A comparative study of zircon trace elements in A-type granites: Indicators for magma fertility in Cu and Au metallogenic provinces

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The study of zircon composition has been applied to assess magma fertility in porphyry Cu-Au-Mo deposits [1]. Zircon from fertile porphyry magmas are characterised by high Eu/Eu* and Ce/Ce* values, interpreted to be a result of high abundance of magmatic water and high oxidation state [2,3]. The applicability of trace element composition of zircon to assess magma fertility in iron-oxide copper gold (IOCG) and Au-only terranes is uncertain [4]. Southern Australia is host to significant IOCG and Au-only mineral depostis [5], which are intimately associated with the Hiltaba Suite A-type affinity granitoids that form part of a Mesoproterozoic silicic large igenous province. Unlike typical A-type granites, the Hiltaba Suite are commonly magnesian, dry and oxidised [6]. As oxidised granites are favoured in Cu-Au provinces, this study attempts to utilise zircon trace element data to discriminate IOCG- and Au-associated granites from non-mineralised granites. Results suggest IOCG- and Au-associated granites can be distinguished by their higher Ce/Nd ratios, consistent with oxidised magmas. Further data will provide new exploration critera for magma fertility in IOCG and Au-only deposits.

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