

# COMET™

Comet is a mass balance calculation system.

The input is 4 acid digest ICP analyses of major elements Al, Ca, Fe, K, Mg, Na and S and significant minor elements As, Ba, Cu, Mn, P, Pb, Ti, Zn

Create a list of minerals present in the system. There are default mineral selections based on the deposit type, which can be modified by the user.

The software contains methods to accommodate likely solid solution variations of mica, chlorite and feldspar compositions.

It runs on an optimization routine that estimates mineral abundances such that the sum of the components of the minerals is equal to the whole rock totals for the elements.

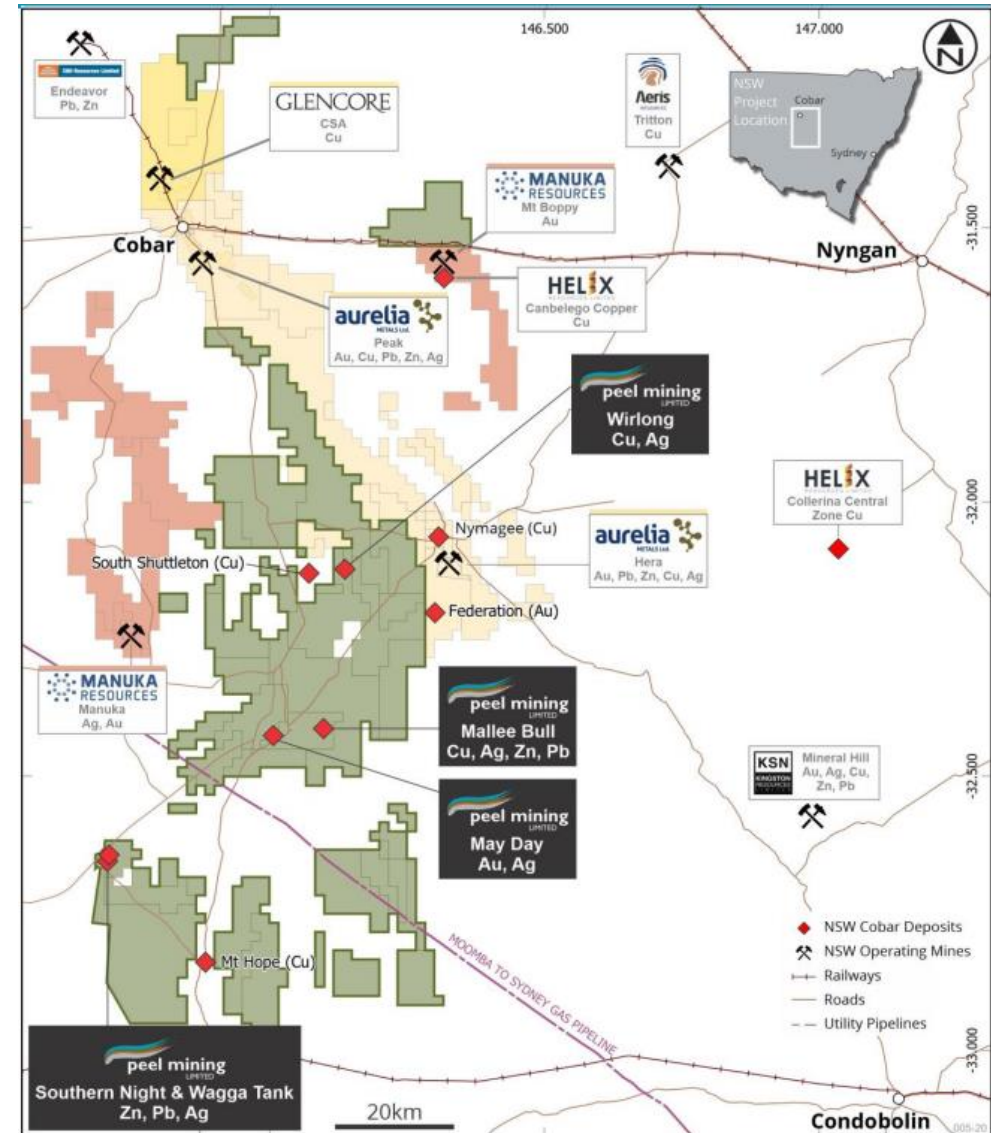
This presentation is a case study of the Comet method applied to drill hole assays from Mallee Bull.

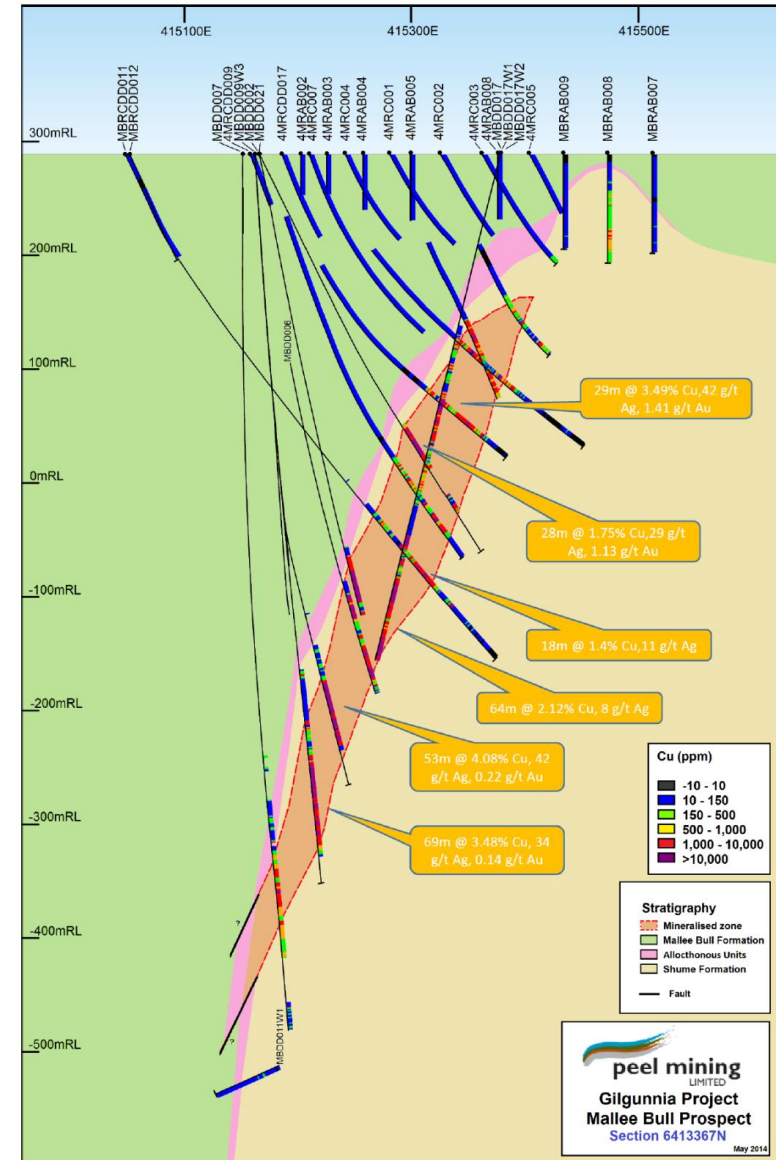
## Mallee Bull

Aeris Resources acquired the South Cobar Copper Project (including Mallee Bull and Wirlong) from Peel Mining in mid-2026.

