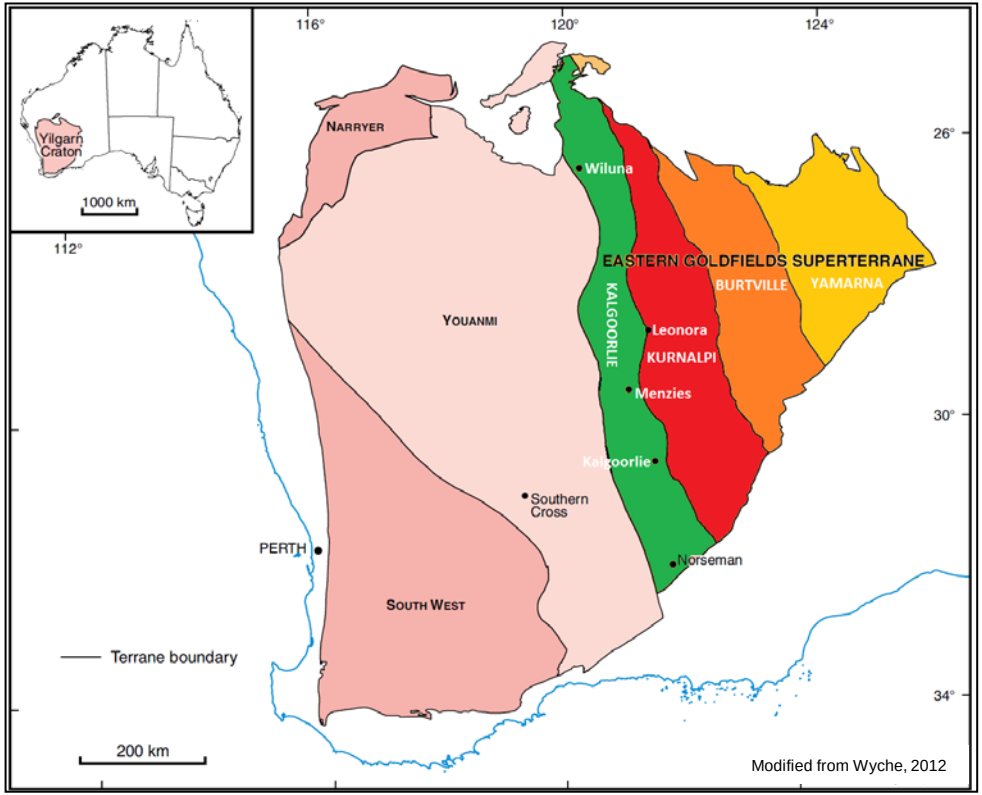
Fisher East nickel sulfide prospects

Lauren Burley

Thanks to Steve Barnes, Marco Fiorentini, David Mole, Will Belbin and Rox Resources

Location

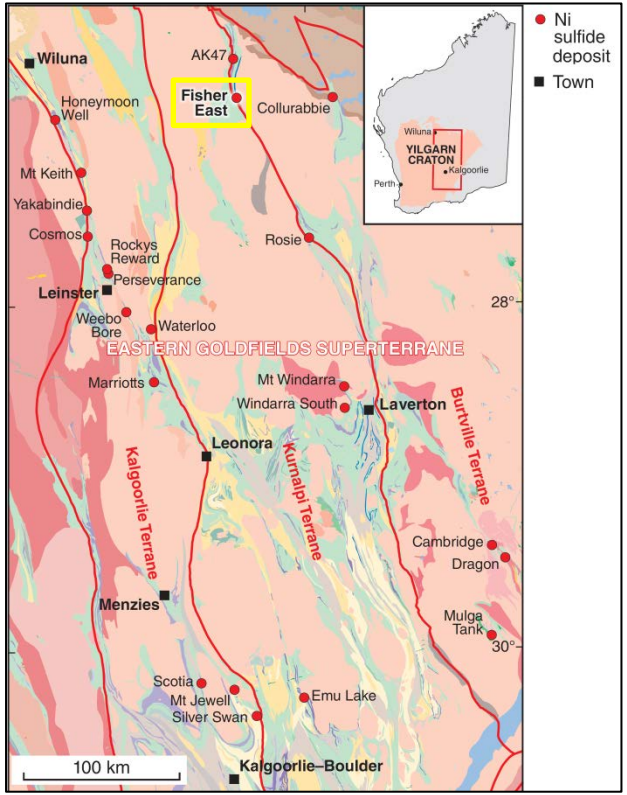


Kalgoorlie Terrane: home to a majority of Ni deposits in the EGST and major focus of exploration

Kurnalpi Terrane: largely ignored, Ni deposits scarce

Is this terrane less prospective, or just under explored?

Location

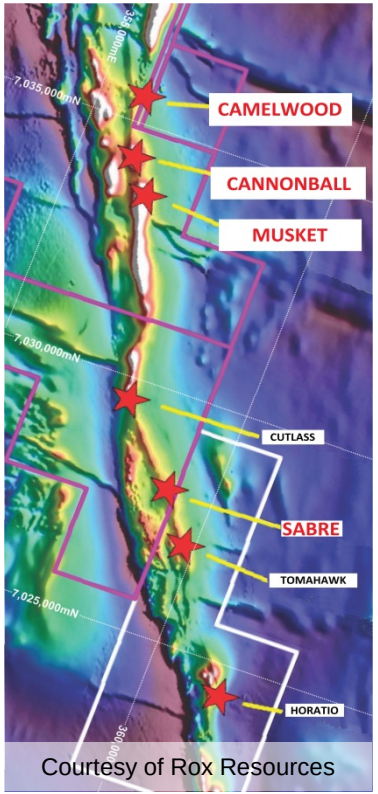


New deposits being discovered near Kurnalpi-Burtville Terrane boundary

Testing prospectivity of the Kurnalpi Terrane by comparing komatiites at Fisher East to komatiites in the Kalgoorlie Terrane

Key Research Aims

- Characterise volcanological setting and komatiite flow-field characteristics;
- Identify the style and composition of nickel sulfide mineralization;
- Determine petrogenesis and metallogenic prospectivity of the ultramafic succession;
- Focus towards nickel sulfide mineralization.



