

Mineralogy variations in the Mamadawerre Sandstone, Kombolgie Subgroup at Angularli Uranium Prospect: applications to exploration in other areas.

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NTGS



NORTHERN TERRITORY GEOLOGICAL SURVEY

AGES2018

ANNUAL GEOSCIENCE EXPLORATION SEMINAR
Alice Springs, 20–21 March 2018, Northern Territory

Mamadawerre Sandstone – visual logging

WRD0085
“strongly
bleached...
fracture
coated with
white clay”

WRDD0136 “strongly
weathered, **highly**
fractured...” “patchy
diagenetic hematite”
“**fractured zone has clay-**
filled gouges... leached”

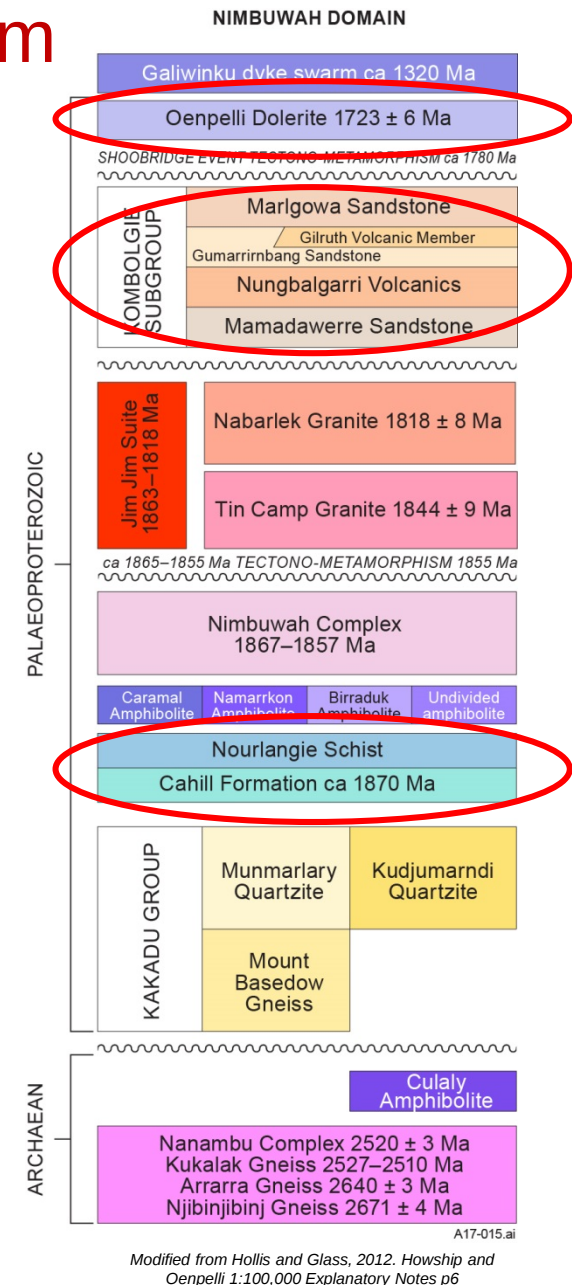
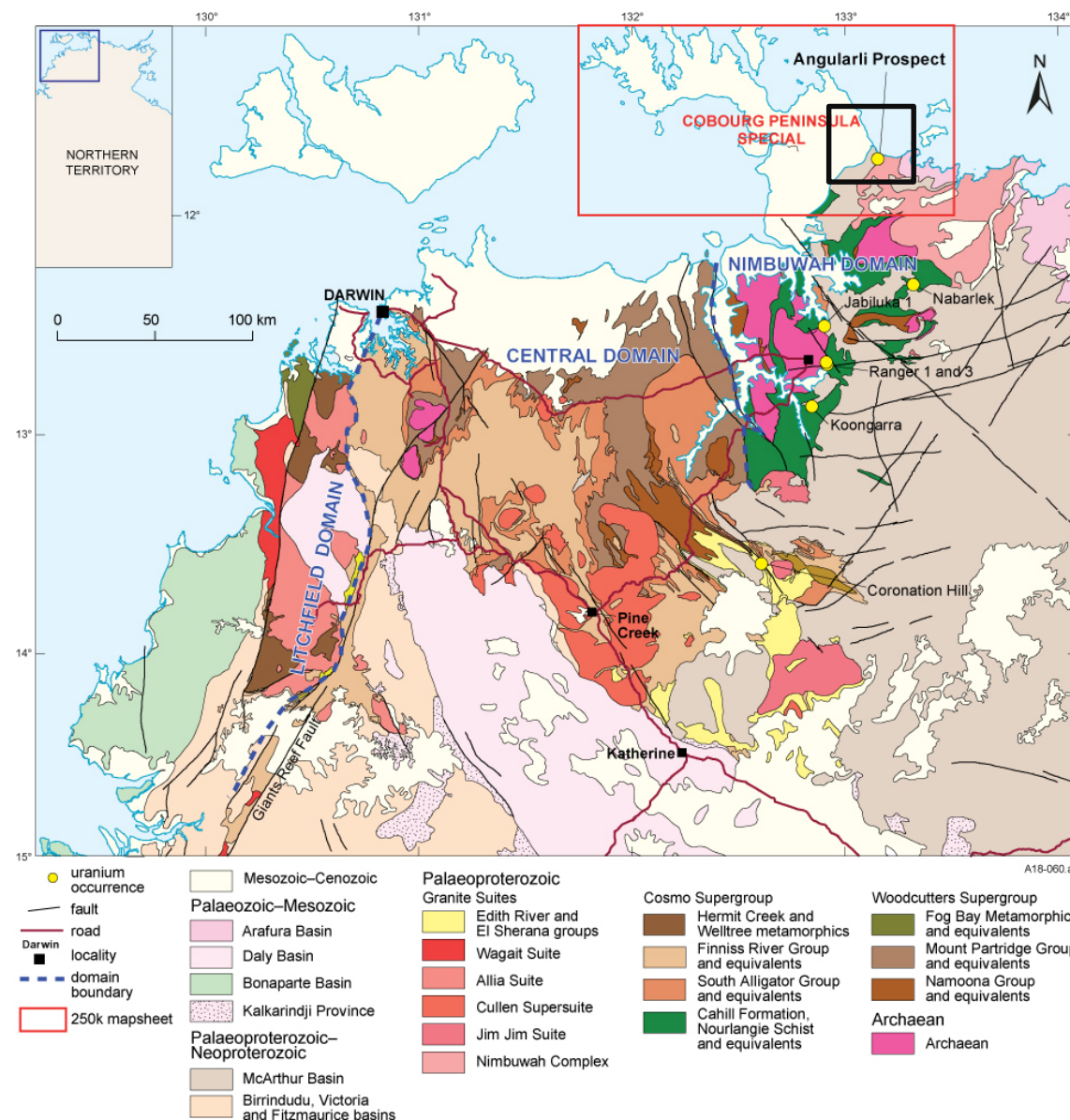


Which hole overlies mineralisation??

Angularli prospect – geology and uranium

Inferred Resource 0.91Mt @ 1.3% U_3O_8 (~26Mlbs U_3O_8)