Mallee Bull is a  
“Cobar-style” deposit  
analogous to the CSA mine

Indicated Resource: 6.25 million tonnes  
grading 1.77% Cu, 30 g/t Ag, and 0.41 g/t  
Au.

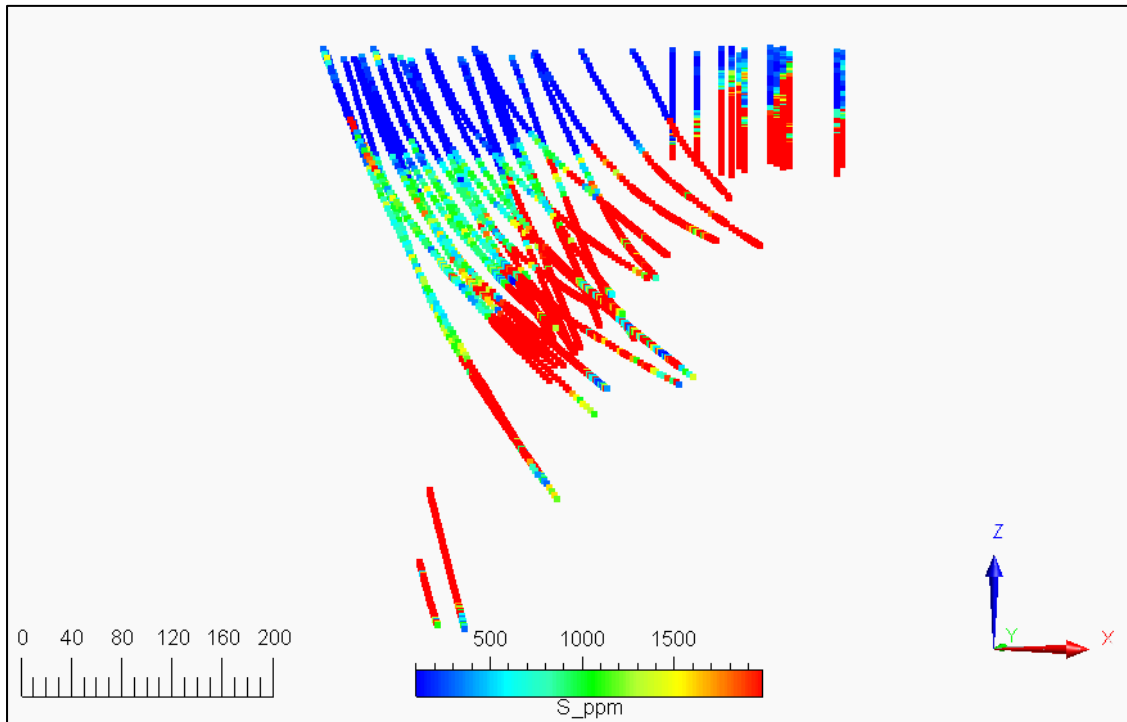




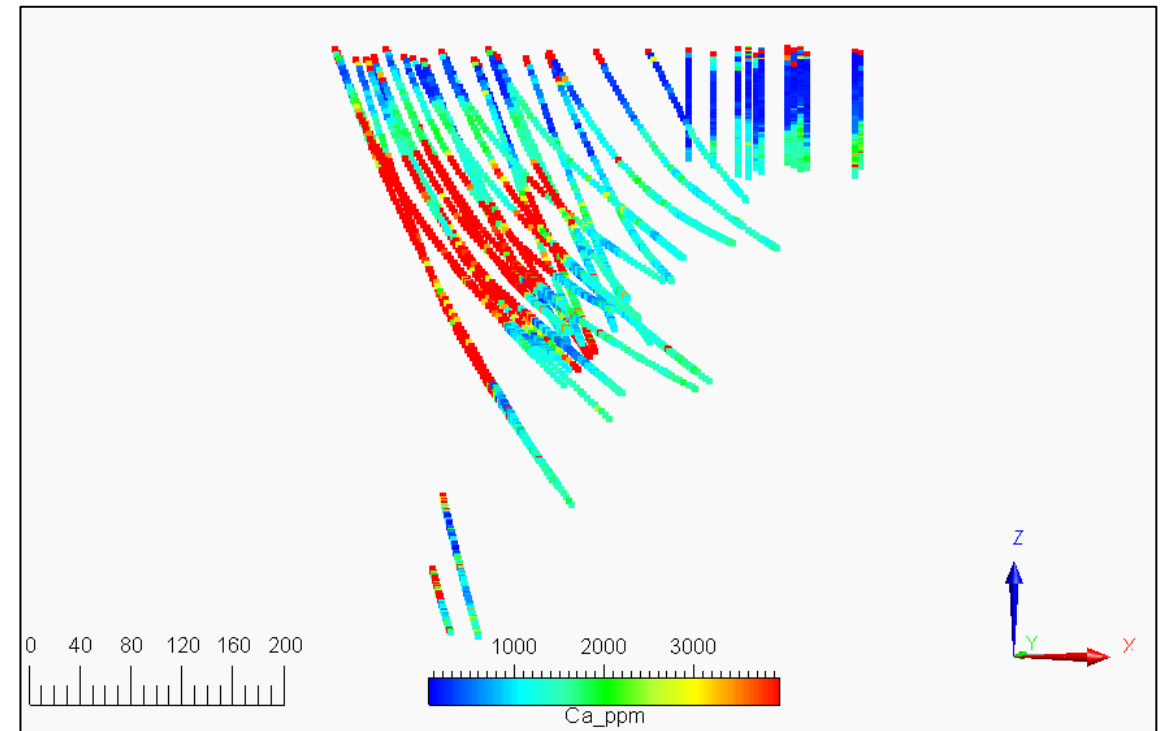
# Regolith

To begin with, consider the regolith (so we can distinguish between hydrothermal and weathering processes). Plot sections of S and Ca, especially looking at the low values. Sulfur depletion is mapping the base of oxidation. The S-depleted zone will contain Fe oxides, kaolinite and smectite. If carbonates were present in this system, the Calcium depletion boundary would be deeper than the sulfur depletion.

