Basin Lake Lithogeochemisrty

Magmatic Suites

Figure 1 shows Th, Zr, Nb and P plotted against Sc. Sc is a proxy for the iron content. Basalts have greater than 30ppm Sc. There are two different Sc-rich groups in here. One group has very high Th, Zr, Nb and P contents. These are Suite 3 basalts, and could be classified as shoshonites. The other “basalt” group is not a well defined cluster. These should be checked against the drill logs and see if in fact they are black shales (some black shales can also have a high Sc content). Note also that there is a quartz porphyry unit in red (labeled here as Suite2 porphyry) that has a very distinct high thorium content.

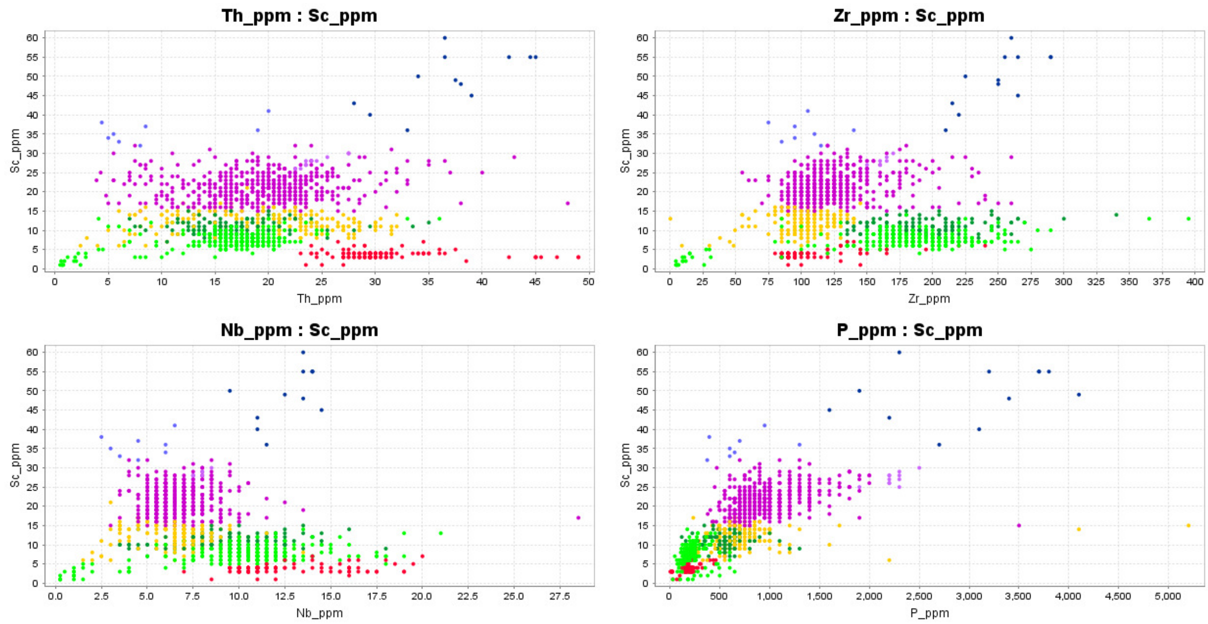


Figure 1.

The points in purple are intermediate compositions (andesites). Note that there is a small population of high Cr andesites. The Sc-Zr plot in particular differentiates andesites (purple), dacites (orange) and rhyolites (green).

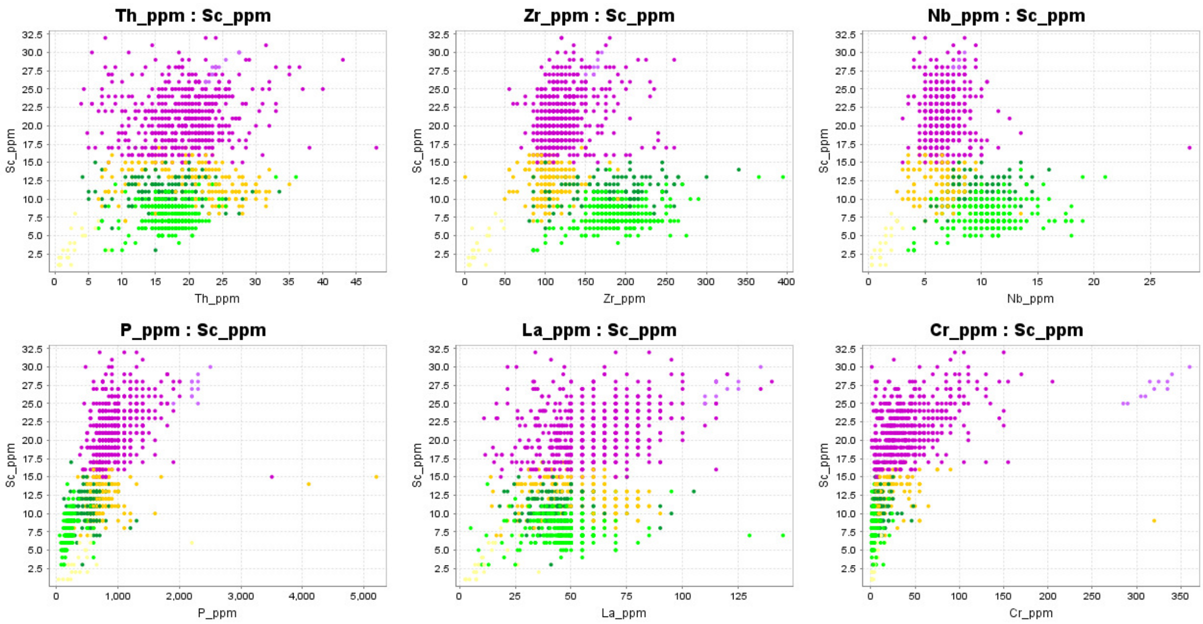


Figure 2.

