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Metallogeny of Myanmar through zircons

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The fundamental controls on granite magma metal fertility are tectonic setting, the nature of source rocks, and magma differentiation. A clearer understanding of these petrogenetic processes has been forged through the accessory mineral zircon, whose composition is shown to have bearing on magma fertility and, therefore, granite prospectivity. We present an integrated zircon isotope (U-Pb, Lu-Hf, O) and trace element dataset from the paired Cu-Au (I-type) and Sn-W (S-type) magmatic arcs in Myanmar[1]. I-type zircons have juvenile eHf (+7.6 to +11.5) and mantle-like $d^{18}O$ (5.2-5.5 ‰), whereas S-type zircons have low eHf (-7 to -13) and heavier $d^{18}O$ (6.2-7.7 ‰). Variations in zircon Hf and U/Yb reaffirm that Sn-W arc magmas contain greater crustal contributions than Cu-Au arc rocks. Correlations between whole-rock Rb/Sr and zircon Eu/Eu* identify the progress of magma fractionation in these systems. Zircon Ce/Ce* and Eu/Eu* are sensitive to redox and fractionation respectively, and are used to evaluate zircon sensitivity to the metallogenic affinity of their host rock. Zircon Eu/Eu* values of ca. ≤ 0.08, for example, identify the Sn content that marks the viability of the granite as a potential host to mineralization. Zircon is both hardy and abundant as an accessory mineral, and its micro-chemistry, used pervasively for geochronology and petrogenetic studies, is now increasingly being found to be relevant in the field of metallogeny.

[1]Gardiner, N.J., et al., 2017. Contrasting Granite Metallogeny though the Zircon Record: A Case Study from Myanmar. *Scientific Reports, accepted for publication.*