

Synvolcanic alteration systems as a precursor to Orogenic gold deposits in the Eastern Goldfields

When: Wednesday 26 July, 2017

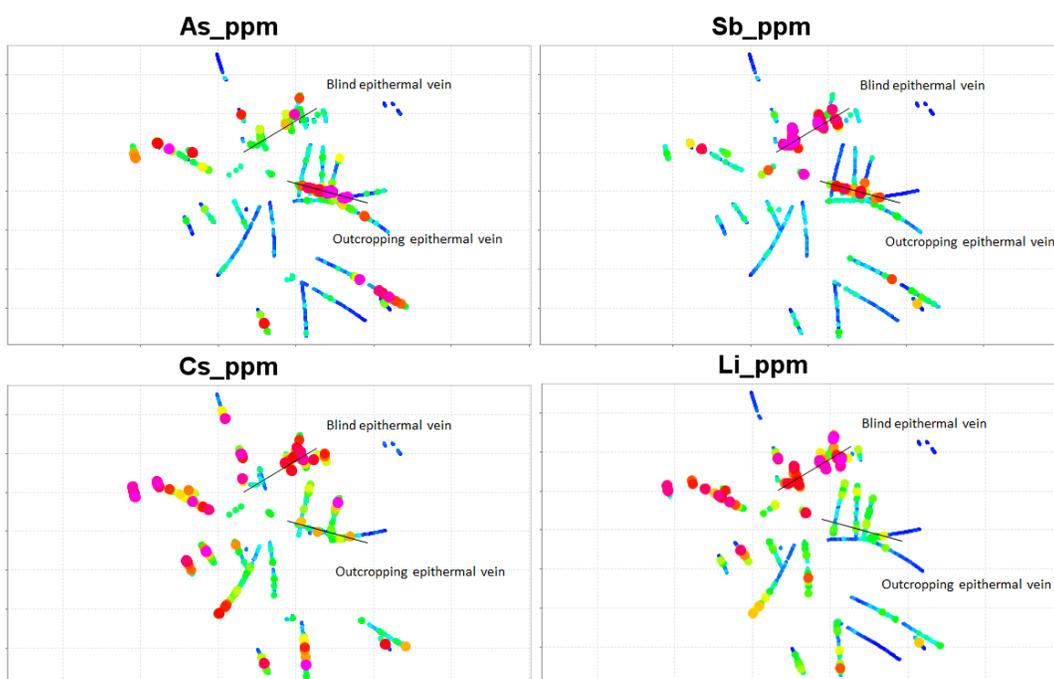
Where: Australian Resources Research Centre (ARRC)
26 Dick Perry Avenue, Kensington WA 6151, Australia

Why: in support of Prostate Cancer Research

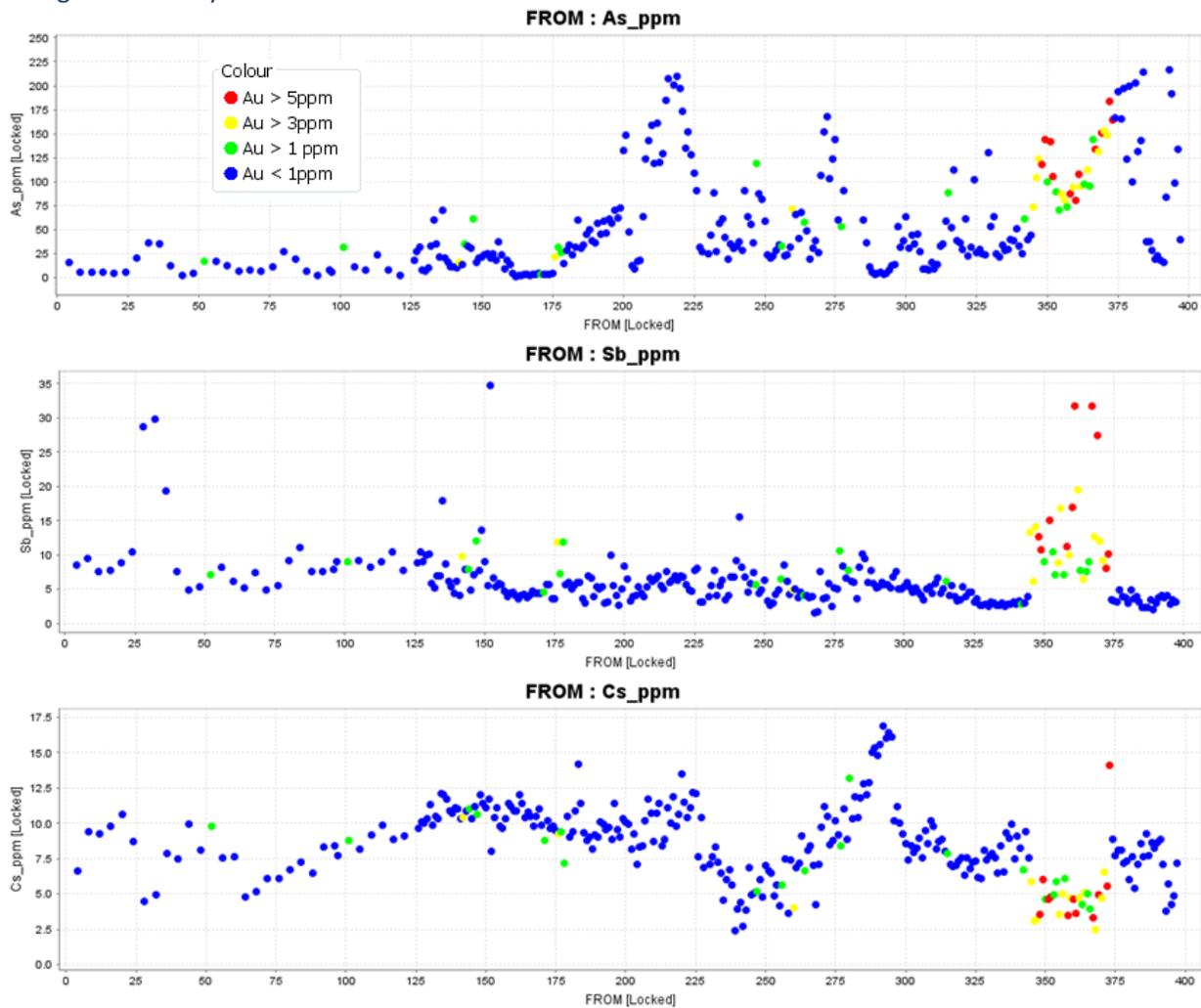
This one-day, not-for-profit technical seminar will highlight the similarities between the geochemical signature of Kalgoorlie gold deposits with modern day porphyry and epithermal systems.