Courtesy of Rox Resources

Methods:

- Core logging; 10 drillholes across 4 prospects
- Petrography
- Geochemistry; whole-rock and pXRF
- Hyperspectral work

Fisher East Prospects

Deposit type: Komatiite-hosted nickel sulfide deposit

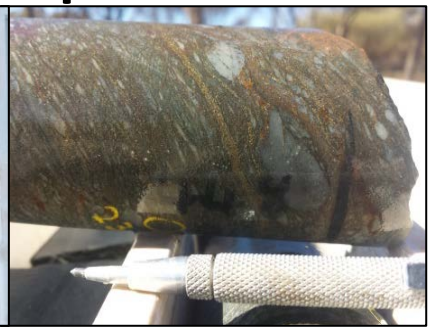
Komatiites; talc-carbonate altered

Igneous textures destroyed

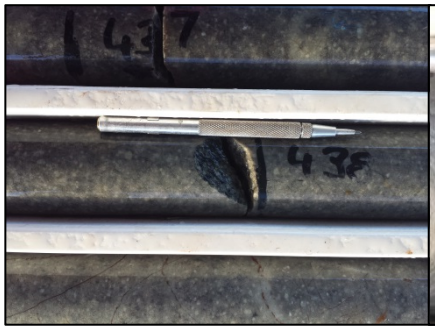
Deformation in drillholes evident, but extent unknown

Metasediments

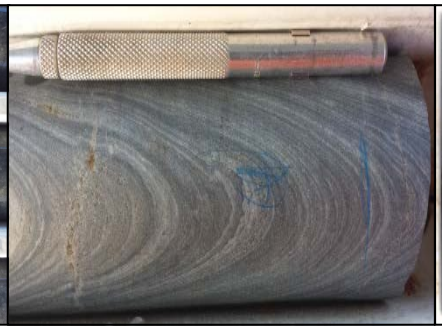
Shale



Sulphidic Chert



Quartz Porphyry



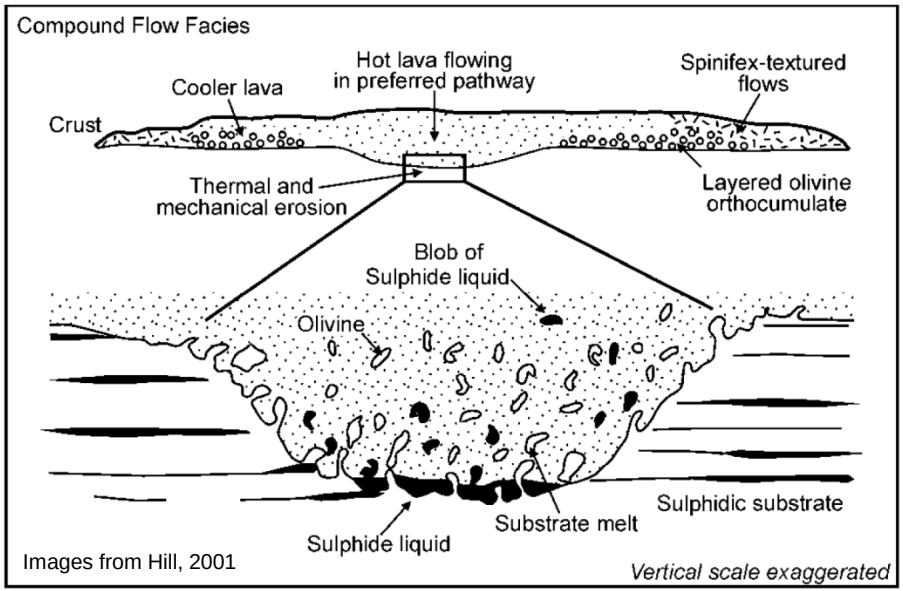
Banded iron formation

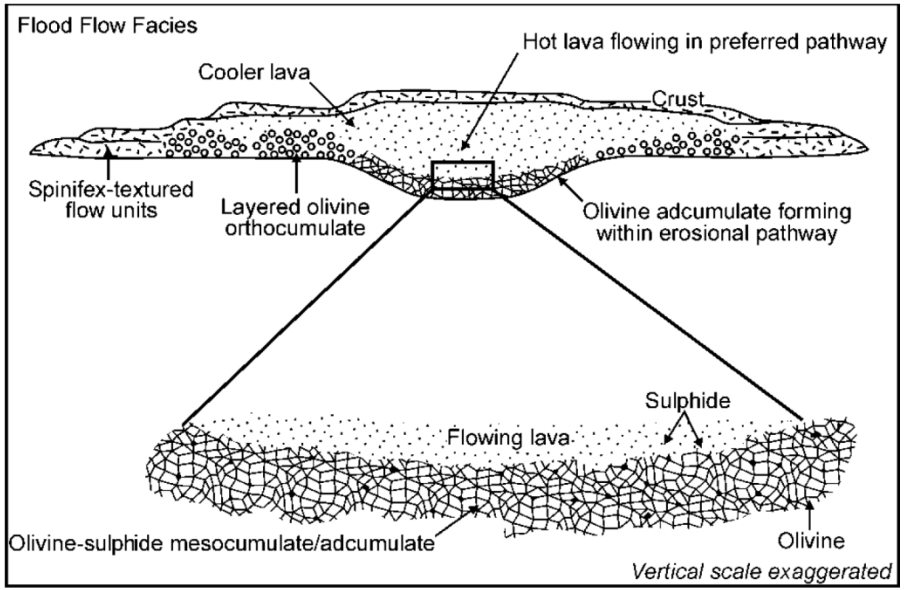
Basalt

Mineralization

5 types of komatiite-hosted nickel sulfide deposits, based on Lesher and Keays, 2002 classification

