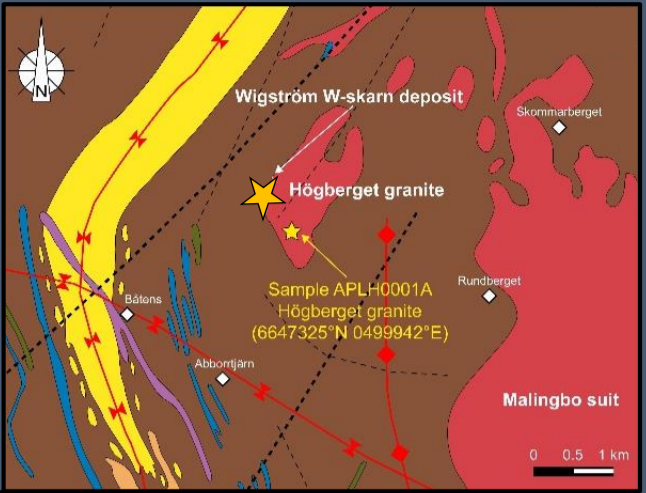
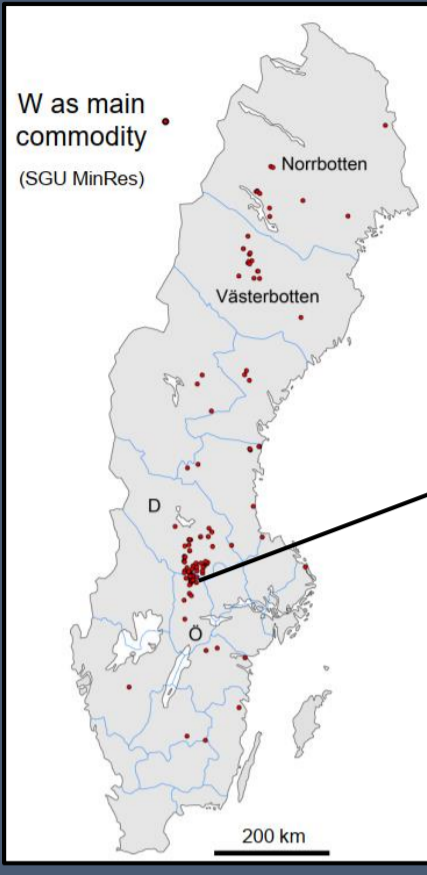
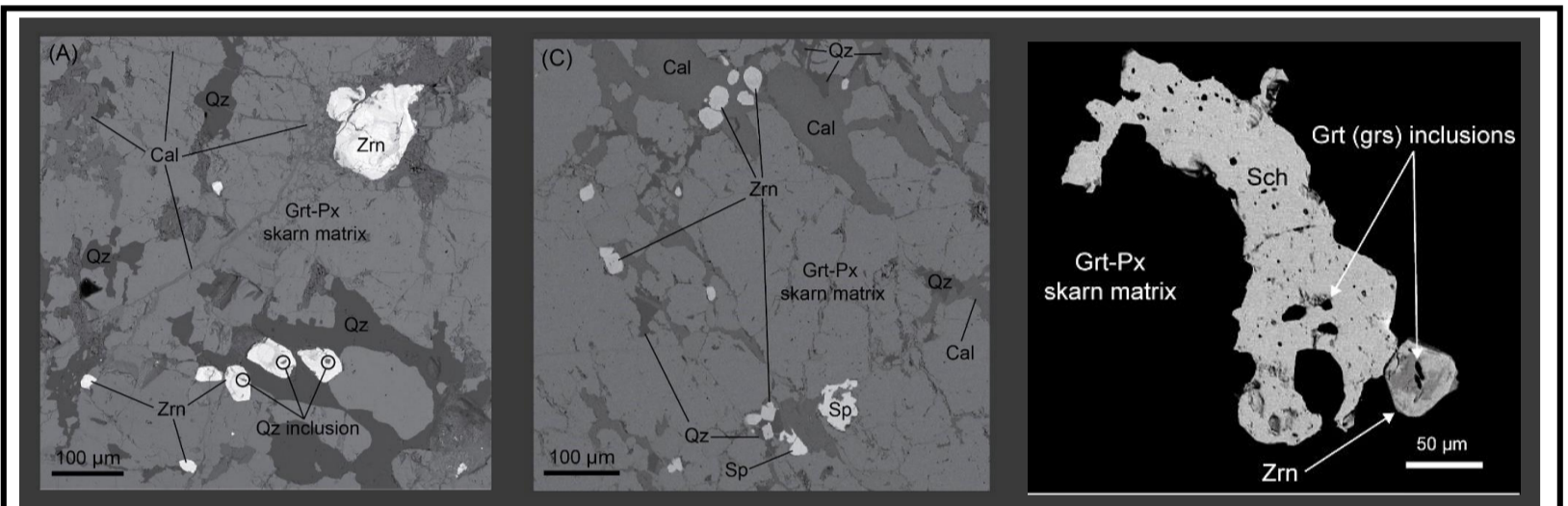
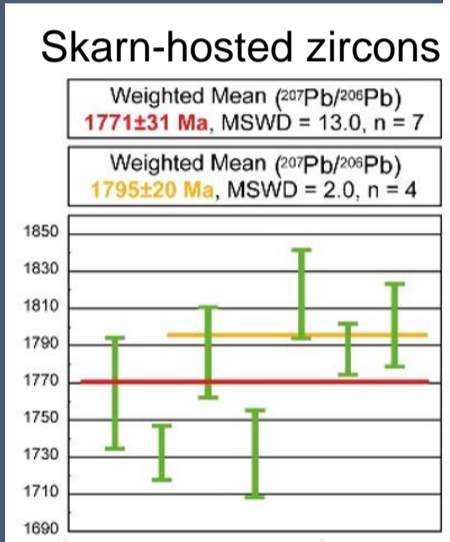


