

GSQ Mineral System Collection: Spotlight on Ernest Henry

Courteney Dhnaram
Minerals Geoscience
Geological Survey of Queensland

Acknowledgments

- Mineral Systems team (Vladimir Lisitsin, Suraj Gopalakrishnan and Daniel Killen)
- Jon Huntington (Huntington Hyperspectral Pty Ltd)



Outline

- Mineral System Collection
 - Rationale
 - Approach
- Case Study
 - Ernest Henry Copper Gold System
 - Drill core collection and sampling plans
 - Initial results of Hylogger interpretation



Rationale

Systematic collection of geological information and representative samples characterising key mineral systems in the Mount Isa Province at all scales



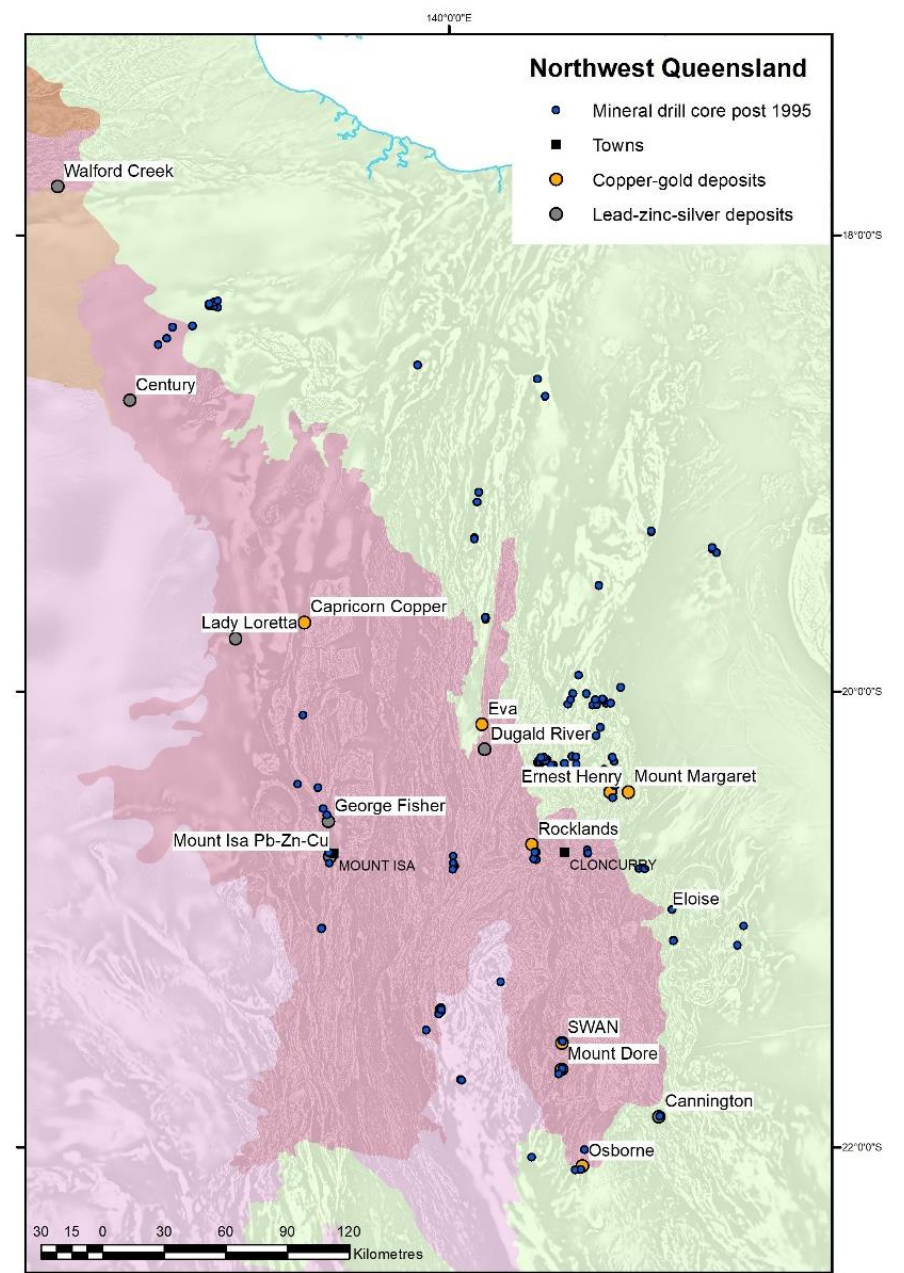
Background

- GSQ are the custodians of geological data and knowledge for Queensland
- DNRME has the responsibility to maintain and grow existing drill core collection
 - Collections housed in both Brisbane and Mount Isa core facilities



Existing mineral drill core holdings

- ~1800 drill holes with core across State
- 761 drill holes with core in Mount Isa Province
- ~160 drill holes with core post 1995
- Donations of core from Ernest Henry and Mount Isa Cu-Pb-Zn systems in 2018