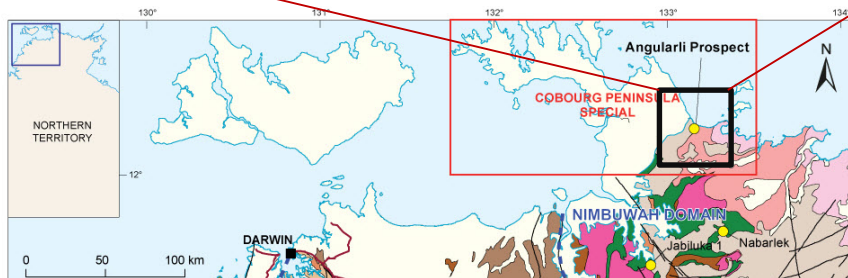
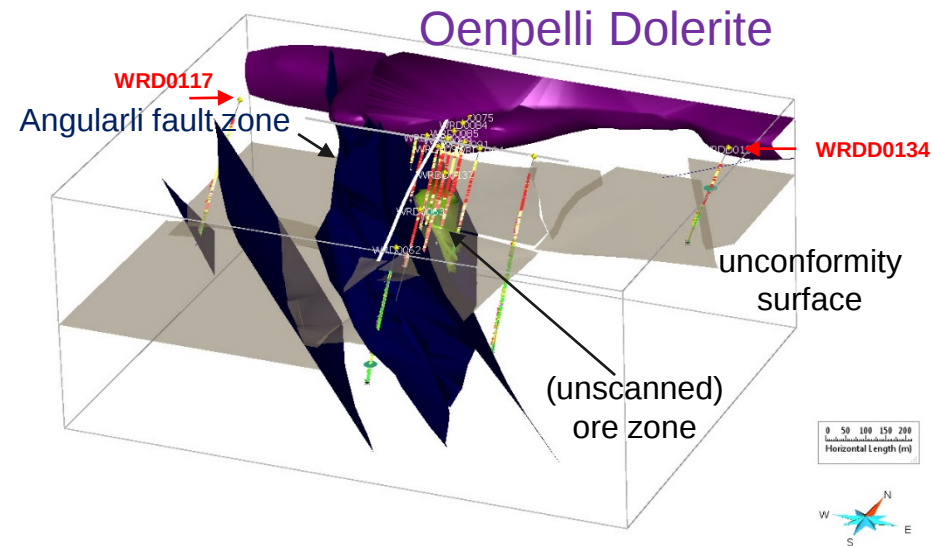
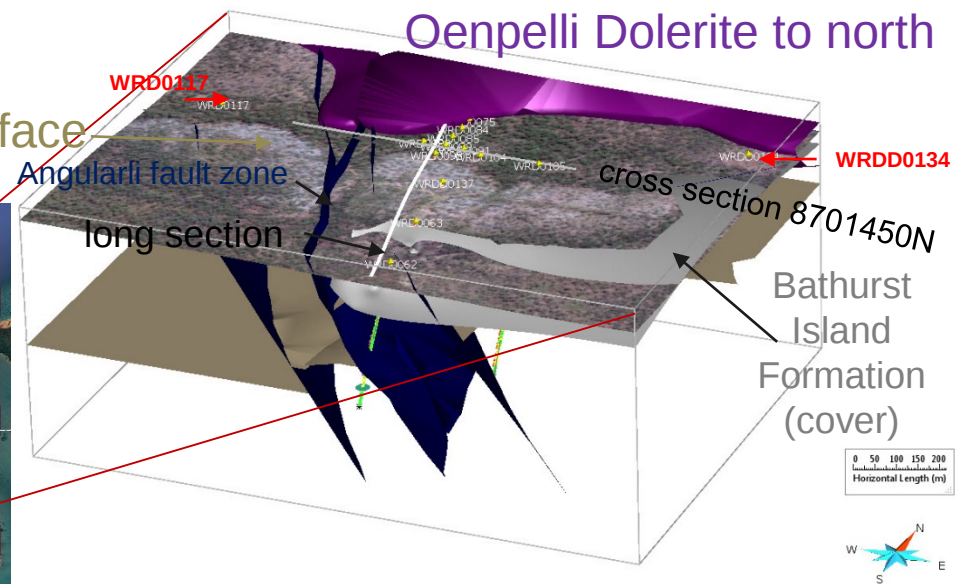
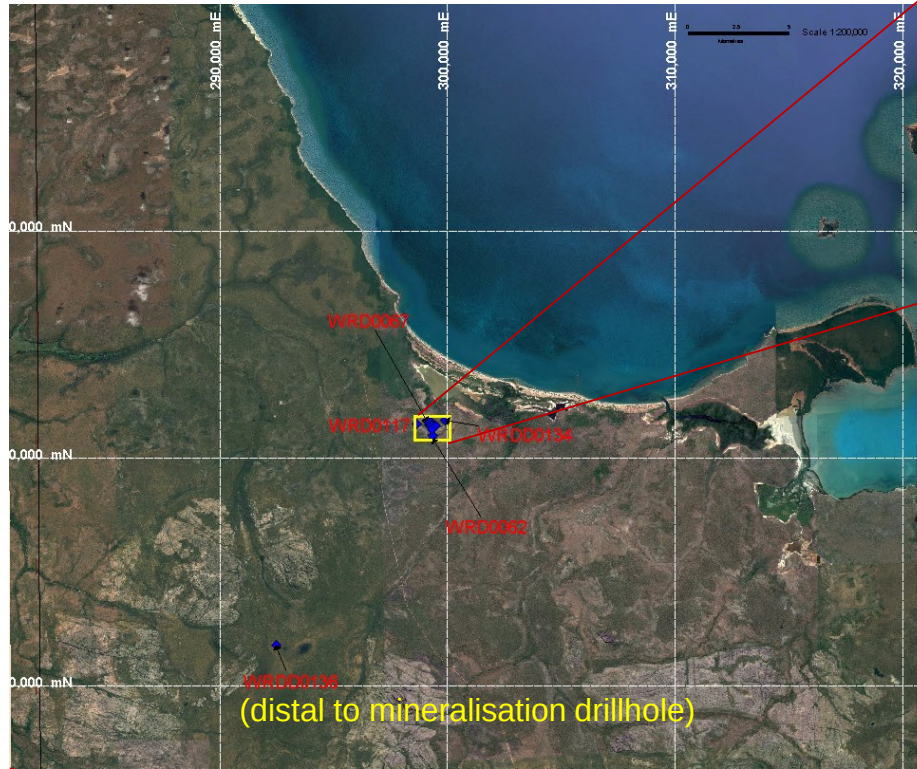
Vimy Resources ASX announcement 20 March 2018



AGES2018

Angularli Prospect

Mamadawerre Sandstone at surface

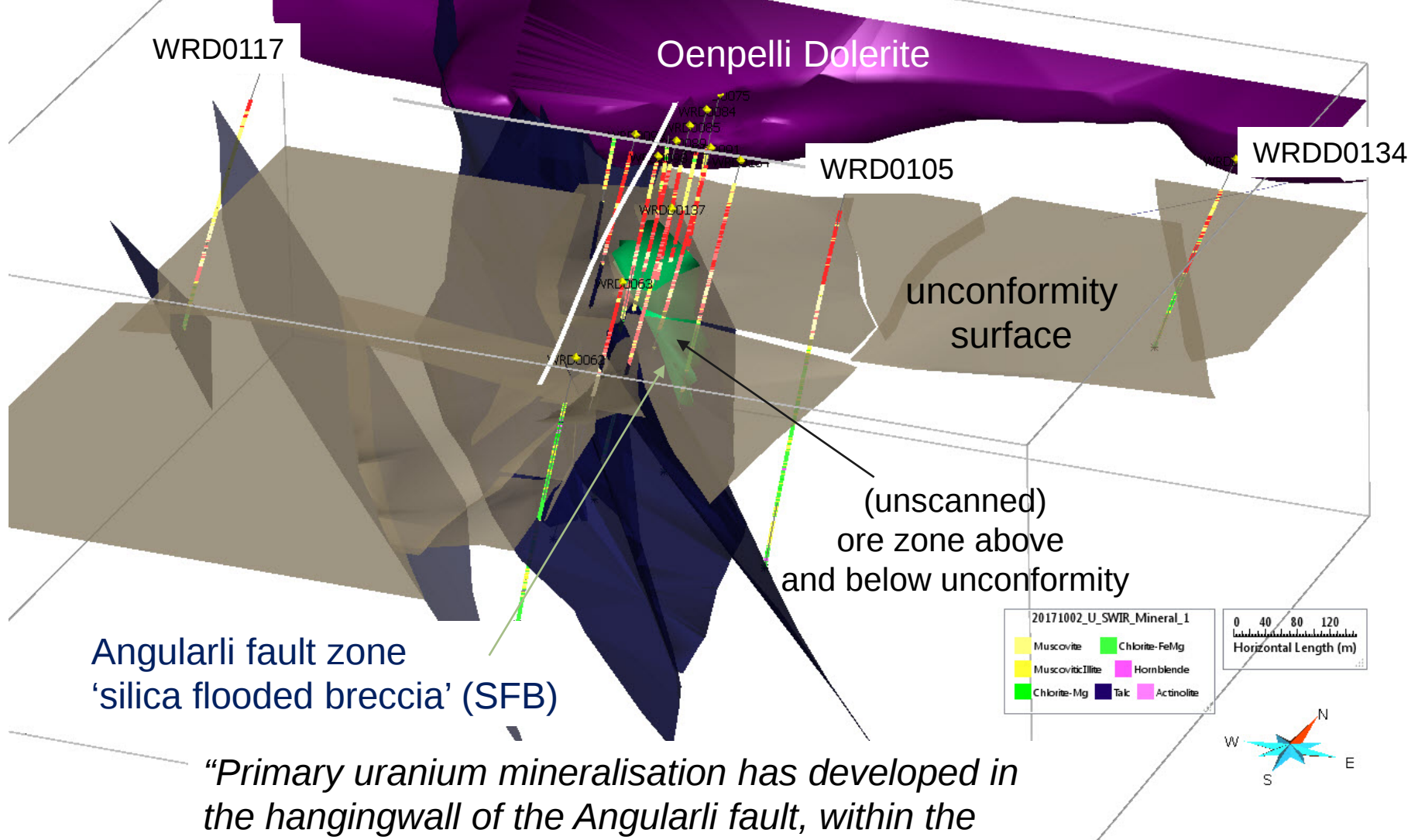


Angularli Prospect

Mineralisation in hangingwall of structural zone (King, 2012)

Silica-sericite-clay-pyrite alteration (basement)

Sandstone mineralogy not described

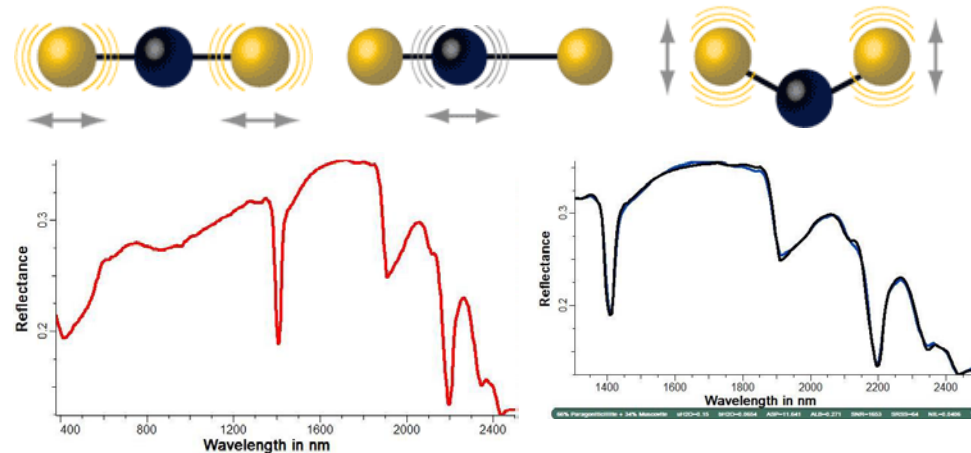


*“Primary uranium mineralisation has developed in the hangingwall of the Angularli fault, within the SFB **and the overlying sandstone.**”* Vimy Resources ASX

Vimy Resources ASX

Measuring mineralogy variations

Reflectance spectroscopy: measuring absorption of radiation from molecular vibration