Type 1 and 2 deposits - most common in the Kalgoorlie Terrane





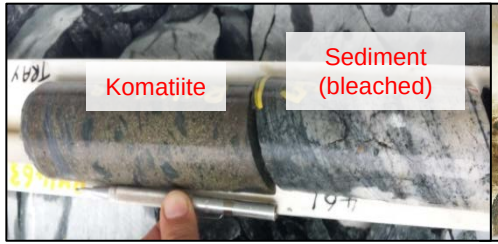
Type 1: massive sulfides on basal komatiite contact

Type 2: disseminated sulfides in cumulates

Mineralization

Typical “type 1” mineralization

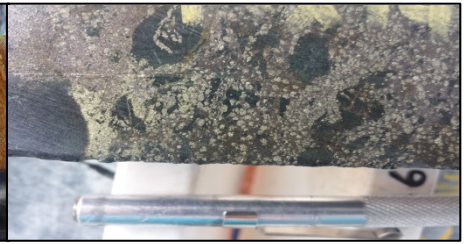
Massive sulfides on basal contact between komatiites and metasedimentary units



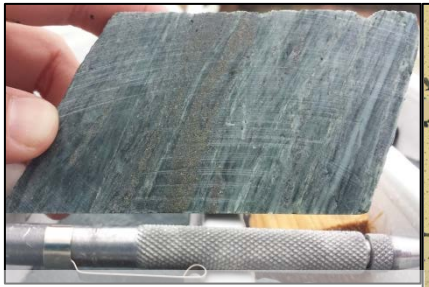
Mineralization contact

Massive sulfides

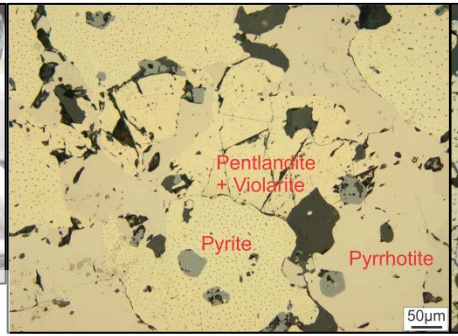
Semi-massive sulfides

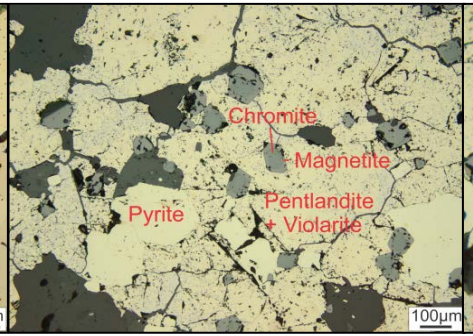


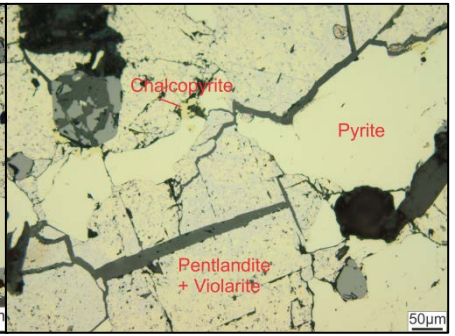
‘Matrix’ sulfides



Vein-like mineralization



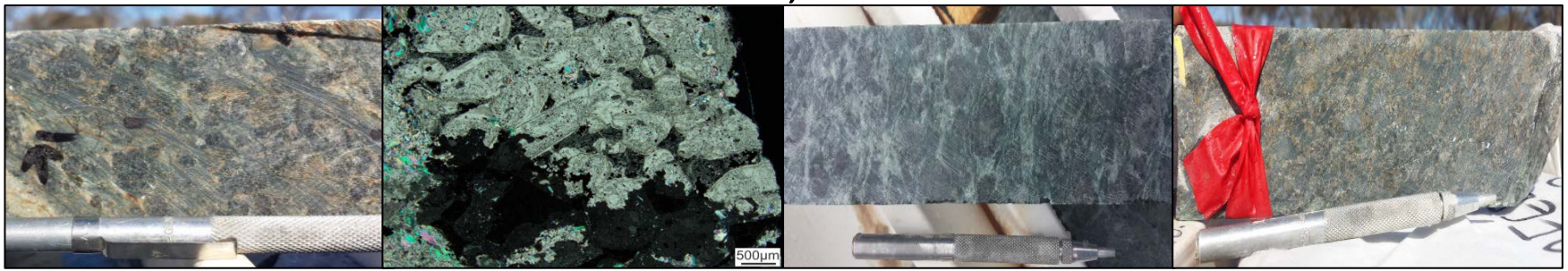




Komatiite – secondary textural features

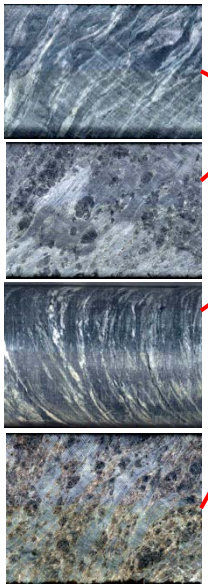
Chlorite rich matrix with carbonate ± quartz veins;

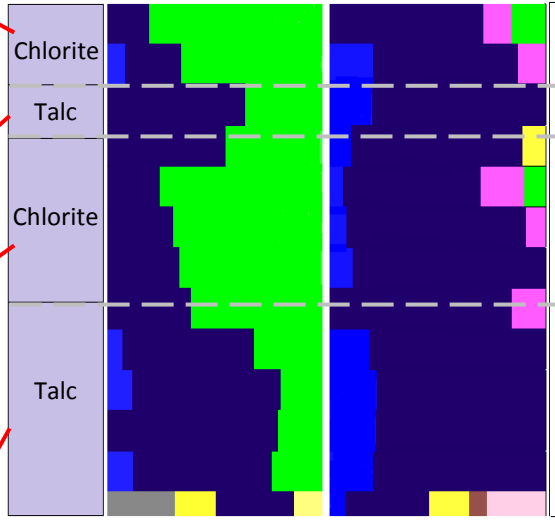
Talc rich matrix + carbonate knots;