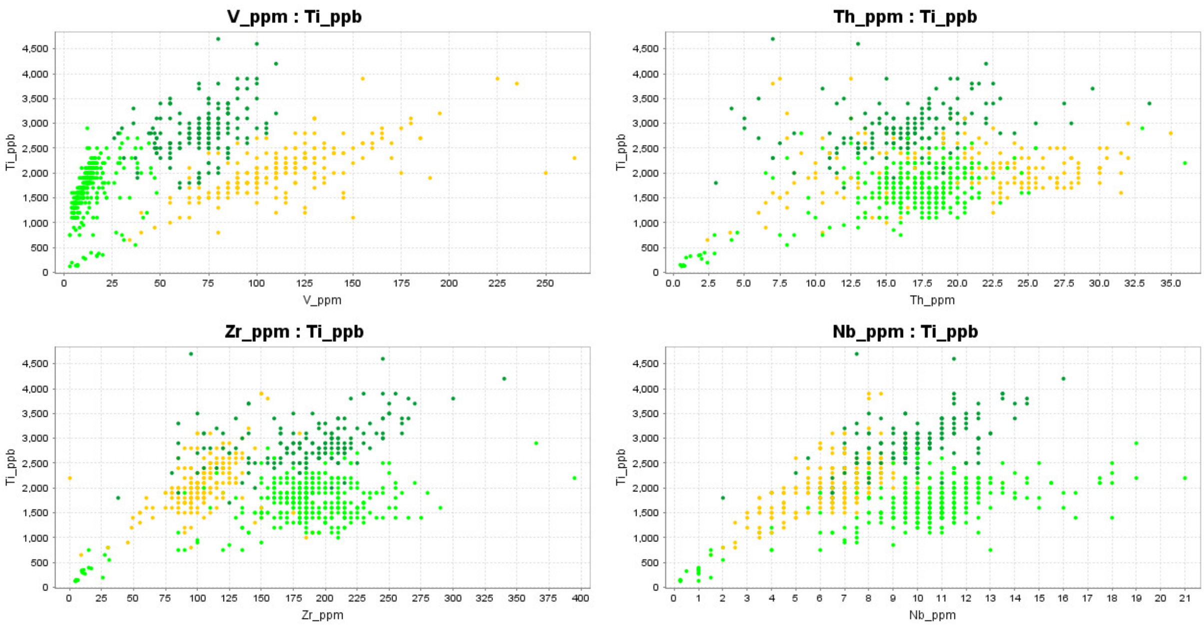


Figure 3.

Figure 3 shows all the dacitic to rhyolitic rocks. These plots show that the felsic compositions can be classified into 3 groups. Again, we need to compare these with the drill logs to correlate against logged units/stratigraphic groups. Note in figure 4 that there is a “tail” of points that head towards the origin on all the plots. These have been coloured as a pale blue group. In the pale blue group, the immobile trace elements are diluted by carbonate; a chemical sediment that lacks immobile traces. These points are limestones. The silicate component of these is projecting towards the andesite and dacite groups.

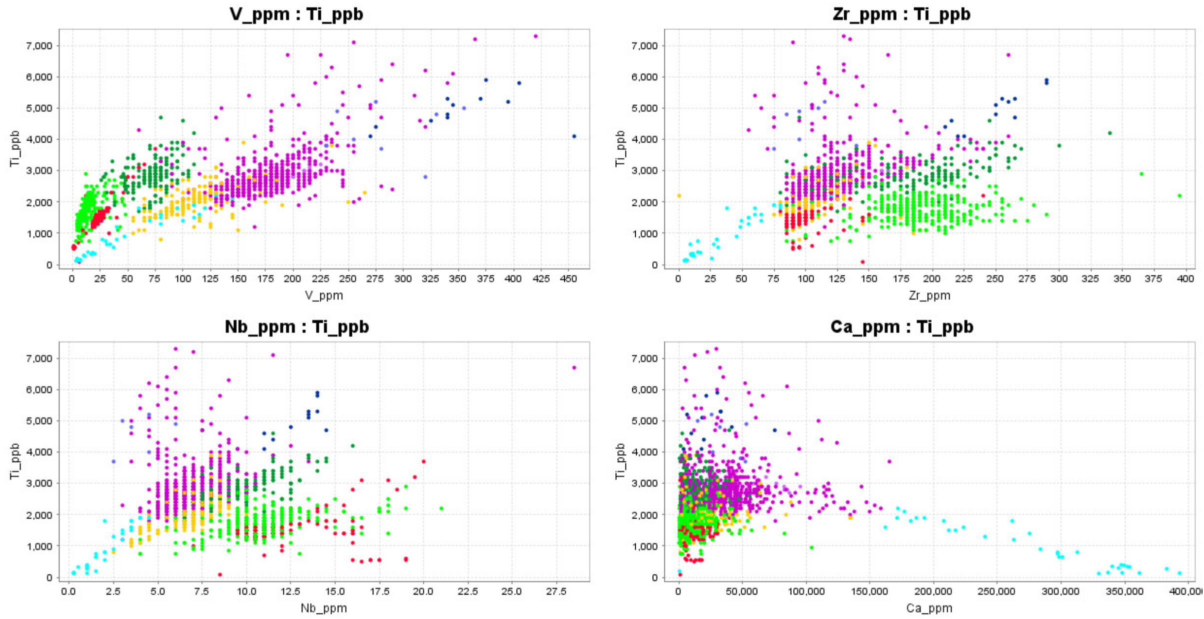


Figure 4.

