

## Origin of Sanukitoid Magmas Linked to Intrusion-related Au Deposits: Insights From the Yilgarn Craton, Australia

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Archaean lamprophyres and sanukitoids have been spatially and temporally linked to magmatic-hydrothermal gold deposits across the Yilgarn Craton of Western Australia. Lamprophyres are considered to be the product of hydrous low-degree partial melting of metasomatic mantle source regions. Sanukitoids are relatively rare late Archaean mantle-derived hornblende-plagioclase porphyritic granitic complexes characterized by high MgO and relatively elevated concentrations of Ba and Sr. Therefore, sanukitoids exhibit mantle-derived (Mg, Ni, Cr) and incompatible element-enriched components (Sr and Ba) indicative of contributions from both mantle and crustal sources. Cognate xenoliths within the sanukitoids are amphibole-rich and/or biotite-rich metabasites. One model proposed for explaining sanukitoid formation is through amphibole-dominated fractional crystallisation of a lamprophyric parental melt.

Understanding whether the spatial relationship between gold systems and sanukitoid-lamprophyre magmatic systems is also genetic will be important for updating Archaean magmatic-hydrothermal gold deposit models. High precision trace gold analyses, with detection limits of 0.02 ppb, have been conducted on systematic samples of lamprophyres and sanukitoids to quantify the gold concentration variation during magmatic differentiation.

Here, we present mineral chemistry (amphibole, feldspar, mica) from sanukitoids associated with gold deposits and their cognate xenoliths in conjunction with whole-rock, and trace gold, geochemistry from the Yilgarn Craton. We present our results of fractional crystallisation modelling and our investigation into the behaviour of gold during mantle (primitive lamprophyres) and crust (evolved sanukitoid) transportation. We test whether the Archaean lamprophyre-sanukitoid magmatic system is intrinsically elevated in gold or whether lamprophyre-sanukitoid magmas provide fertile fluid conduits for gold deposit formation.