

Titanite from Nalunaq gold mine, Greenland – potential new reference material for *in-situ* single grain titanite U-Pb geochronology

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U-Pb dating by laser ablation magnetic-SF-ICPMS of 100 titanite grains collected from the Nalunaq Gold Mine, South Greenland yields concordia ages of 1766 \pm 8 Ma (Wetherill); 1763 \pm 8 Ma (Tera-Wasserburg) (MSWD=2.2), and a weighed mean ²⁰⁶Pb/²³⁸U age of 1768 \pm 9 Ma (2SE; MSWD=0.7) and ²⁰⁷Pb/²⁰⁶Pb age of 1762 \pm 8 Ma (2SE; MSWD=1.9). Internal precision (2SE) of single ²⁰⁶Pb/²³⁸Pb and ²⁰⁷Pb/²⁰⁶Pb titanite ages is 1-5 %. The titanites were collected from a calcite-rich skarn alteration zone hosted in metabasalt. The alteration zone consists of pockets of coarse-grained calcite and clinopyroxene with a 2-3 cm alteration halo of clinopyroxene, plagioclase, spinel, quartz, chalcopyrite, pyrrhotite, ilmenite and titanite. The age of the titanite compares to the weighted mean U-Pb zircon age of 1762 \pm 9 Ma (MSWD=0.6; N=6; unpubl. analyses obtained by SHRIMP at Curtin Univ., Australia) of an adjacent pegmatite, thus linking the processes leading to skarn alteration to the formation of the pegmatite, which in turn has implications on the mineralization processes in the area.

Analyses were obtained at 25 μ m laser spot size on mounted grains. Ages were calculated through Iolite [1] using the VizualAge DRS [2] or the UcomPbine DRS [3]. The small proportion of common Pb included into the titanites was corrected using measured ²⁰⁴Pb. The analyses were performed using the A1772 titanite (pers. comm. Yann LaHaye, GTK, Finland) or the GJ-1 zircon as external standard matrixes, bracketing the titanites and known-unknown reference materials (viz. Harvard 91500 and GJ-1 zircons; A1772 and Seiland titanites; pers. comm. Jan Kosler). The known-unknowns yield acceptable concordia and mean ages, e.g. 1065 \pm 8 Ma (MSWD=3.5) for 91500 Harvard zircon and 2617 \pm 11 Ma (MSWD=2.7) for the A1772, thus suggesting a robust analysis procedure and produced data set. Further dating of the titanite by ID-TIMS and MC-ICPMS are being conducted and will be presented at the conference.

[1] Paton et al. (2011) *JAAS* **26**, 2508-2518. [2] Petrus & Kamber (2012) *GGR* **36**, 247-270. [3] Chew et al. (2014) *Chemical Geology* **363**, 185-199