

Geochronology of events leading to Au-U mineralization at Rompas, Peräpohja Schist Belt, northern Finland

FERENC MOLNÁR^{1*}, HOLLY STEIN²³, NICK COOK⁴ AND HUGH O'BRIEN¹

¹Geological Survey of Finland, P.O. Box 96, FI-02151 Espoo, Finland

²AIRIE Program, Colorado State University, USA

³CEED, University of Oslo, Norway

⁴Mawson Resources Ltd., Australia

(*correspondence: ferenc.molnar@gtk.fi)

The Peräpohja Schist Belt comprises a greenschist to amphibolite facies, multiply-folded supracrustal sequence of quartzites, mafic volcanics and volcanoclastics, carbonate rocks, black shales, mica schists and greywackes which were deposited from ca. 2.44 Ga to 1.92 Ga, during the protracted rifting of the Archaean basement. Emplacement of layered intrusions, as well as gabbroic sills and dikes took place at 2.44 and 2.20-2.13 Ga, respectively, and geochemistry of volcanic formations also indicate A-type magmatism at around 1.98 Ga. Metamorphism and multiple folding of the basin fill took place during the Svecofennian orogeny (1.9-1.8 Ga) followed by intrusions of post-orogenic granitoids (1.81-1.77 Ga) [1] [2]. The Rompas Au-U mineralisation is hosted within deformed and metamorphosed dolomite-quartz veins enclosed within mafic volcanics and contains uranium bearing zones without gold and very high grade (>10 000 g/t Au) gold pockets with uraninite. Textural evidence suggests that deposition, and multiple re-mobilization of uraninite was followed by a localized hydrocarbon-bearing fluid flow which produced pyrobitumen crusts around grains of uraninite. Gold precipitated during the latest hydrothermal event either in fractures cutting uraninite or in cracks and on surfaces of pyrobitumen.

Re-Os dating of molybdenite, which is ubiquitously associated with uraninite, uraninite-pyrobitumen and gold-bearing mineral assemblages, together with chemical age dating of uraninite, as well as model calculations based on the Pb isotope contents of lead-rich minerals (e.g. galena, altaite with extreme enrichments in radiogenic lead) associated with native gold suggest ~300 Ma difference in age between the early stage deposition and recrystallization of uraninite and the late stage, post-orogenic deposition of gold (1.78 Ga). These multiple hydrothermal events appear to be temporally coincident with the major phases of igneous activity in the vicinity of the mineralization.

[1] Perttunen and Vaasjoki (2001) *Geol. Surv. Finland Spec. Pap.* **33**, 45-84. [2] Hanski et al. (2005) *Bull. Geol. Soc. Finland*, **82**, 31-62.