**Sulfur**

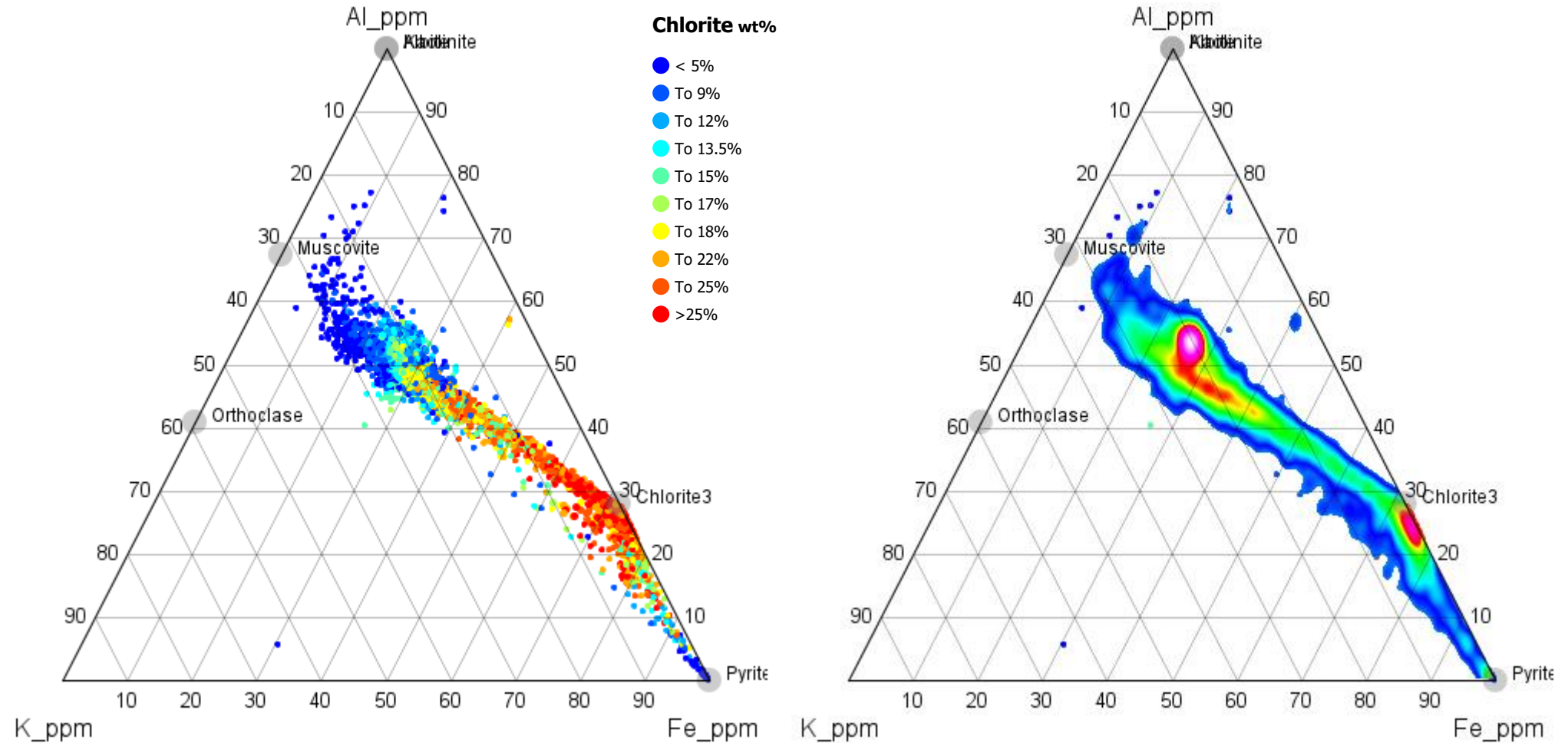


**Calcium**



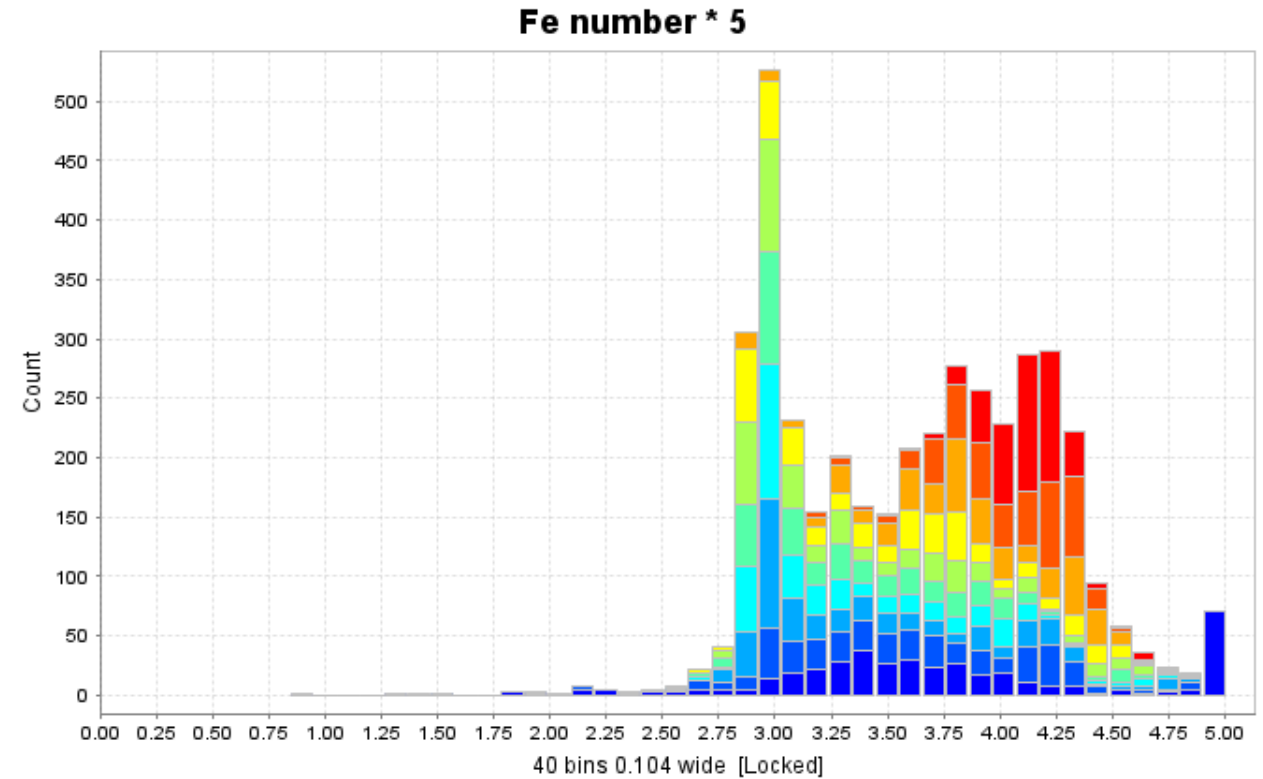
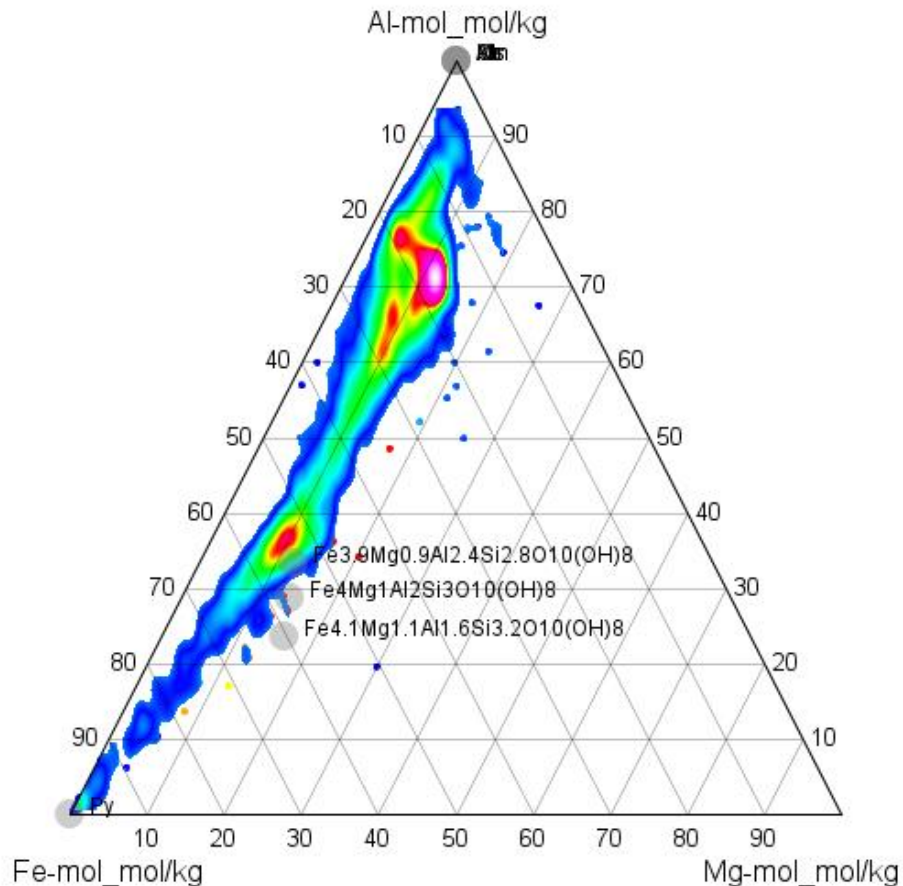
# Sericite and Chlorite

