Presentation of results in AusSpec reports

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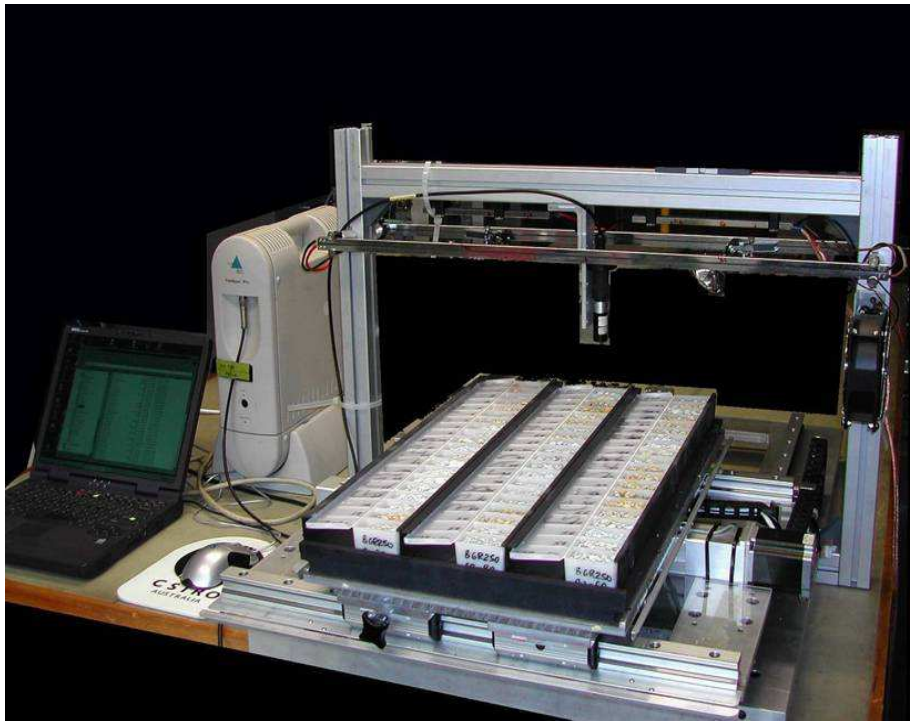
Background to HyChips

- HyChips analysis allows identification of:
  - Alteration minerals – sericite, biotite, chlorite, carbonate
  - Weathering clays – kaolinite, smectite (Montmorillonite – Al smectite, nontronite – Fe smectite)
  - Fe oxides – hematite and goethite
  - Weathering intensity – based on iron oxides, kaolinite and smectite

- As well as sample mineralogy,
  - Mineral crystallinity (e.g. kaolinite, sericite) can be measured;
  - Mineral composition (e.g. biotite, chlorite and sericite) can be measured;
    - Sericite – Muscovite, phengite (Mg-Fe substituted) and paragonite (Na substituted) all are distinctive.
    - Chlorite and biotite – All compositions from Fe rich to Mg rich can be estimated.
  - Relative proportions of minerals can be assessed.

HyChips Analysis



- HyChips can be used for analysis of:
  - Existing drilling
  - Ongoing drilling
  - At rates of at least 1600m / day
  - Automated measurement of samples in chip trays
  - No sample prep, samples only need to be dry
  - Can include digital imaging
  - Provides long-term digital archive

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Project assessment

- All projects have clearly stated objectives, e.g.:
  - Determining sample mineralogy, and/or
  - Assessing alteration associated with mineralisation, and/or
  - Defining the base of the transported horizon, and/or
  - To assess feasibility of HyChips for:
    - Developing geological framework in which assay data can be assessed
    - Delineating proximity to ore
    - Defining the ore block for mining applications
    - As a basis for potential larger volume study.
- All projects are fully costed out, usually on a per sample basis
- Clients are requested to supply relevant data to the project, such as,
    - Lithology in digital format
    - Geochemistry in digital format

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Data analysis

- Spectra are usually analysed in detail with respect to:
  - Mineralogy
    - Alteration
    - Weathering
  - Variations in mineral composition and crystallinity
    - Proximity to Au, Cu, Pb, Zn, Ur
    - Relationships with logging information (lithology, alteration, fracturing, weathering, MagSus etc)
    - Delineating base of transported horizon in deeply weathered profiles

