

Re-Os dating of auriferous LLHR pyrite and SHRIMP U-Pb zircon age for host granitoids: Implications for the origin of the Jonnagiri gold deposits, Dharwar Craton, Southern India

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Gold deposits in Archaean granite-greenstone terranes are generally hosted by supracrustal rocks in greenstone belts, although they may also occur in related granitoids. The Jonnagiri gold deposit of the Dharwar craton is a granodiorite-hosted Archean gold deposit [1]. In the mineralized area, the host granodiorite is strongly sheared and traversed by numerous auriferous quartz-carbonate veins. Gold is generally refractory and occurs as inclusions in pyrite and arsenopyrite [1]. SHRIMP U-Pb zircon dating of the host granitoids, as determined from 12 zircon grains, yields a Concordia age of 2641 ± 10 Ma (MSWD = 0.66; 2σ error). Re-Os dating of a low-level highly radiogenic (LLHR) pyrite [2] associated with Jonnagiri gold yields an age of 2635 ± 10 Ma (2σ analytical error only) or 2635 ± 28 Ma (2σ , includes ^{187}Re decay constant uncertainty). The Re-Os date is interpreted as the age of gold mineralisation and the zircon U-Pb date as the age for the gold-hosting granitoid. The two ages are in good agreement at the 2σ uncertainty level. The results of carbon and oxygen isotopic studies [3] and REE studies indicate that the Jonnagiri gold deposits were the product of juvenile hydrothermal fluids emanating from the mantle and/or from juvenile granites [3]. Temporal correspondence of granite magmatism and mineralization indicate that the two events are likely related. (The authors thank Prof. Allen Nutman, University of Wollongong, Australia, for SHRIMP U-Pb dating of zircons from the Jonnagiri granites)

References: [1] Jairam et al. (2001) GSI Special Pub 55, 59-66; [2] Stein et al. (2000) Econ Geol 95, 1657-1671. [3] Kesarwani et al. (2019) OGR 107, 754-779.