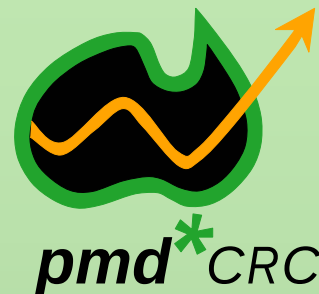




MERIWA

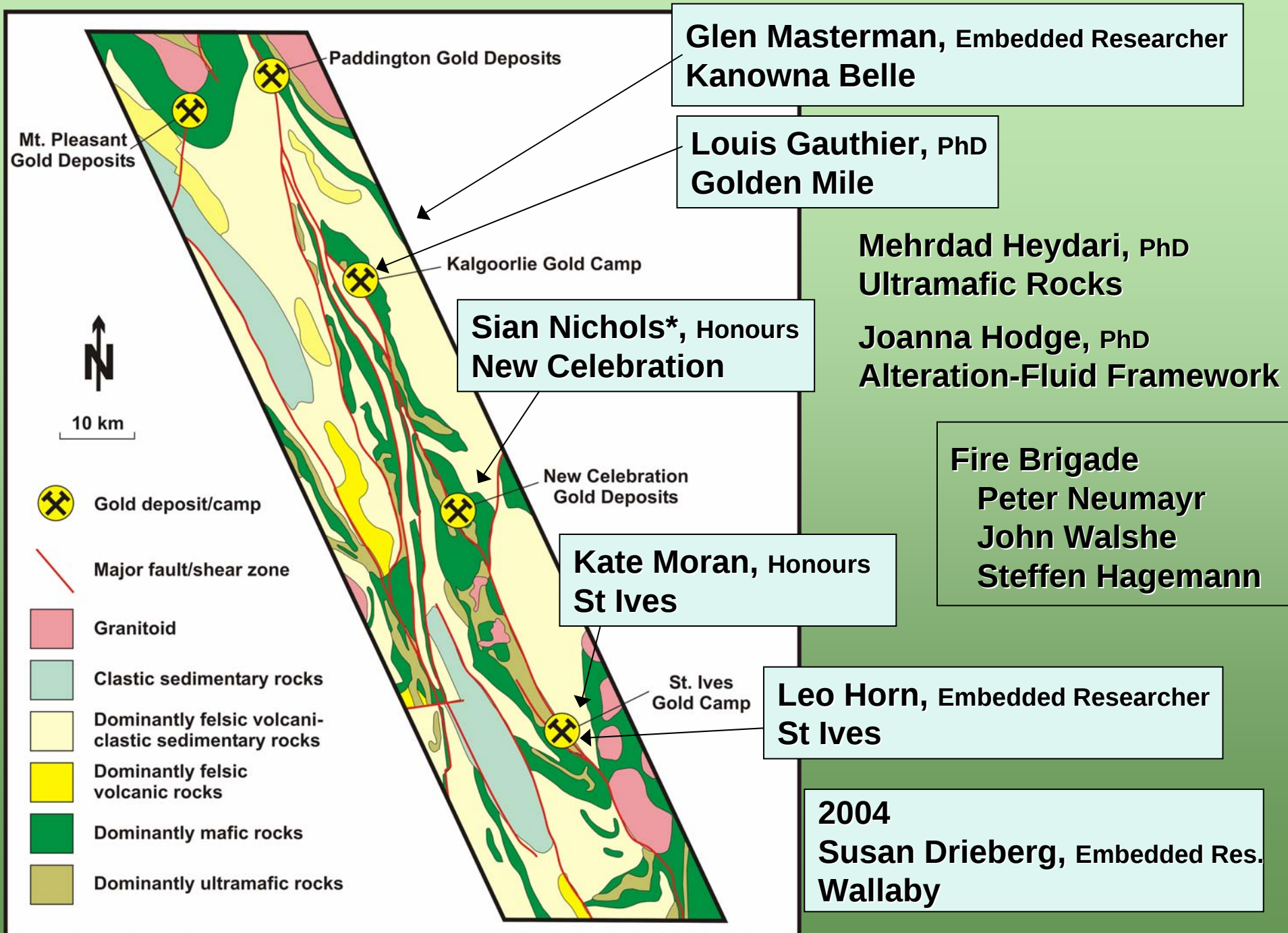


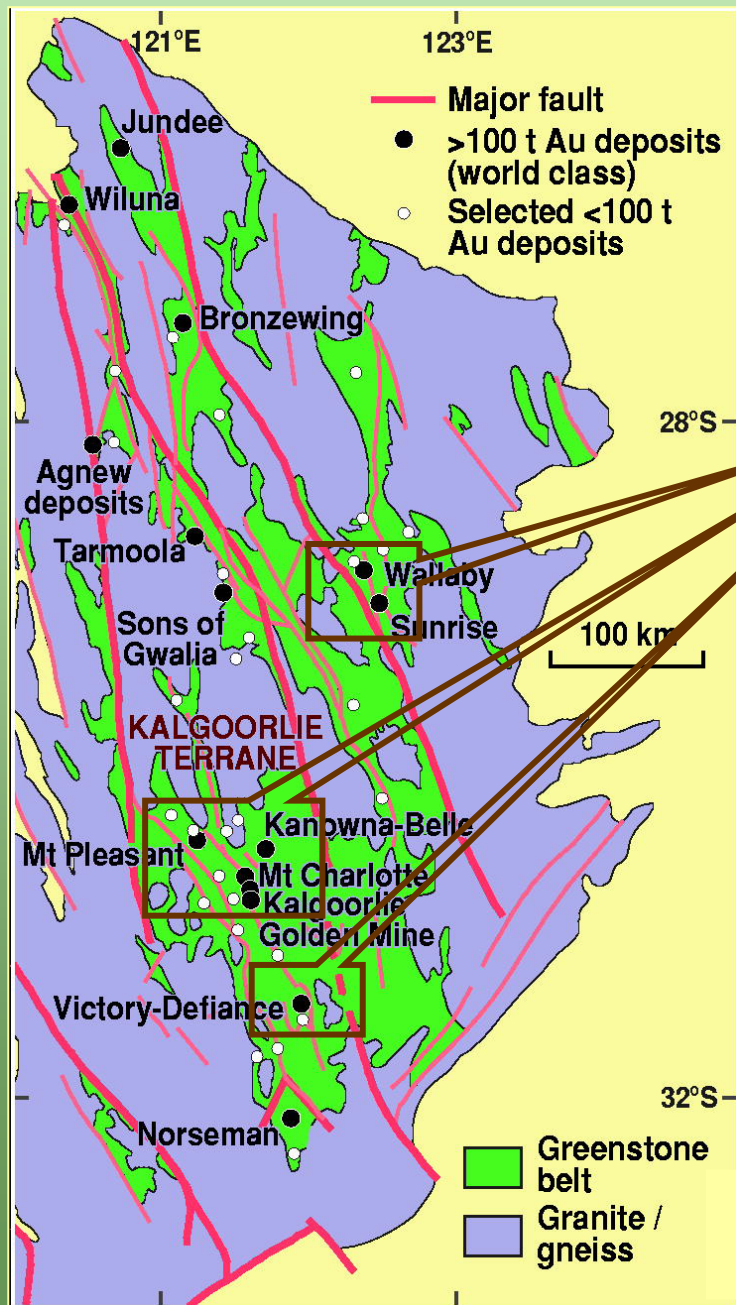
The Things that Matter

Architecture and Chemistry

Peter Neumayr, John Walshe, Steffen Hagemann







Goal: More Cost effective Exploration

- Answer 5 Questions