Presentation of results

- All results are presented as a PDF summary report together with:
  - An MS Excel file with mineralogy presented in text and numerical format for plotting in client's software packages
  - Spectral parameter data on specific mineral characteristics (dependent on client requests and mineral assemblage of samples)
  - A TSG (The Spectral Geologist) file of all spectral and logging data which can be viewed with the time limited TSG Viewer software included with the study
- Depending on the objectives of the analysis the following can also be included with the report:
  - Analysis of relationships between the alteration mineralogy and proximity to mineralisation, such as compositional, crystallinity and/or mineral assemblage variations
  - Down hole log plots of mineral characteristics against logging data
  - X-Y spatial plots of sample points coloured by mineralogy and mineral characteristics

Mineralogy and Excel files

Sample Data				Spectral Analysis Data							
Sample	Depth	Lithology	Unit	Interpretations		MicaAlOH	MicaXT	Chlorite	Carbonate	Fe Slope	WtMvschlcb
DDDC_1530m	1530	Dolomitic siltstone	Dingo formation	White mica + carb + kaolinite		2218.451	1.227		2337.173	0.936	1.148
DDDC_1539m	1539	Dolomitic siltstone	Dingo formation	White mica + carb + kaolinite		2223.864	1.147		2333.685	0.905	0.978
DDDC_1548m	1548	Dolomitic siltstone	Dingo formation	White mica + carb		2216.764	1.172		2323.222	0.893	1.11
DDDC_1557m	1557	Dolomitic siltstone	Dingo formation	White mica + carb		2218.692	1.229		2332.775	0.925	1.135
DDDC_1566m	1566	Dolomitic siltstone	Dingo formation	Carb +/- white mica		2217.202	0.969		2312.966	0.917	0.487
DDDC_1575m	1575	Dolomitic siltstone	Dingo formation	Carb +/- white mica		2224.173	0.928		2321.819	0.924	0.463
DDDC_1584m	1584	Dolomitic siltstone	Dingo formation	Carb +/- white mica		2221.009	0.739		2319.041	0.929	0.422
DDDC_1593m	1593	Dolomitic siltstone	Dingo formation	Carb +/- white mica		2219.682	0.833		2311.993	0.95	0.477
DDDC_1602m	1602	Dolomitic siltstone	Dingo formation	White mica + carb + chlorite		2217.576	1.18	2240.102	2320.247	0.954	0.389
DDDC_1611m	1611	Dolomitic siltstone	Dingo formation	White mica + carb + chlorite		2215.064	1.183	2236.783	2320.651	0.962	0.617
DDDC_1620m	1620	Dolomitic siltstone	Dingo formation	White mica + carb + chlorite		2208.686	1.19	2238.075	2324.003	0.981	0.627

- Excel file includes:
  - Logging and sampling information provided by clients;
  - Mineral interpretation;
  - Spectral indices / parameters of specific mineral characteristics such as composition and crystallinity. These are digital values that can be plotted to show trends in mineral characteristics within an alteration system.
- The above file includes:
  - Mica composition: Often useful for mapping different phases of sericite alteration;
  - Mica crystallinity: Useful temperature indicator in some alteration systems;
  - Chlorite composition;
  - Carbonate presence;
  - Fe slope: Iron value reflecting iron content of carbonates.

