Lithium-rich pegmatites of the Bynoe Field

David Rawlings, Core Exploration Ltd

AUSTRALIA'S NORTHERN TERRITORY

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CORE EXPLORATION LTD

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AGES Conference Alice Springs March 2017

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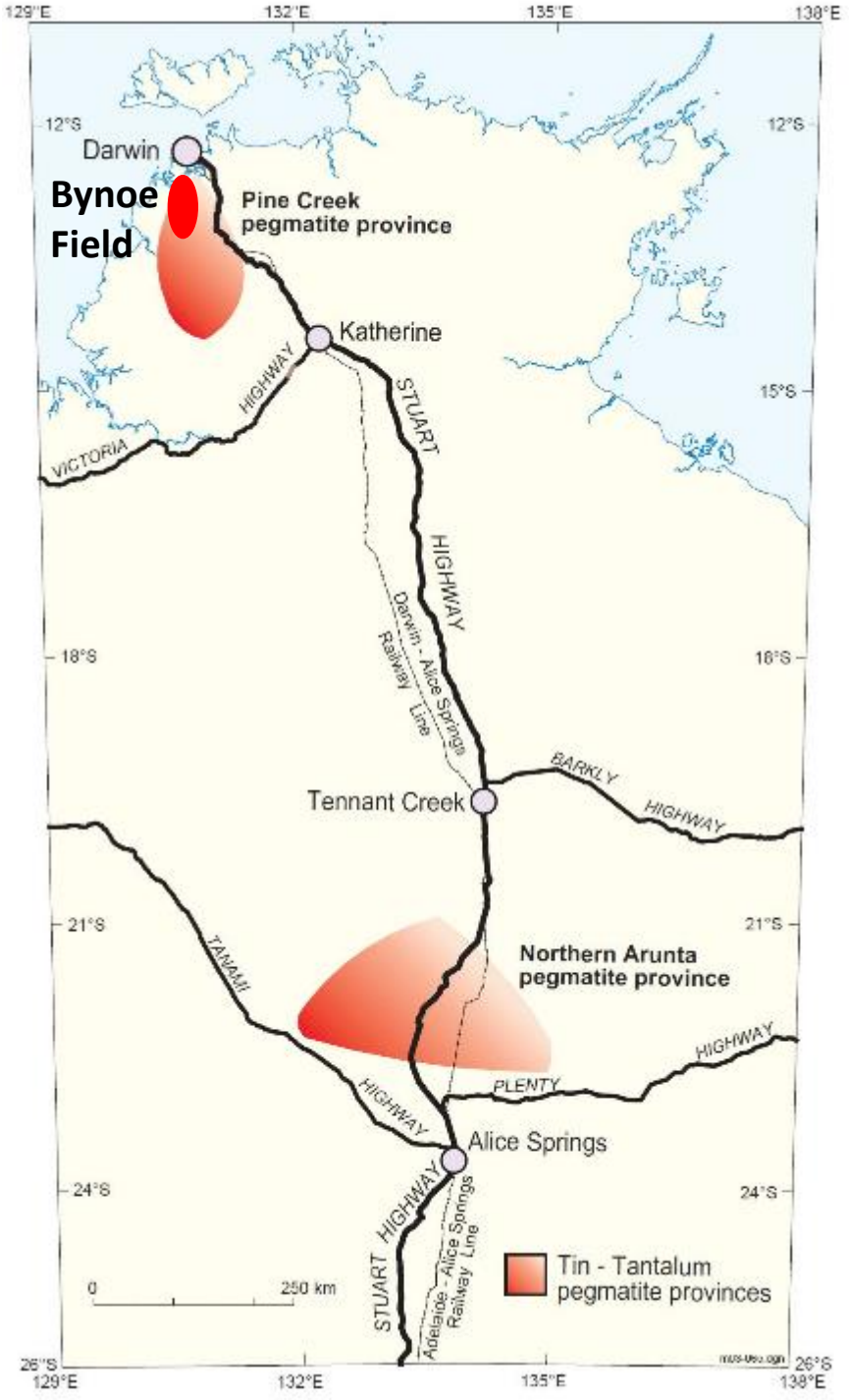
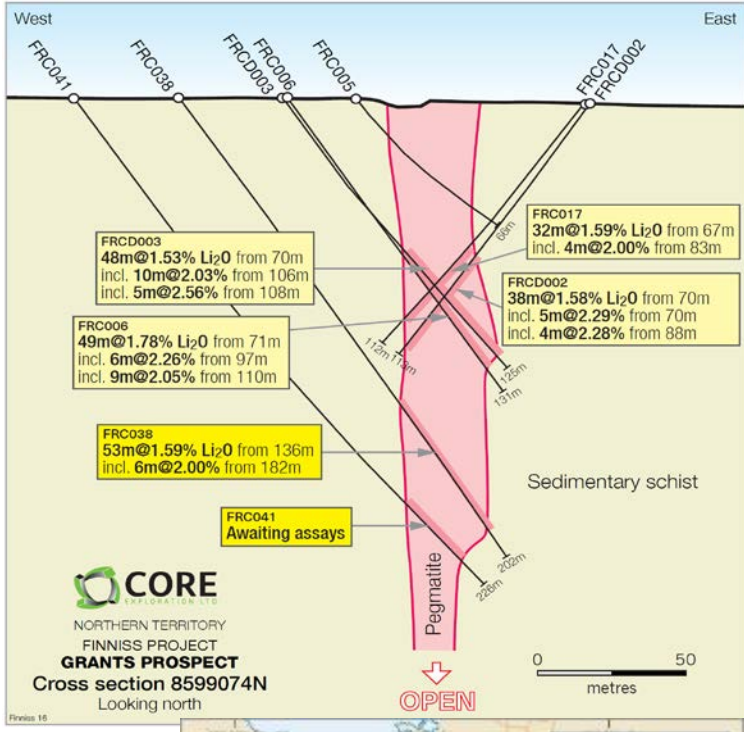
BACKGROUND

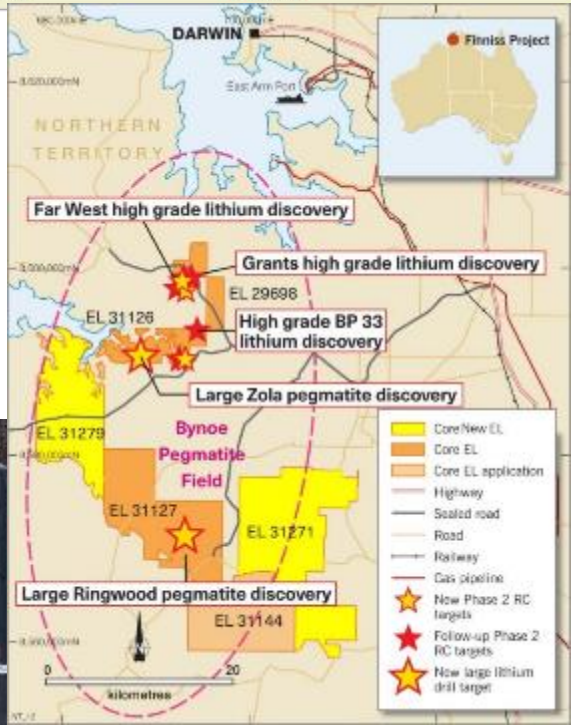
- Bynoe Pegmatite Field
- 15 km south of Darwin
- Historic Sn-Ta Production from 1886 until late 1990s
  - >120 t Ta2O5 & >600 t SnO2
- Now re-cast as a Lithium District
- Current activity by Core, Liontown & Kingston
- NTGS Sn-Ta Studies
  - Ahmad, 1995
  - Frater, 2005