Project scope

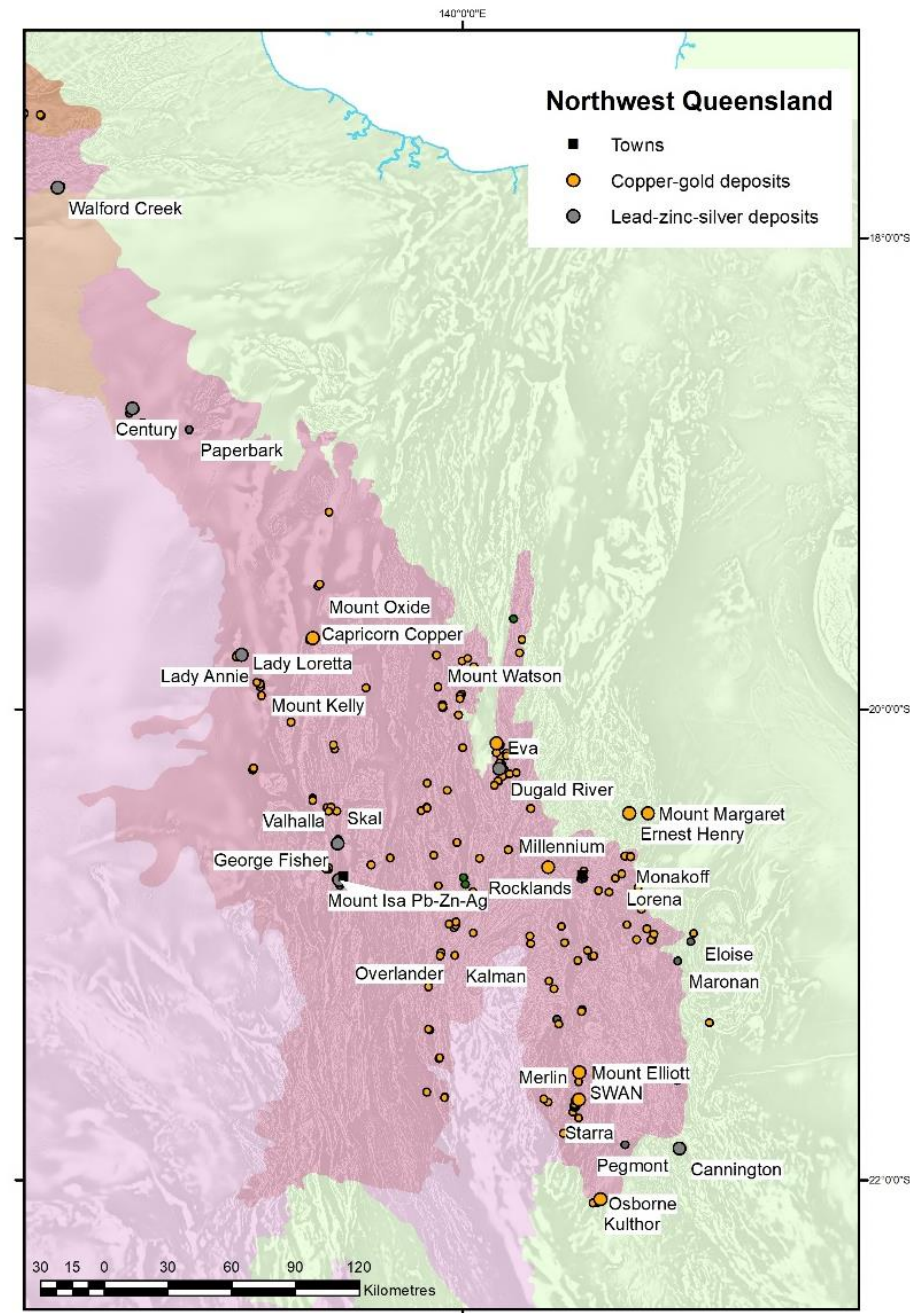
To create both a **physical** and **virtual** reference collection of mineral systems across the Mount Isa Province

- Funding under the New Discovery program of SREP (2018-2021)
- Plans to continue building up collection within NW Qld and across the State



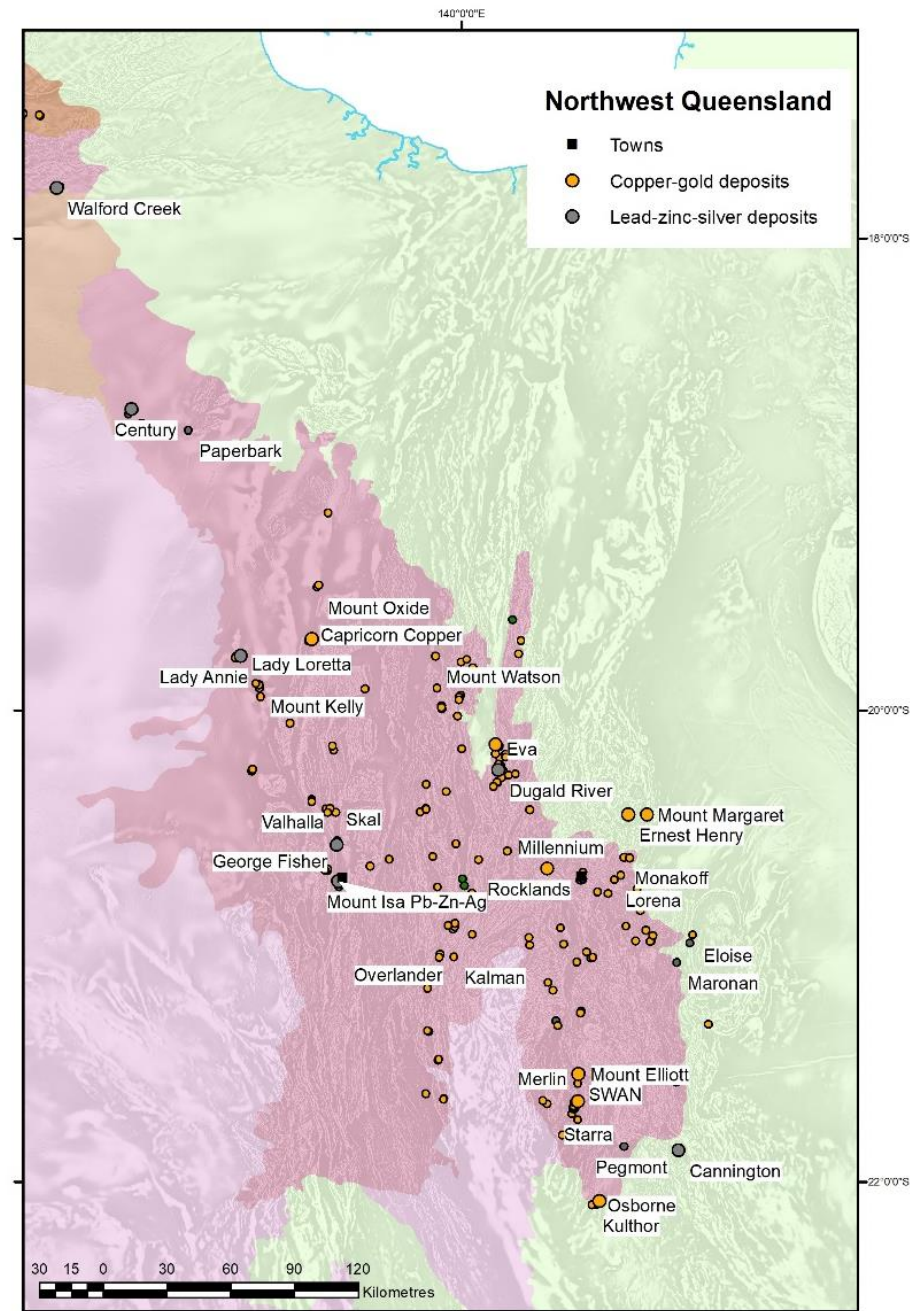
Project scope

- Acquire drill core and associated data from major deposits and current active projects
- Collection will be stored at the Mount Isa core facility, with a representative set of samples housed in Brisbane