Within the Golden Mile, the relationship of early “Fimiston-style” mineralization overprinted by “Charlotte-style” stockwork orogenic veins is well documented. Field geology relationships around Kanowna Belle show that there are multiple gold events spread through the geological evolution of the Kalgoorlie district. Mineralized diorite north of Kanowna Belle has been uplifted, tilted and eroded, shedding mineralized clasts into the Golden Valley conglomerate. The KB orebody is hosted partly within the Golden Valley conglomerate. KB is overprinted by a later foliation. The mineralized veins at Red Hill cross cut that foliation. These geological relationships show there are 3 gold events, which probably span from 2670Ma to 2630Ma.

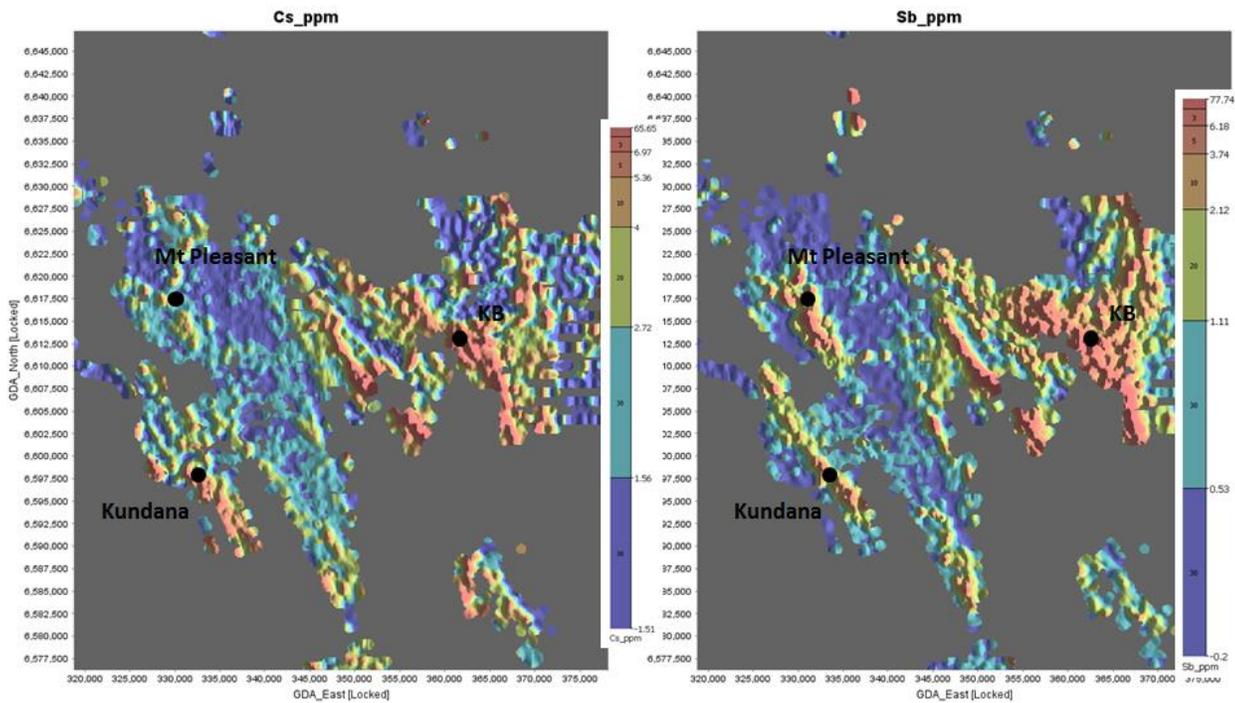
There are some interesting things to learn by comparing geology, chemistry and mineralogy from the Yilgarn with modern porphyry and epithermal environments. The shallow levels of porphyry systems, outflow zones from epithermals and geothermal systems are usually capped by regionally extensive clay blankets. These environments are geochemically characterized by fine grained pyrite with antimony decoupled from arsenic (Sb keeps moving after the temp. has dropped too low for As transport), anomalous Cs (hosted in smectitic clay) and anomalous Li (hosted in Mg smectite and dickite).