FINNISS LITHIUM PROJECT

- Discovery hole: 49m @ 1.78% Li_2O from 71m (FRC006) at Grants Prospect
- High Grade Spodumene drill intersections at multiple prospects in first drill program
- 25 historic pegmatite prospects/mines, including Mt Finniss mine - the largest pegmatite mine in the NT
- 100s more likely in the Bynoe Field under thin cover
- Is it the "Tip of the Iceberg"?

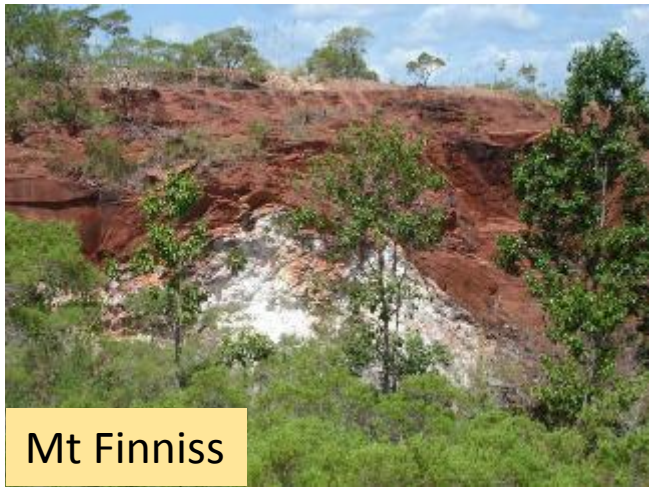




EXPLORATION HISTORY

- Costeans, pits & shafts
- Mined/processed Sn-Ta in soft rock & alluvials
- Greenex centralised processing plant
- Interest & knowledge of Lithium limited to amblygonite collectors
- No spodumene at surface
- Chemical weathering during Tertiary & recent
- Current slow exhumation of laterite

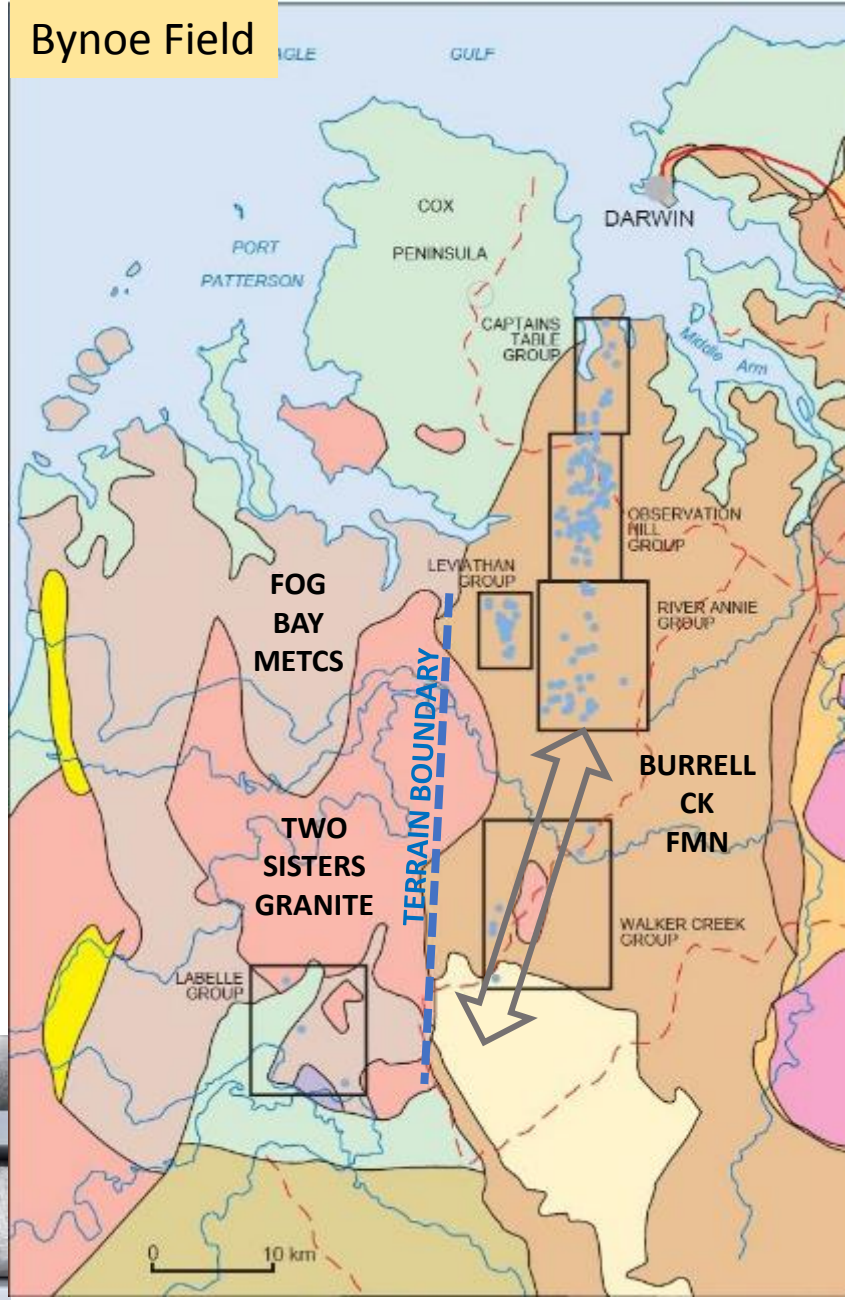

Ah Hoys


Mt Finniss


BP33

GEOLOGICAL SETTING

- 'LCT Type' (Li Cs Ta) pegmatites
- Source: Two Sisters Granite ~1850Ma
- Host: Burrell Creek Fmn turbidites (Pine Ck Province)
  - Greenschist facies
  - Isoclinal to tight folds
- Granite top dips east
- Regional fabric – sub-vertical NNE