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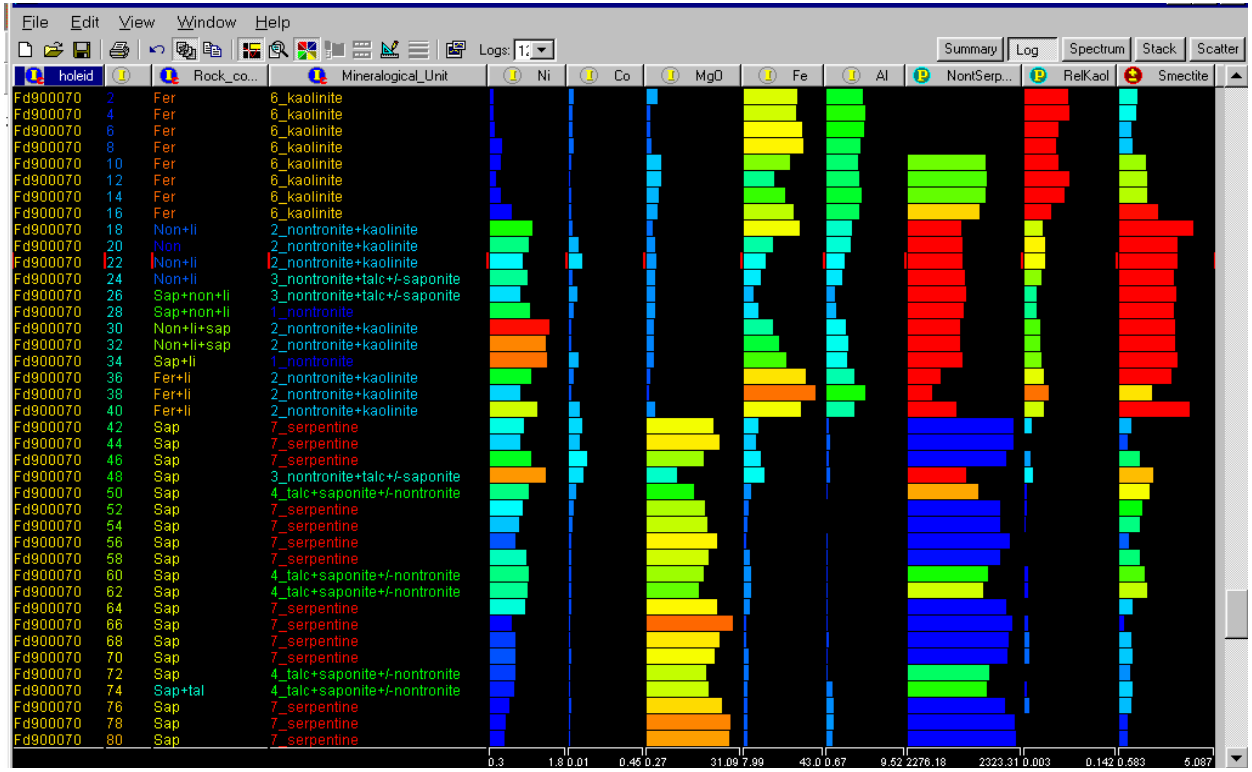
Example of down hole log



- Developing alteration model for exploration.
- Down hole chip samples.
- Mineralogical characteristics (nontronite, kaolinite and smectite) plotted against geochemistry and logging data.
- Analysis showed close relationship between nontronite and nickel mineralisation.