 - Kalgoorlie-Kambalda

Key Themes:

- Scale integrated structural-hydrothermal alteration models
 - Chemical gradients
 - Contrasting fluid systems
-
- Empowered by embedded researchers on site and University-based research and training

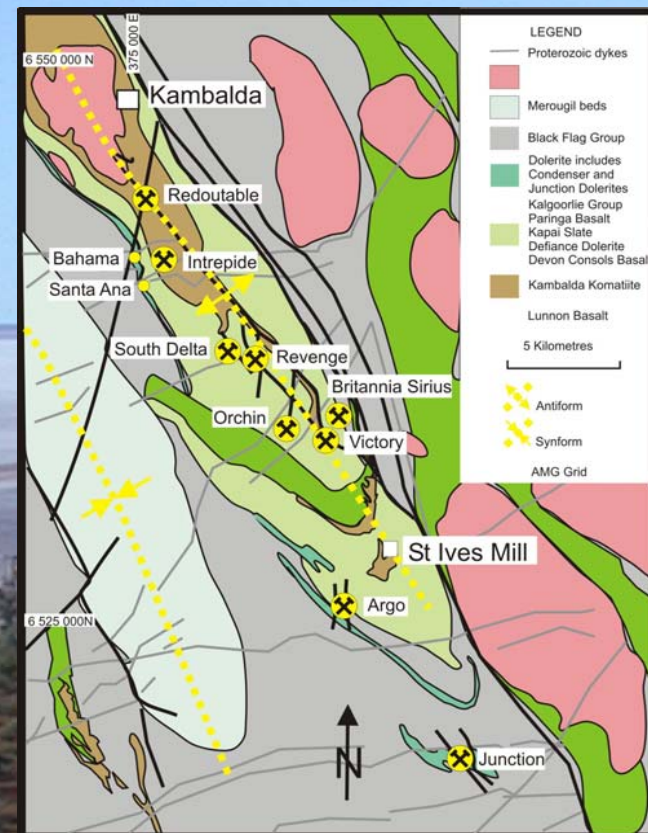
Eastern Goldfields

Aim:

