralization (disseminations, veins; e.g., Edenwald). Massive sulfides (pyrrhotite, chalcopyrite etc.) are associated with thin intercalations of marble and calc-silicate rocks (Ca amphiboles, calcian plagioclase, grossular, diopside-hedenbergite, vesuvianite, wollastonite) (Hutter 2022). This type is interpreted as a reduced magmatogenic skarn, a mineralization style very rare in the Eastern Alps. (3) Scheelite in quartz veins and clefts within the intrusive rocks. This pure scheelite mineralization is controlled by brittle division surfaces in the intrusive rocks.

The Oligocene plutonic rocks span a wide petrographic composition from metaluminous (gabbro)diorite, tonalite, to more evolved peraluminous granodiorite/granite. They are magnesian showing calc-alkaline magma characteristics. The high W bulk values (up to hundreds of ppm W) to are due to post-magmatic (type 3) hydrothermal processes.

LA-ICP-MS trace element analyses of scheelite allow to discriminate these different mineralization styles. We present combined micro-textural features (obtained from CL imaging) and trace element data of scheelite in their geological/petrographic context, we discuss the possible applications for exploration and propose that tungsten has undergone several stages of crustal recycling.

Hutter F (2022): Wolframvererzungen und Intrusionsgesteine am Lienzer Schlossberg, Osttirol. - Masterarbeit, Montanuniversität Leoben

Linner M, Reitner JM, Pavlik W (2013) Geologische Karte 179, Lienz 1:50.000.- Geologischen Bundesanstalt, Wien

Neinavaie MH, Ronge W (1985): Wolframprospektion 1984 in Teilen Osttirols, Kärntens, Niederösterreichs und der Steiermark sowie petrographische Untersuchungen an neu aufgefundenen Wolframvererzungen im Arbeitsgebiet. - Unveröffentlichter Ber VOEST-ALPINE, Eisenerz

Portugaller T (2010): Scheelitvererzungen im Thurntaler Quarzphyllitkomplex, Osttirol: Petrographische und chemische Untersuchungen an Nebengesteinen und Bachsedimenten. - Masterarbeit, Montanuniversität Leoben