Project scope

- Collect geochemical, mineralogical, petrophysical and geochronological data on these drill core to form a 'baseline' of key mineral systems
- Data collection is a much wider process and will complement datasets acquired on samples in the collection



Approach

- **Representative** sample collection from key deposits
- Orebody-proximal-distal-background



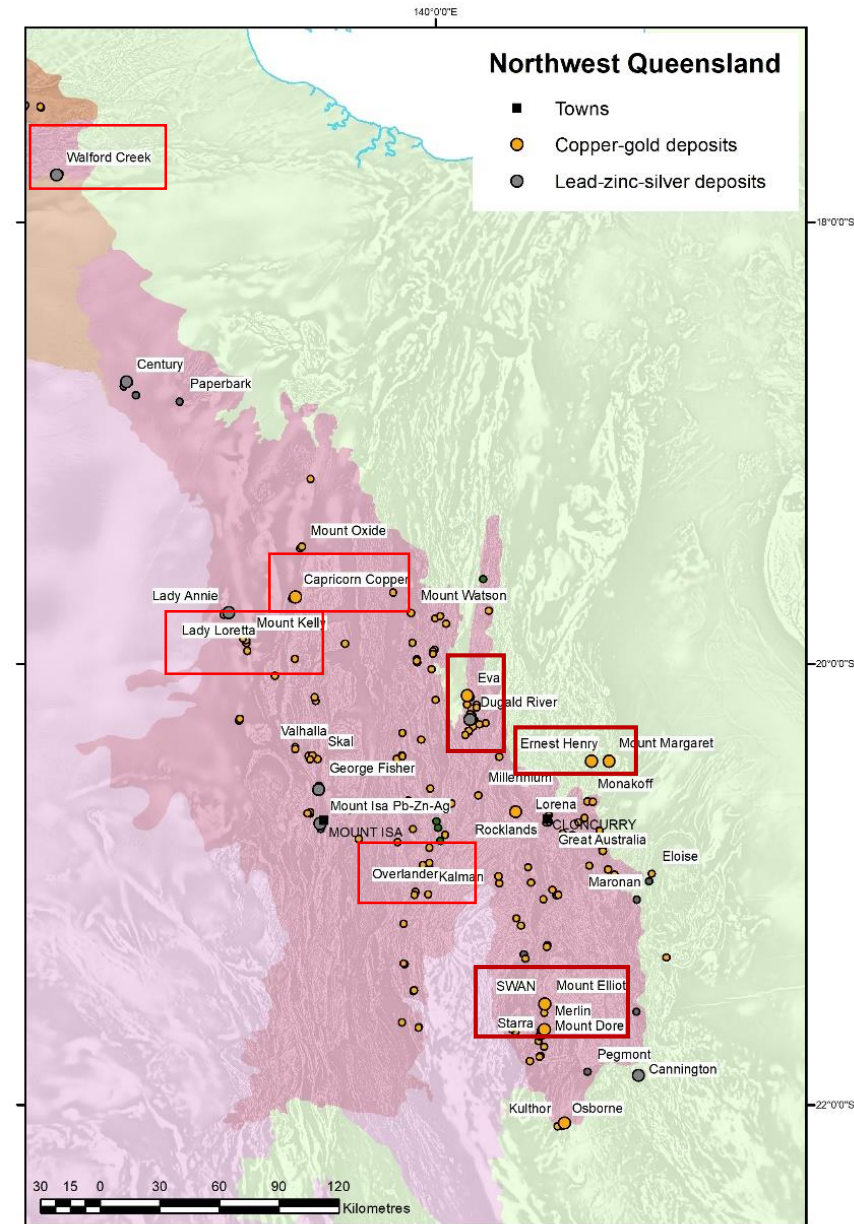
Approach

- Initially focusing on major **Cu-Au** and **Pb-Zn-Ag** deposits
- Characterising mineral systems not deposits
 - looking to sample from Cu-Co, Au-As-Bi, Mo-Re deposits/prospects



Areas of focus over next 12 months

- Mount Elliott/SWAN ✓
- Eva (Roseby) ✓
- Ernest Henry ✓
- Overlander/Kalman/Elaine
- Mammoth/Esperanza (Capricorn Copper)
- Mount Kelly
- Dugald River
- Walford Creek