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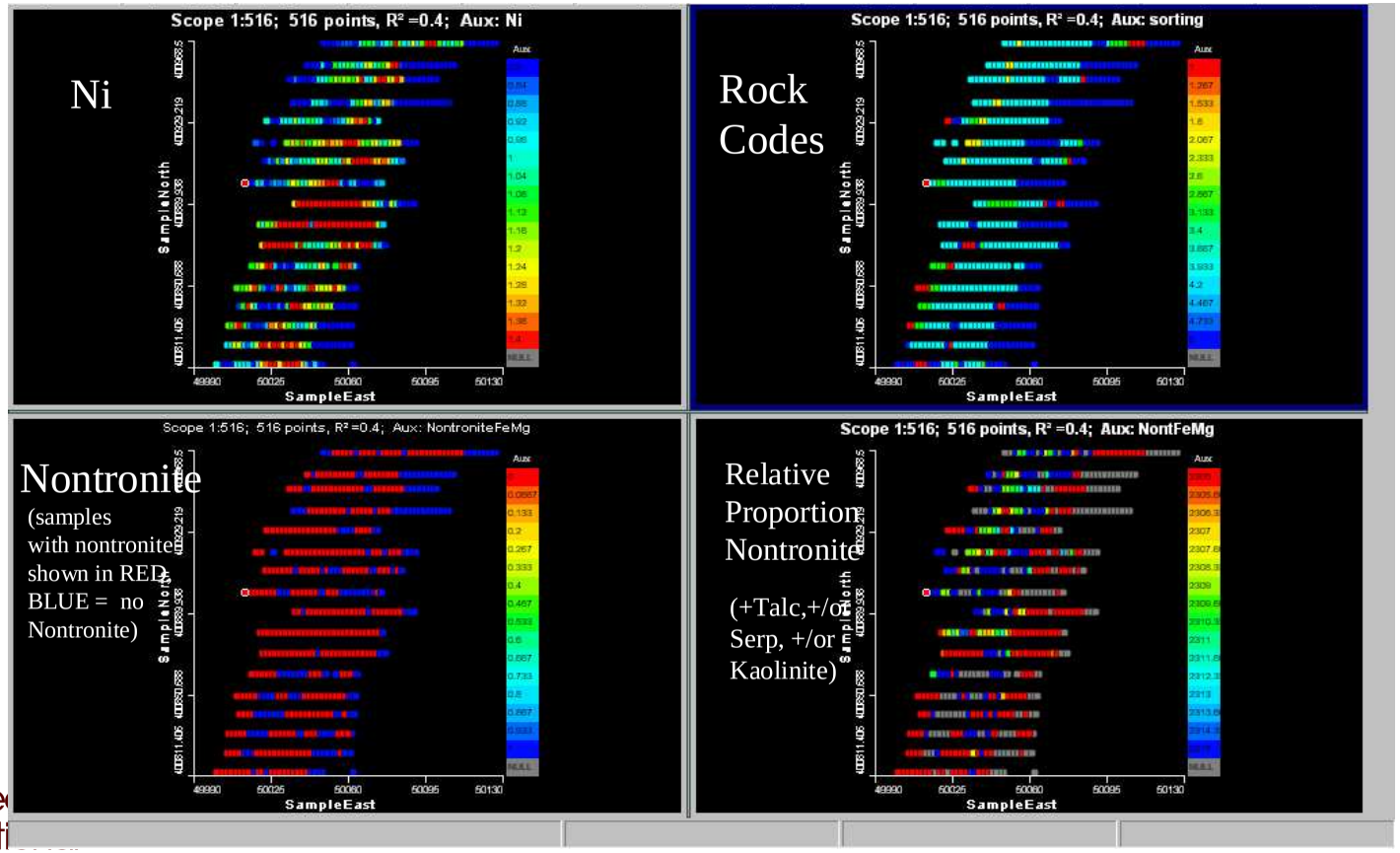
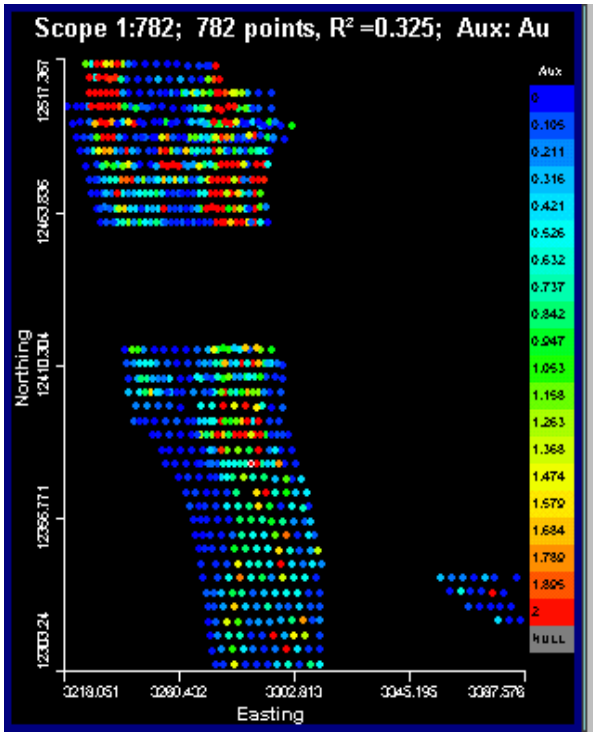
Mineral distribution mapping