Satellite; multispectral
(mineral groups)



Airborne; hyperspectral

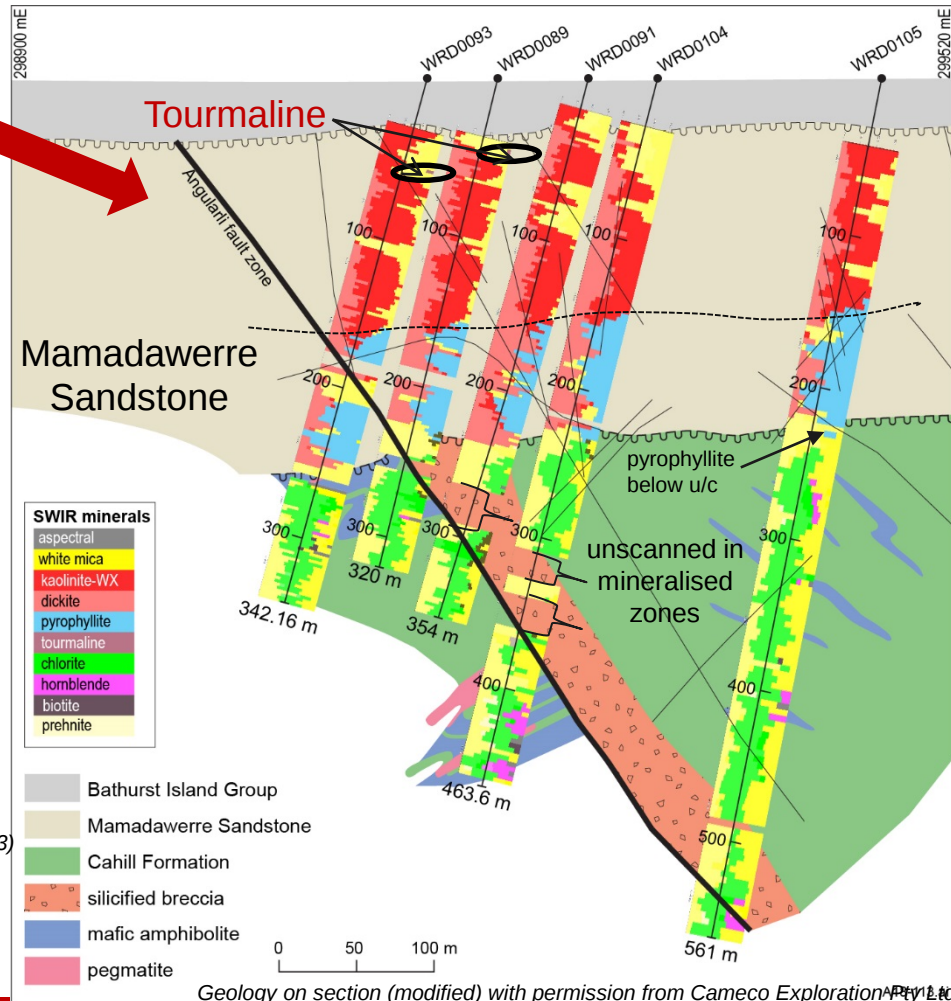
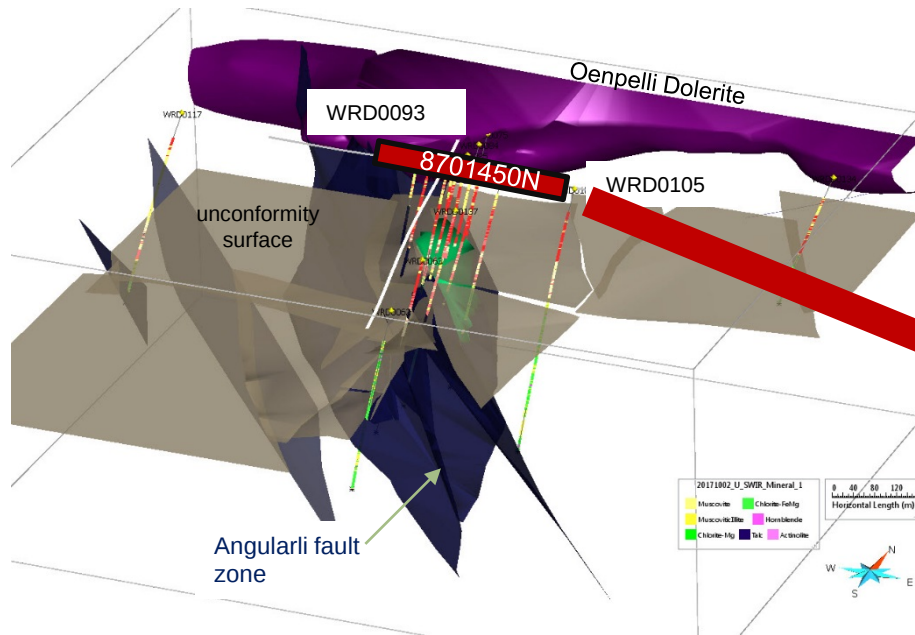


Proximal automatic / continuous drillcore / rock samples;
Hyperspectral (mineral species including quartz, feldspars,
pyroxenes) with imagery (HyLogger)



Proximal manual / point measurement
(no imagery, less minerals detected than
HyLogger)

Mamadawerre Sandstone; Angularli – 8701450N Section



Pyrophyllite ($\text{Al}_2\text{Si}_4\text{O}_{10}(\text{OH})_2$)

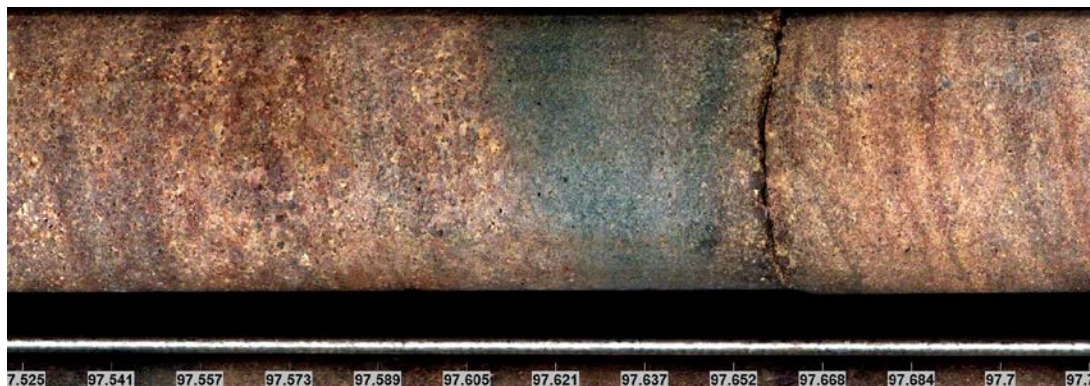
Usually in Al-rich metamorphic rocks
or from hydrothermal alteration
300-380°C temperatures at 2kBar pressures (Frey, 1987)
Can form from kaolinite

Dickite ($\text{Al}_2\text{Si}_2\text{O}_5(\text{OH})_4$ (kaolin polymorph))

Could be diagenetic or from hydrothermal alteration
90-130°C at 3-4.5km from diagenesis (Worden & Morad, 2003)

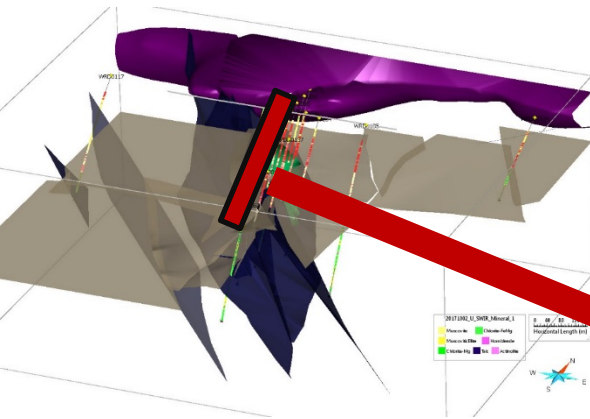
Tourmaline – minor; patchy matrix infill, or in breccias
well-documented in alteration around Athabasca U