When data show a strong linear trend on an alteration diagram, it indicates a mineralogical control on the whole rock composition. In this case there is a very strong sericite-chlorite control. This is an unusually Fe-rich chlorite.



# Chlorite Composition

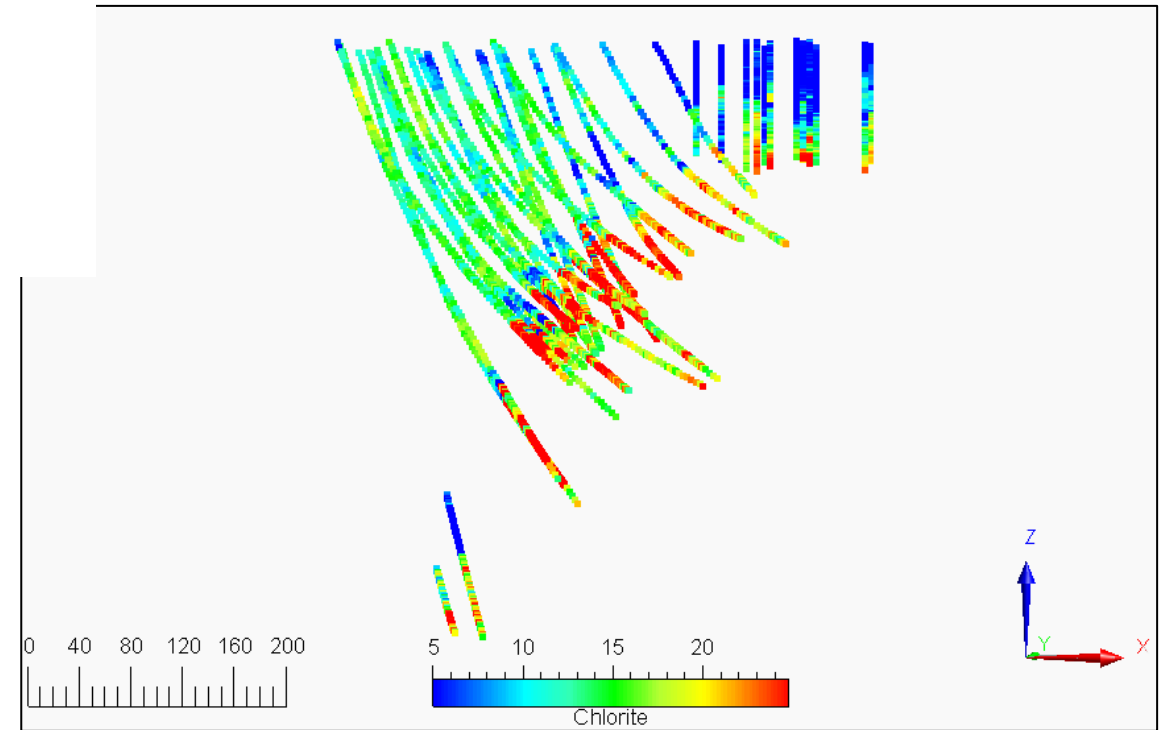
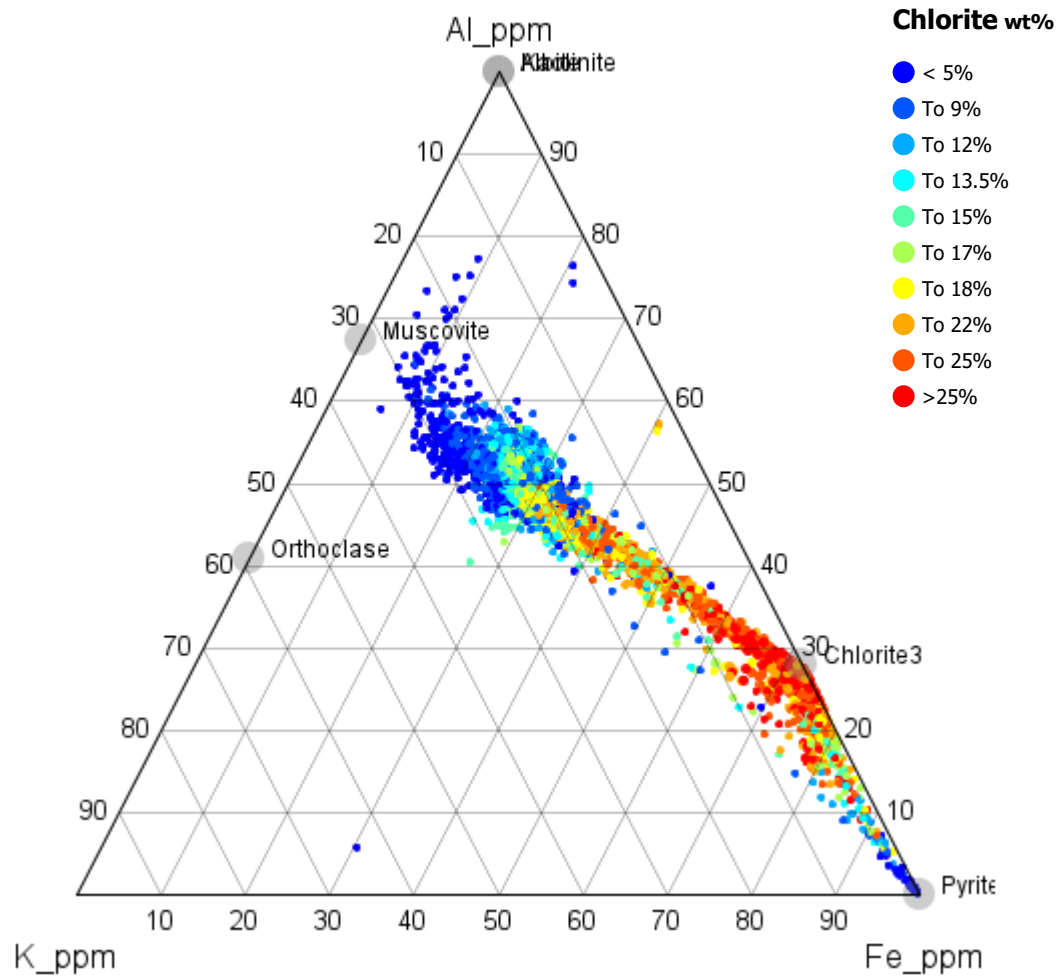
The most chlorite-rich rocks have no K, Na or Ca. If I plot molar proportions of Al, Fe and Mg, I can determine the composition of the chlorite.  $\text{Fe}_{4.2}\text{Mg}_{0.5}\text{Al}_{2.6}\text{Si}_{2.7}\text{O}_{10}(\text{OH})_8$  This was used as one of the chlorite endmembers in the Comet calculation. In the background rocks, the chlorite is more like  $\text{Fe}_3\text{Mg}_2\text{Al}_2\text{Si}_3\text{O}_{10}(\text{OH})_8$