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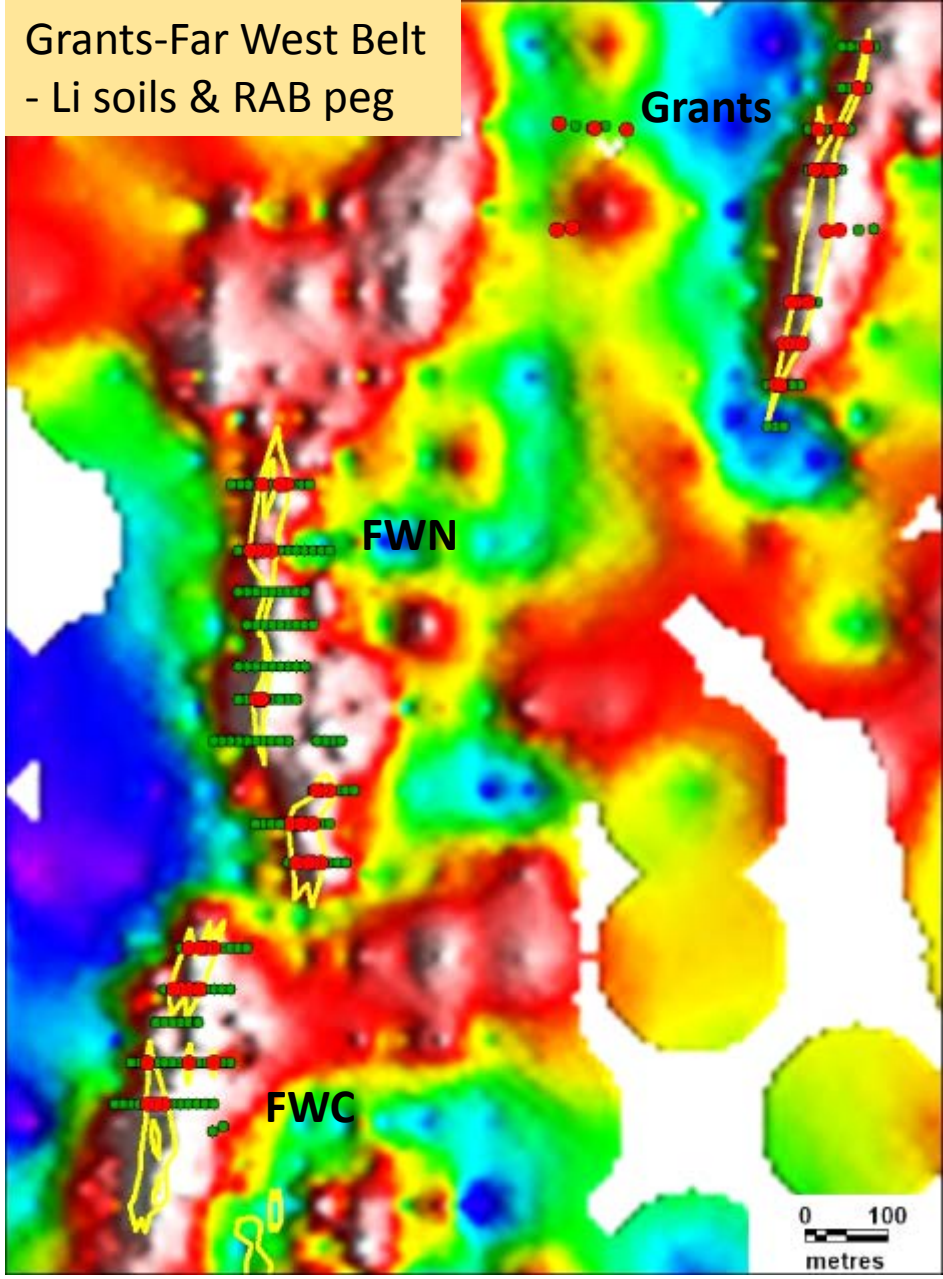
MORHOLOGY

- Narrow veins to lozenge shapes
- Up to 500m long & 60m wide
- Coalescing & interconnected
- N to NNE trending (regional fabric), but locally discordant fault jogs
- Steep to vertical
- No structural dismemberment

Grants-Far West Belt
- Li soils & RAB peg



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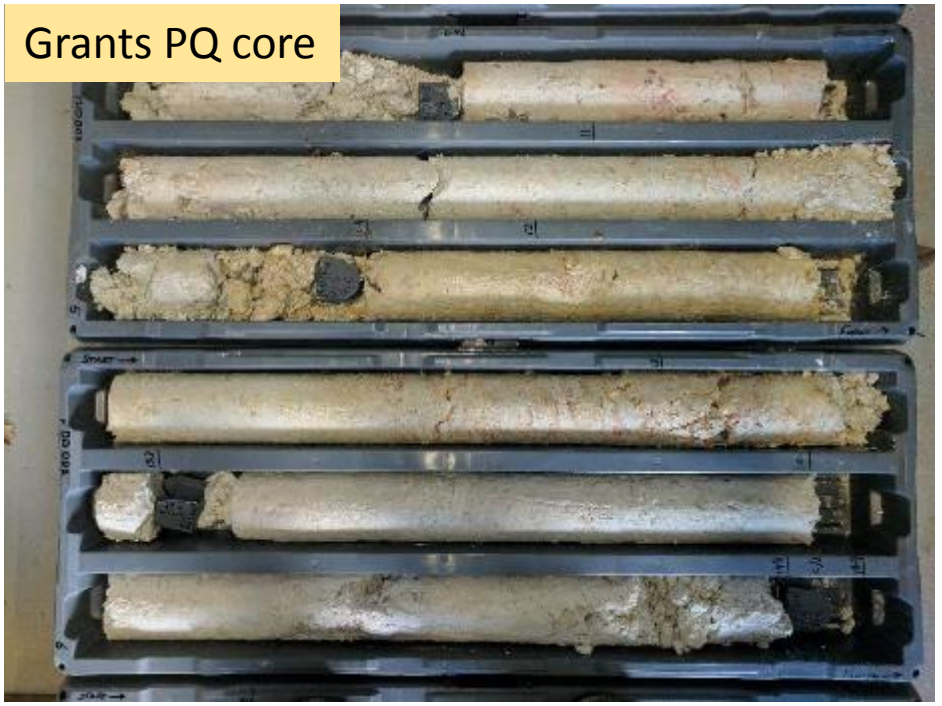
SURFACE EXPRESSION

- Clay saprolite (smectite-kaolinite)