Mamadawerre Sandstone; Angularli – tourmaline textures

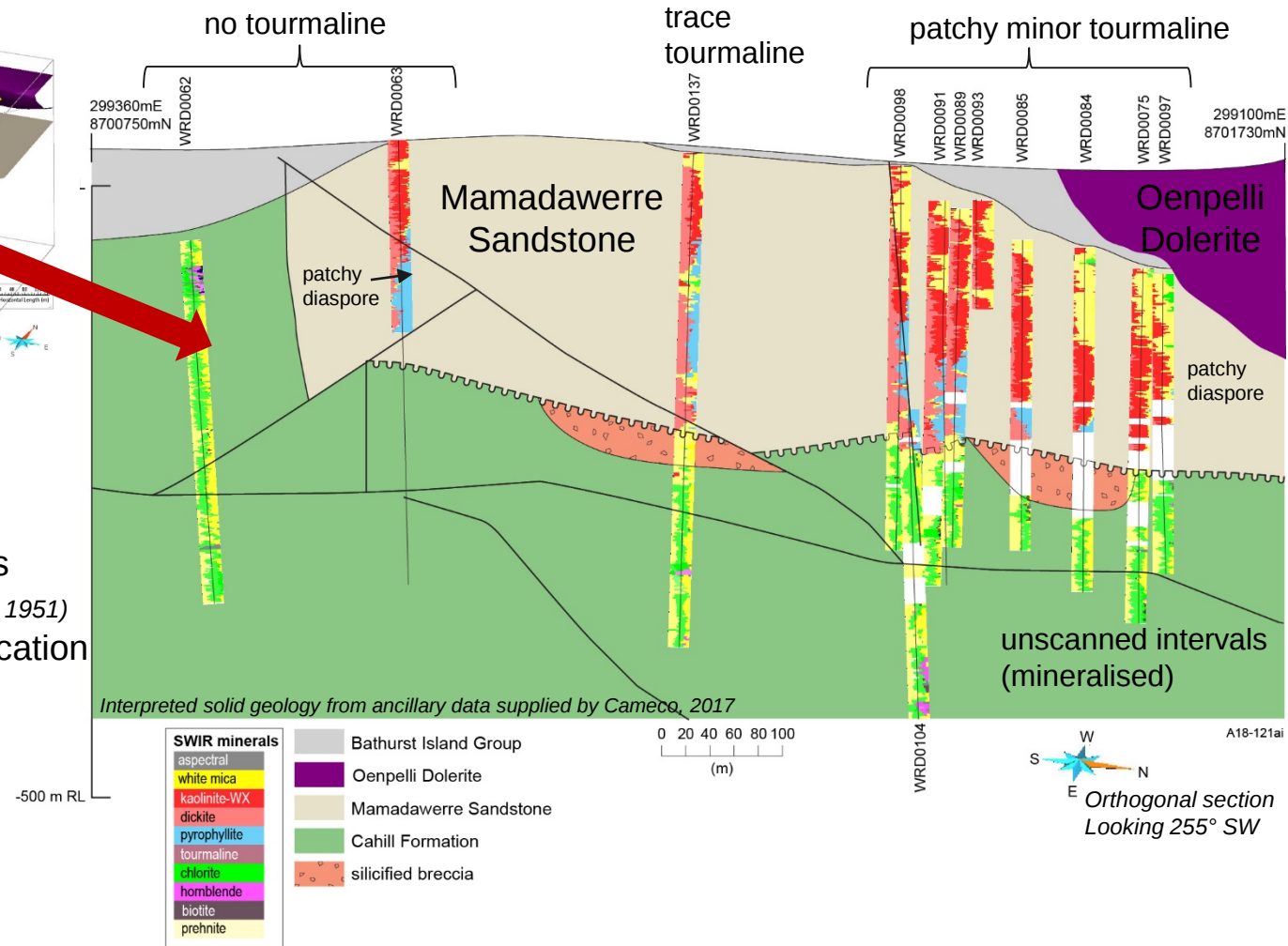


Tourmaline in matrix: WRD0085, 97.6 m

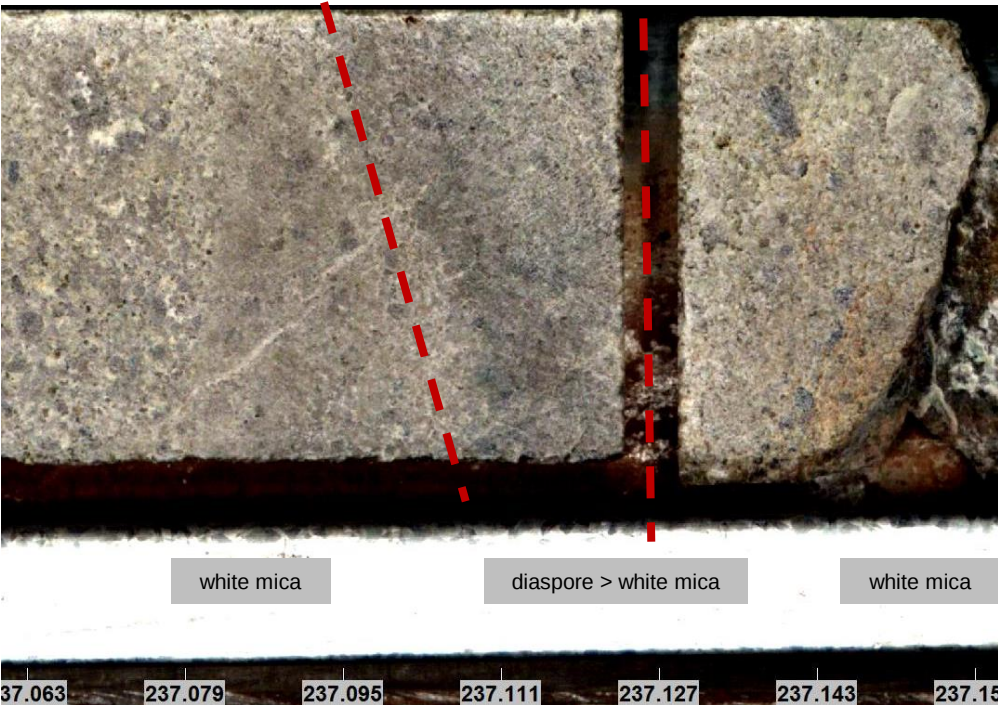
Mamadawerre Sandstone; Angularli – long section



Tourmaline near mineralisation
 Diaspore (α -AlO(OH)) near faults
 high temp; 275°C (Ervin and Osborn, 1951)
 can form from kaolinite desilicification
 (Chesworth, 1994)



Mamadawerre Sandstone; Angularli – diaspore textures

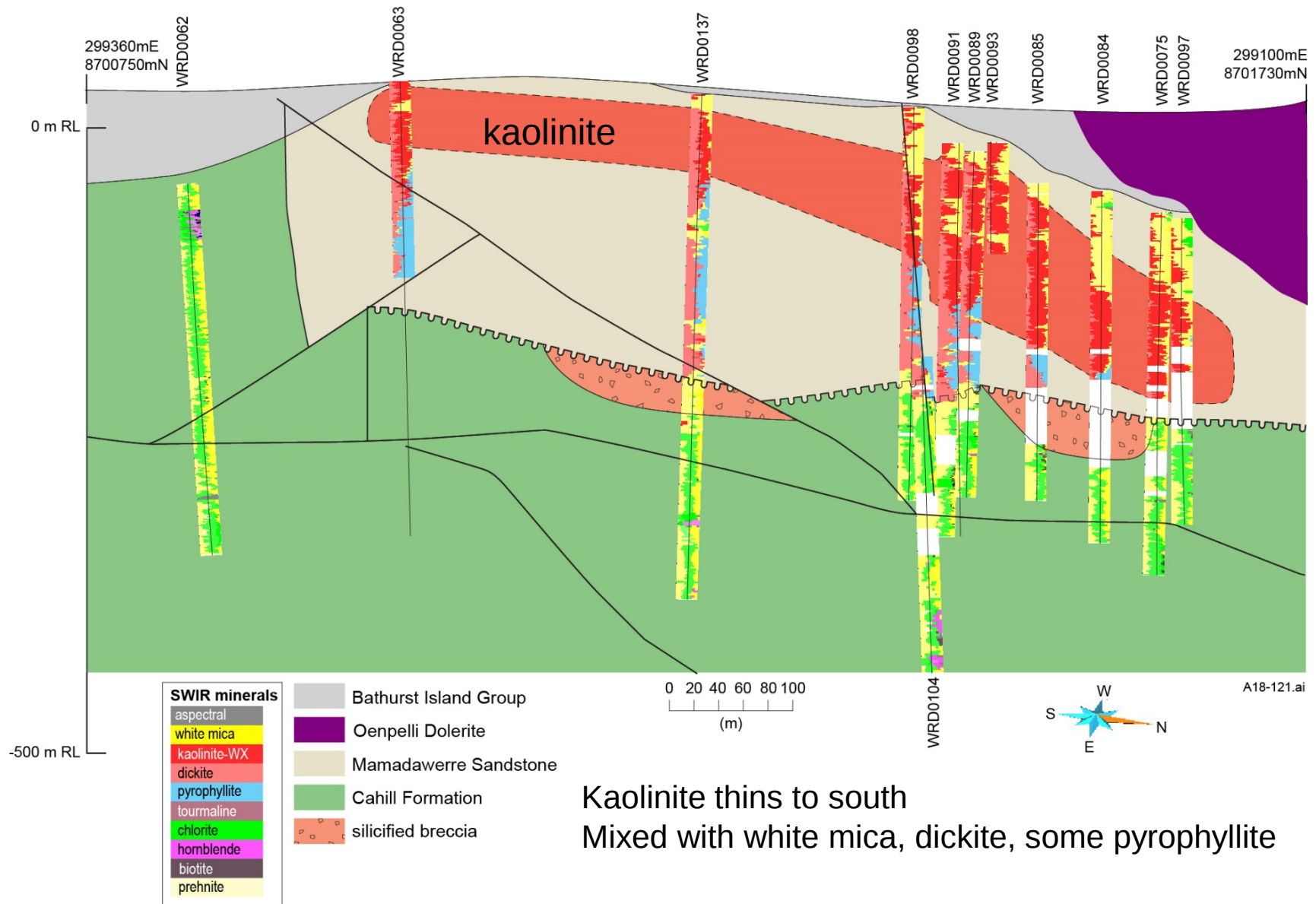


WRDD0137 237 .1 m;
diaspore > white mica
close to the unconformity.
Note the diaspore is in a
darker zone with diffuse
boundaries. Adjacent core
has sulphides.