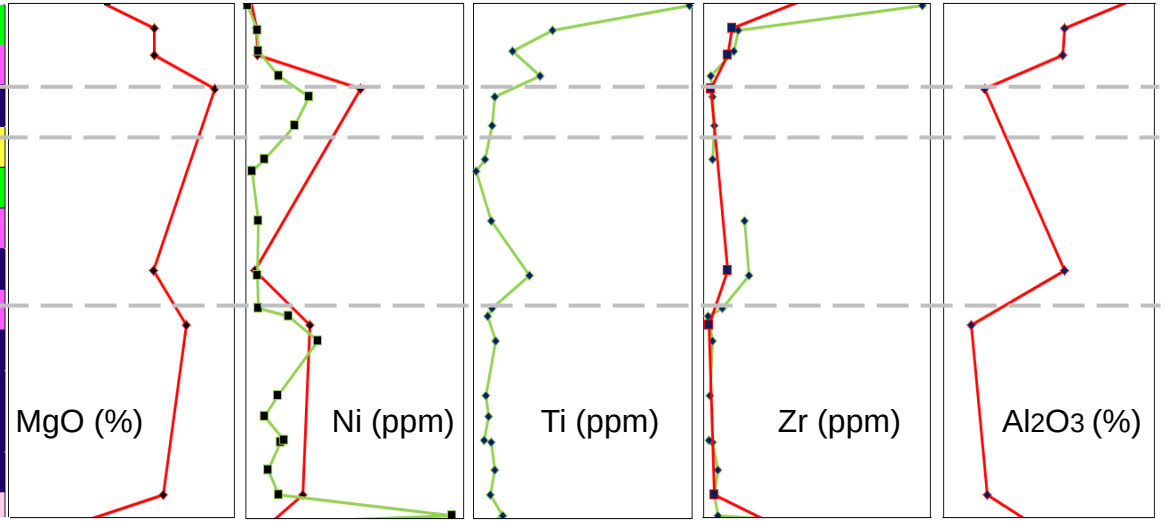


Geochemistry of komatiites

MFED060 – Non-mineralized drillhole between Camelwood and Cannonball







Carbonate
Chlorite
Talc
Hornblende
Quartz
Albite
White mica
Aspectral

pXRF
Whole-rock

Komatiite flow

A zone – chlorite rich matrix; more chlorite, higher Al_2O_3, Zr and Ti; **Spinifex**

B zone – talc rich matrix; higher MgO and Ni; **Cumulates and mineralization**

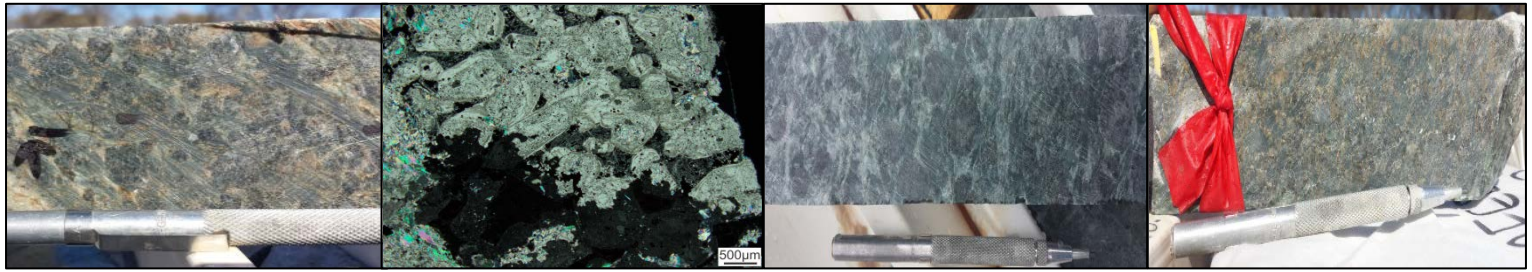
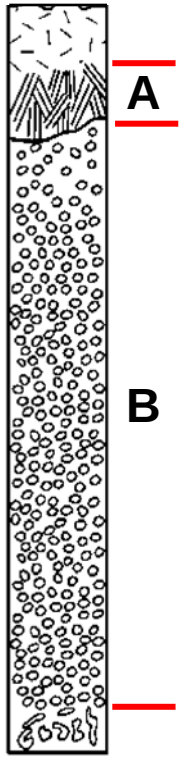
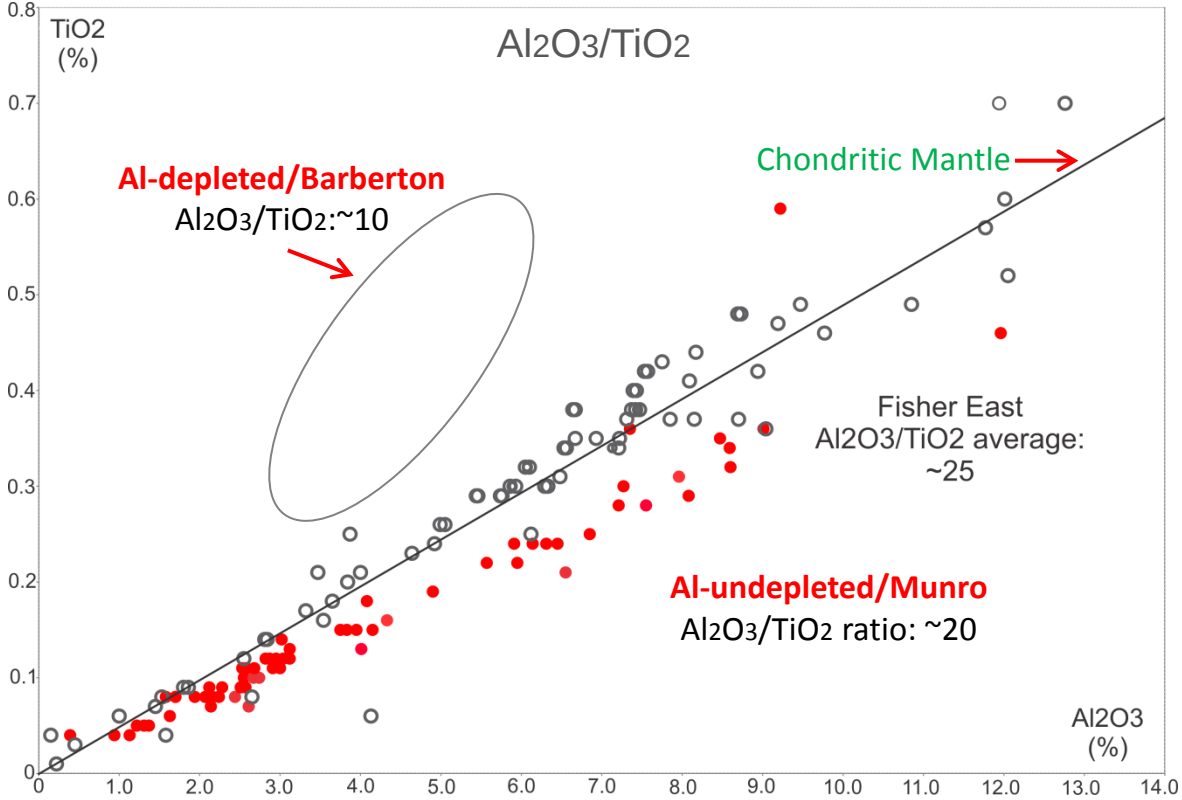