The empirical formula for chlorite is  $(\text{Fe,Mg})_5\text{Al}_2\text{Si}_3\text{O}_{10}(\text{OH})_8$   
 From the whole rock data, a molar ratio of  $\text{Fe}/(\text{Fe}+\text{Mg}) * 5$  was calculated. In effect, this portrays the possible range of chlorite compositions.

# Chlorite Abundance

Comet calculated the abundance of chlorite as the sum of an Fe-Al-rich endmember ( $\text{Fe}_{4.2}\text{Mg}_{0.5}\text{Al}_{2.6}\text{Si}_{2.7}\text{O}_{10}(\text{OH})_8$ ), an Mg endmember and Mn chlorite.

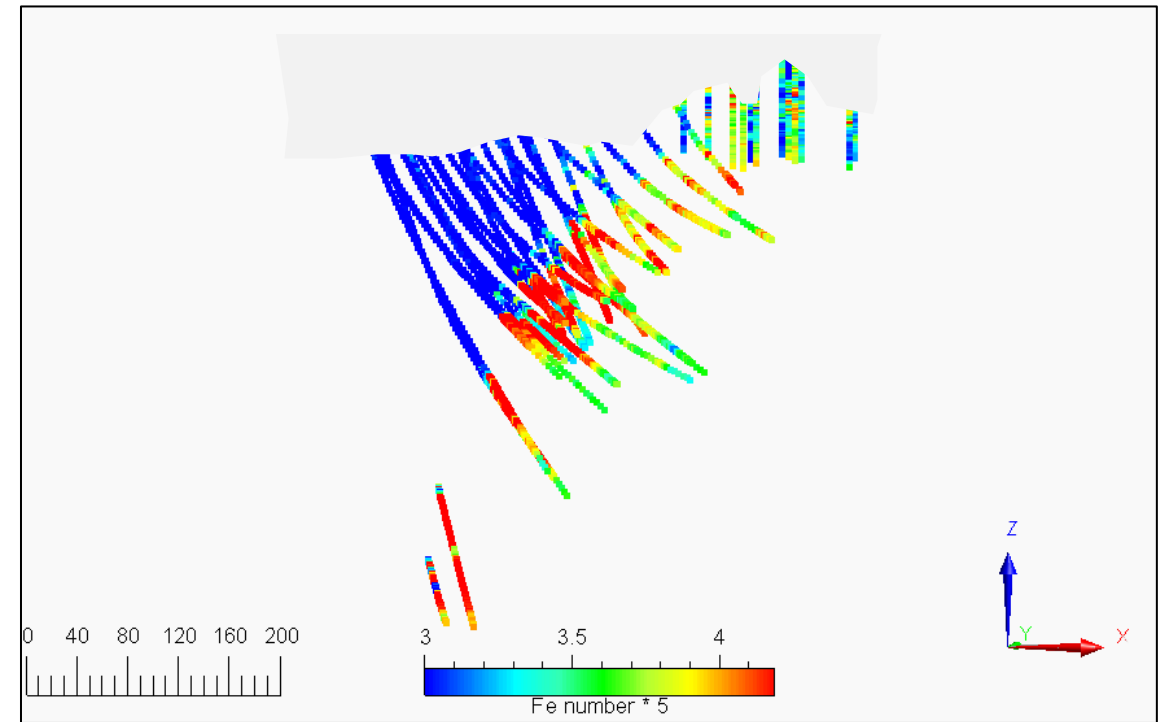
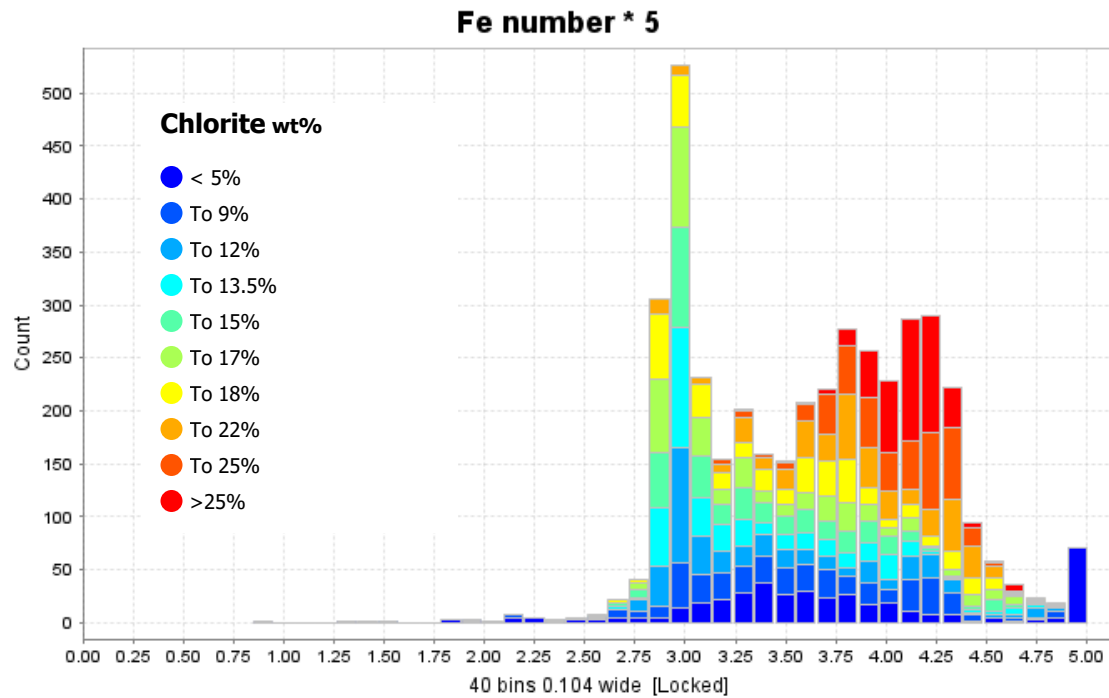