Develop Ore Systems View of Goldfields

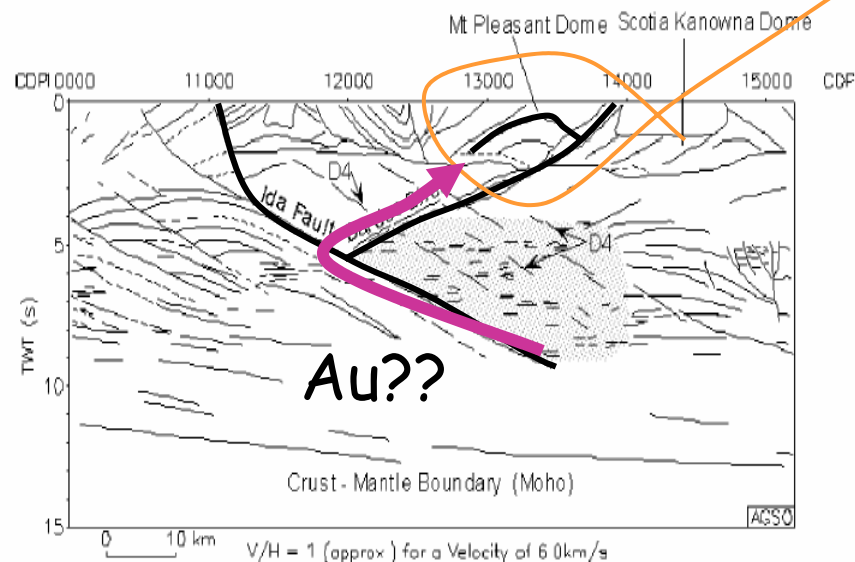
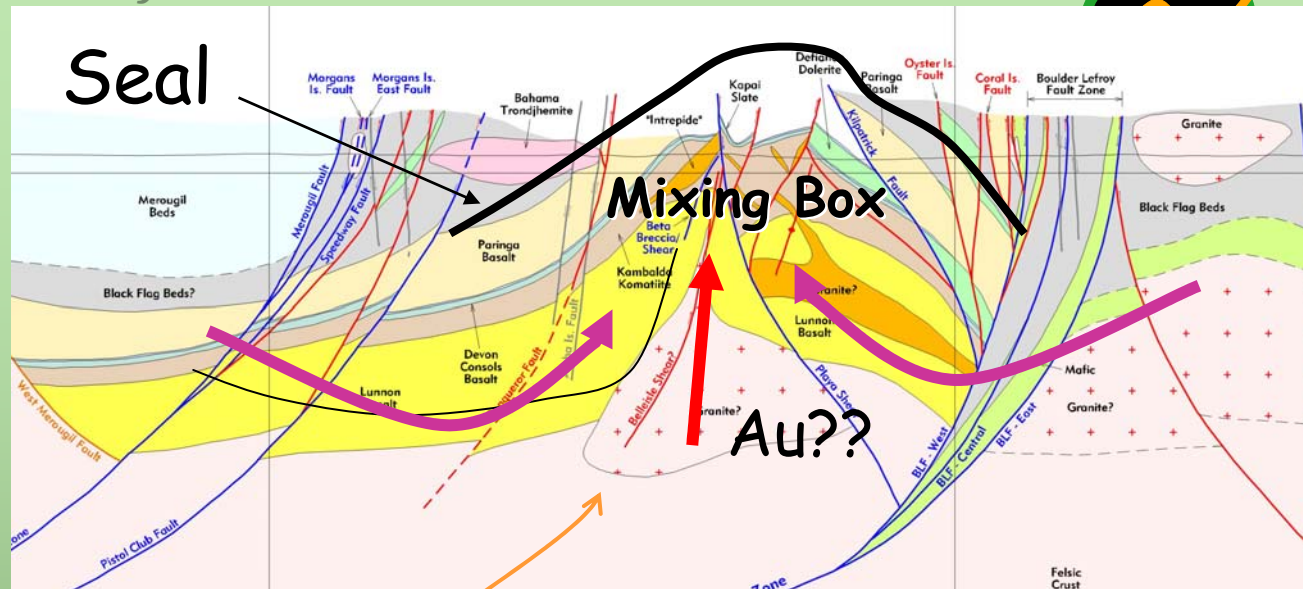
5 QUESTIONS: AGCRC heritage

- Architecture ✓
- Geodynamic ✓
- Reservoirs ✓ ✓ ✓
- Fluids drivers ✓
- Transport /deposition ✓ ✓

