

# Geochronology of Mesoproterozoic gold mineralization in the Gawler Craton, and temporal links with the Gawler Range Volcanics

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We present the first radiometric age determinations from a group of gold prospects in the central Gawler Craton, South Australia, via  $^{40}\text{Ar}/^{39}\text{Ar}$  analyses of sericite that is spatially and texturally related to gold mineralization. Gold occurs in brittle faults and shear zones in Paleo- to Mesoproterozoic granitoid and metasediment host rocks, with intense sericite-pyrite alteration and quartz veining. Hydrothermal sericite from twelve samples from three separate gold prospects yields reproducible  $^{40}\text{Ar}/^{39}\text{Ar}$  plateau-ages between 1567 and 1583 Ma, with a weighted mean age of  $1580 \pm 4$  Ma (MSWD 3.2). If the two youngest ages are excluded, one of which shows clear evidence of argon loss in the initial steps of the age spectrum, the remaining ten ages yield a weighted mean of  $1581 \pm 3$  Ma (MSWD 1.6). Euhedral igneous hornblende from a diorite dyke that is cut by mineralization yields a  $^{40}\text{Ar}/^{39}\text{Ar}$  plateau age of  $1582 \pm 5$  Ma, supporting the interpretation of the sericite ages as the time of fluid-alteration and gold mineralization, rather than being cooling ages.

Recent revised estimates of total potassium decay constant and age of the FCs argon standard, together with published intercalibration of FCs versus GA1550 biotite [2], allow us to recalculate our  $^{40}\text{Ar}/^{39}\text{Ar}$  plateau ages, and shift the weighted mean from 1581 Ma to 1594 Ma, in excellent agreement with published U-Pb TIMS zircon ages for the Gawler Range Volcanics [3, 4]. This study demonstrates the current limitations in comparison of U-Pb and  $^{40}\text{Ar}/^{39}\text{Ar}$  ages, particularly in old rocks (Proterozoic and Archaean), and the potential benefits of further refinement of the intercalibration of the U-Pb and  $^{40}\text{Ar}/^{39}\text{Ar}$  timescales, currently in progress through the EARTHTIME initiative

## References

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