Zola

Ringwood

Grants PQ core



BP33

SURFACE EXPRESSION

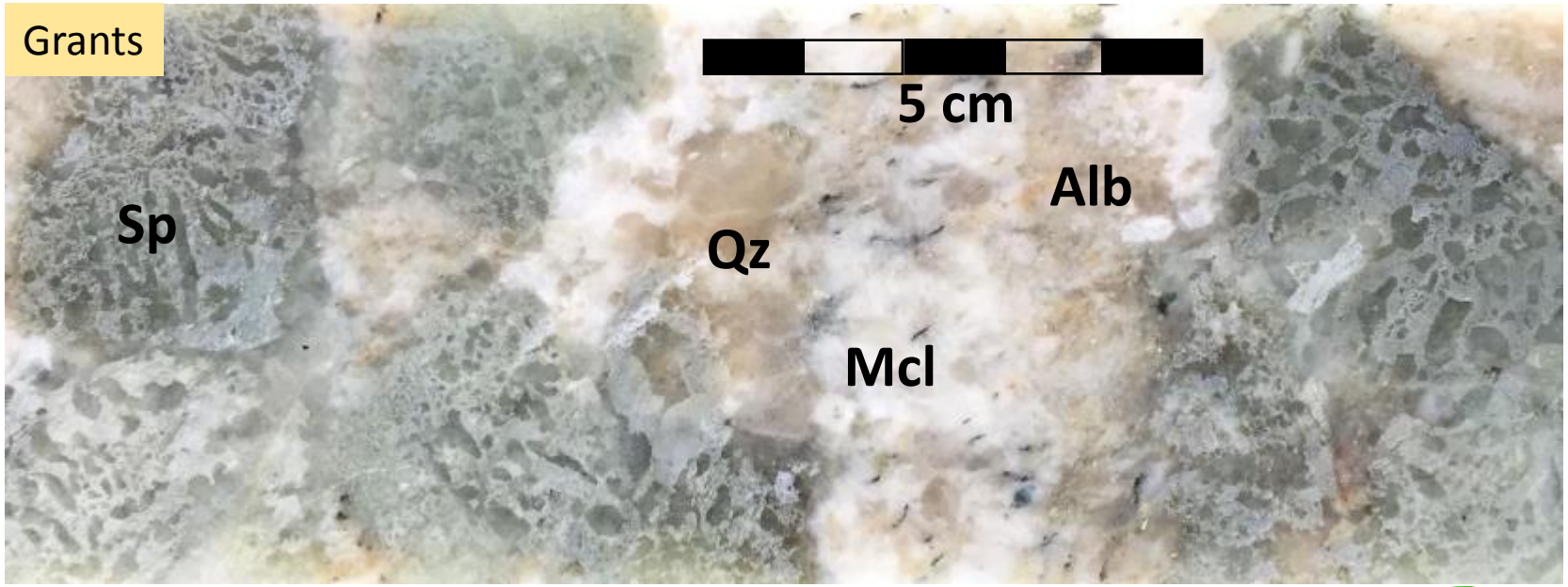
- Quartz float & blows
- Laterite iso-surface
- Blacksoil drainage
- Vegetation
- Soils/RAB
  - Li, Cs, Rb, Sn, Ta

Ringwood – Li soils grid

0 500
metres

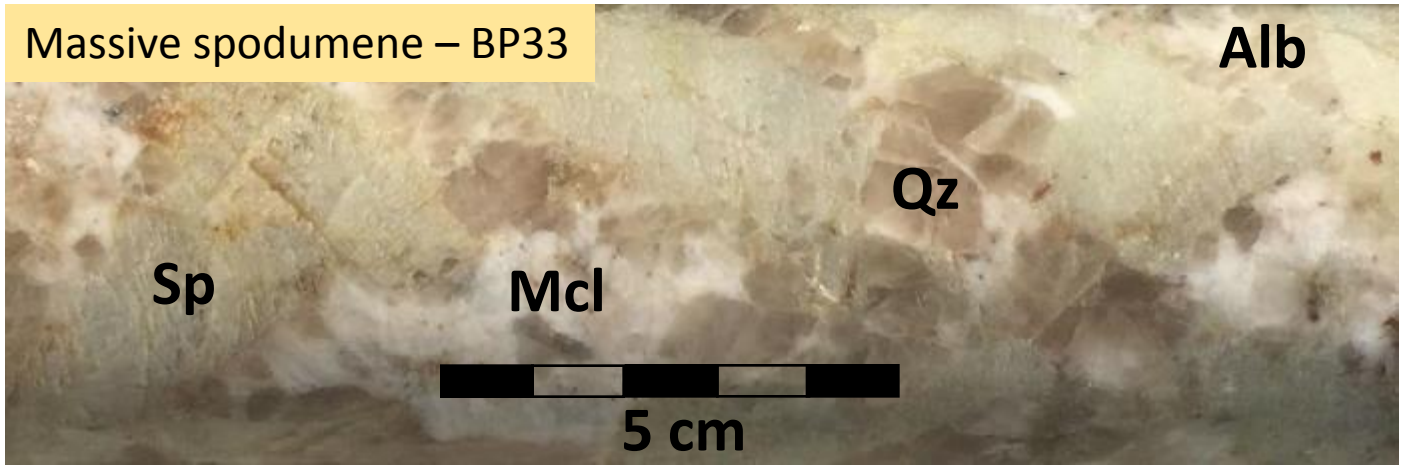
PEGMATITE MINERALOGY

- Spodumene (20-40%) - Lithium clinopyroxene - $LiAl(SiO_3)_2$
  - Poikilitic (quartz) & lesser massive (inclusion free) – crystals 2 to >10 cm long
  - Pale green/grey & lesser pink (Grants vs BP33)
- Quartz (20-30%) - translucent & inclusions in spodumene
- Albite & Microcline (30-50%) - pink & white