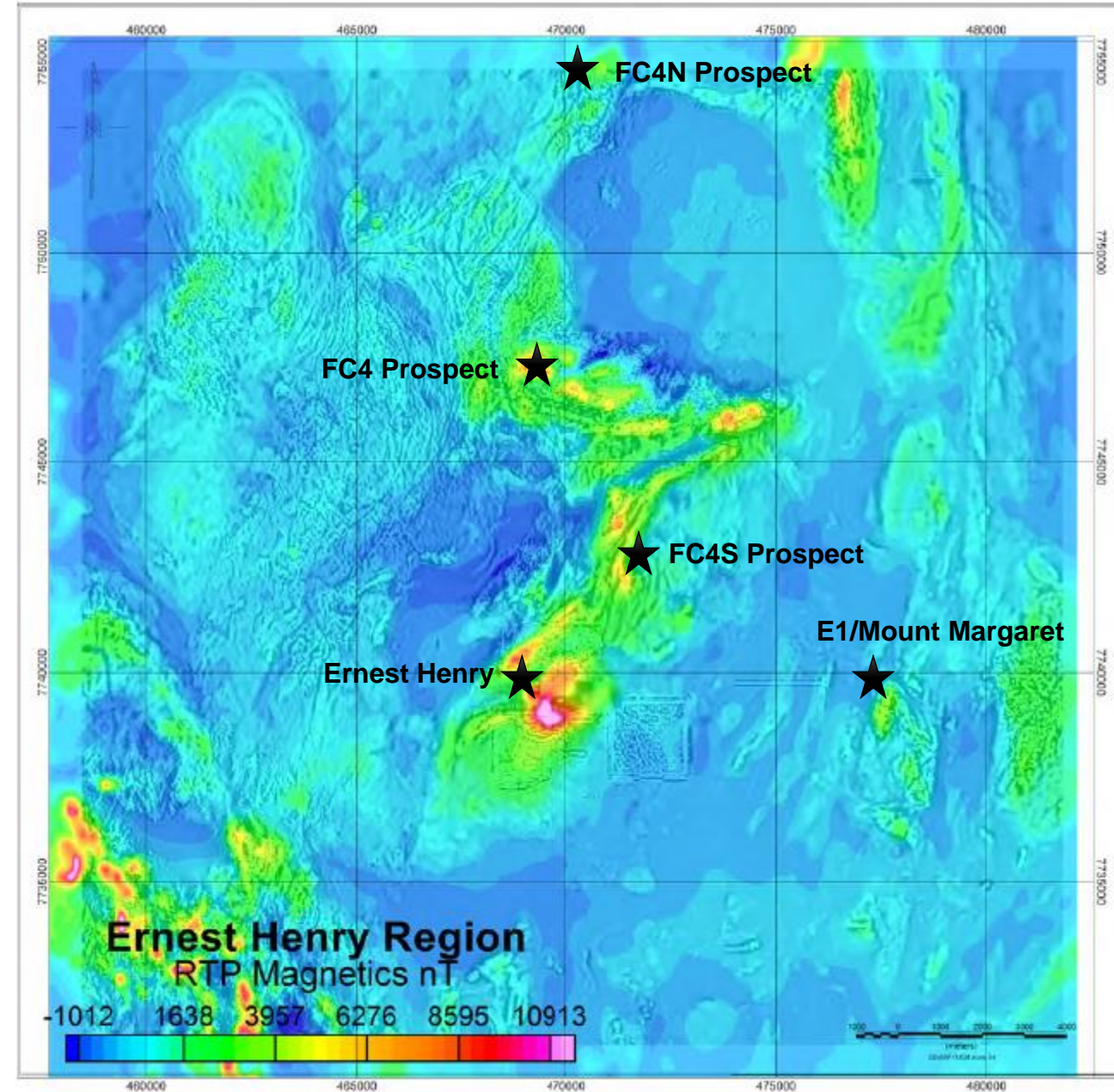


Case study

Ernest Henry Cu-Au system

- 'typical' iron oxide copper gold (IOCG) deposit in the Eastern Succession
- one major deposit (Ernest Henry), with satellite deposits (E1) and similar prospects (FC targets)

How far away can you see the alteration signature of the Ernest Henry deposit?



NWQMP Deposit Atlas, 2018

Representative drill holes

Glencore

- two through orebody
- two within the inner halo
- one deep drill hole (1.7km)

GBM Resources

- three drill holes from FC4S target



Current work

- ~4.9km of drill core scanned by Hylogger from core permanently in our collection
- 2 drill holes (EH 435, EH550) scanned by TruScan
- ~300 samples taken for geochemistry, mineral chemistry and petrophysics (CODES, BRC, CSIRO)
- Sampling planned on 7 more drill holes to complement and extend existing sampling

<u>Bore No</u>	<u>Bore Name</u>	<u>Total Depth</u>	<u>Core from</u>	<u>Core to</u>	<u>Total Core</u>	<u>Truscan</u>
71762	ERNEST HENRY EH435	630	89.7	630	540.3	Y
71763	ERNEST HENRY EH550	1044.5	164.8	1045	879.7	Y
74969	ERNEST HENRY EH154	252.4	101.8	252.4	150.6	
74970	ERNEST HENRY EH242	324	55.1	247	191.8	
74671	FC4S MMA001	652.8	63.4	652.3	588.9	
74672	FC4S MMA002	510	86.1	510	423.9	
74673	FC4S MMA003	549	78.8	549	470.2	
74842	MOUNT FORT CONSTANTINE EHMT001	1746.7	98.2	1747	1648.5	

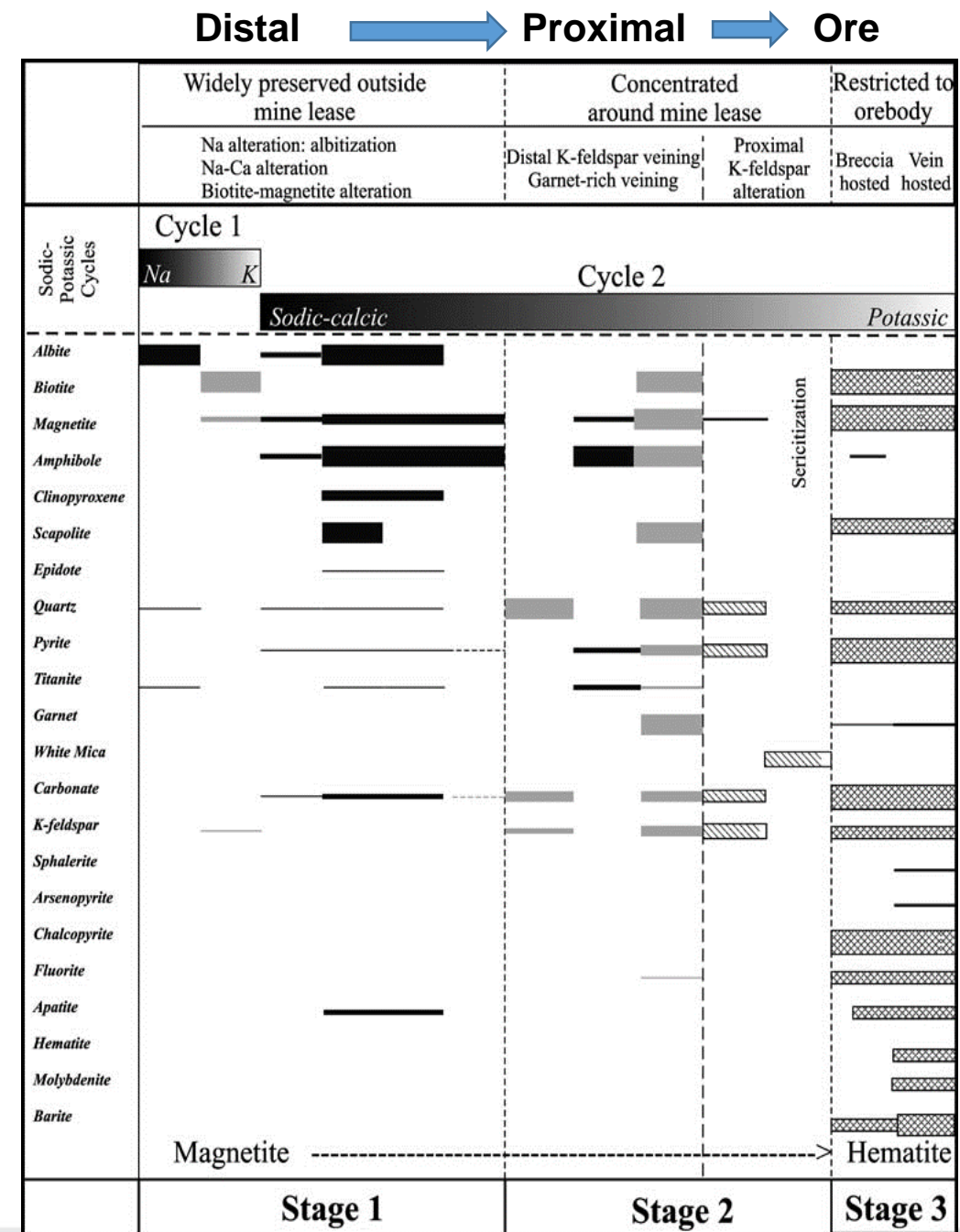
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Hyperspectral scanning

