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New U-Pb age constraints for the timing of gold mineralization at the Pampalo gold deposit, Archaean Hattu schist belt, eastern Finland, obtained from hydrothermally altered and recrystallised zircon

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Abstract

In this paper we present new U-Pb data on zircon and titanite from the host rocks of the Pampalo gold deposit located within the Neoarchaean Hattu schist belt in eastern Finland. We also present new U-Pb data on nearby plutonic rocks. Plagioclase porphyries at the mine site demonstrate inheritance from 2.82 – 2.83 Ga sources while a suggestive intrusive age is at c. 2.76 Ga. Zircon grains extracted from the altered felsic units hosting the gold ore show complex alteration and recrystallisation textures and demonstrate Zr mobility. This mobility is most probably related to the alteration event although direct link to gold mineralization remains to be shown. The preserved or recrystallized parts of the altered zircon grains, texturally homogeneous grain aggregates and some overgrowths yield heterogeneous ages which cluster between ca. 2.73 – 2.70 Ga, with a mean age of 2.71 Ga. This age is considered to place new constraints on the timing of mobility of Au at the Pampalo. This event postdates the known crustal formation event at 2.76 – 2.73 Ga in the area as recorded by the adjacent plutonic rocks and volcanoclastic rocks within the Hattu schist belt. The Naarva tourmaline granite, 10 km NW of Pampalo, is 2.69 Ga and is thus temporally associated with known regional crustal anatexis and metamorphism in the Archaean of eastern Finland. Whether this crustal reworking event played a role in the genesis of the gold in eastern Finland needs to be further studied.

Keywords: gold, Archaean, zircon, mobility, alteration, mineralization, hydrothermal

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