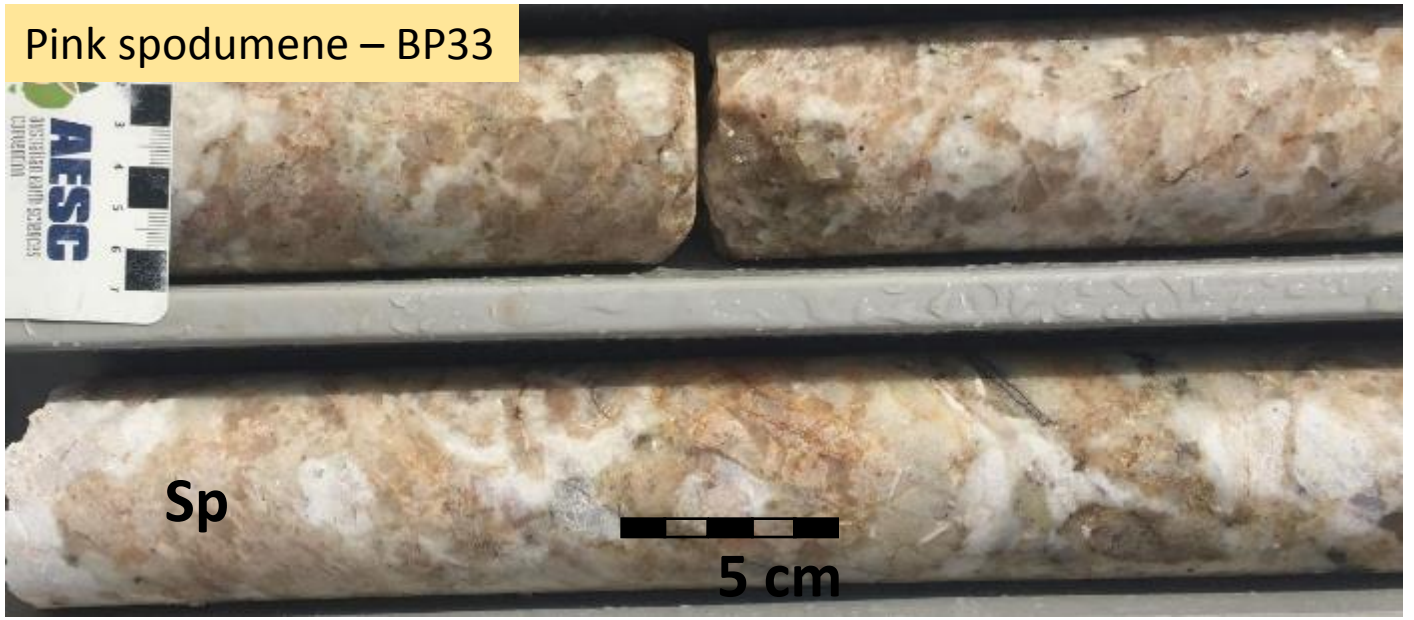


PEGMATITE MINERALOGY

Massive spodumene – BP33



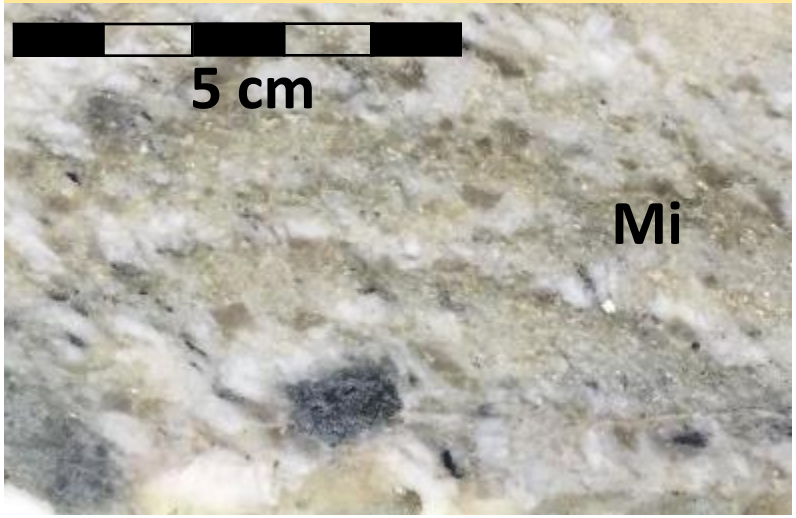
Pink spodumene – BP33

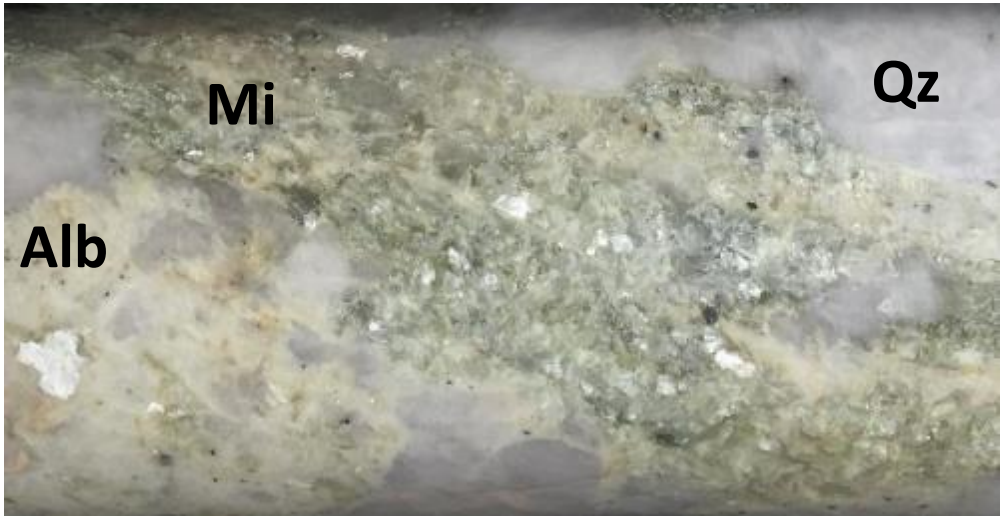


PEGMATITE MINERALOGY

- Muscovite (<5%) – pale green with minor Li in lattice
- No Lepidolite recognised
- Accessories: amblygonite, apatite, cassiterite, ilmenite & rutile
- Rare: columbite, tantalite, tourmaline (elbaite), fluorite, topaz & beryl

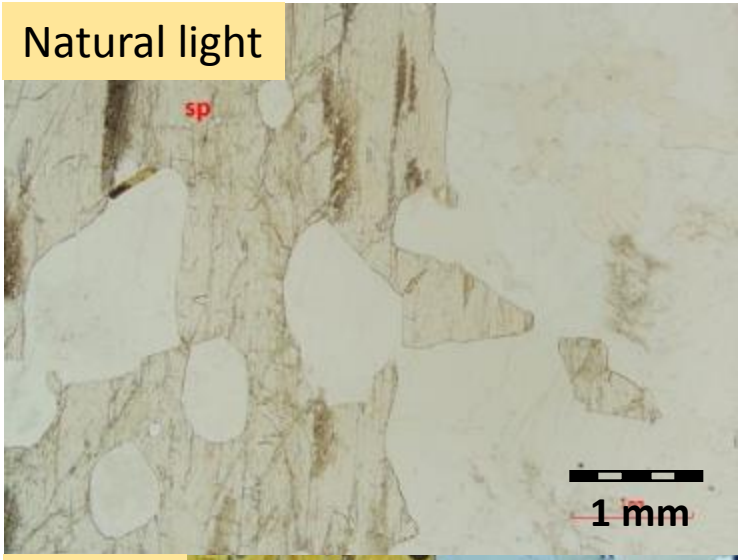
Quartz-mica-albite margin – Grants

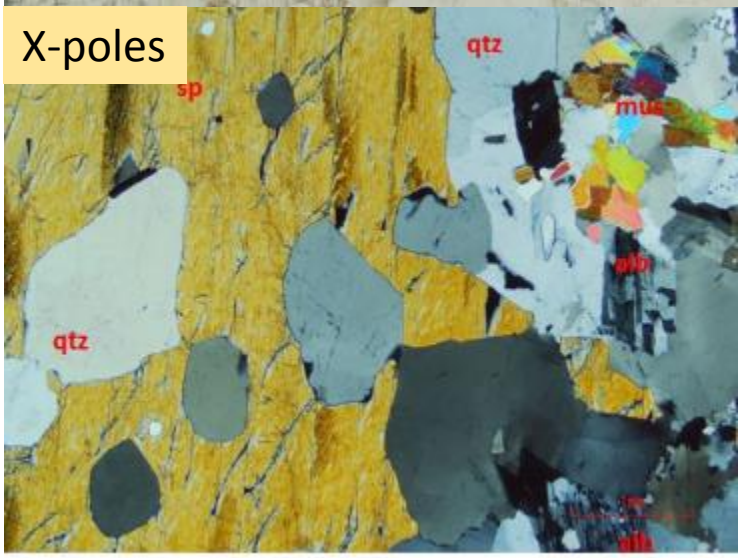




PEGMATITE TEXTURE

- Major minerals intergrown coarsely, but spodumene generally late
- Poikilitic textures
- Easy liberation