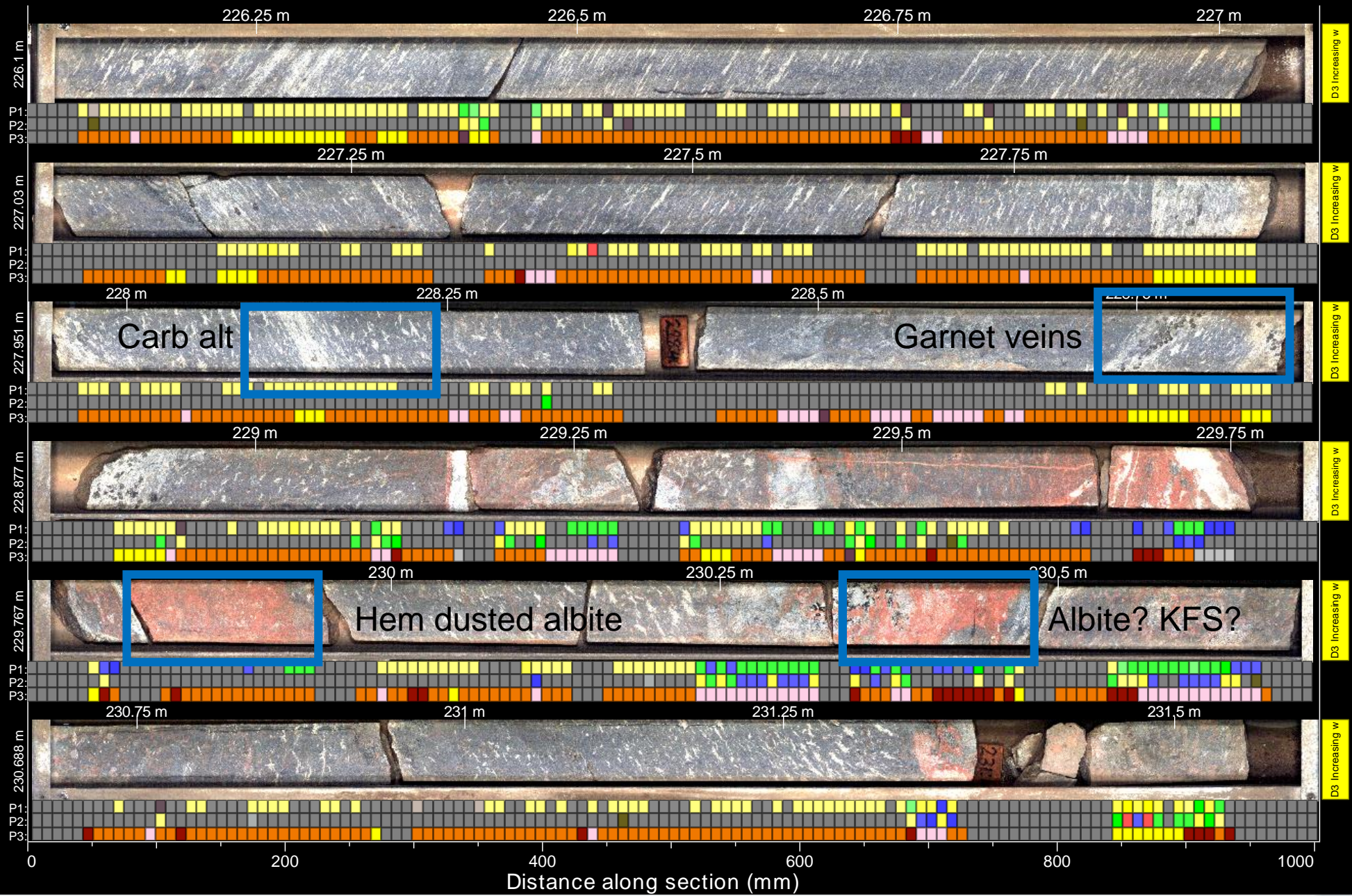
- Hylogger 3 machine based at our Exploration Data Centre (Brisbane)
- Visible near infrared (VIR)-Short wave infrared (SWIR) and Thermal infrared (TIR) spectrums
- Detect oxide, carbonate, hydrous and anhydrous silicate mineralogy
- High resolution core photography

Ernest Henry alteration

- Stage 1
 - Regional albitization, Na-Ca and Biotite-Magnetite alteration
- Stage 2
 - Varies from K-feldspar and garnet-rich veining to K-feldspar alteration
- Stage 3
 - Matrix-supported hydrothermal ore
 - Crackle veining-controlled ore
- Stage 4
 - Late stage fluids (not shown in table)