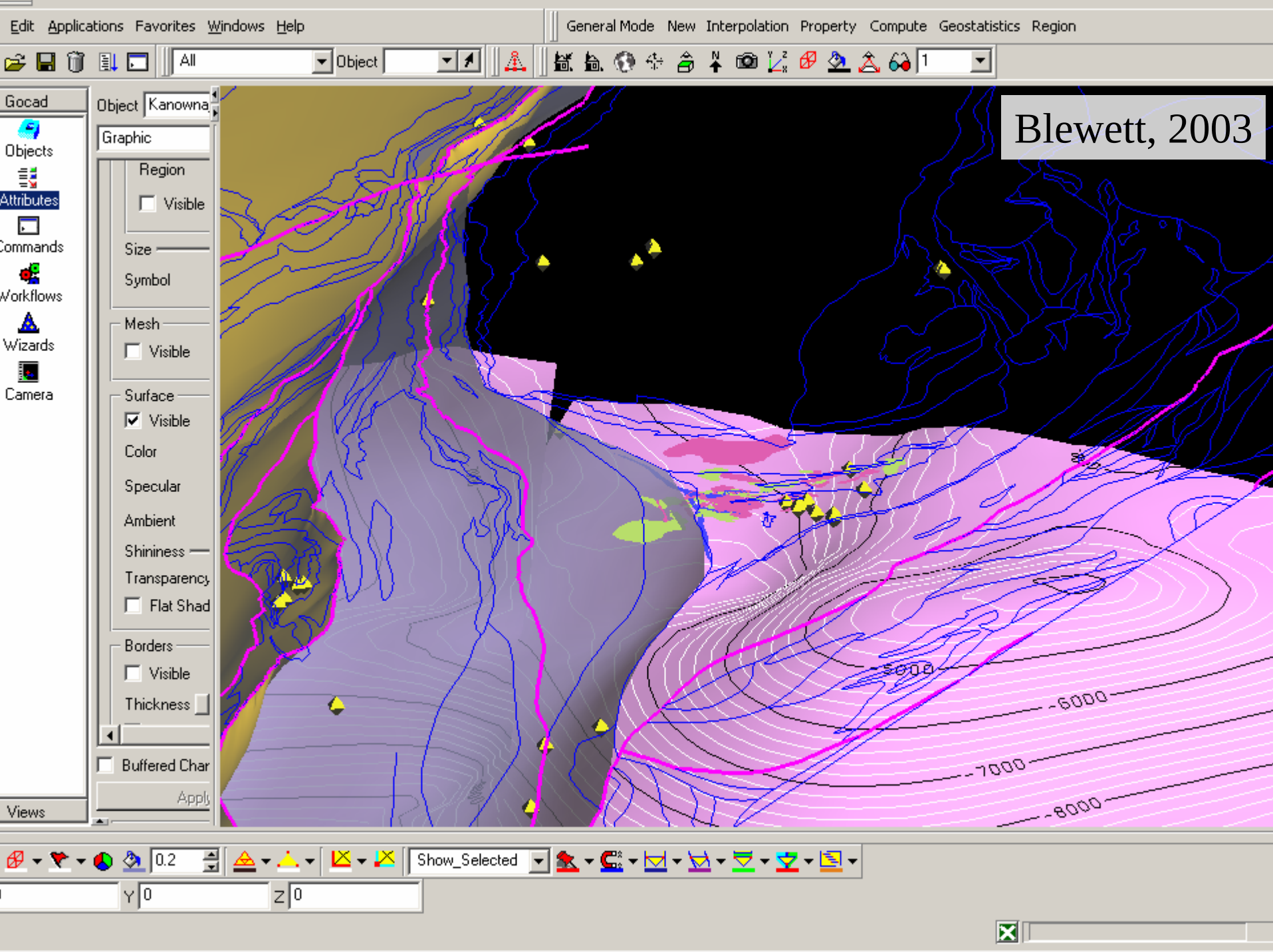




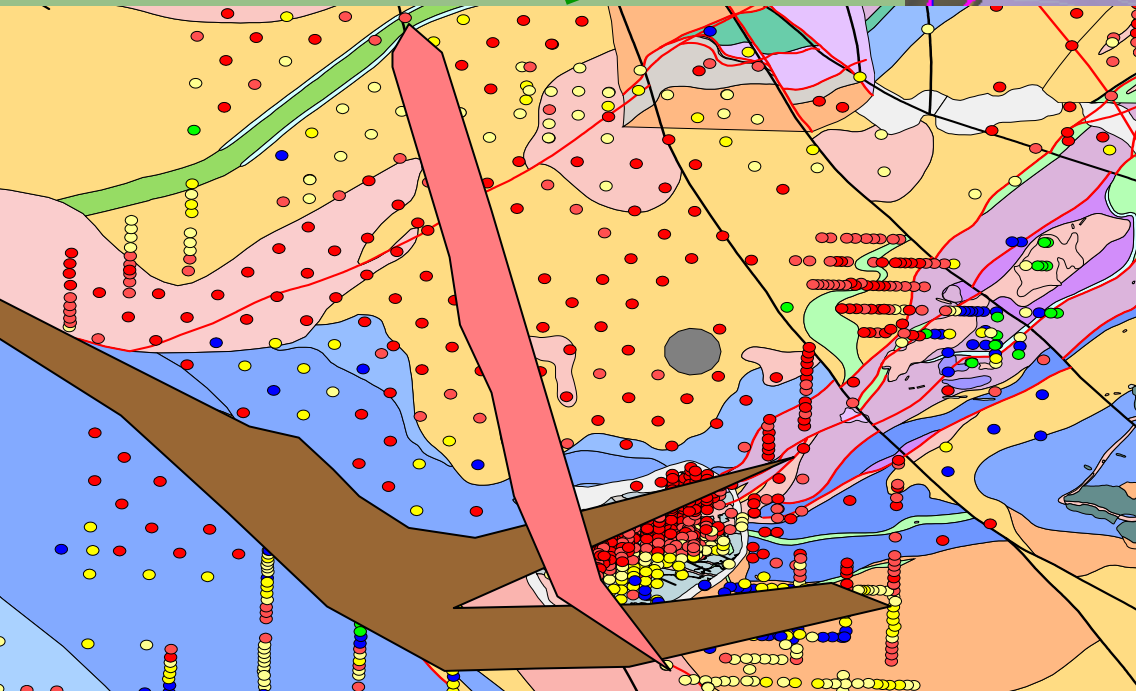