Diagram from Hill, 2001



No primary igneous textures; based purely on secondary textures and geochemistry

Al_2O_3/TiO_2 ratios



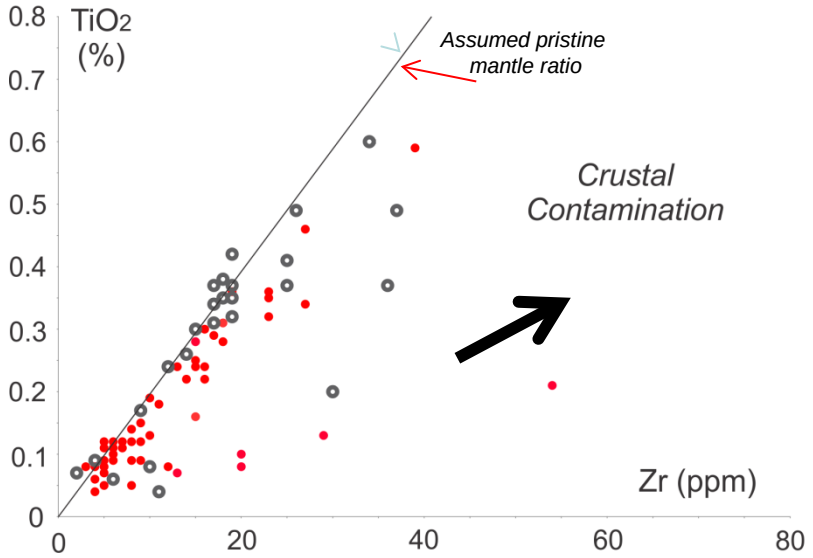
Kalgoorlie komatiite data from the GEOROC database

Kalgoorlie Terrane
Fisher East

Kalgoorlie Terrane samples from: Agnew, Mount Keith, Scotia, Kambalda, Rocky's Reward, Six Mile Well, Yackabindie and Perseverance

Trace Element Features

Incompatible trace elements show crustal contamination – can be used as a proxy for mineralization



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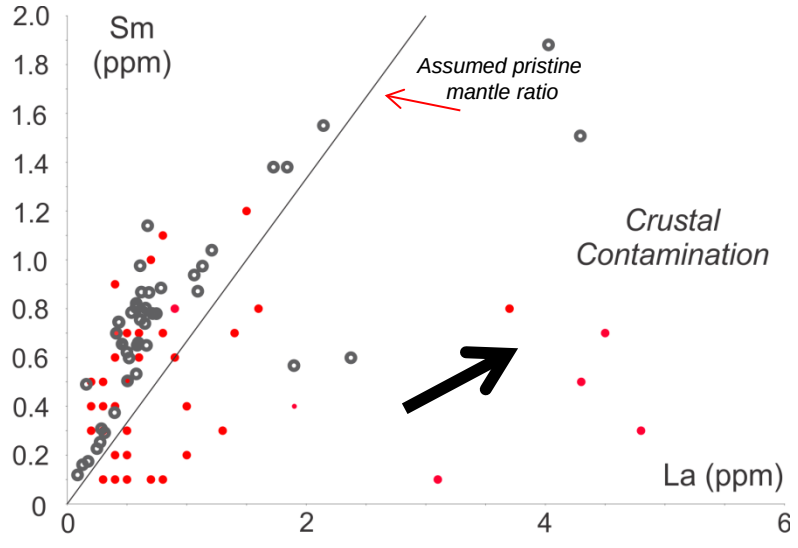