# Chlorite Composition

This is a proxy for chlorite composition based on the value of  $\text{Fe}/(\text{Fe}+\text{Mg}) \text{ molar} \times 5$

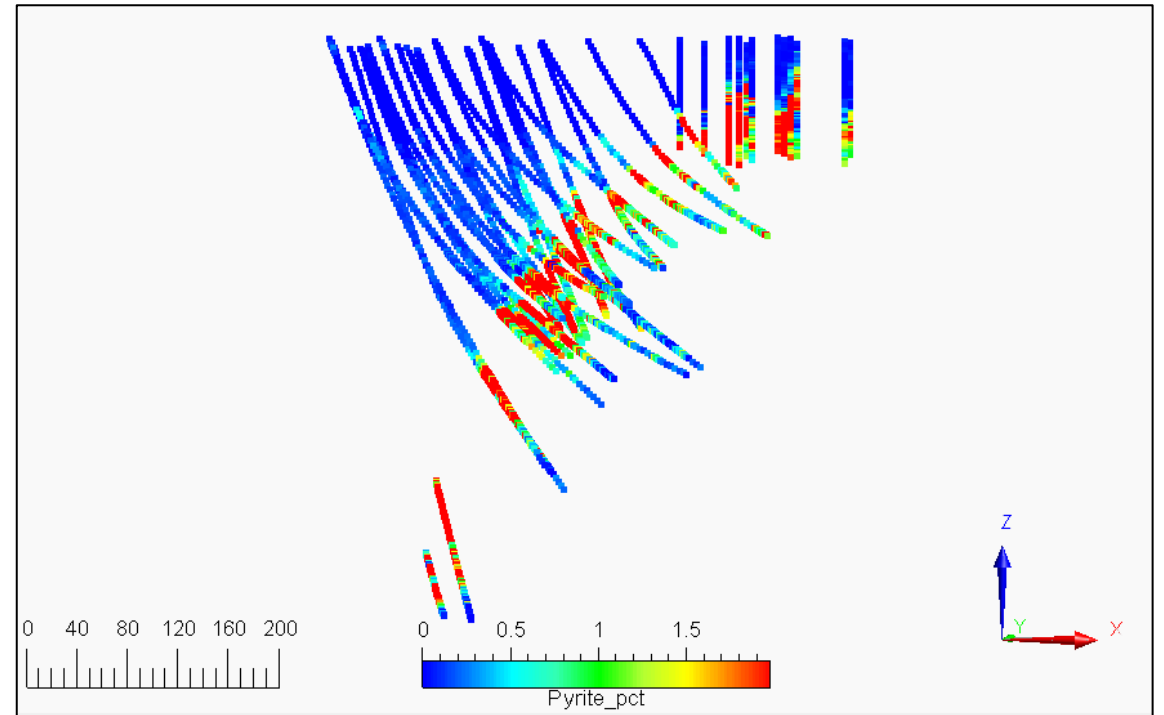
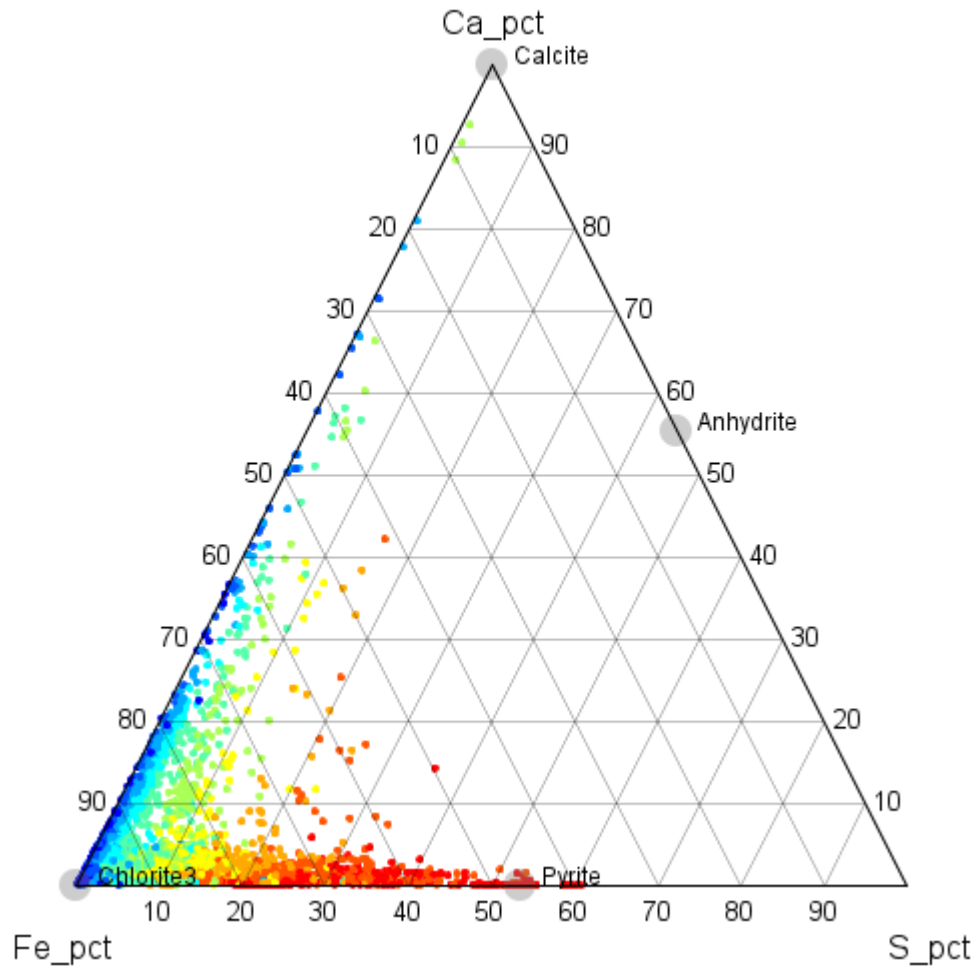
I could make this more precise by accounting for Fe in sulfides, but chlorite >> pyrite, so it makes little difference.