Alteration

A convenient way to quantify the chemical changes during alteration is to plot the whole rock analyses as general element rations of K/Al vs Na/Al (figure 5). These are ratios calculated on a molar proportion rather than a weight percent basis. This allows the data to be projected in terms of alteration mineral compositions. In this way, the relative amount of sericite, or albite can be quantified. Each rock type has a different primary composition, so a separate projection is required for each compositional group. Once the alkali-element alteration trends have been identified within each compositional group, all of the data can be re-combined to see the overall alteration picture.

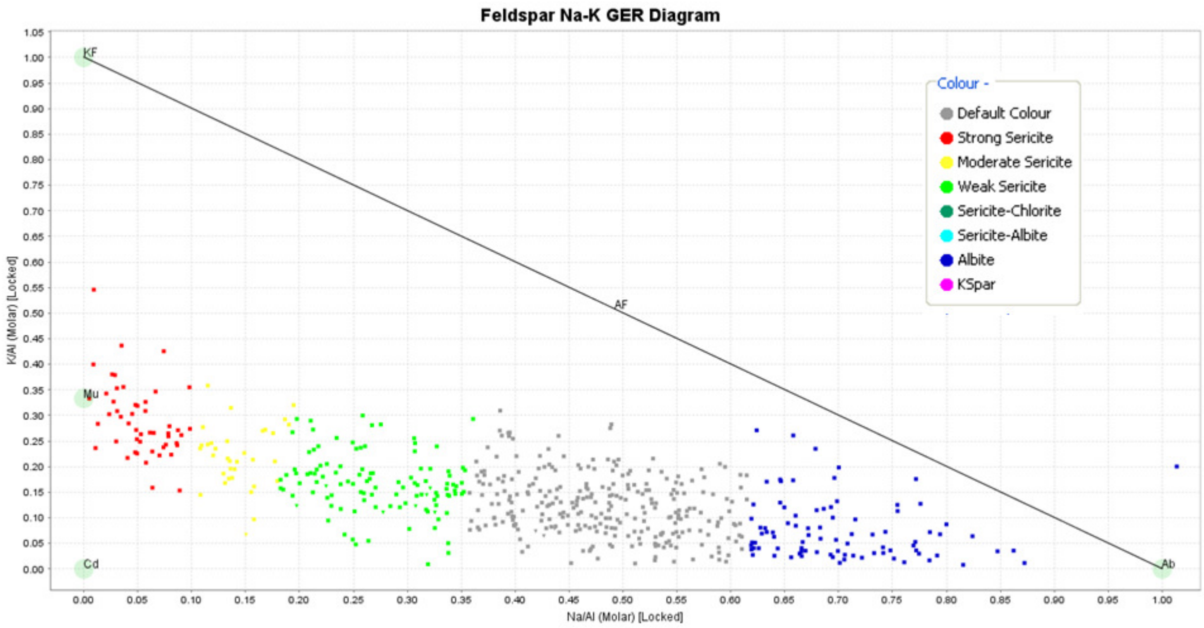


Figure 5.

Figure 5 shows the classification of the alteration in all the andesites. There is a complete spread of mineralogy from albite to sericite. Figure 6 shows the alteration from the rhyolite group. In the rhyolite, there is a big cluster of points that are completely sodium depleted, however they have too much K to be just sericite. Many of these samples contain K feldspar. These all come from Itat Creek on the southern side of Mt Sedwick. The ASD data also shows that these are phengitic micas, like the KSpar-phengite signature around Fossey. Epithermal systems also have this same signature.