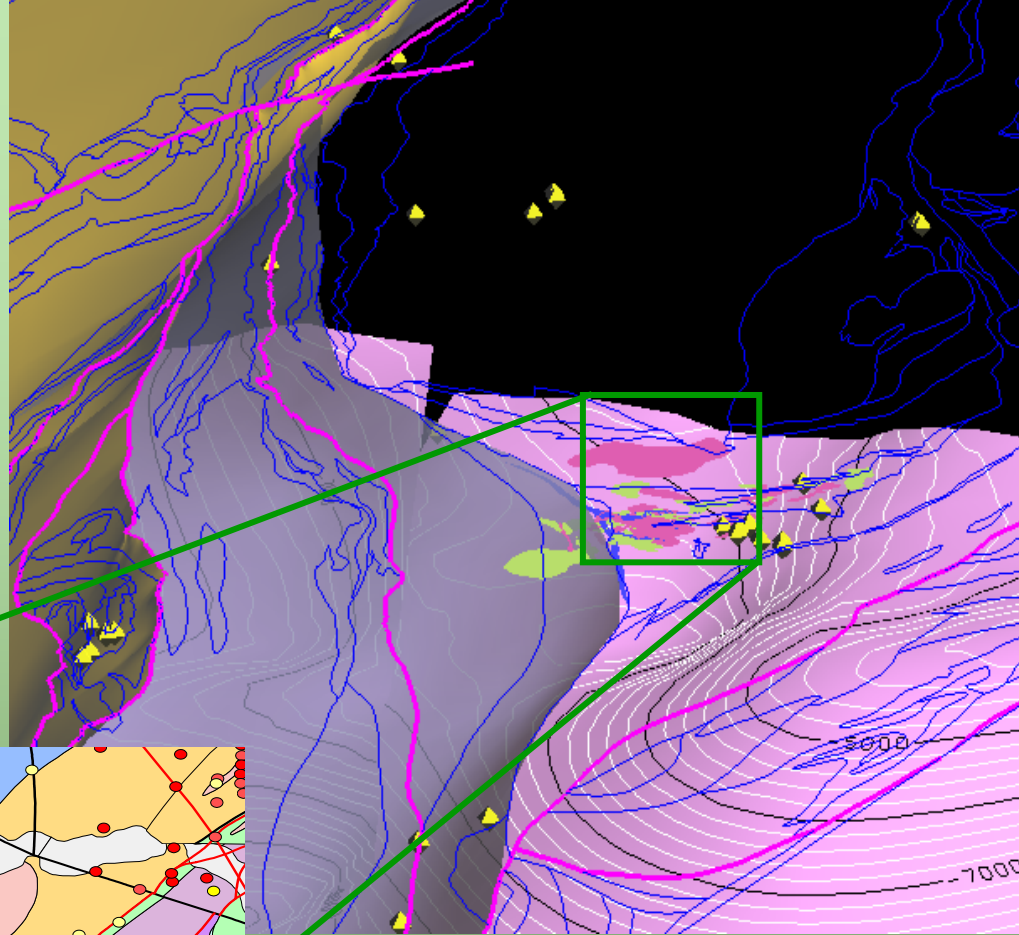
Architecture of depositional site & intrusive complexes



