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Successful exploration for new Porphyry Copper and IOCG (Iron-Oxide Copper-Gold) systems is increasingly challenging because those with clear surface expressions were historically gradually discovered, while those yet to be discovered will invariably be located deeper undercover. Future exploration therefore requires a smarter systematic approach, utilizing high quality, variable data sets, combined with best available technology.

Some of the known geological and geophysical indicators of significant Porphyry Copper and IOCG systems are:

- Mega-scale structural trends with vestiges of ancient volcanic arcs
- Potassic (K) anomalies in radiometric surveys
- Signature petrology (propylitic grade porphyry dykes; potassic grade mineralisation \pm phyllic)
- Spherical magnetic anomalies
- Magnetic anomalies signifying buried hydrothermal alteration with associated mineralisation

Our contribution to an improved toolkit for a systematic approach to exploration focuses on the last two points above. Our work provides better understanding of Porphyry Copper and IOCG systems through application of a rigorous scenario-testing scheme, whereby we gathered and analysed multiple magnetic forward modelling results achieved directly from an array of simple 3D geology models.

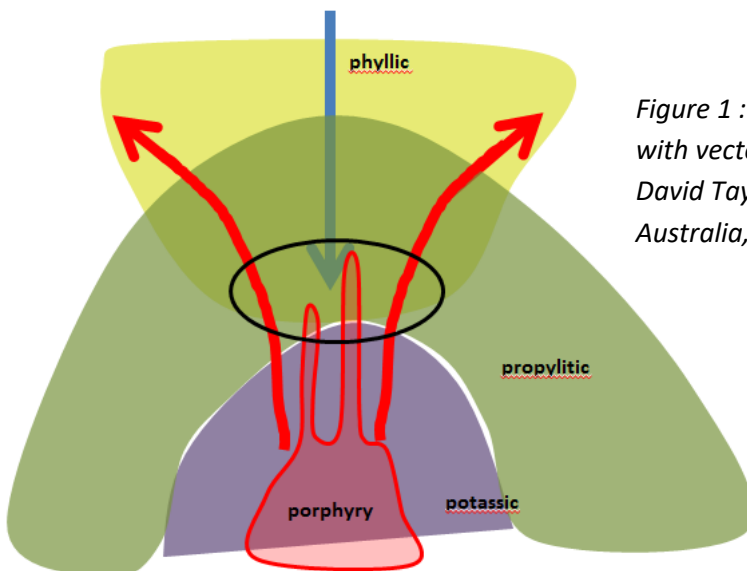


Figure 1 : Stylised Porphyry system zonation with vectors to mineralisation (Figure after David Taylor, Geological Survey of Victoria, Australia, 2015, unclassified conference paper).

Each 3D geology-property model was systematically varied to investigate the relative importance of: (i) variable geology-geometry, including variable dimensions of the Porphyry-system and (ii) variable magnetic susceptibilities of units within and hosting the system. Results will be presented.

Reference:

[1] Clark, D.A.,2014. Magnetic effects of hydrothermal alteration in porphyry copper and iron-oxide copper–gold systems: A review, *Tectonophysics* (2014), <http://dx.doi.org/10.1016/j.tecto.2013.12.011>