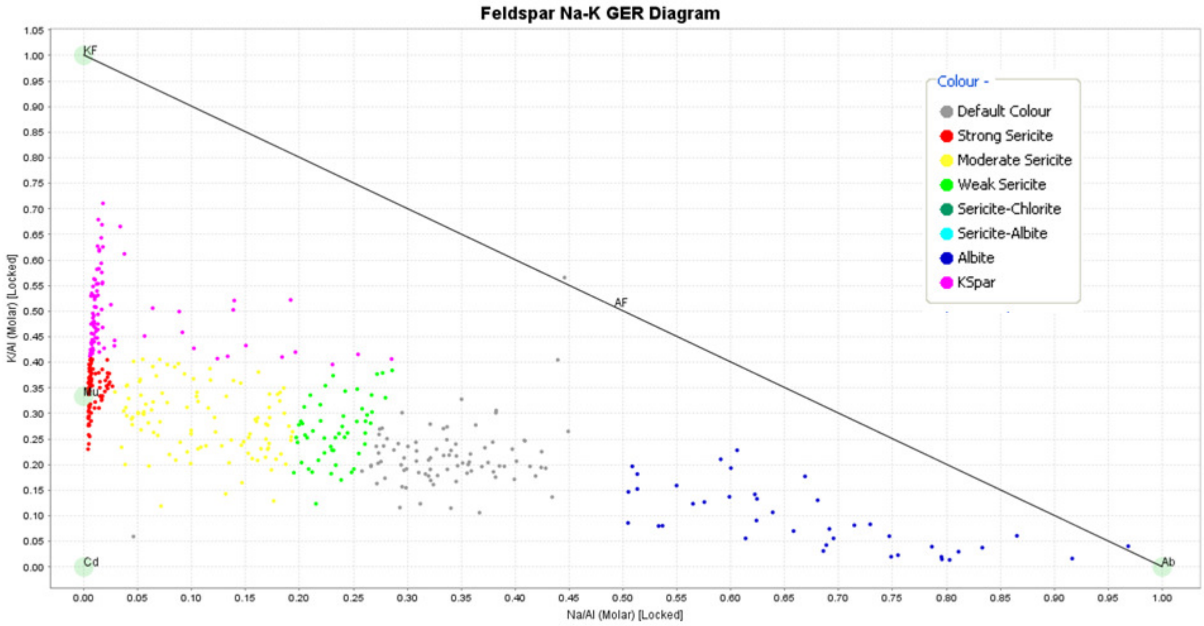


Figure 6. Alteration from the Rhyolite group.

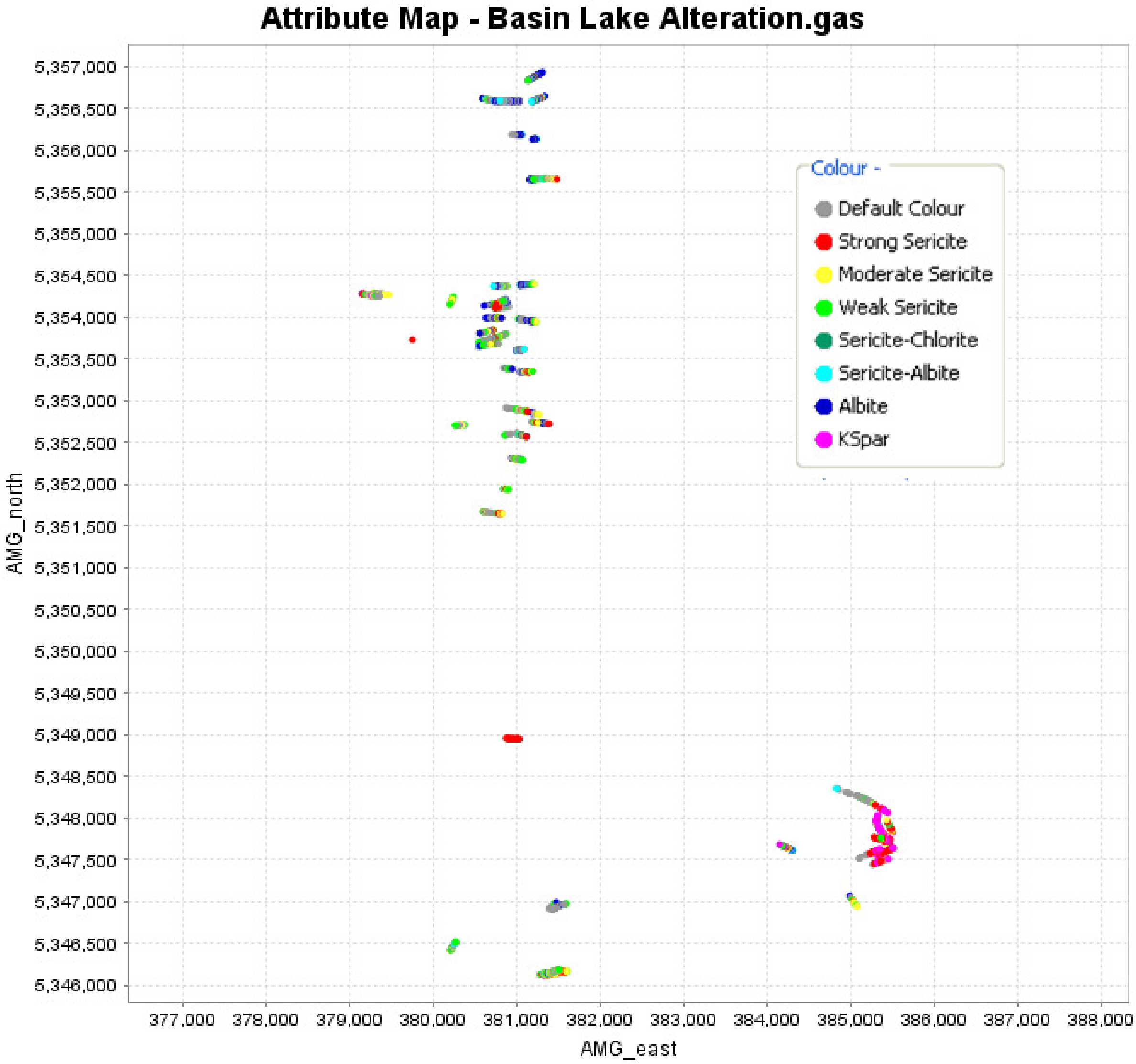
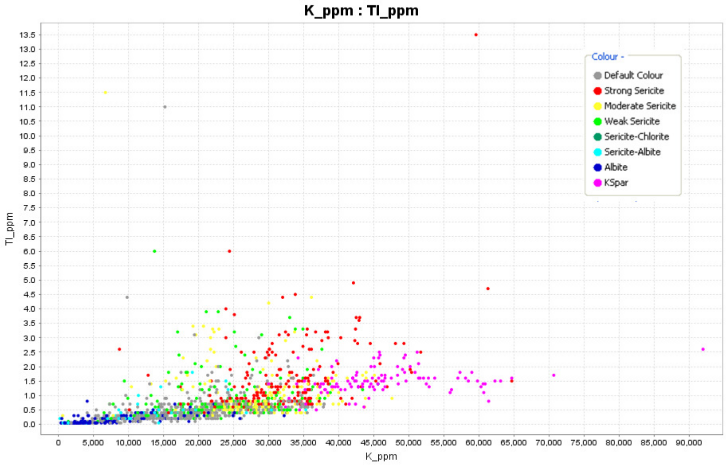