Integrate upper crustal architecture with deep-crustal architecture

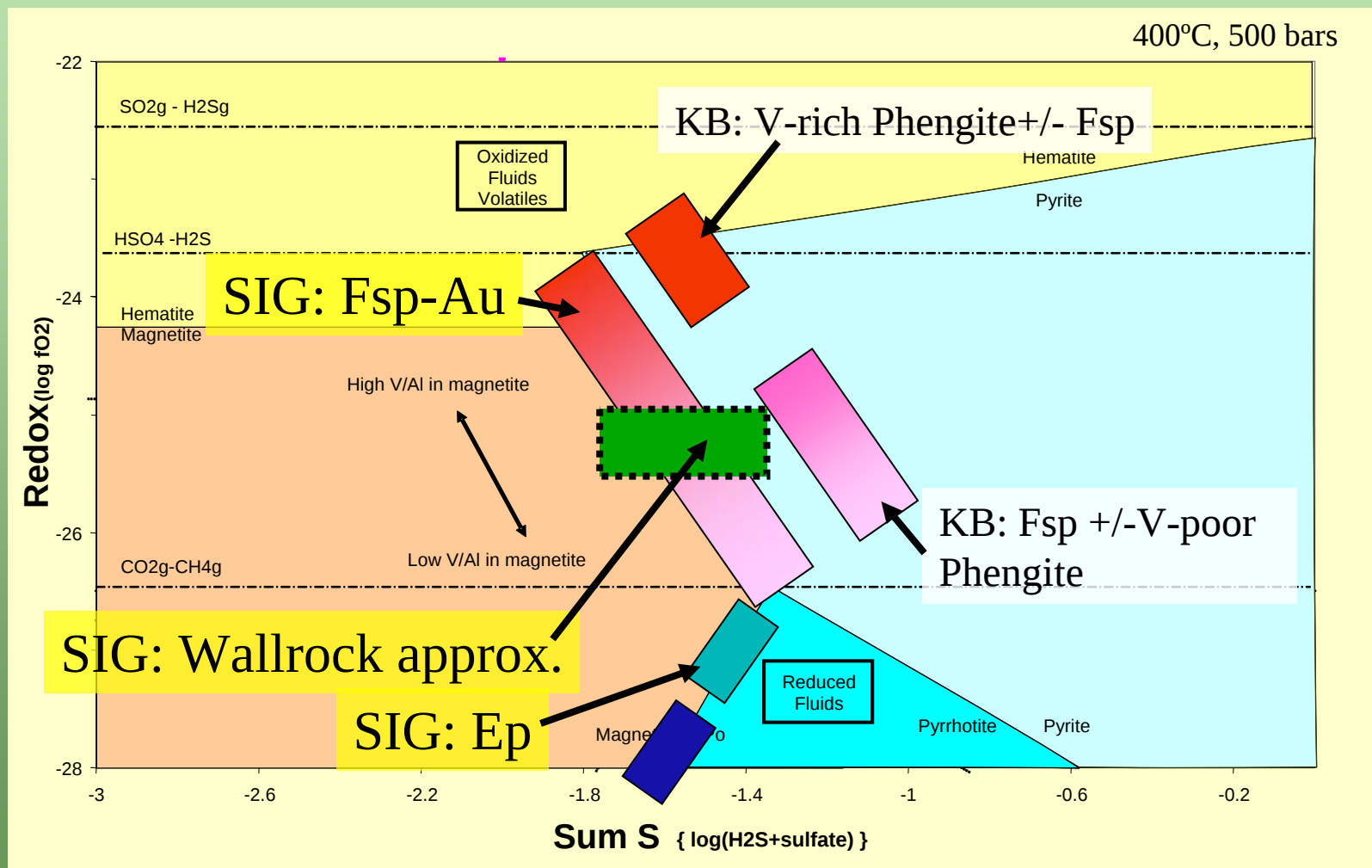


3D Architectural
controls on
reservoirs fluid
pathways, chemical
gradients



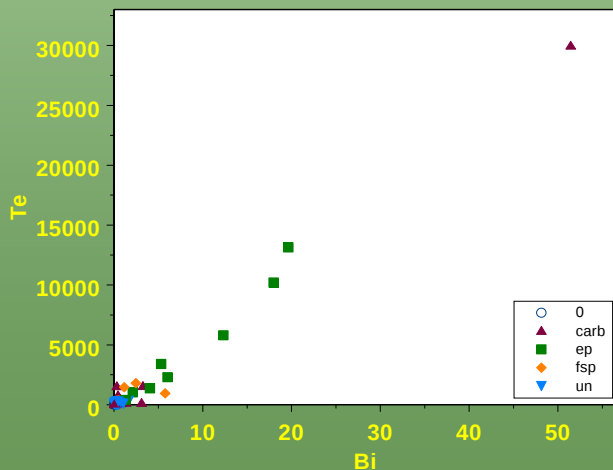
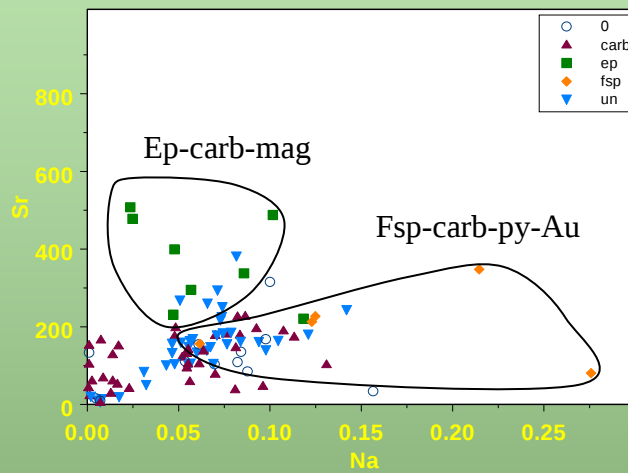
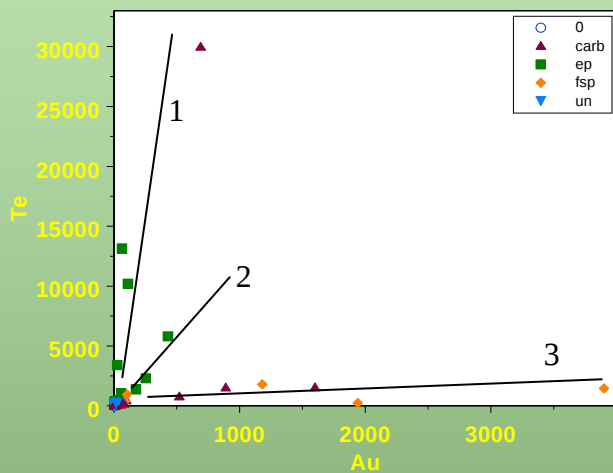
Challenge:
District -
Terrane
Scale Models