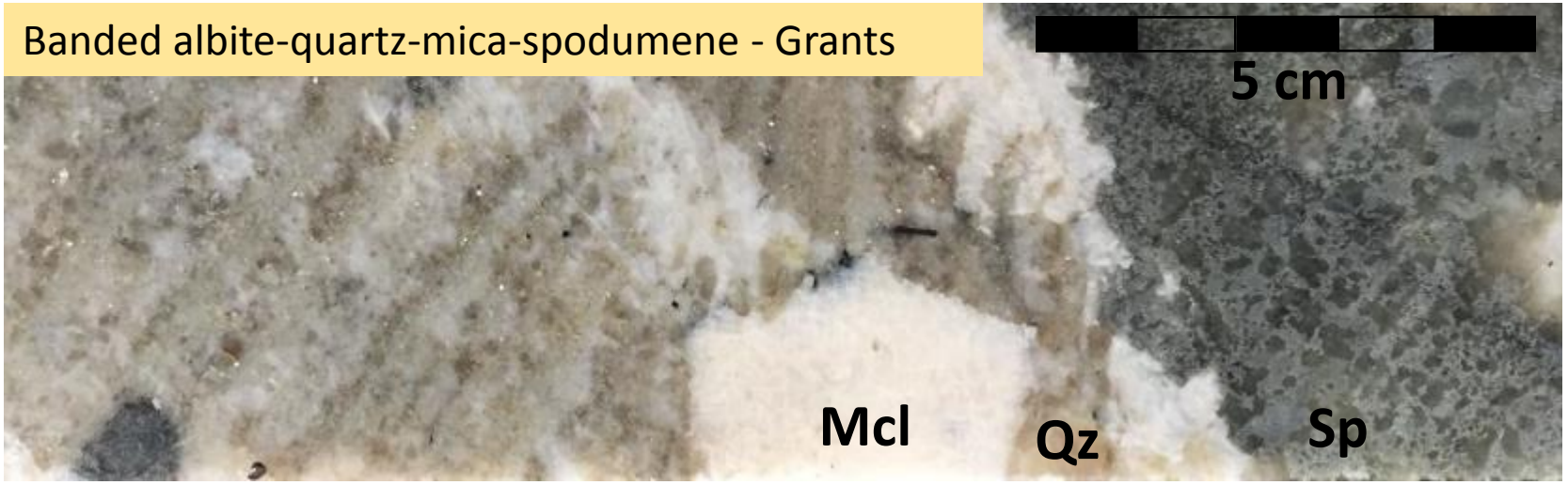




PEGMATITE TEXTURE

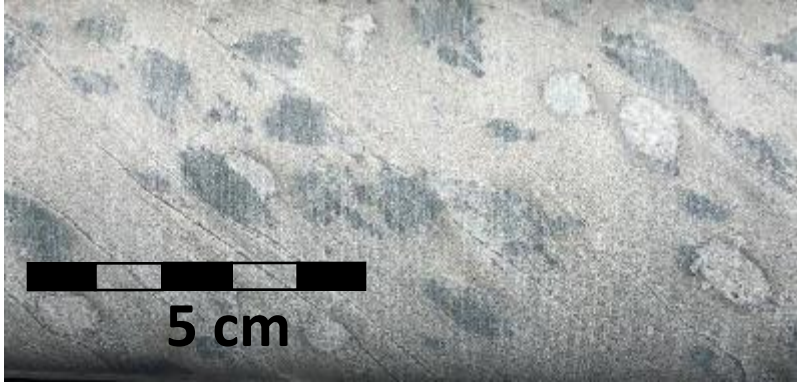
- Banded facies – rapid late crystallisation of open space

Banded albite-quartz-mica-spodumene - Grants



PEGMATITE ZONATION

- Contact zone
  - Quartz-mica-albite margin 0.5-2 m thick
  - Low Lithium, high Sn, Ta
  - Andalusite & garnet in BCF up to 5-10 m away from pegmatite margin
  - Small acicular minerals in BCF