Figure 7. Map view of the alteration signatures.



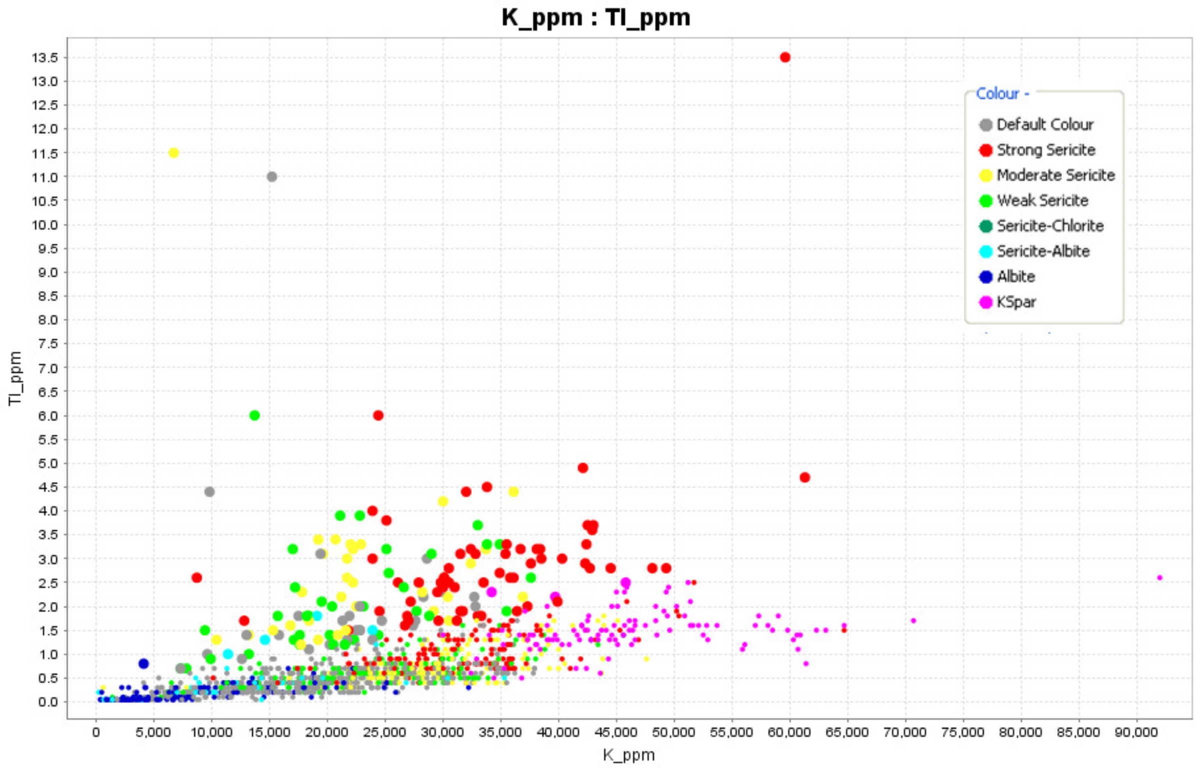


Figure 8.

Thallium was a particularly useful pathfinder around Hellyer. Thallium is generally hosted in potassic minerals, substituting for K. The important component is the thallium that is hosted in pyrite. A plot of Tl vs K shows a strong linear correlation. It is the enrichment of Tl above this trend that identifies the samples that have Tl-bearing pyrite. These are highlighted in figure 8. This has been flagged as a separate column in the excel file of the lithogeochem data.

Pathfinder Chemistry

There are a number of highly anomalous pathfinder elements within this data set. In the phyllic alteration zones proximal to porphyry systems, the suite of elements that is diagnostic of this environment is Mo, Te, Bi, Se.

Bi, Te and Se are the most anomalous elements In this data set, but not so much Mo. It would be interesting to see if these were also the distinctive pathfinders on the fringes of Prince Lyell and the Lake Newton Cu prospect. The average crustal abundances for Bi, Te and Se are around 0.03, 0.01 and 1ppm respectively.