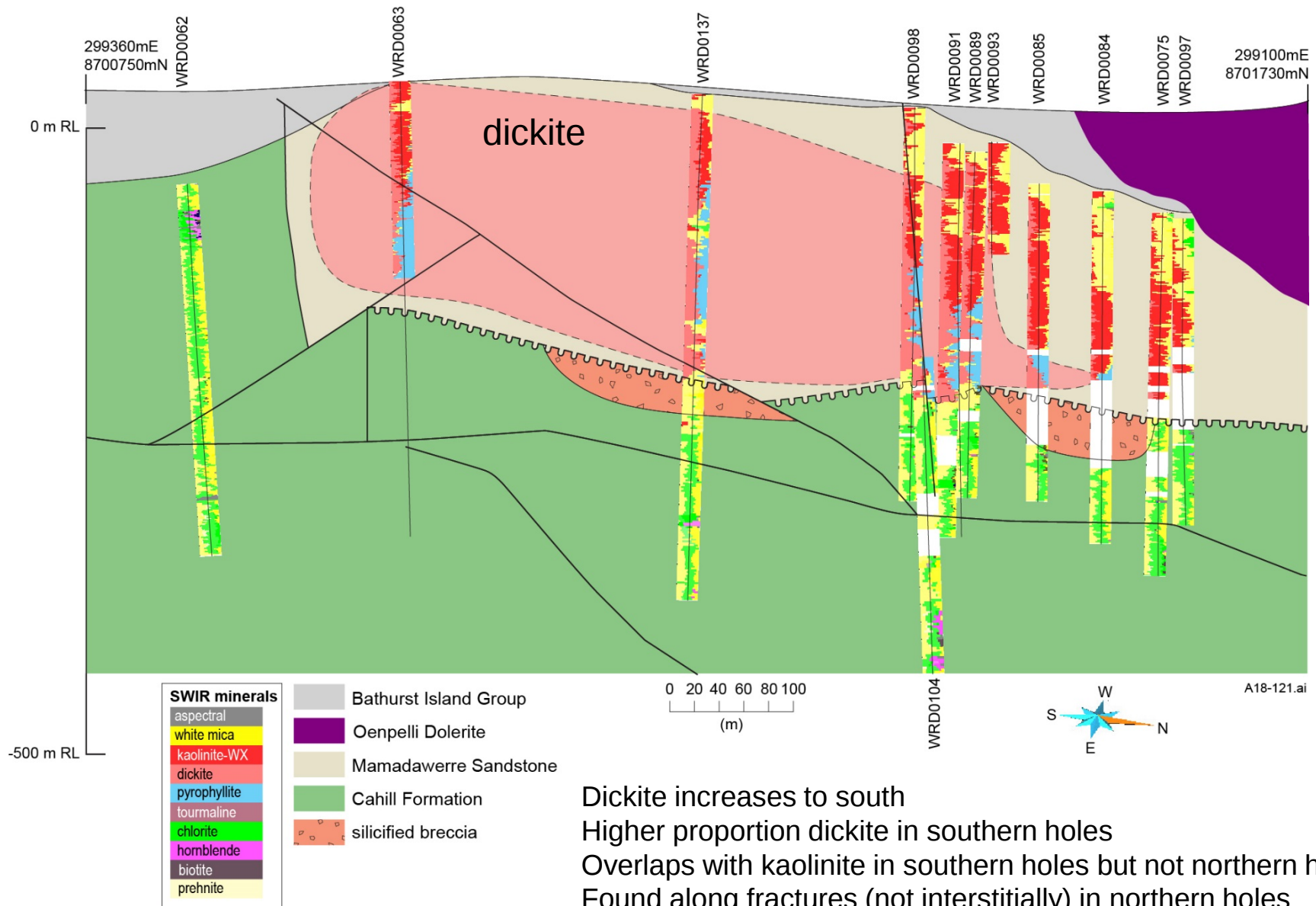


WRD0105

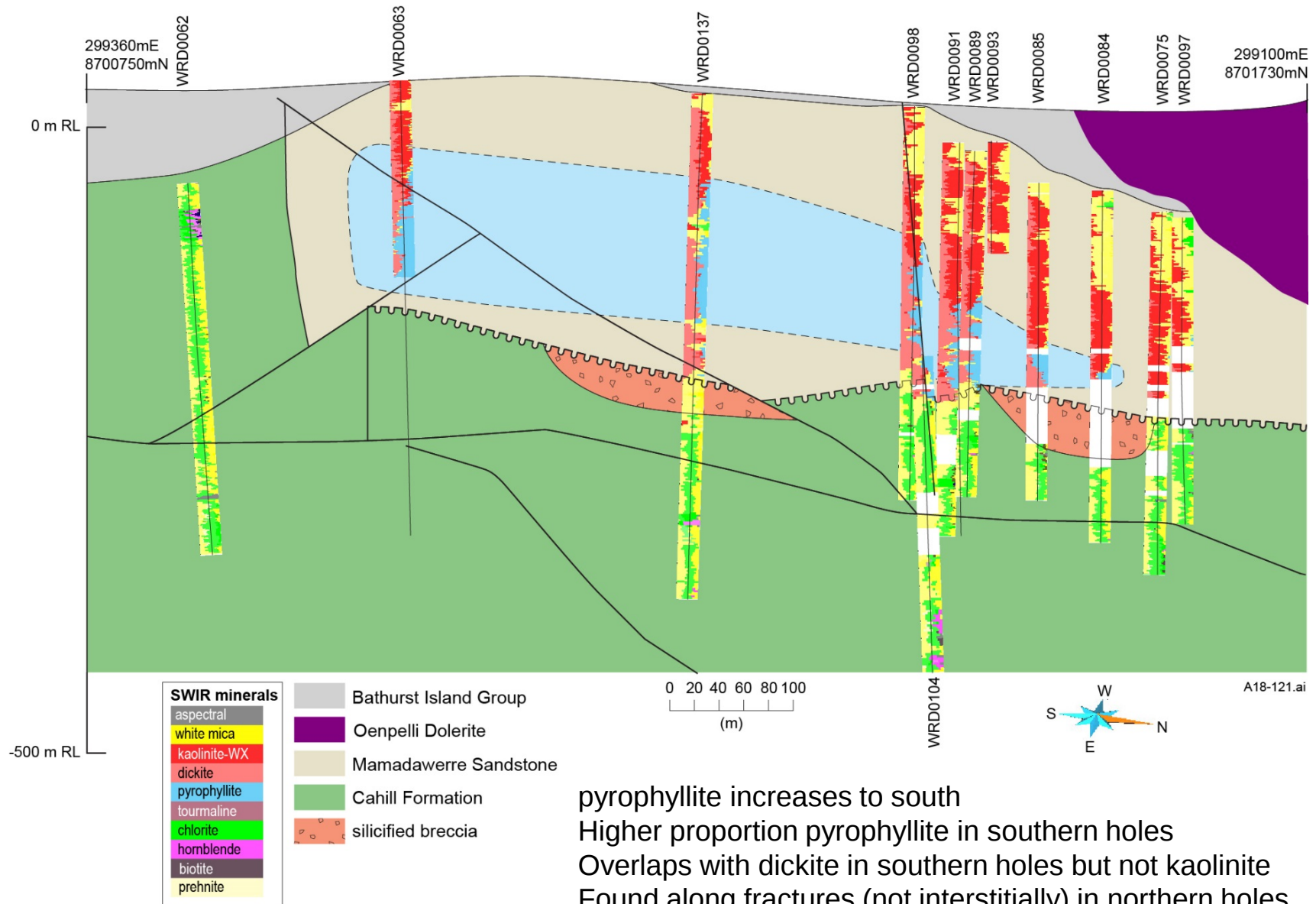
Mamadawerre Sandstone – long section: kaolinite



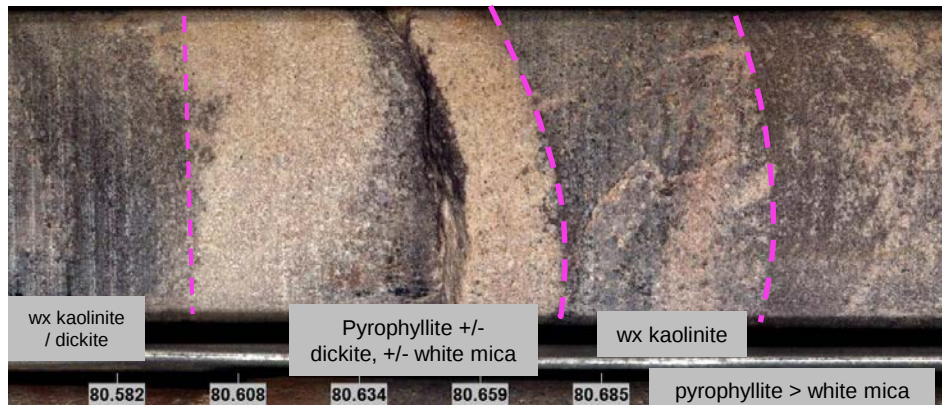
Mamadawerre Sandstone – long section: dickite



