

(U-Th)/He chronometry of multiple secondary minerals, Sierra Nevada, California

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Anatase (TiO₂), Cr-magnetite, chrysoprase (SiO₂ + Ni-talc microinclusions [1]), and other Fe-oxides occur as secondary minerals within a horizon of lateritic weathering on the basal Cenozoic nonconformity in the Sierra Nevada, CA. We investigate the application of the (U-Th)/He chronometer to these secondary minerals in pursuit of 1) chronology of geochemical alteration along this nonconformity and 2) new approaches to radiometrically dating laterites globally.

The diversity of chemically altered lithologies hosting the secondary phases we aim to date include:

- Altered plutonic rock hosting calcite which is cross cut by euhedral anatase and acicular brookite.
- Lateritically weathered Kings-Kaweah Ophiolite Belt rocks [2] underlain by saprolite where magnesite veins are altered to chrysoprase.
- Jurassic Gopher Ridge meta-volcanics [3] weathered to ~10 m thick hematite-bearing ferruginous laterite
- Ferruginous jasperoid silcrete hosting Cr-magnetite grains (Fig. 1) exhibiting Cr, Mg, Al depletion and Fe, Ni enrichment (both core-to-rim depletion gradient and fully depleted profiles) which have been reported in other laterically altered chrome-spinel phases [4].

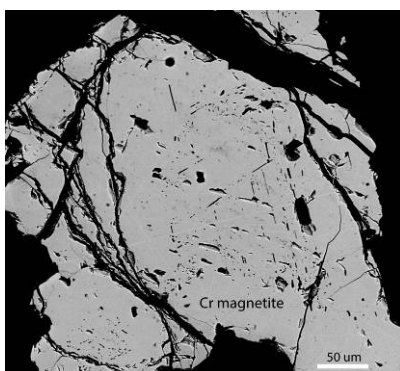


Fig 1. BSE image of lateritically weathered Cr-magnetite

[1] Vasconcelos and Singh (1996) *Mesozoic Geology of the Eastern Australian Plate Conference* **43**, 545. [2] Saleeby (1978) *GSA Bulletin* **89**, 617-636. [3] Bates (1945) *GSA Bulletin* **56**, 1-38. [4] Oze et al. (2003) *USGS OFR* **03-251**.