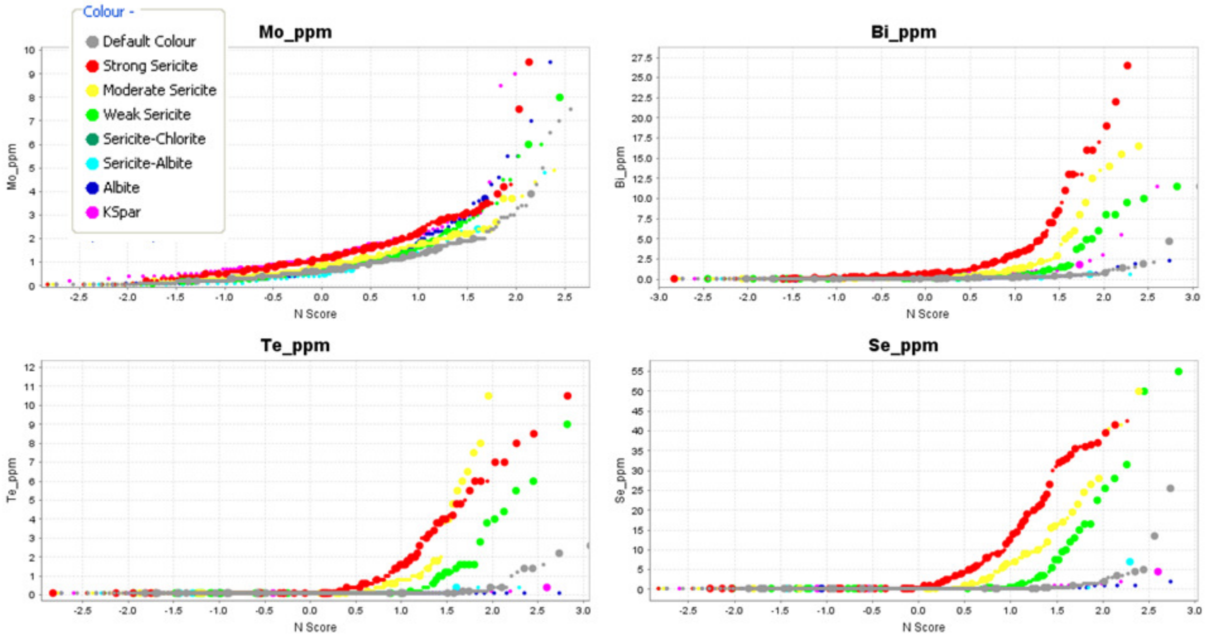


Figure 9.

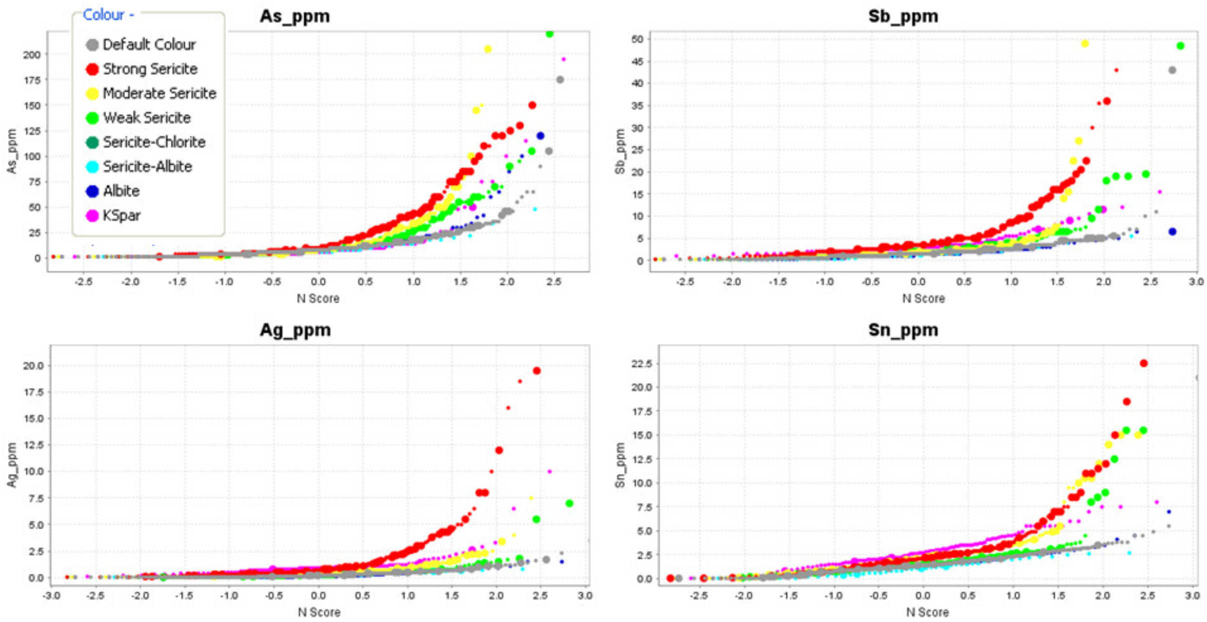


Figure 10.

Arsenic values in this data set are lower than the Hellyer region, but still very anomalous. The antimony values are very strong, and they form well defined anomalous zones. The silver values are strongly elevated and there is a distinct anomalous population of Sn results above 4ppm. The pathfinder elements are best viewed in the Mapinfo workspace, where thematic ranges are already plotted, and in the 3D Leapfrog Viewer files.