Mamadawerre Sandstone – long section: pyrophyllite

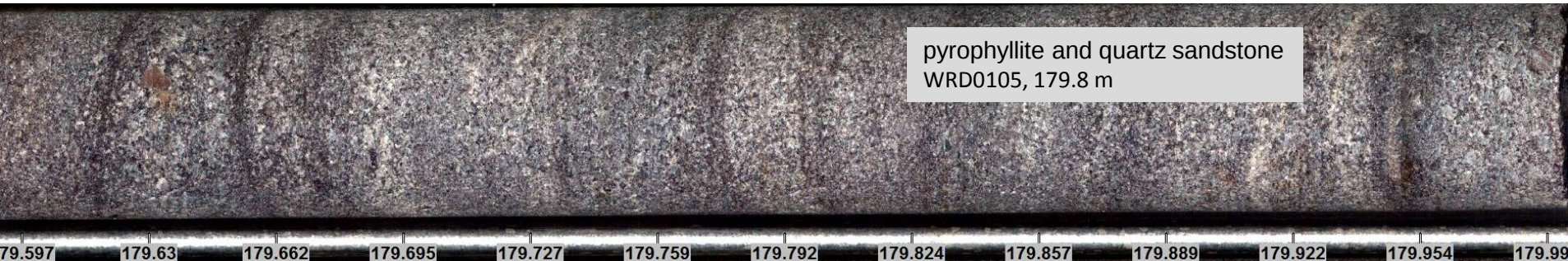
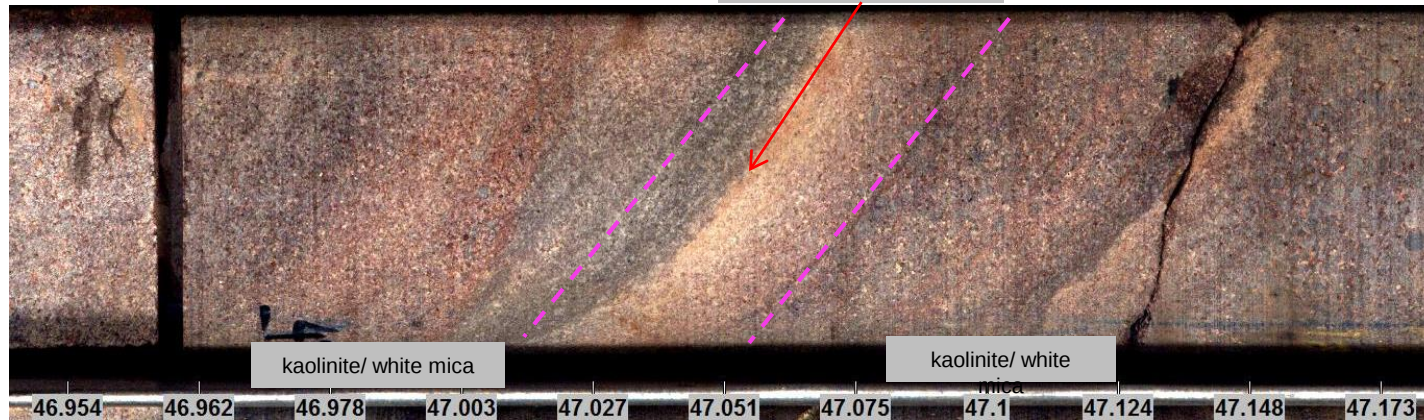


Mamadawerre Sandstone – pyrophyllite mineralogy textures



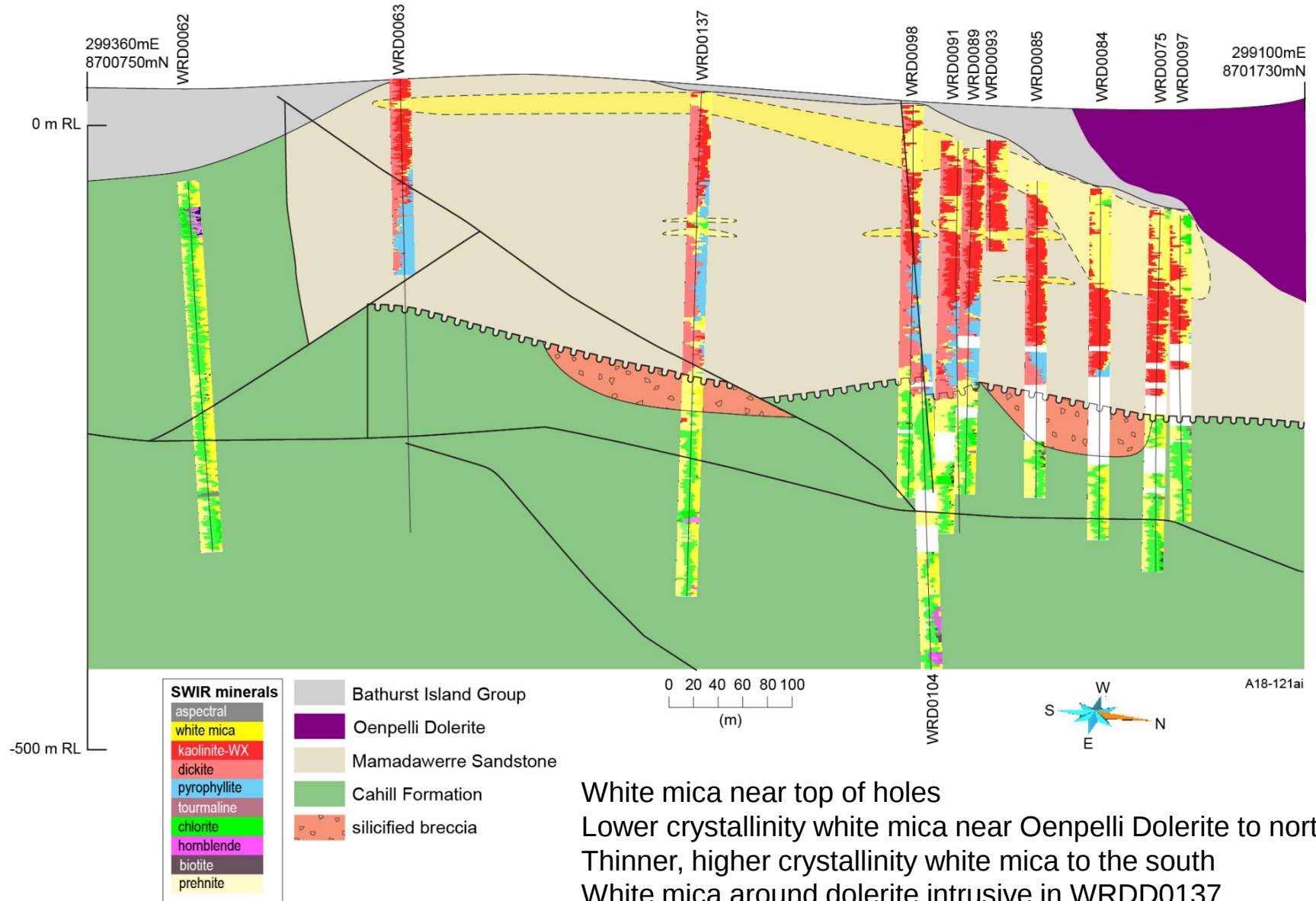
Pyrophyllite +/- dickite,
+/- white mica