Komatiite volcanic facies

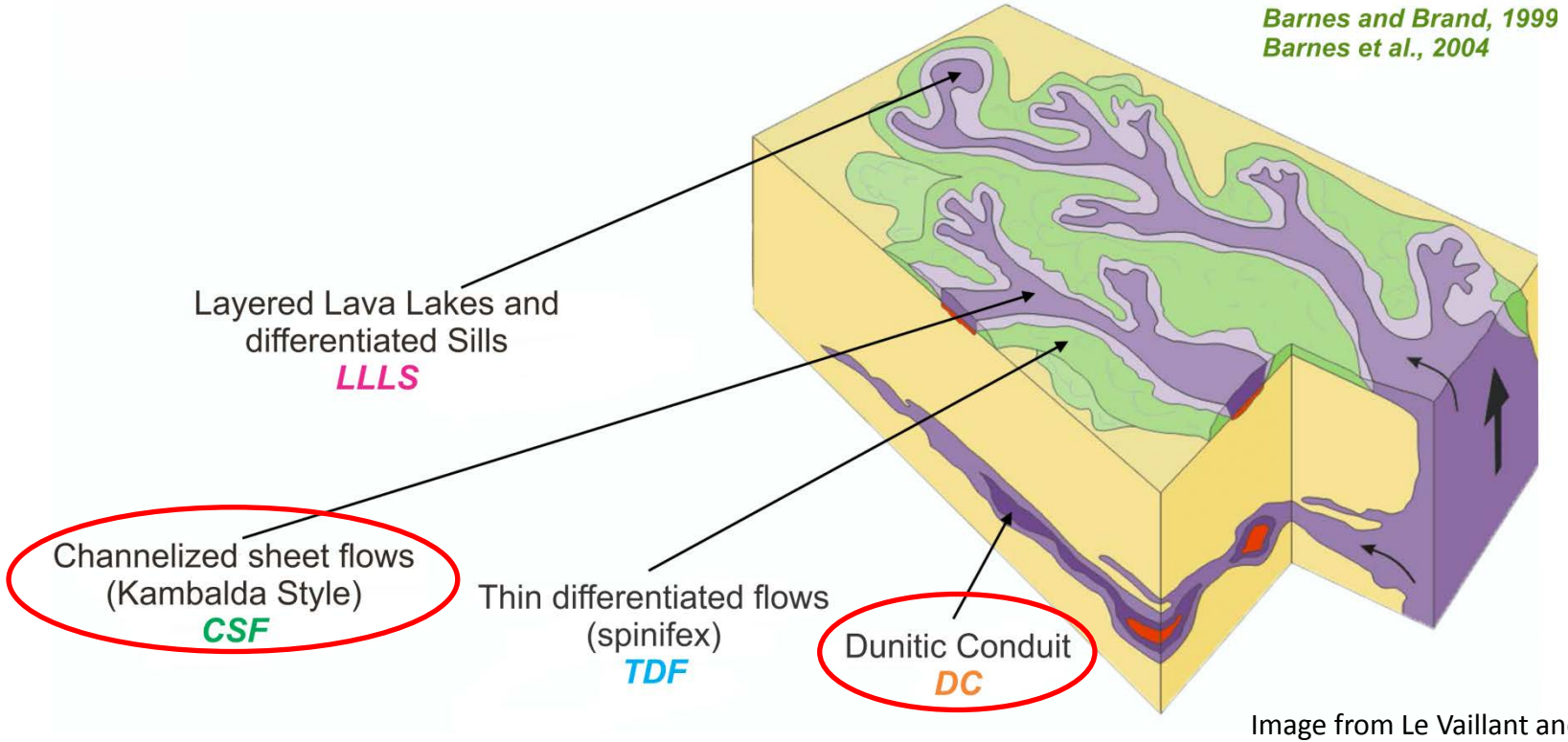
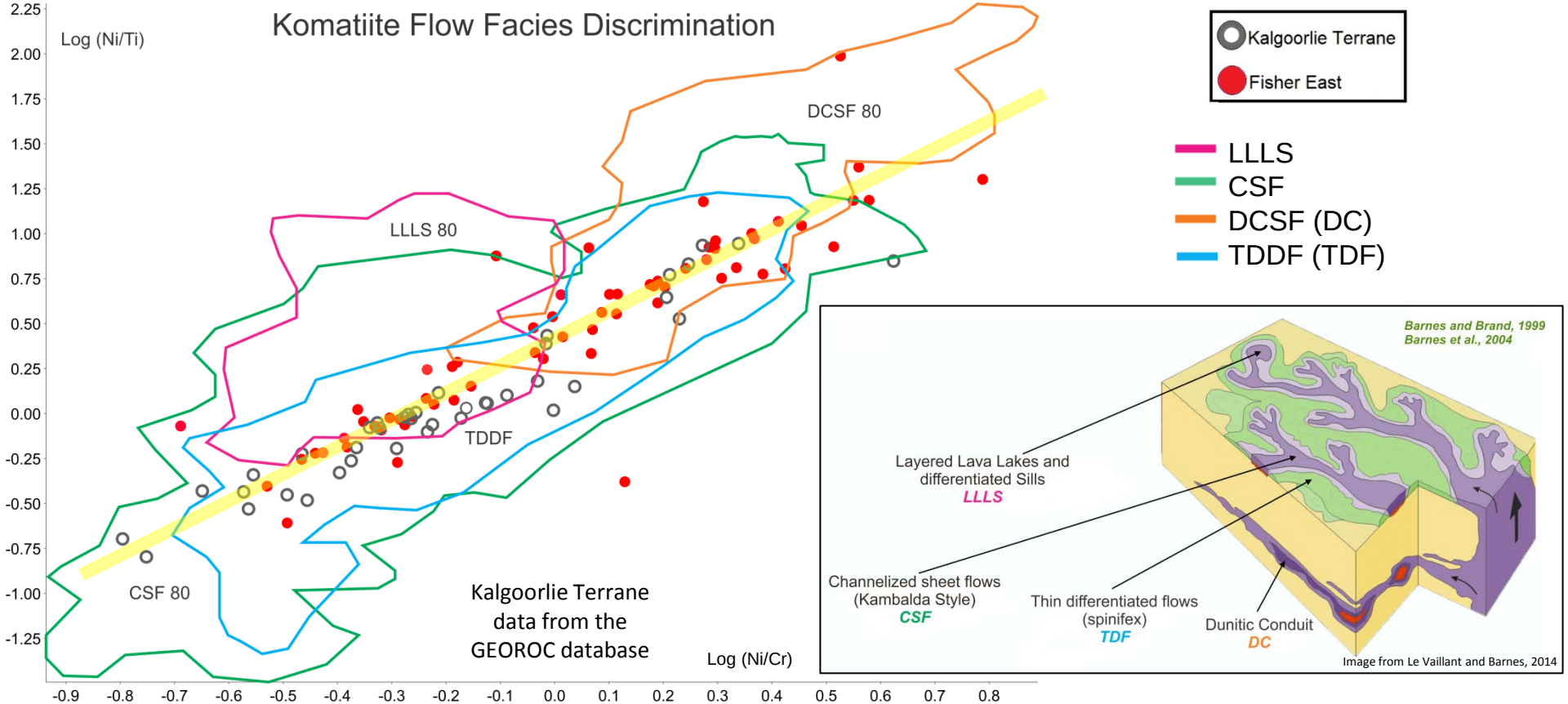