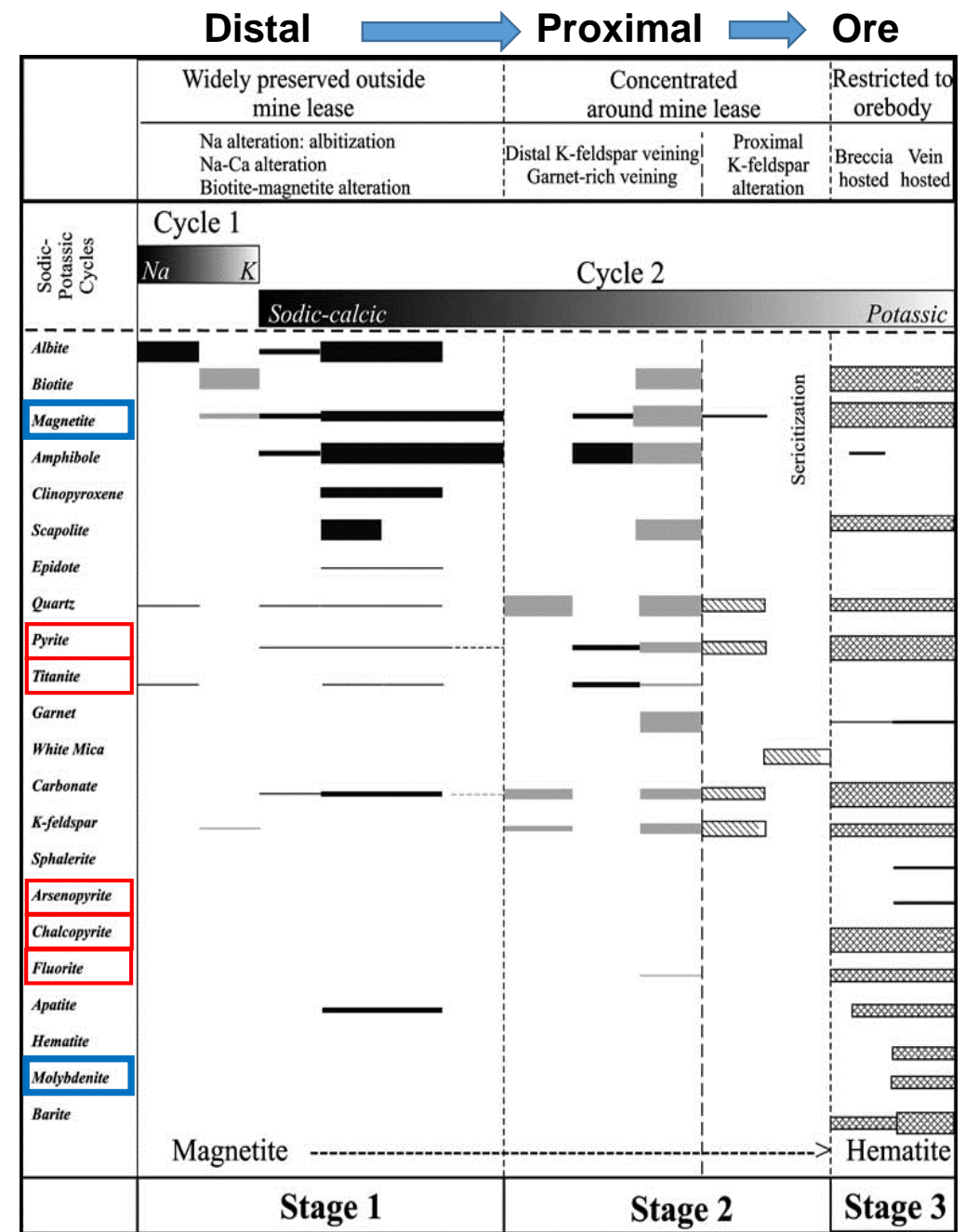


ErnestHenryEH154 Tray 0023, 226.1 to 231.6 m

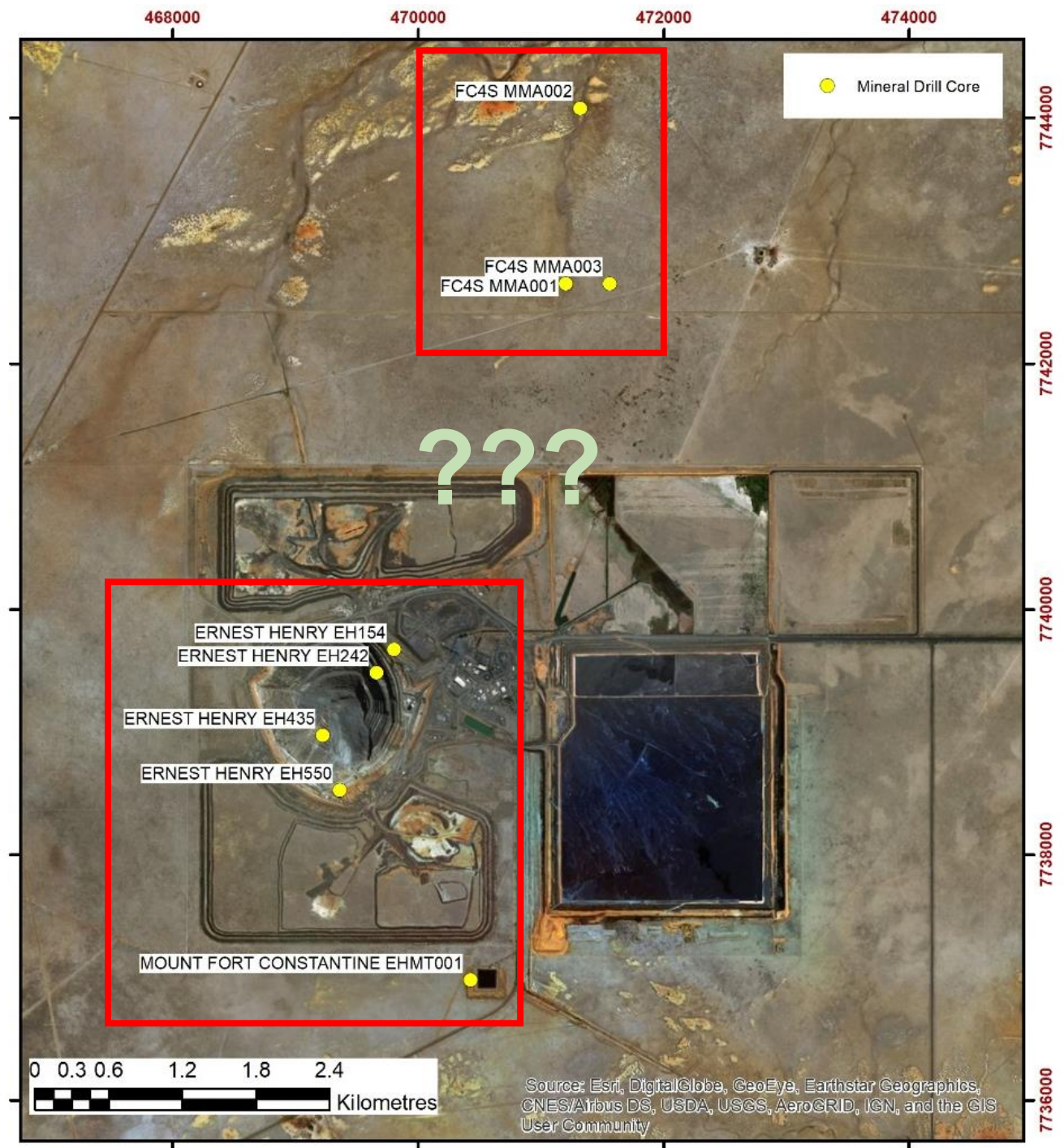


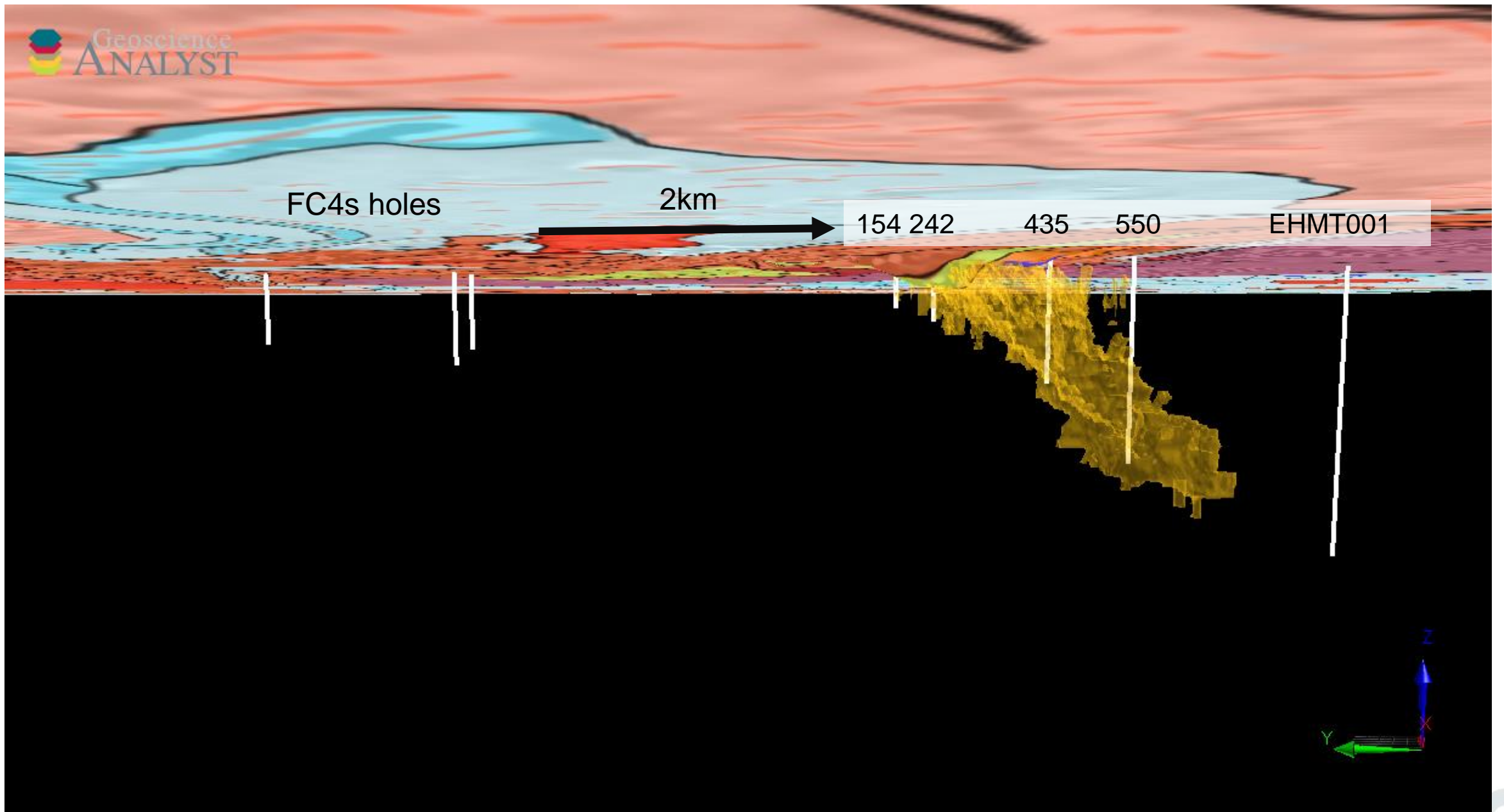
Detectable minerals

- Highlighted minerals (**red**) not detectable
- Minerals (**blue**) are only detectable when massive
- Hylogger data allows for interpretation of multiple alteration phases by interrogating both spectra and detailed core photos