Contact zone, Grants

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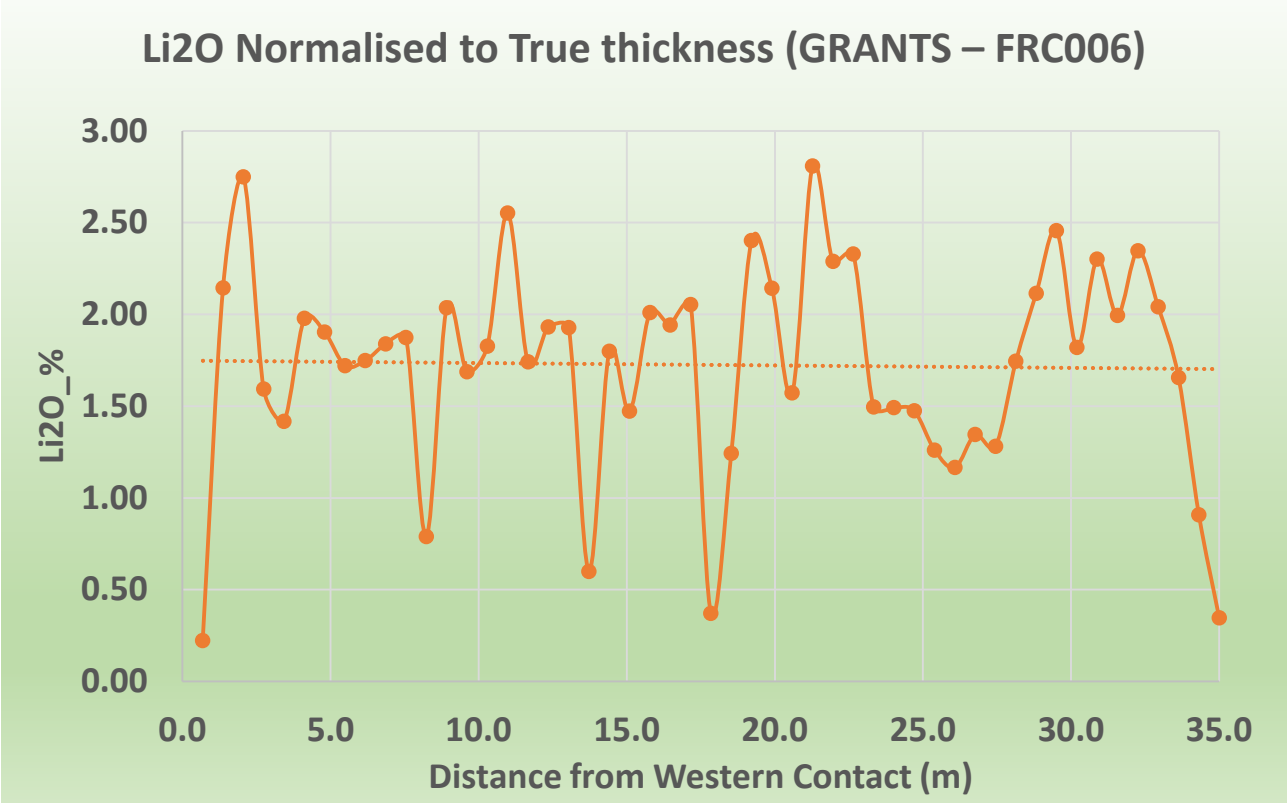
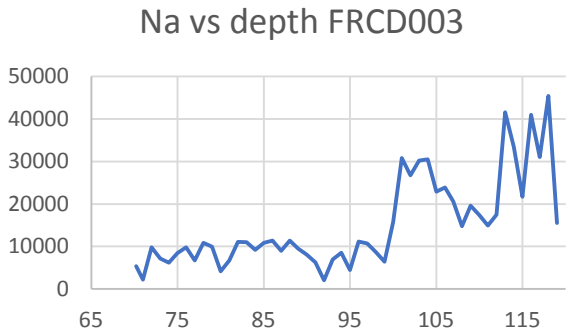
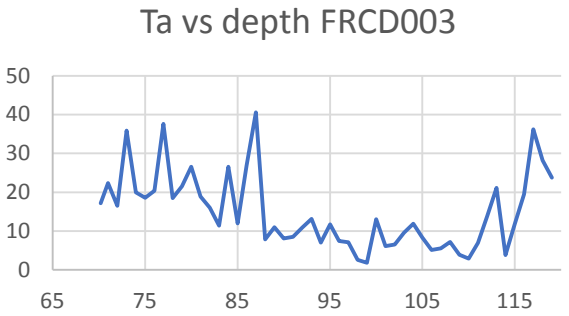
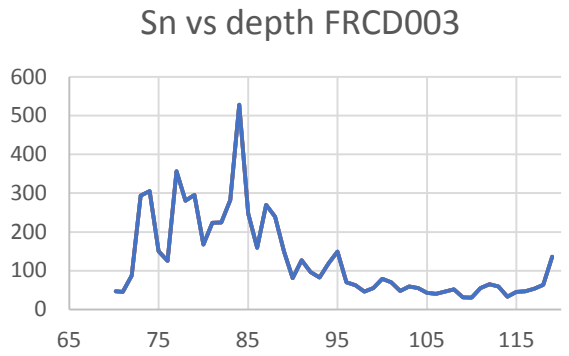
PEGMATITE ZONATION

- Limited or subtle zonation – consistent Li grade
- Geochemical trends not symmetrical





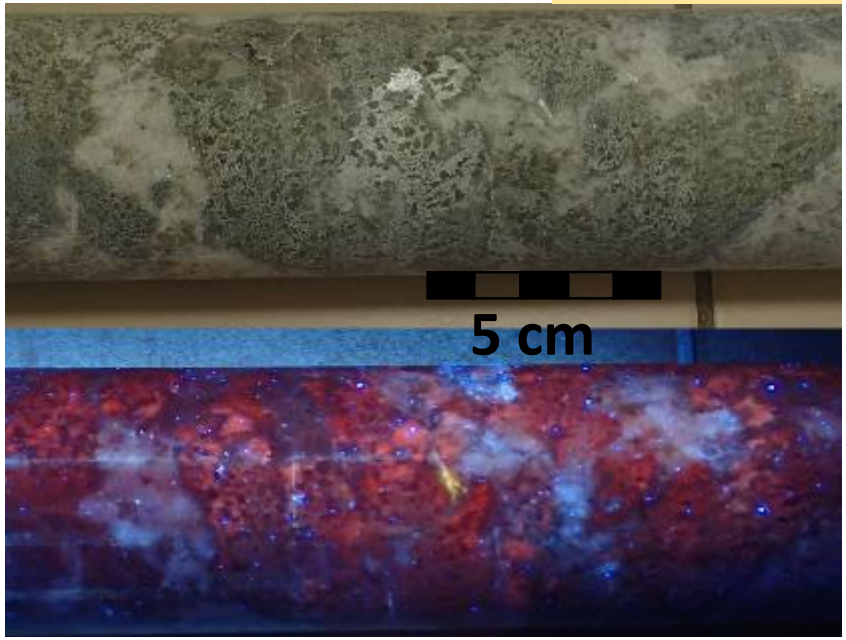




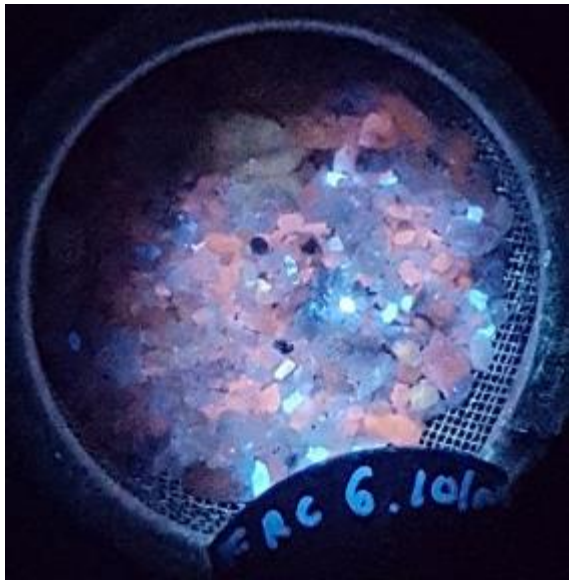
UV FLUORESCENCE

- UV light to identify minerals & estimate grade
- Spodumene – red or pink
- Microcline – yellow
- Quartz, albite and mica – dull