Redox Range of Alteration



KB: Felsic Hosts; SIG: Mafic Hosts

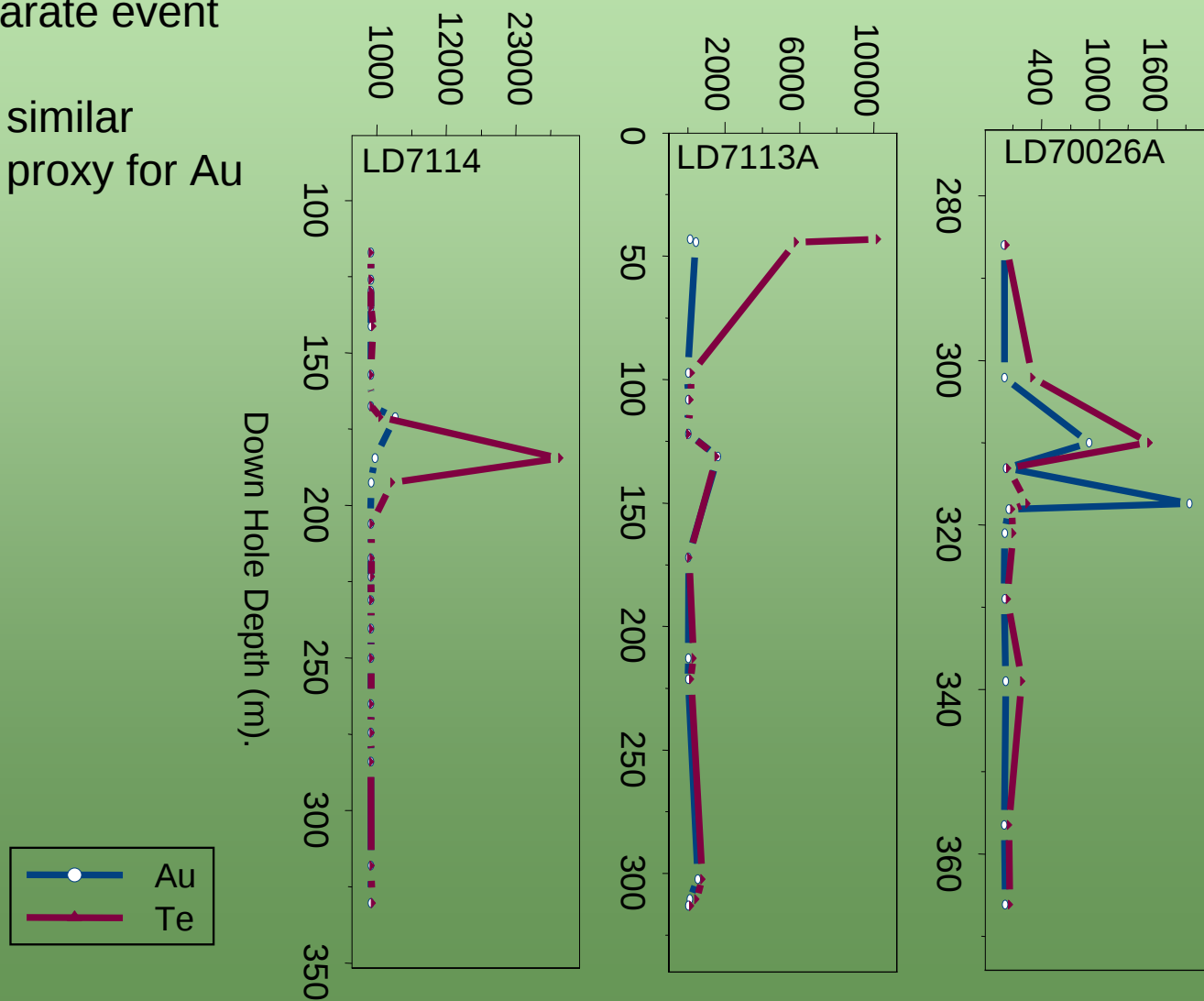
Early Epidote-Carbonate-Magnetite Alteration – WR GC