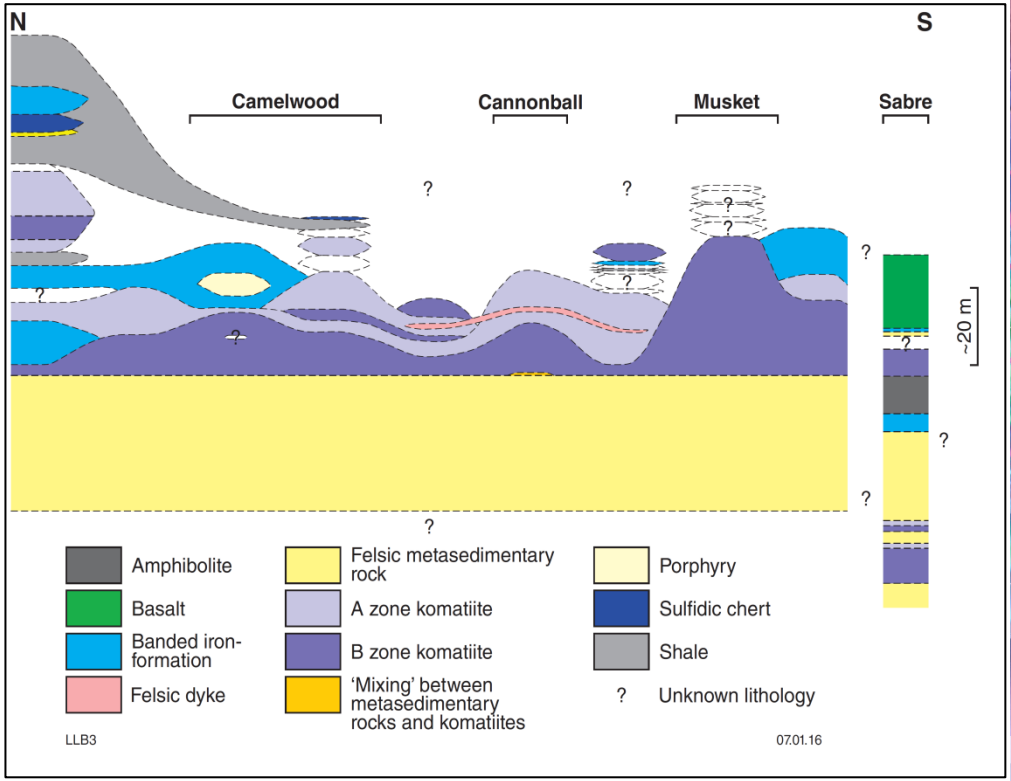
Image from Le Vaillant and Barnes, 2014

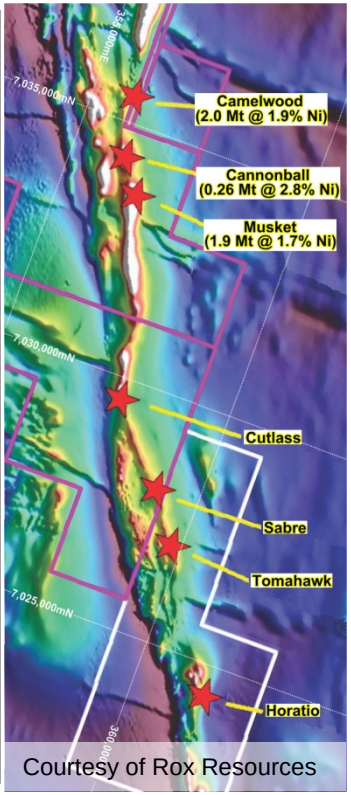
Volcanic facies using whole-rock data



Interpretation and Implications

Interpretations – Volcanic Architecture





Points to note

System with a lot of B zone comparative to A zones

Flows with high proportion of B zones = high flux magma pathways

(Hill, 2001, Barnes et al., 2004)

Ore zones contain thicker B zones – possible flow channels?