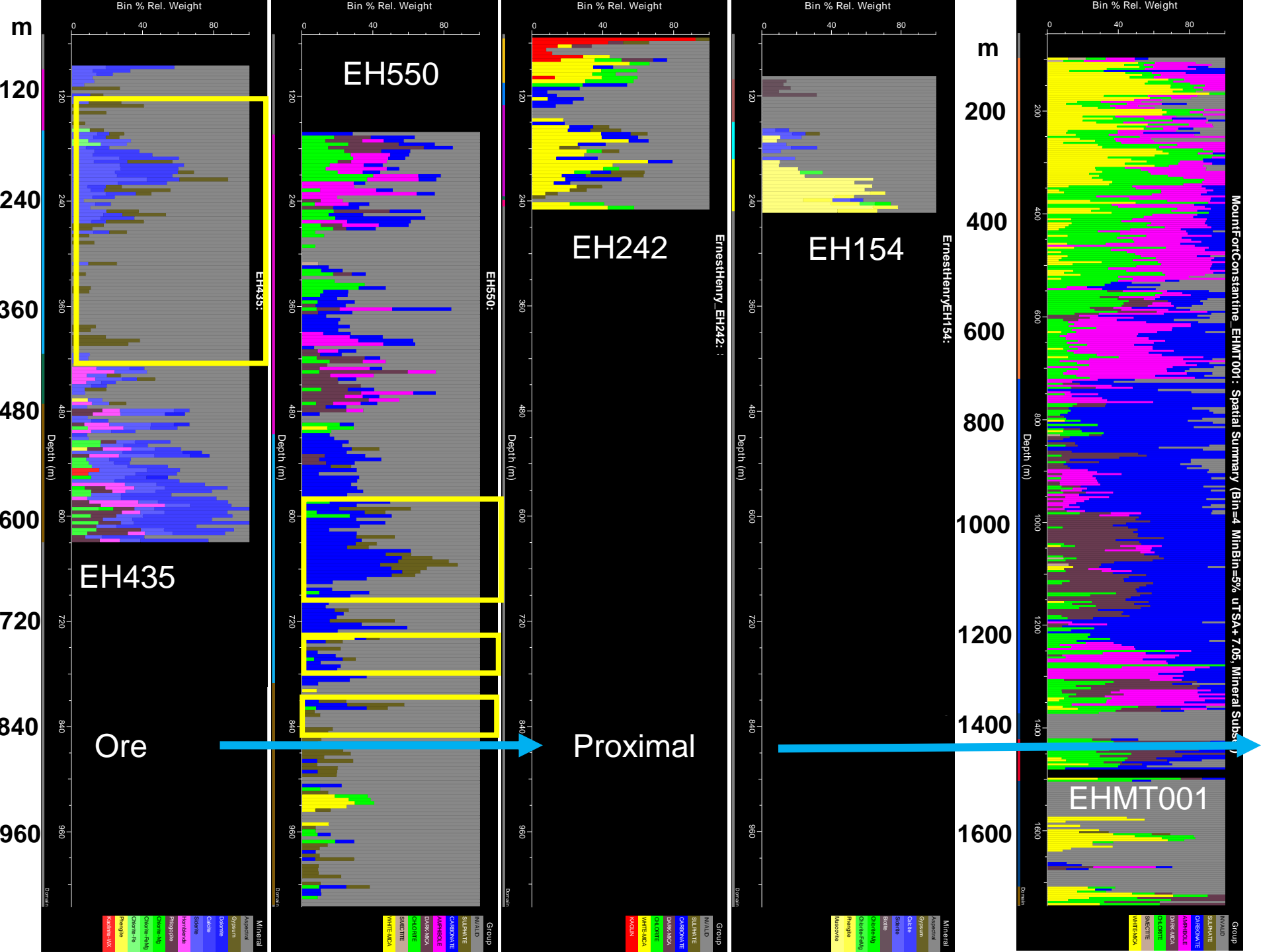


- Ore-Proximal-Distal?
 - EH435, EH550 → EH242, EH154 → EHMT001
- Distal?
 - MMA001, MMA003 → MMA002



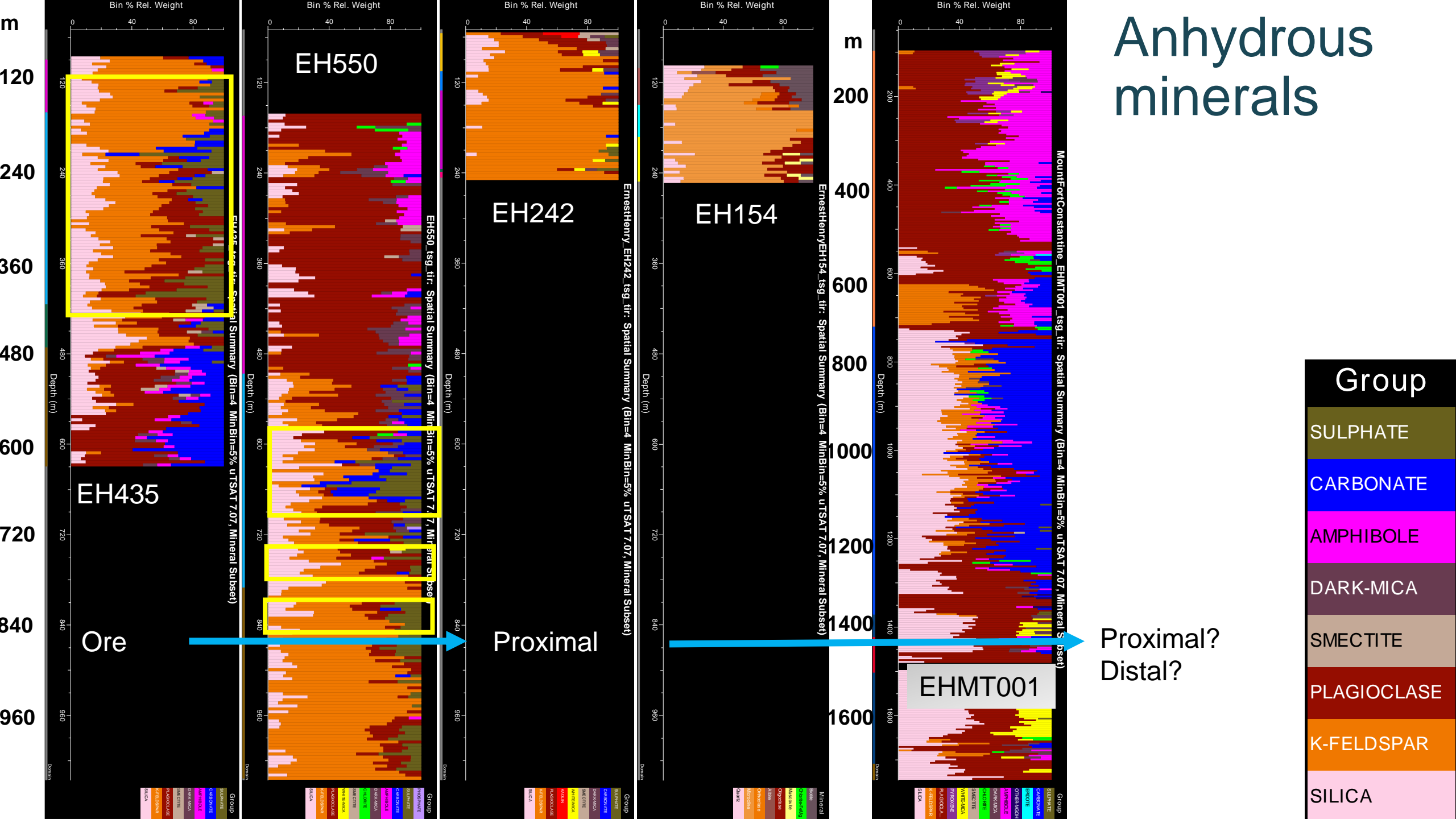


Hydrous minerals



Mineral
Aspectral
Gypsum
Dolomite
Calcite
Siderite
Hornblende
Phlogopite
Chlorite-Mg
Chlorite-FeMg
Chlorite-Fe
Phengite
Kaolinite-WX

Anhydrous minerals



Group

- SULPHATE
- CARBONATE
- AMPHIBOLE
- DARK-MICA
- SMECTITE
- PLAGIOCLASE
- K-FELDSPAR
- SILICA

Proximal?
Distal?

Summary

- Focus on building up a physical and virtual reference sample collection across the Mount Isa Province
- Support external SREP projects and drive future GSQ work
- Case studies – Ernest Henry (ongoing), Mount Elliott/SWAN next up