Note how the high chlorite abundance occurs in those rocks with high Fe number. There is both addition of Fe and removal of Mg in these rocks. Note on the section, the regolith is blanked out.



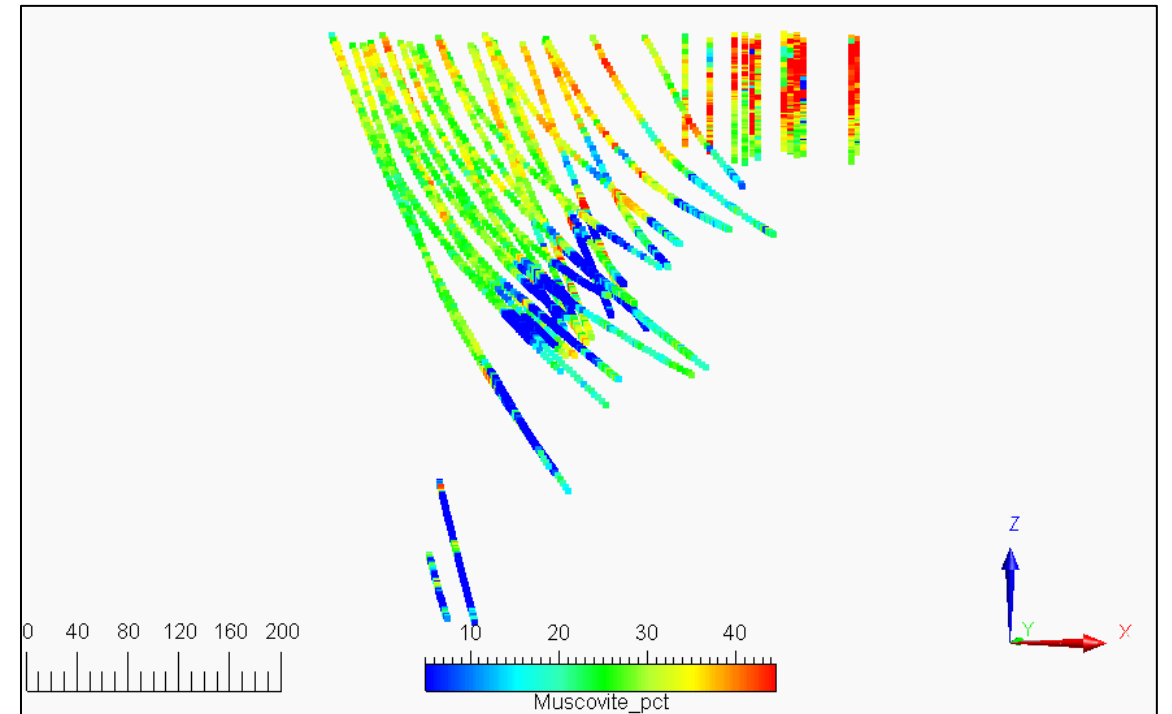
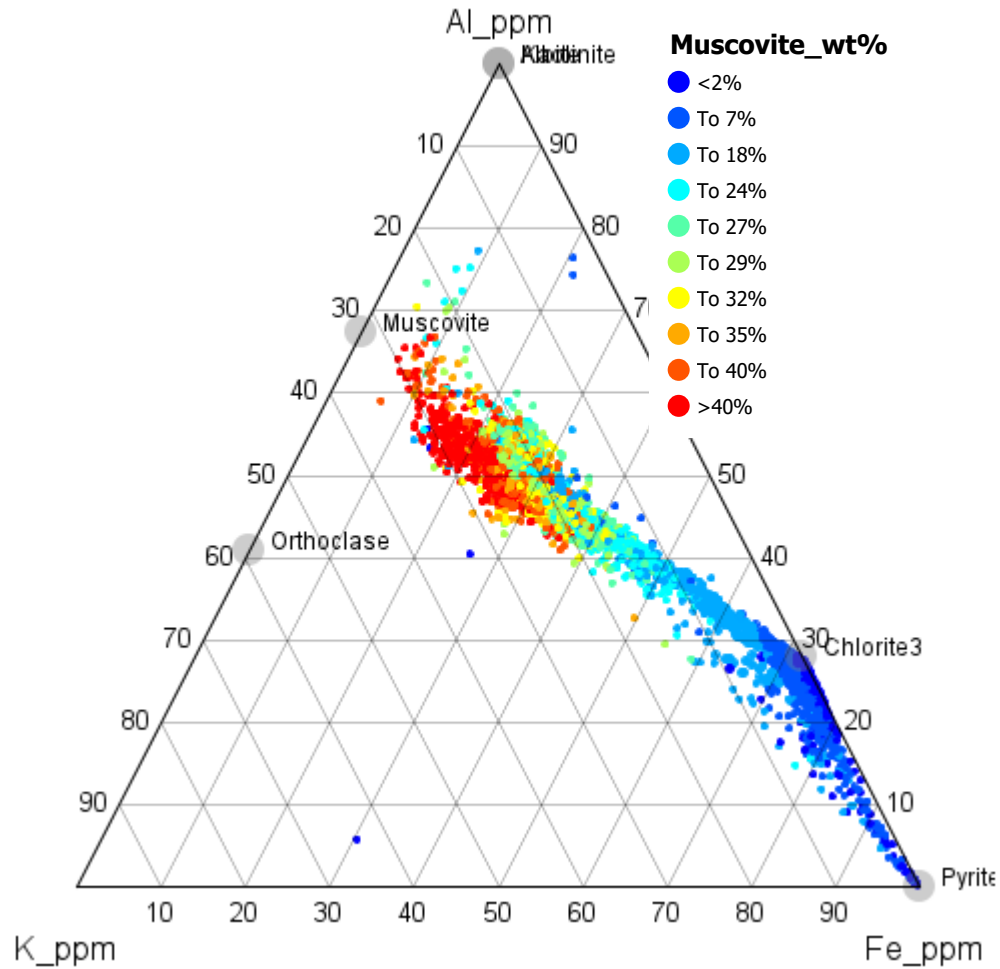
# Pyrite Abundance

The Ca-Fe-S ternary shows that pyritic rocks contain no Ca. There is a large amount of chlorite in the ore zone, but the sulfide abundance is relatively low.