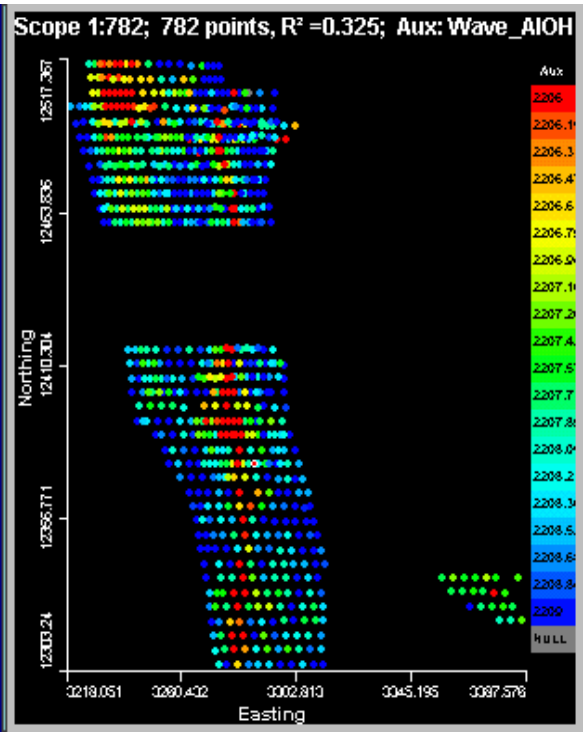
- Ni-laterite, Bulong, WA. Grade control pulp from pit.
- X-Y Plots showing different sample characteristics
- Analysis provided more detailed mineralogy than available with logging.



Example of grade control samples from an open pit



Au (ppm)



Sericite vs Kaolinite

- Fosterville Gold Mine, Victoria..
- Grade control pulp samples measured to identify weathered alteration signature for an exploration targeting tool.
- X-Y Plots show gold versus kaolinite/sericite distribution in the pit.
- Colours in second plot indicate occurrence of kaolinite versus sericite
  - Red = Sericite
  - Blue = Kaolinite
  - Green = Mixed
- Analysis highlights sericite alteration halo around gold mineralisation

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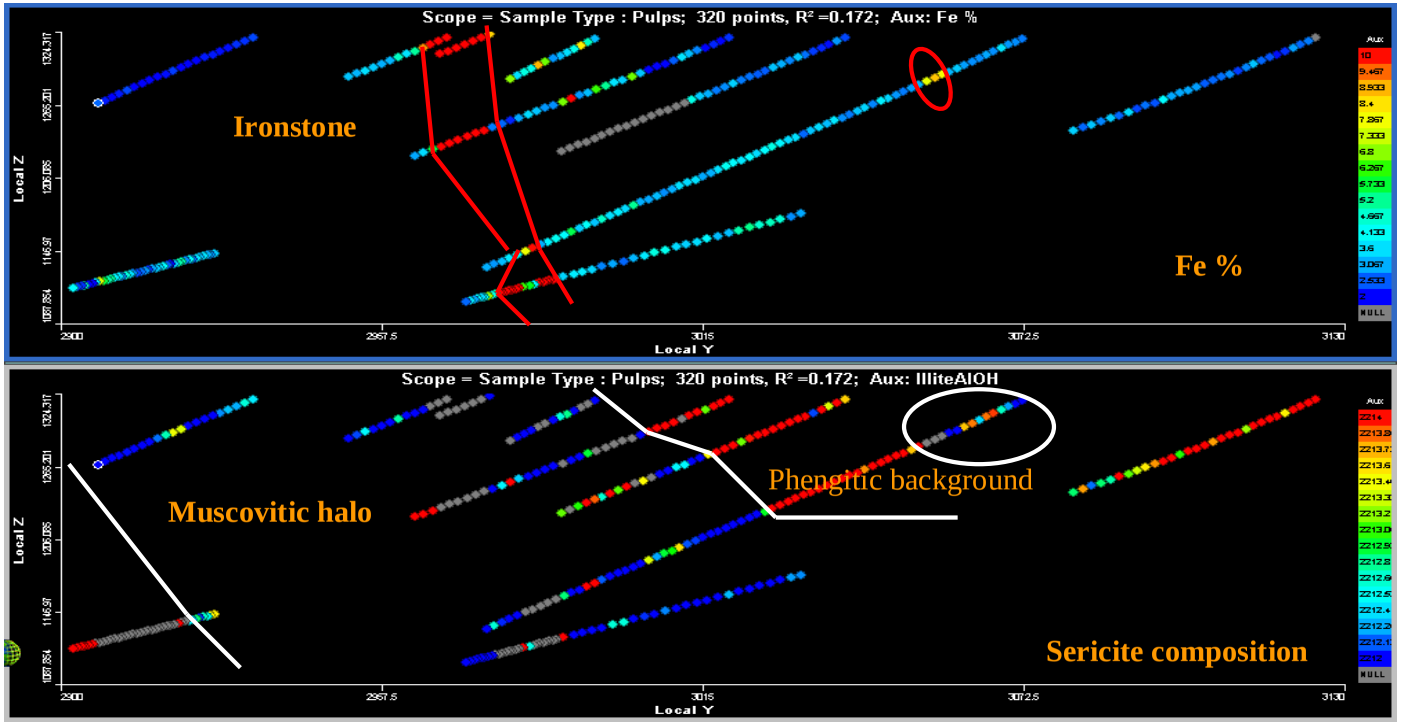
Example of cross-section of holes