pyrophyllite after kaolinite, WRD0063

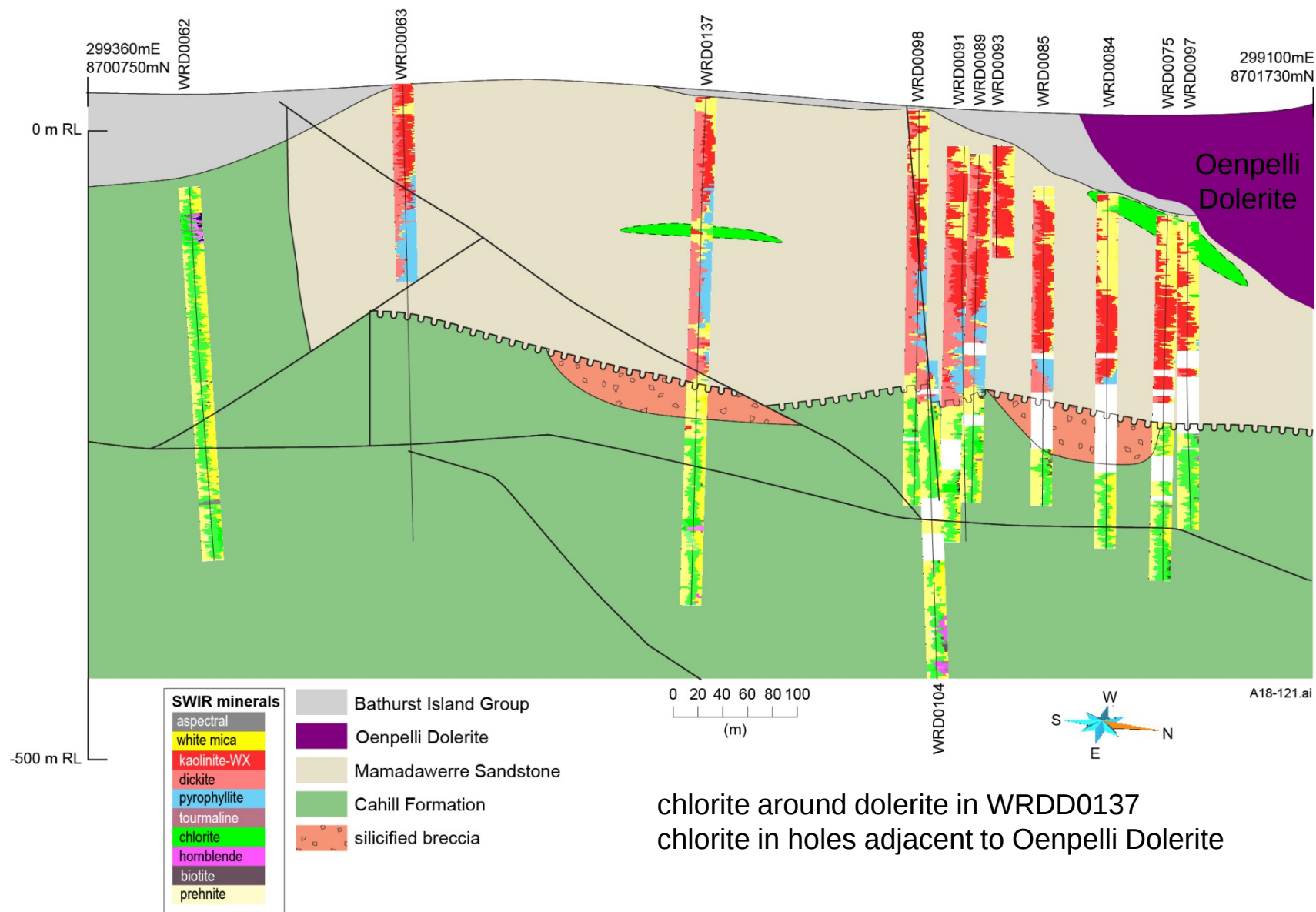


pyrophyllite and quartz sandstone
WRD0105, 179.8 m

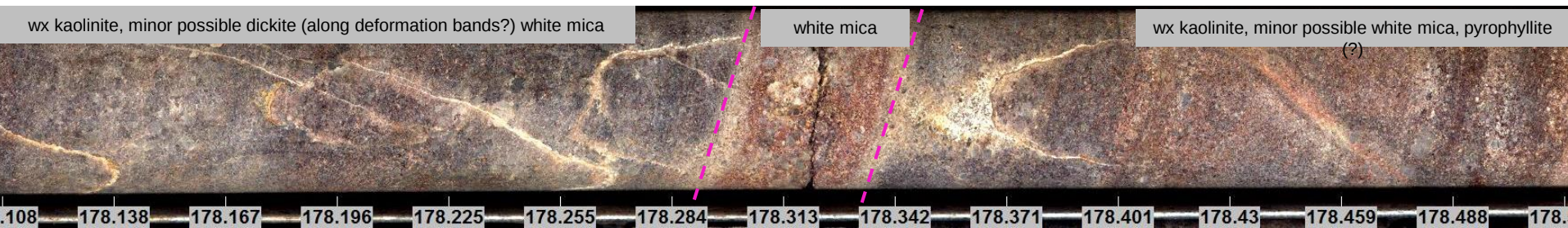
Mamadawerre Sandstone – long section: white mica



Mamadawerre Sandstone – long section: chlorite



Mamadawerre Sandstone – cross-cutting mineralogy textures

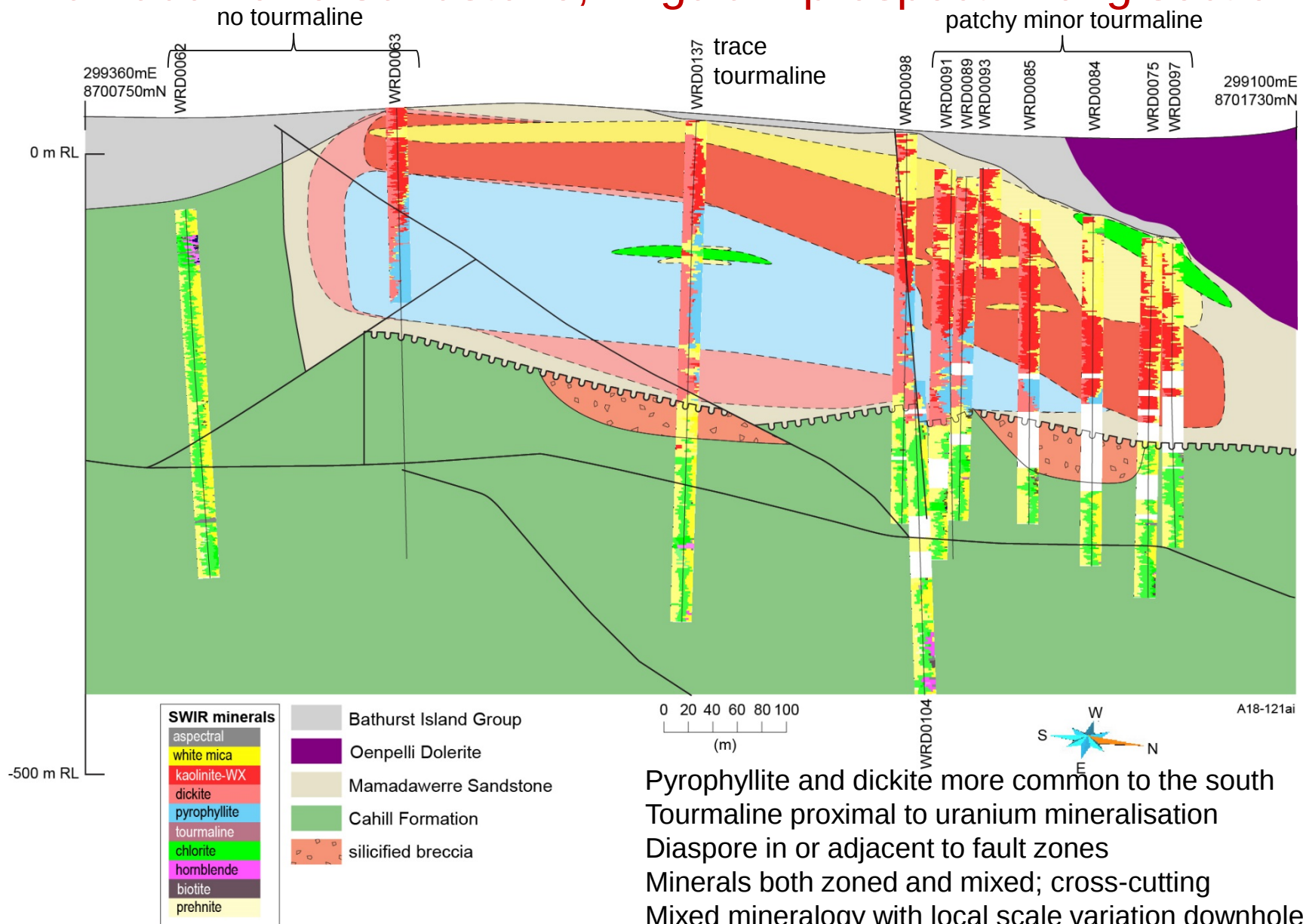


White mica after kaolinite



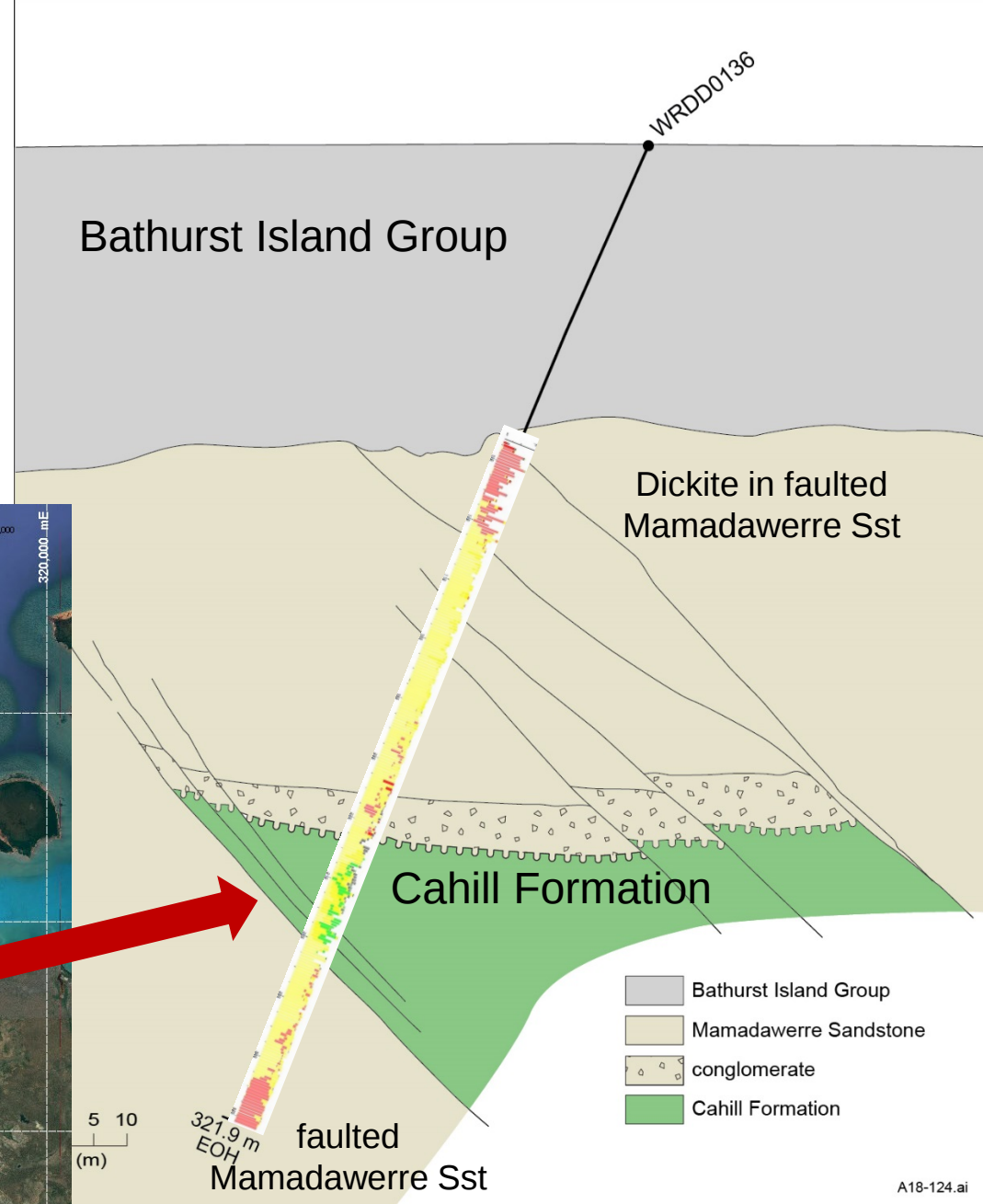
WRD0085 129.5 m: dickite along open fracture (sub-parallel to core axis) in sharp contact with well-crystalline kaolinite quartzose sandstone.