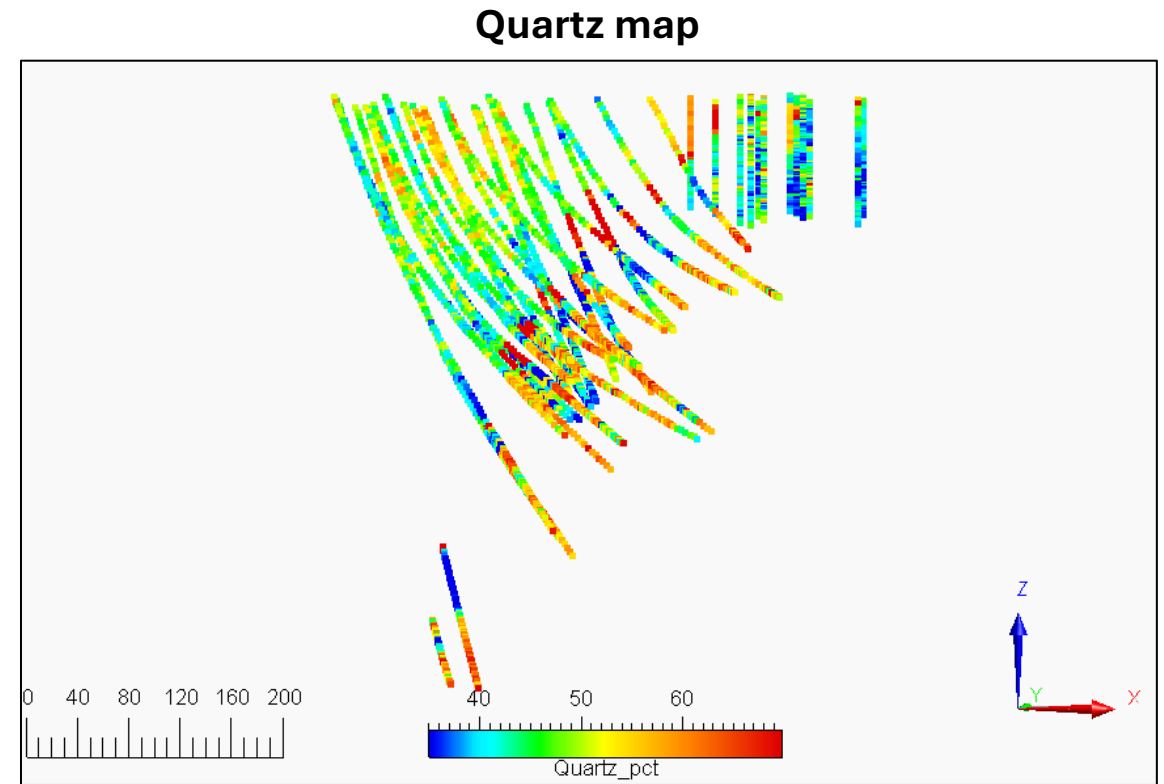
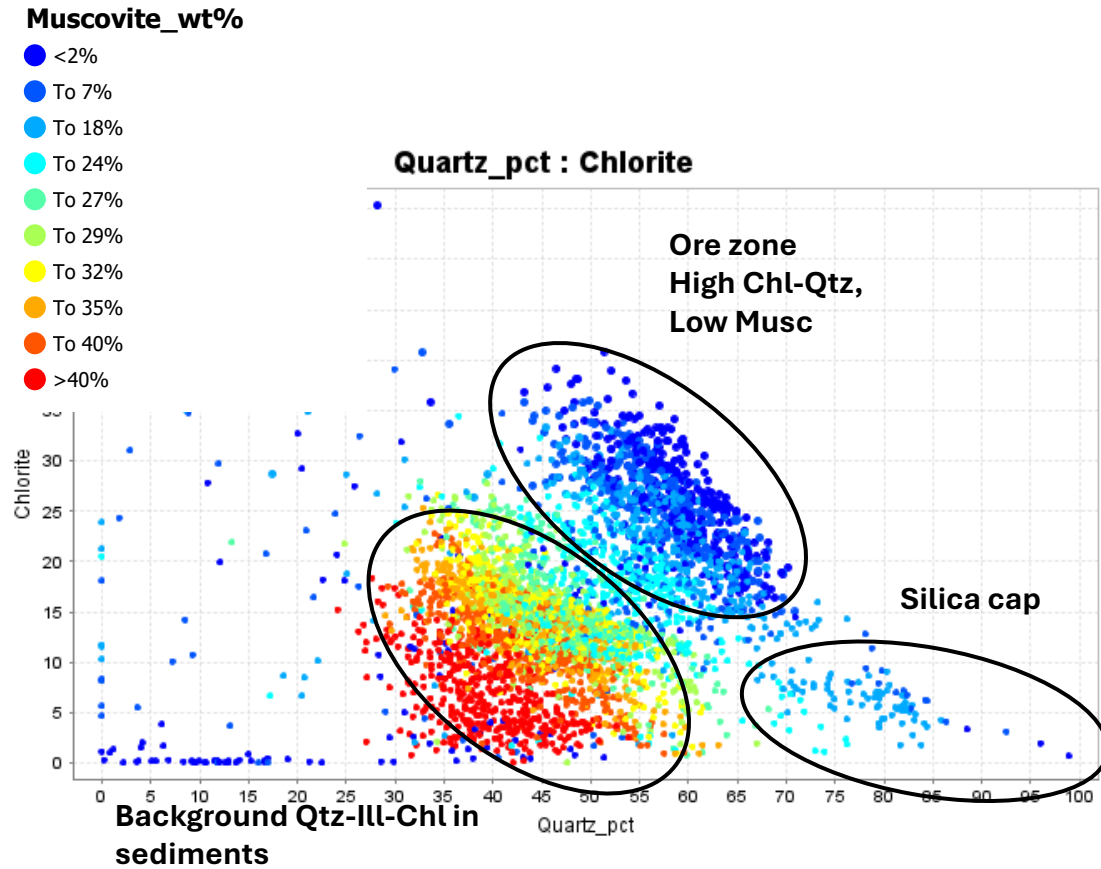
# Muscovite Abundance

The near surface portion of Mallee Bull is sericite-rich. It has high Zn and Pb and is highly anomalous in Sb and As.



# Quartz Abundance

Even though SiO<sub>2</sub> cannot be measured from a 4 acid digest, the calculation of quartz is still surprisingly accurate. Note the quartz-rich cap that sits above the ore zone.



Here are Al-K-Fe ternary plots from Mallee Bull and 3 other Cobar type deposits. They all have the same muscovite-chlorite-(quartz) trends with highly unusual strong Fe metasomatism and Al-Fe-rich chlorite. The deposit on the top right is metamorphosed to an assemblage of almandine garnet-biotite-andalusite even though the whole rock data still plots on the chlorite-muscovite trend. This shows how whole rock compositions still “see through” metamorphism.