Natural light

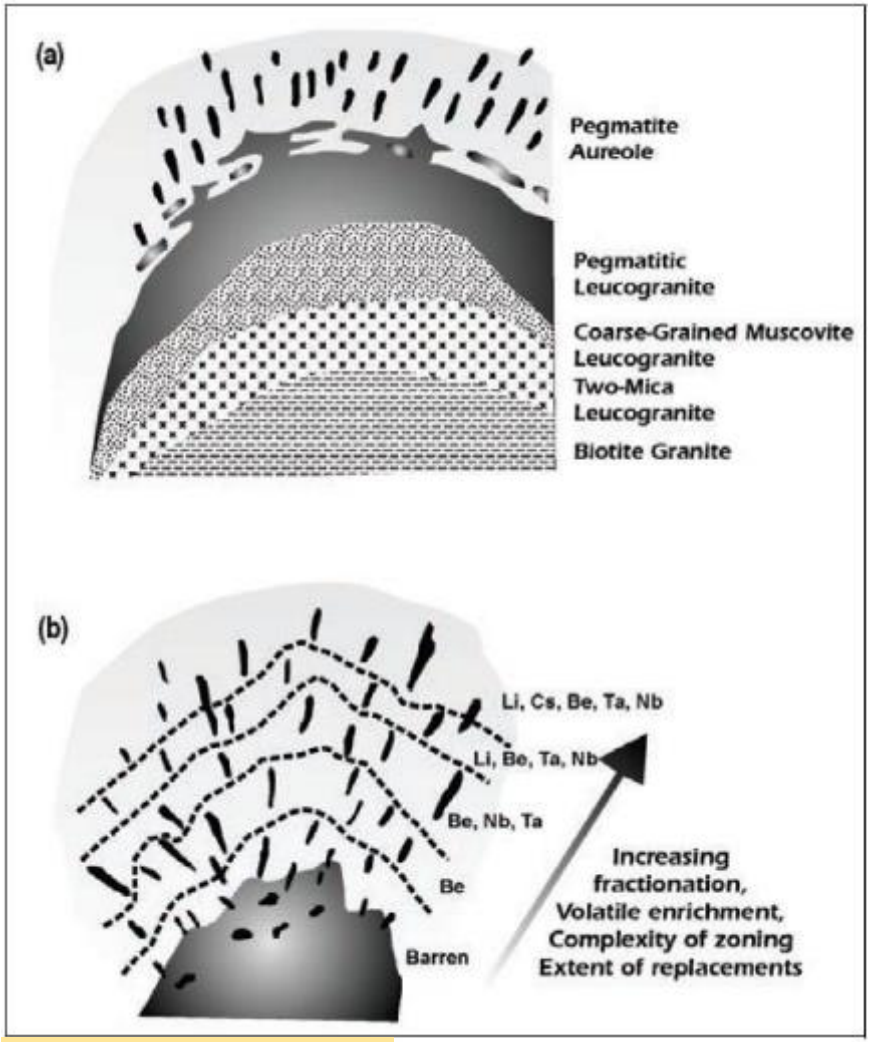


UV light



PEGMATITE MODEL

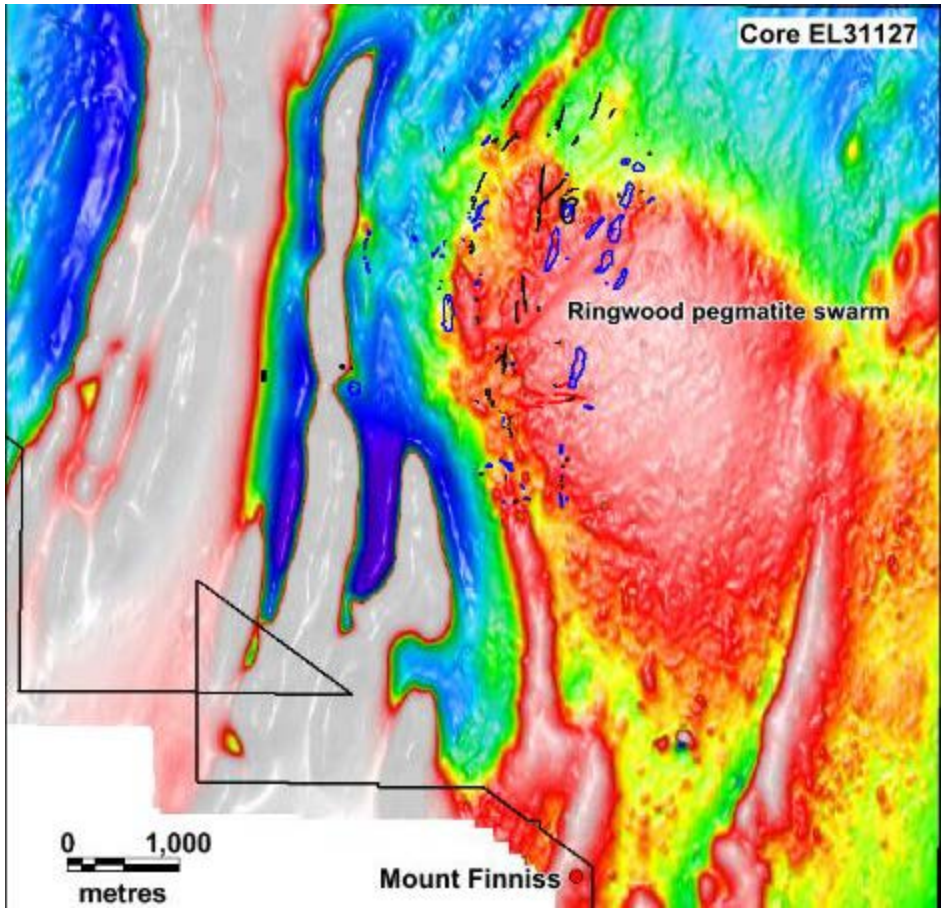
- Injection of volatile-rich structurally-controlled pegmatite dykes into BCF
- Distal to Granite
- Crystallise at <500 degrees
- Confining pressure & homogeneity of host critical in focussing the fertile magmatic fluids
- Structural regime related to granite emplacement?
- Rapid crystallisation
- F or Cl critical, but not H2O?
- Granite cupola and greisen



Selway et al 2005

EXPLORATION

- Historic maps – detailed, local grid
- Mapping – <10% float + outcrop, costeans, pits
- Geophysics – no established rock property contrast
  - Trials of gravity, ground mag, passive seismic (Tromino), EM34, remote imagery & spectral data, Hylogger
  - Detailed Airborne Magnetics
- Soils geochem – Laterite, Blacksoil & Lithium mobility
- Aircore/RAB - define surface expression & shallow geometry
- Deep RC, then DDH Drilling



CXO-LTR-KSN 50m mag survey
RTP histogram equal

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PROJECT ADVANTAGES

- Unexplored district for Lithium
  - 100s of historically-known pegmatites
  - Many un-recorded – low Ta/Sn ≠ low Li
  - New geochemical and geophysical targets
  - Drilling hit rate for fertile pegmatites is >50%
- High grade – >1.5% Li2O
- Simple coarse mineralogy & no petalite or lepidolite (yet)
  - Almost exclusive Li deportment to Spodumene
  - Simple liberation & concentrate processing
  - DSO potential
- Infrastructure - nearness to road, port, grid power & stable workforce
  - Logistics chain to China

ACKNOWLEDGEMENTS

Darwin geologists Glen McIlwain & Andrew Jettner

Carol Simpson (petrology)

Core's field staff, especially the soil sampling crew!

Drilling contractors

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