I use a simple rock physics model, based on linear combinations of the properties of unaltered and altered rocks, to predict the physical properties of altered rocks at the St Ives Gold Mine, Western Australia. Previous studies of mineral systems demonstrate that alteration can produce physical property contrasts with respect to unaltered host rocks and thus produce geophysical signatures in various datasets such as gravity, magnetics and seismic.

When viewed on a scatter plot, the majority of samples at St Ives plot within a limited field, representing the properties of unaltered host rocks. Samples plotting outside this field are inferred to be altered. As host rocks have a restricted range of physical properties, there are a range of paths (alteration trajectories) which altered samples can follow on bivariate plots. These trajectories define a cone shaped field, the alteration cone. The open end of the cone encompasses the expected physical properties of unaltered samples, and the focus of the cone lies on the physical properties of the alteration assemblage. Samples plotting inside an alteration cone are inferred to result from alteration of a host lithology and contain some proportion of that alteration assemblage. The distance a sample occurs along the cone is proportional to the amount of alteration the sample has undergone.

This model accounts for the physical properties of samples which are known to be altered, by comparison with HyLogger core logging results and the St Ives drillhole database. This model can also be used to predict alteration within other datasets, e.g. gravity-magnetic inversion results.

**Technical Area:** Case Studies in Western Australia