Specific Zones

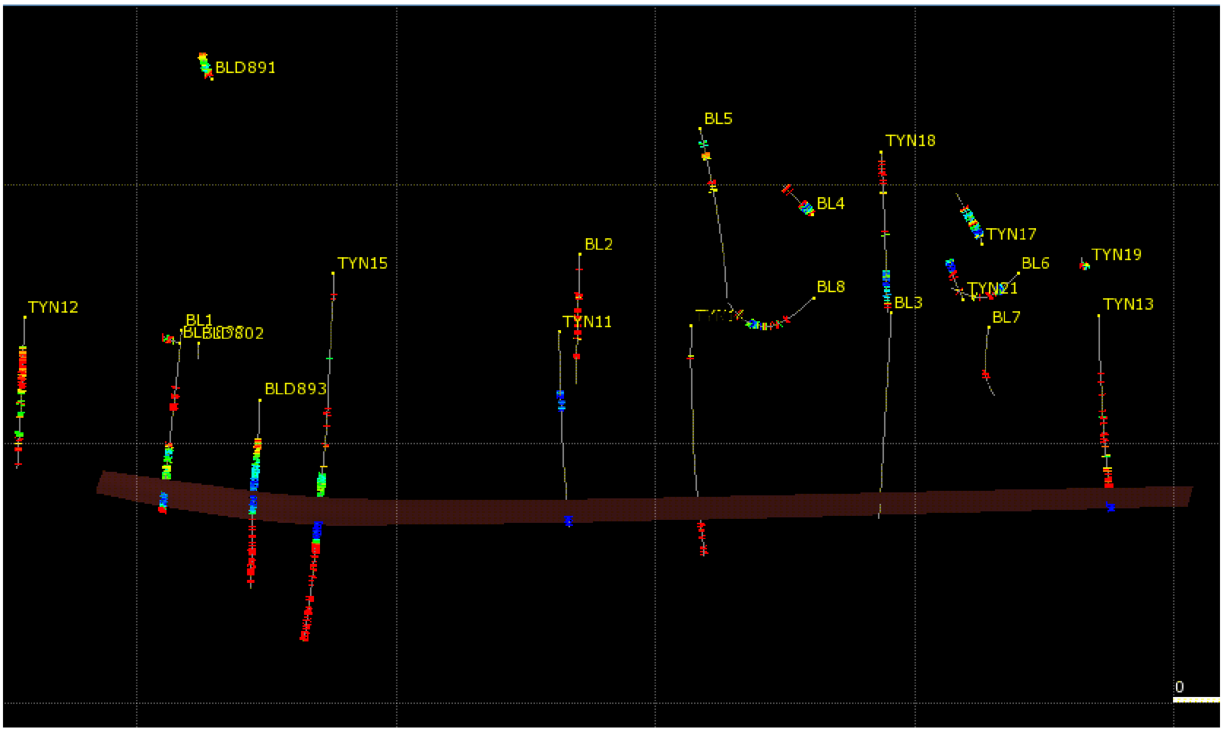


Figure 11.

There is a zone defined by BL1, BLD893, TYN15, TYN11 and TYN13 (figure 11). This is a zone of acid alteration defined by the ASD white mica chemistry. This alteration is around the margins of a coarse quartz porphyry sill near the top of the Anthony Road Andesite.

The Basin Lake pyrite zone (figure 12) is highlighted by the spectral data (acid micas), strong sericite alteration (Na-depletion), and anomalous As, Sb, Se, Tl, Bi, etc.