Resolving temporal links between the Högberget granite and the Wigström tungsten skarn deposit in Bergslagen (Sweden) using trace elements and U-Pb LA-ICPMS on complex zircons

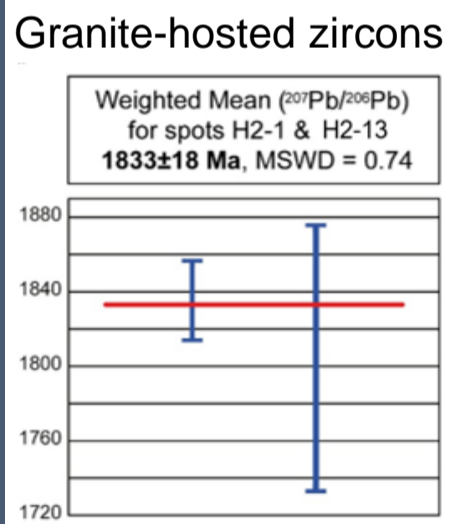


The Bergslagen region, and especially the Ludvika area, contains numerous tungsten (W) occurrences, predominantly hosted in metavolcanic country rock, and mainly associates with skarn/calc-silicate rocks neighbouring granitic suits. **Main theory:** the granitic-pegmatite suit acted as a driver for the W mineralizations—exsolved magmatic-hydrothermal fluids promoted marble metasomatism and W-F±Mo mineralization at ~1.8 Ga.

Study aim: (i) Constrain temporal links between the Högberget granite and the Wigström tungsten skarn deposit by providing new zircon U-Pb geochronology for the two localities. (ii) Characterise skarn mineralization (SEM petrography constrains).

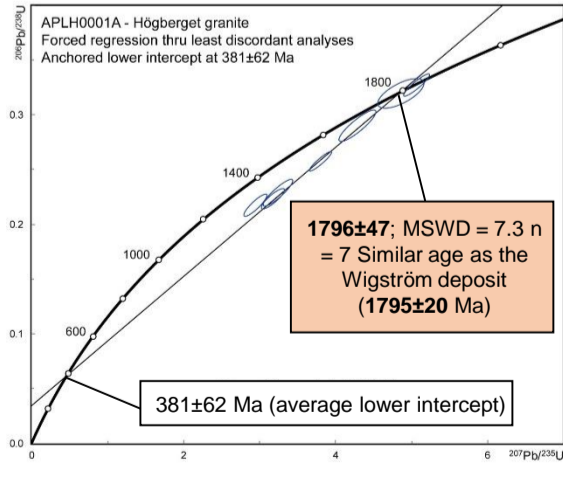
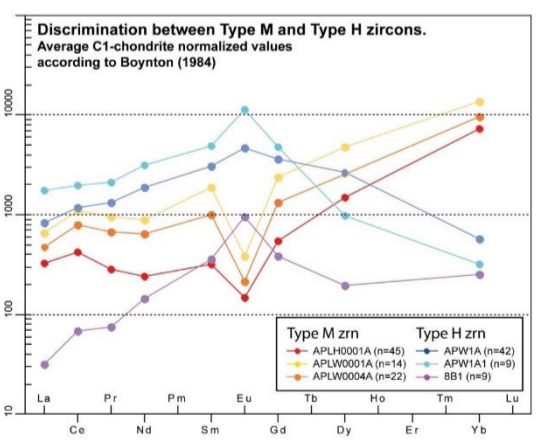


Key skarn petrographic observations: quartz-calcite-fluorite veinlets associates with skarn-hosted zircons, scheelite (tungsten minerals) and other sulfides (e.g. sphalerite). The paragenesis suggest that nucleation of skarn-hosted zircon, scheelite and sulfides were coeval. In skarn literature (e.g. meinert et al. 2005), skarn develops during two main stages: prograde and retrograde, and in the latter stage the main ore deposition occurs. The retrograde stage is highly fluid dependent and associates with hydrous minerals, e.g. quartz, calcite, fluorite and chlorite, similar petrographic context occurs in the Wigström skarn. These assumptions and observations further imply that the skarn-hosted zircons are of hydrothermal origin.



Zircon U-Pb and REE LA-ICPMS analyses

In CI-normalized “spidergram” plots, skarn-hosted zircon (*type H*) and granite-hosted zircon (*type M*) have distinctly contrasting patterns. Clearly REE have fractionated differently within the two localities. Overall, the geochronological analyses provided highly discordant data. For *type H* zircons, seven analyses are however concordant—depending on interpretation a weighted mean age of ~1.79 Ga is achieved. For *type M* zircons, two analyses are concordant, and achieves a weighted mean age of ~1.83 Ga. By anchoring the lower intercept to a calculated average intercept and forcing regression thru the least discordant analyses yields a upper intercept of similar age as the Wigström deposit (~1.79 Ga).



The geochronological data constrain temporal links between the granite and the deposit and further supports the main (1.8 Ga) metallogenic theory for tungsten mineralization in Ludvika area, Bergslagen.

