

**Multi stage gold mineralization events in the Archean Tati Grenstone Belt, northeast Botswana: constraints from integrative white mica Ar/Ar, garnet U/Pb and sulfide Pb/Pb geochronology**

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The Tati Greenstone Belt (TGB) in northeastern Botswana hosts numerous Au deposits (Shashe, Mupane and Signal Hill) associated with sulfides, garnet and white mica. Integrative white mica Ar/Ar, garnet U-Pb and sulfides Pb/Pb dating techniques were combined with whole rock and sulfide Pb isotope characteristics to track the sources of gold and constrain the timeframes of gold mineralization events. All sulfides and arsenopyrite from the TGB yielded overlapping Pb/Pb errorchron ages of  $2227 \pm 66$  Ma and  $2220 \pm 73$  Ma, respectively, which coincide with the Shashe sulfides Pb/Pb errorchron age of  $2250 \pm 110$  Ma. At Mupane, whereas Au mineralization-associated hydrothermal almandine garnet yielded overlapping Tera-Wasserburg lower intercept  $^{206}\text{Pb}/^{238}\text{U}$  age and a concordia age of  $2119 \pm 18$  Ma and of  $2105 \pm 24$  Ma, respectively, sulfides produced an errorchron Pb/Pb age of  $2873 \pm 140$  Ma, which coincides within error with the first Neoproterozoic Limpopo-Liberian Orogeny (2.70–2.65 Ga), granitoids intrusion emplacement (2.65–2.73 Ga) and deposition of banded iron formation ( $2.73 \pm 0.15$  Ga). Ore-related white mica from Signal Hill yielded an overlapping Ar/Ar plateau age of  $1987 \pm 24$  Ma and a weighted mean Ar/Ar age of  $1987 \pm 13$  Ma, which coincide within error with the 2.05–1.95 Ga second Limpopo-Liberian tectonic cycle, herein considered to have triggered the Au mineralization in this area. Lead isotope compositions of most of the sulfides overlap with those of spatially associated schists and granitoids, thus suggesting these units possibly represent Pb and by inference Au rock sources. The genetic model of the TGB Au deposits is consistent with many greenstonehosted gold deposits worldwide.