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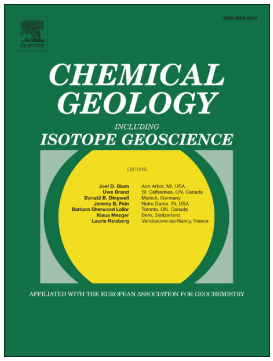


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# IRON-ISOTOPE SYSTEMATICS FROM THE BATU HIJAU CU-AU DEPOSIT, SUMBAWA, INDONESIA

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## ABSTRACT

This study examines the fractionation of iron isotopes as a reflection of processes that govern the co-magmatic formation of a hydrothermal ore system of a classic porphyry copper deposit. We present iron isotope analyses, measured using multi-collector ICPMS, of magmatic intrusive rocks and coeval hypogene ore minerals from the Batu Hijau porphyry copper-gold deposit in Sumbawa, Indonesia. Isotopic analysis were made of the intrusive magmatic host rocks to the deposit, ranging from sub-volcanic andesite and quartz diorite to tonalite, and of hypogene chalcopyrite, bornite and magnetite ore mineral separates.

Iron isotope values of andesite and quartz diorite range from $\delta^{57}Fe$ = 0.17±0.05‰ to 0.26±0.05‰. The more felsic, differentiated dacite and tonalite have heavier iron isotope values ($\delta^{57}Fe$ = 0.27 ±0.08‰ to 0.32 ±0.08‰) than the intermediate and mafic rocks. Heavy iron isotopes are positively correlated with $SiO_2$ and negatively correlated with MgO, CaO, $TiO_2$ and V suggesting that crystallisation of clinopyroxene, amphibole and magnetite is the primary control on isotopic evolution of the melt. These isotopic trends are supported by thermodynamic (rhyolite-MELTS) modelling of crystal fractionation using published mineral-melt fractionation factors, and demonstrate that the isotopic evolution of the Batu Hijau melts was controlled by crystal fractionation.