At Kanowna Belle the arsenic halo at about 10 times background, extends for around 200m into the hangingwall. The antimony and caesium haloes at 10 times background extend for at least 1km into the hangingwall. The hangingwall alteration is sericite-pyrite-ankerite. Antimony (without As) plus Cs and Li would not precipitate in metamorphic conditions of 300° and 2 kB. The metal assemblage in the hangingwall is indicative of smectite-pyrite mineralogy formed during the initial hydrothermal event.



Now step back a scale. The Eastern Goldfields has a large number of alteration systems with very obvious, regionally extensive Sb-Cs-Li signatures that could only be the result of low temperature clay-rich hydrothermal alteration. These are presumably syn-volcanic; commonly spatially associated with fractionated diorites. These alteration cells also have a high spatial coincidence with orogenic gold deposits, with a metamorphic grade anywhere from middle greenschist to lower amphibolite. The evidence presented in this seminar will show that Fimiston age alteration systems are much more common than is now recognized and may be a critical component in the formation of large gold deposits. Rather than orogenic gold deposits being the product of metamorphic de-watering of an entire greenstone belt at amphibolite grades, the large clay alteration systems may provide a very localized source of water which is liberated at lower to middle greenschist grade, and also contains a very significant source of metal, sulfur and CO₂.



If these ideas are correct then there are implications for exploration. Big clay rich alteration systems only form at low temperatures, so the nature of the stratigraphy and the location of the paleosurface at the time of alteration are critical. The clay alteration systems have most likely been through 2 major deformation events; therefore the systems on the limbs of folds are tilted (which way does the zoning point?). In many cases, metamorphism of the clay alteration has produced anomalous metamorphic mineral assemblages.

This seminar will;

- discuss geological evidence for multiple mineralizing events,
- show the geochemical signatures of low temperature hydrothermal systems,
- show the metamorphic mineralogy derived from low temperature alteration cells,
- provide demonstrations of Leapfrog models derived entirely from multielement geochemistry and SWIR spectra data,
- demonstrate in iGAS how to identify potentially “fertile” porphyries from immobile trace element chemistry, and
- showcase some of the exciting new developments in geochemical and mineralogical analysis techniques.

This event is generously sponsored by:



My motivation – creating awareness and raising funds for prostate cancer

Every year in Australia, 22,000 cases of prostate cancer are diagnosed, over 3,000 men die from it. Five years ago I was diagnosed with prostate cancer. I had a blood test just in time. Without a PSA test, I wouldn't have made it to 60.

I am participating in a bike ride from Perth to Margaret River on 15-16 September to promote public awareness about prostate cancer, and to raise funds for the Prostate Cancer Foundation of Australia (PCFA). Last year PCFA provided \$11 million to fund medical researchers who are looking at better ways to diagnose and treat prostate cancer. They also funded 28 specialist Prostate Cancer nurses around Australia.



This seminar is my contribution to this fund raising event. Prostate cancer has a high survival rate, but the key is early detection. Without awareness of the risk, many men leave it too late to have a test. This year the funds raised will go directly towards employing specialist prostate cancer nurses around Australia.

Numbers are limited and will be on a first-come, first served basis, so please register your interest with CSIRO by emailing Cheryl Harris – Cheryl.harris@csiro.au

This is a not-for profit event. Please consider making a donation.

Donations can be made at <https://prostateactive2017.everydayhero.com/au/scott>