Mamadawerre Sandstone, Angularli prospect – long section: all



Angularli – distal hole WRDD0136

Drilled under NTGS Geophysics
and Drilling Collaborations;
Round 9, 2016-2017
12km from Angularli
Background mineralisation



WRD0097; mineralised



Applications to exploration – using reflectance spectroscopy

‘TERRASPEC / PIMA’



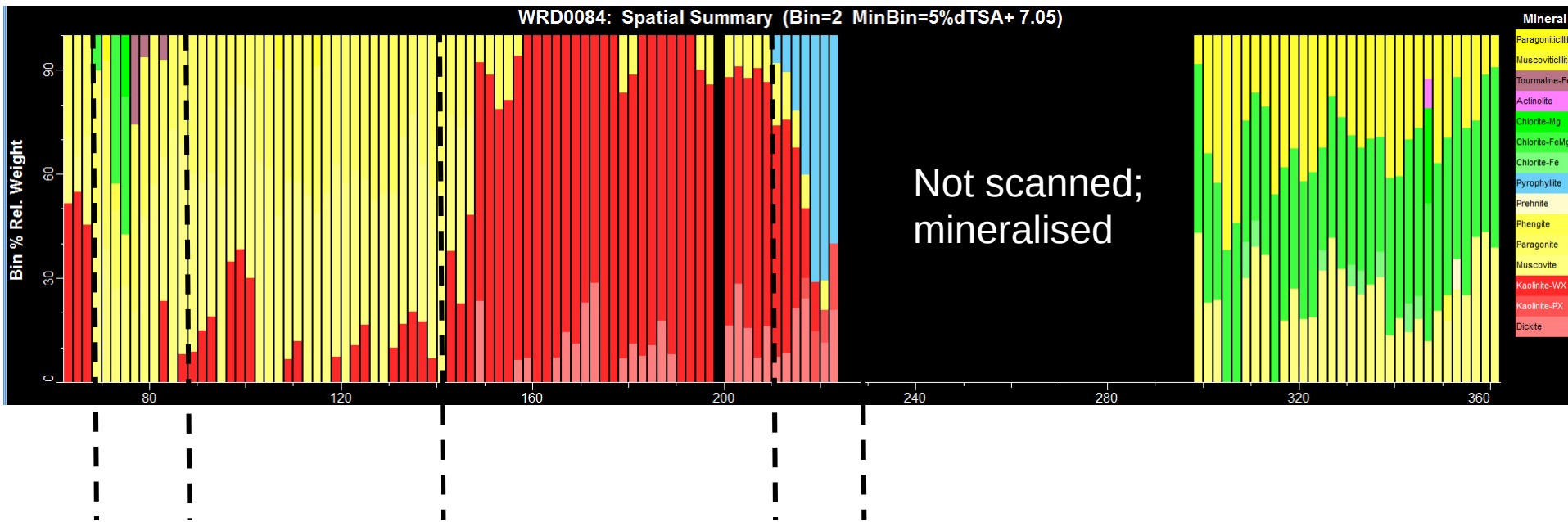
Proximal manual / point measurement
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‘HYLOGGER’

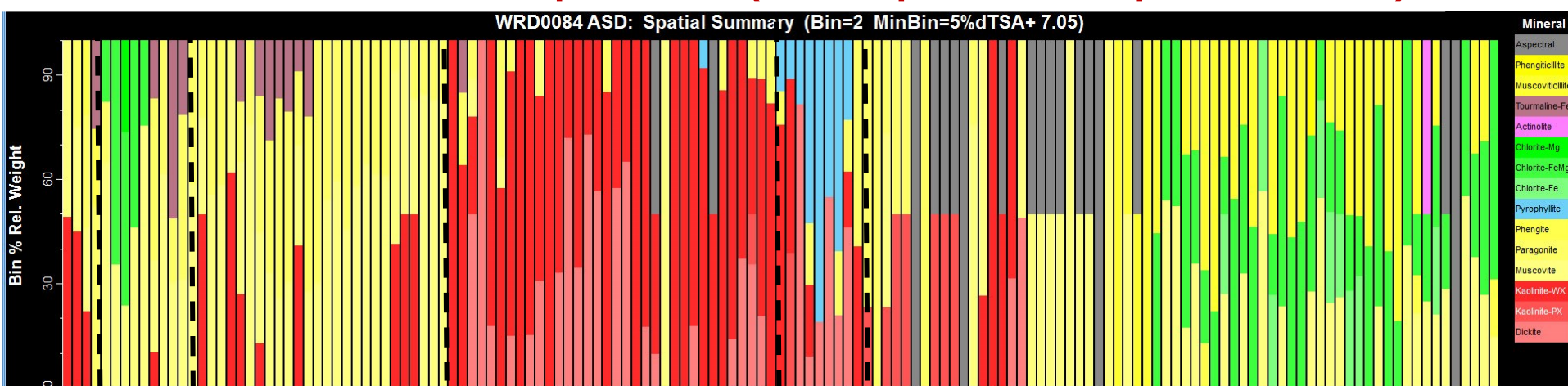


Proximal automatic / continuous drillcore / rock samples;
Hyperspectral (mineral species including quartz, feldspars,
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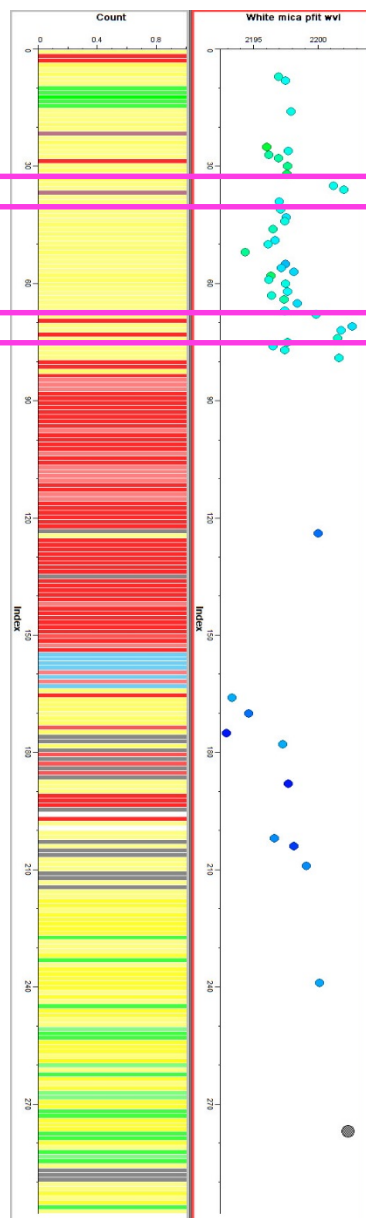
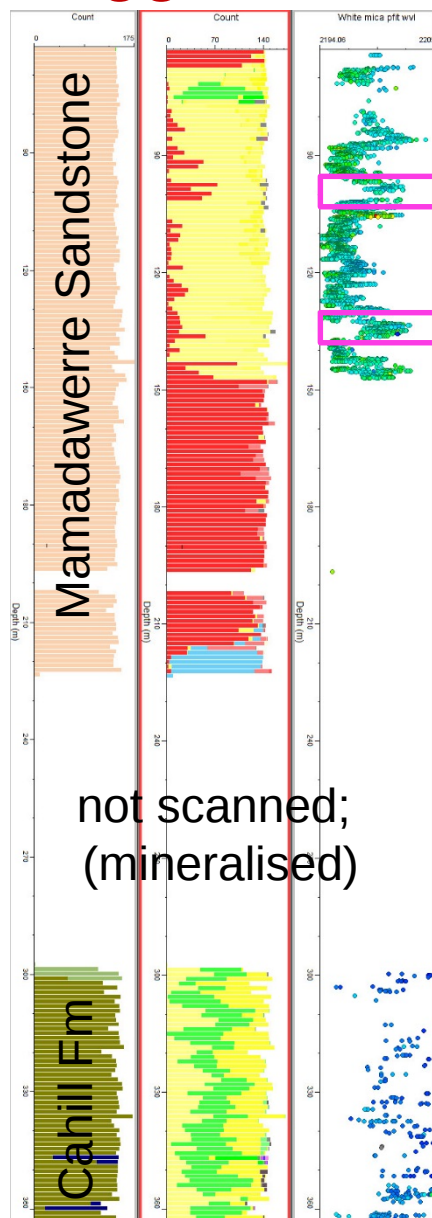
HyLogger – 26,750 spectra (~125 spectra per metre)



PIMA / ASD – 295 spectra (~ 1 spectrum per metre)



HyLogger vs ASD: WRD0084 white mica variations



Moderate crystallinity white mica
Variable white mica composition
(wavelength)

Lower crystallinity white mica
More phengitic than sandstone
white mica

Summary

- Primary uranium mineralisation in the Mamadawerre Sandstone at Angularli prospect
- Mineral zonation both with depth and along strike at Angularli
- Pyrophyllite, diaspore and tourmaline at Angularli prospect
- Non-mineralised WRDD0136 (distal to Angularli prospect):
 - uniform white mica composition and crystallinity
 - no tourmaline, no diaspore, trace to no pyrophyllite
- Handheld reflectance spectroscopy tools ('Terraspec, PIMA') can emulate HyLogger SWIR data, especially when combined with photos (textural context) and other ancillary data (assays, petrography)

Acknowledgements

- HyLogging the Angularli drillcore and data interpretation is possible under an agreement between the Northern Territory Government and the Joint Venture partners Cameco Australia Pty Ltd and Rio Tinto Exploration Pty Ltd.
- Cameco Australia Pty Ltd supplied drillcore from Angularli prospect for scanning. Cameco also supplied Ancillary data to assist with this HyLogger interpretation of results.
- HyLogging and TSG are trademarked by CSIRO.
- Kathy Johnson did invaluable drafting of figures.
- Darren Bowbridge scanned the core.
- James Farrell from Mira Geoscience helped the import and visualisation of data in Gocad.

References

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