*Note for diagram: no horizontal scaling. Basal contact used as horizontal datum to depict variation in flow thickness

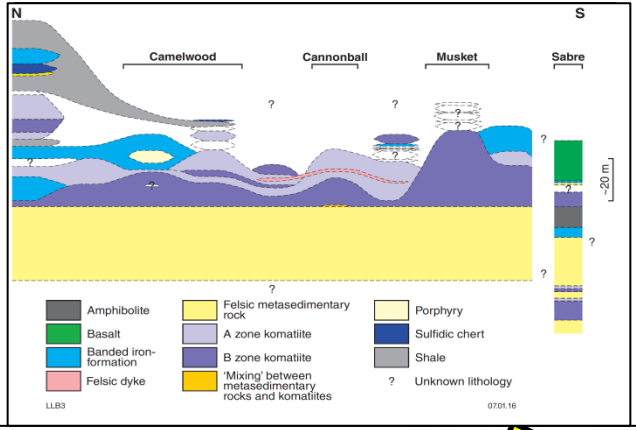
Interpretations – Volcanic Architecture

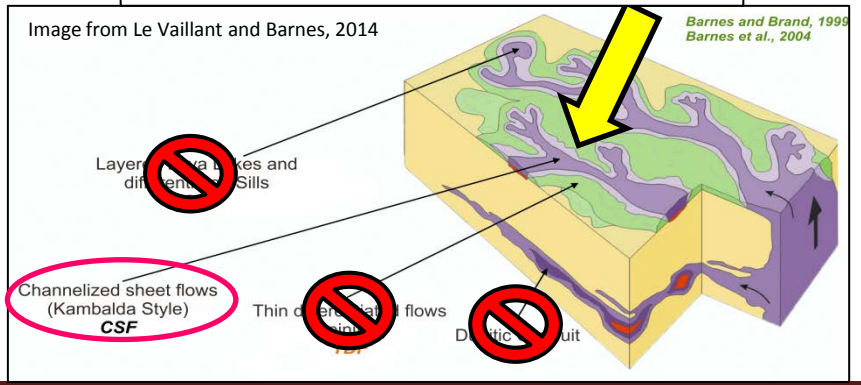
<u>Ni/Cr and Ni/Ti ratios – difficult to get definitive facies</u>

- HOWEVER, definitely not in the DC or LLLS field
- Core logging: Higher proportion of B to A zone – rules out LLLS and TDF facies

Fisher East = CSF Facies

Positive for prospectivity



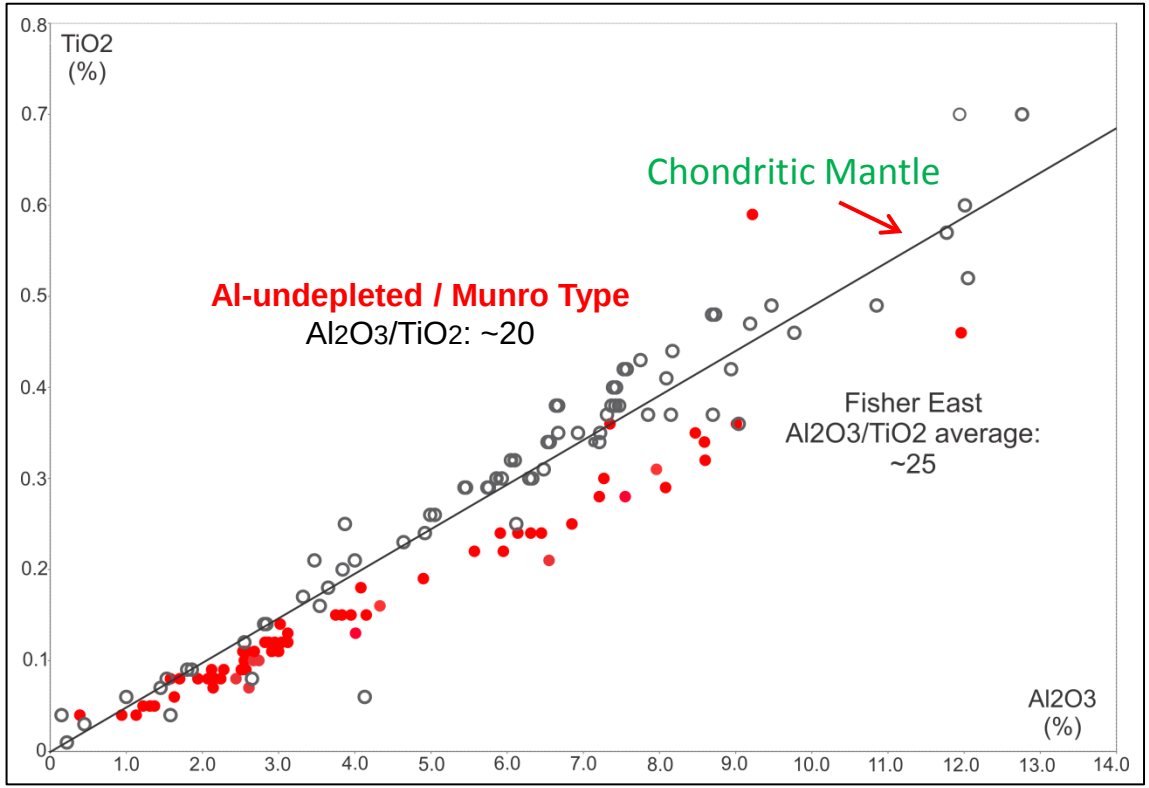


Interpretations – Primary melt characteristics

Al_2O_3/TiO_2 – Al-undepleted : Komatiite melt source = shallow.

Fisher East; below chondritic mantle line:

- Primary source difference, e.g. Ti depletion?
- Alteration/contamination?



Fisher East Prospectivity

Fisher East: all the right ingredients to host a large nickel sulfide deposit

* Developed in a channelised high flux flow field

* Rich in cumulates

* Evidence of crustal contamination

Conclusions

Fisher East vs Kalgoorlie Terrane - Similarities

- ✓ Both Al - undepleted komatiites
- ✓ Both contain type 1 mineralization
- ✓ Both show crustal contamination
- ✓ Both have systems within the 'Channelised Sheet Flow' volcanic facies

Fisher East vs Kalgoorlie Terrane - Differences

- ❖ Some Kalgoorlie Terrane deposits have adcumulates
- ❖ Stratigraphy – komatiites directly associated by basalts or intermediate-felsic volcanics

(Barnes and Fiorentini, 2012).

Kurnalpi Terrane: Less prospective or under explored?

Do other prospects along the Kurnalpi-Burtville Terrane boundary display the same level of prospectivity?

This study opens up the entire region prospectivity wise and calls for more exploration!

Questions?