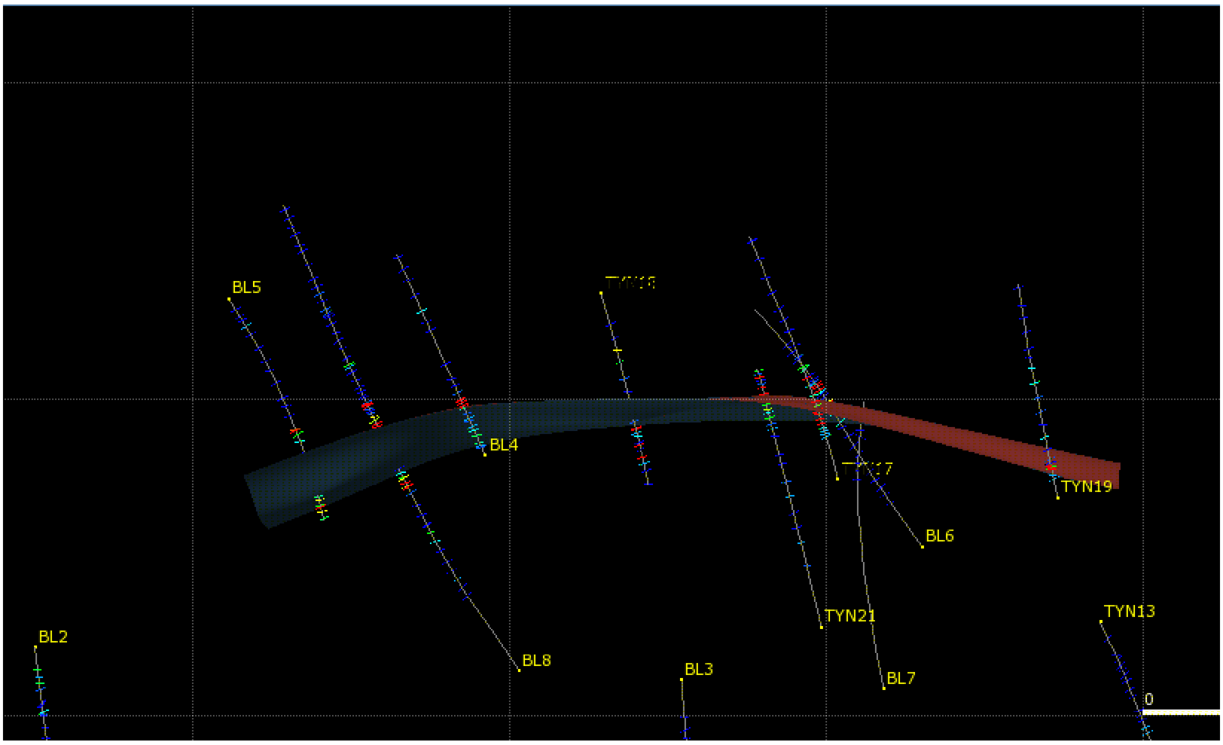


Figure 12. Basin Lake Pyrite Zone; Sb assays.

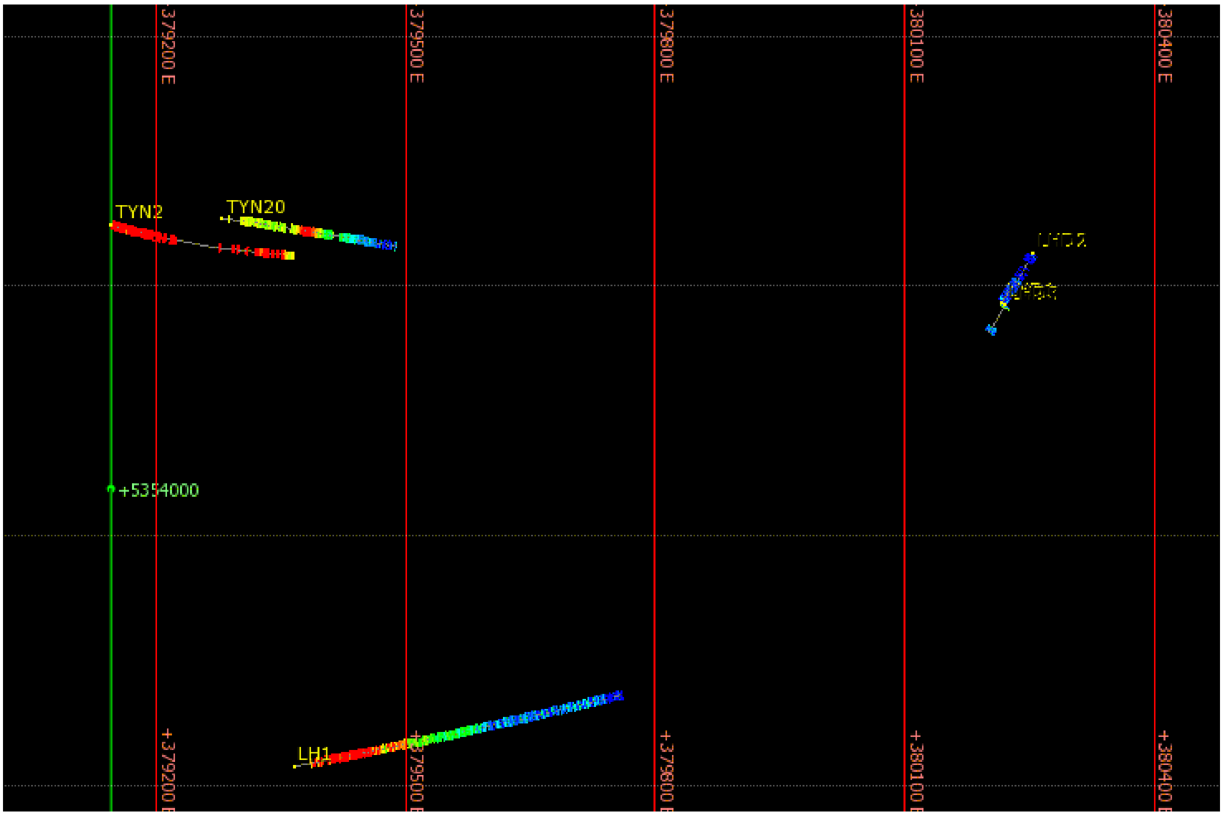


Figure 13. ASD sericite wavelengths from Leach Hill pyrite zone; note the gradient in LH1

Drill hole LH1 has a spectacular gradient in mica chemistry from the ASD results (figure 13). This indicated that the core of the Leach Hill pyrite zone has not been drilled as yet. Some more lithogeochem from LH1 would be useful to see if this is just a barren pyrite system.

LMD1A is a very interesting hole. The rocks here are intensely altered, and there is a very strong Bi-Te-Se signature. This has some of the most intense alteration and pathfinder signatures in this data set. I think it is worth drilling more holes around here.