- IOCG deposit, Chariot Ironstone, Tennant Creek. Down hole pulp samples of drill core measured to identify alteration halo around the ironstone for an exploration targeting tool.
- Top cross-section shows position of ironstone between two red lines. Lower cross-section highlights sericite composition which is muscovitic close to the ironstone.
- Analysis showed that alteration halo can be detected at the surface allowing further exploration and shallow drilling.

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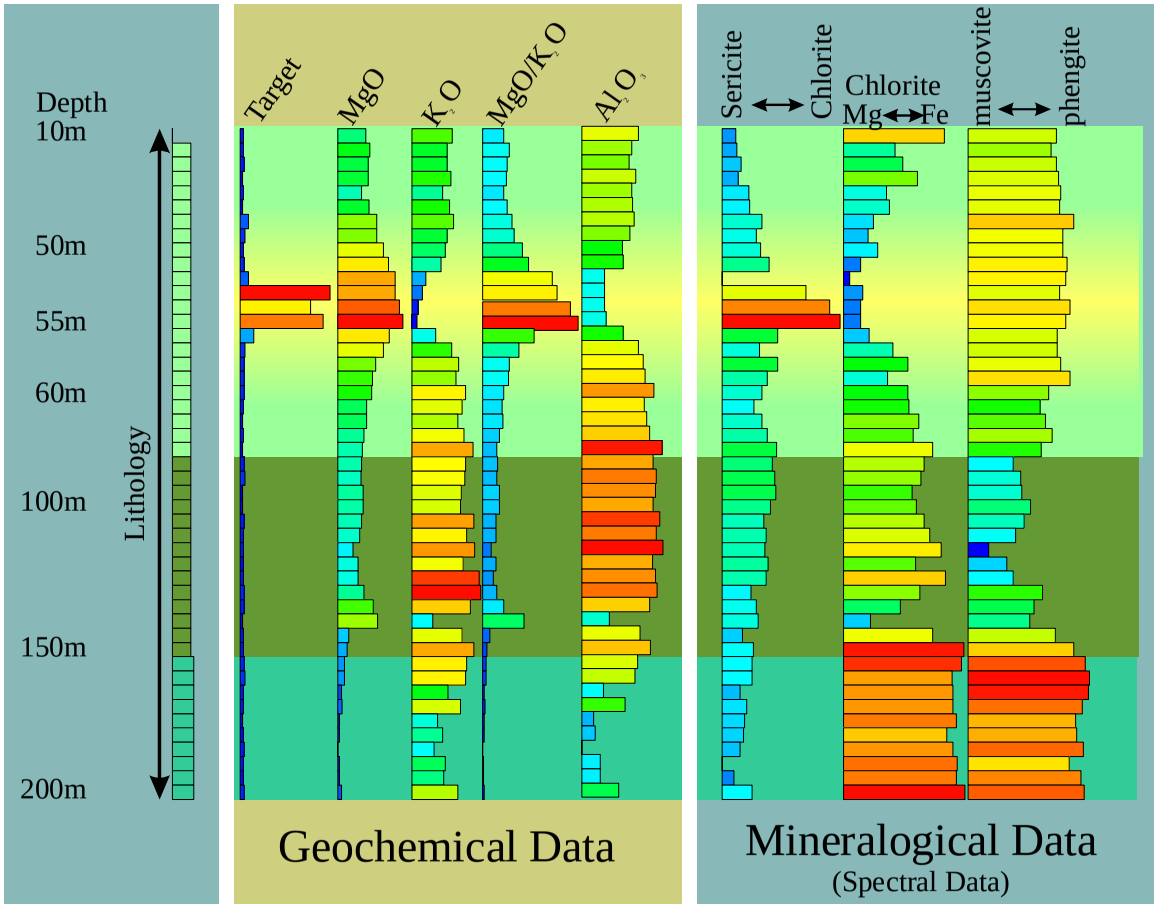
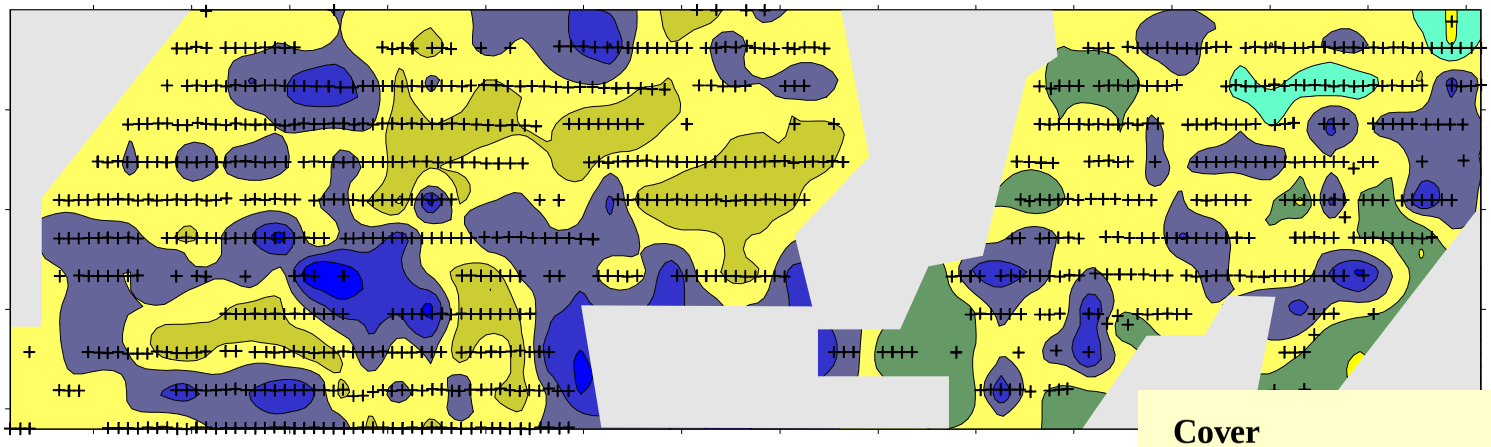
Mineral controls on multi-element geochemistry



- Down hole plot showing example of how diverse datasets can be integrated with mineralogy.
- Target mineralisation has specific geochemical signature related to decrease in sericite abundance relative to chlorite and change in chlorite chemistry.

Contouring of data in external packages



Cover

- Transported Cover
- Probable Transported Cover
- Possible Transported Cover

Basement

- Upper Saprolite
- Lower Saprolite (Int' Volcanics)
- Lower Saprolite (Mafics)
- Lower Saprolite (Ultramafics)

- Regolith plan for geochemical EOH RAB sample program (3 x 12km) in a deeply weathered environment, NT.
- Data provided to clients in excel or csv format for plotting
- Analysis allowed client to:
  - Assess impact of transported cover on assay results
  - Attribute variability to changes in regolith and drill hole depth
  - Use pulps to reassess results of older surveys

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