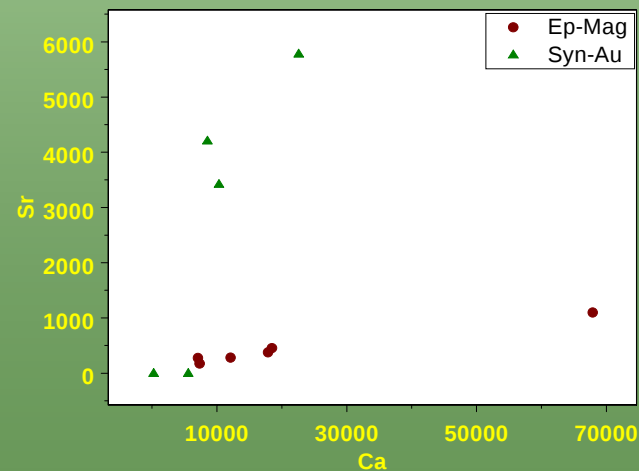
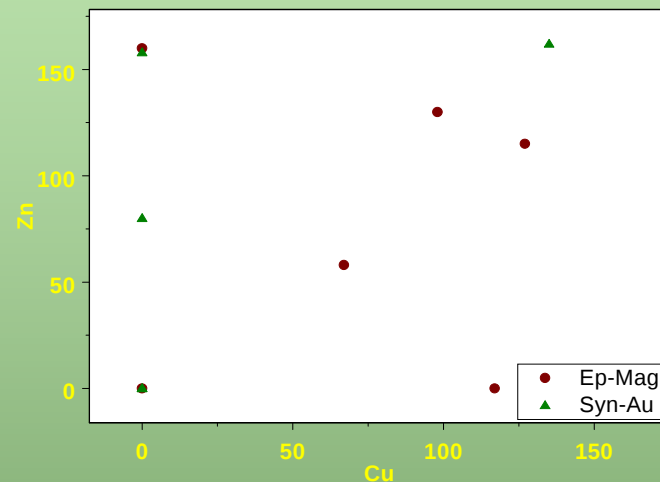
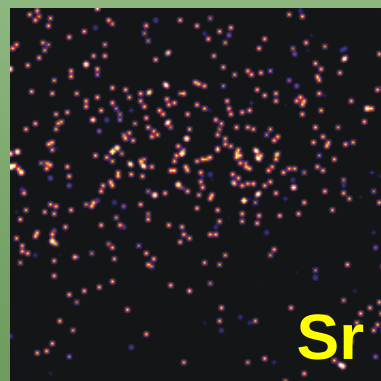
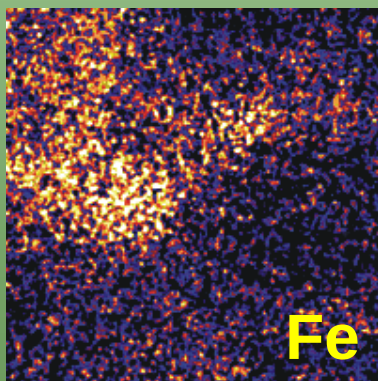
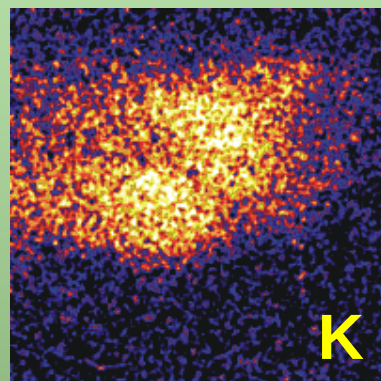
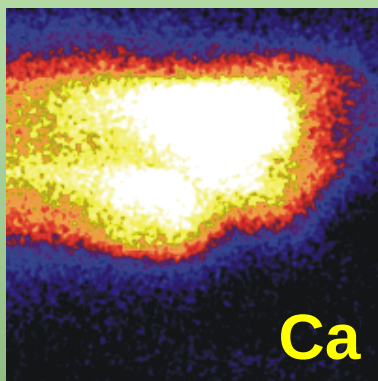
- associated with porphyries
- pre-dates gold
- Bi-tellurides
- Sr-rich, Na-poor

Exploration: Te-Au

- Most Te separate event to Au
- But spatially similar
- Te still good proxy for Au

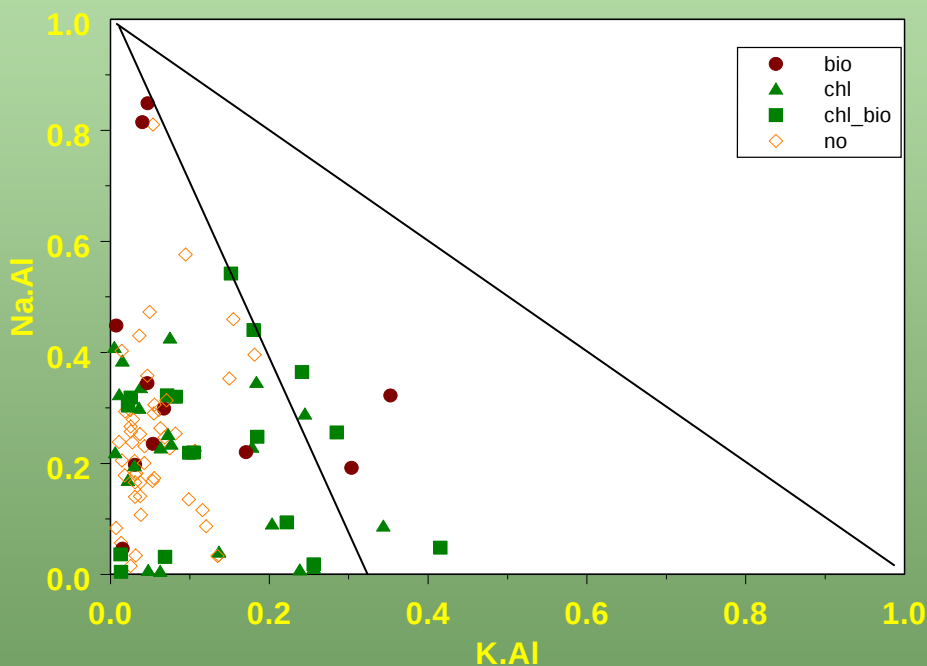


Early Epidote-Carbonate-Magnetite Alteration – FC (PIXE)



Fsp-Carb-Py-Au alteration – WR GC

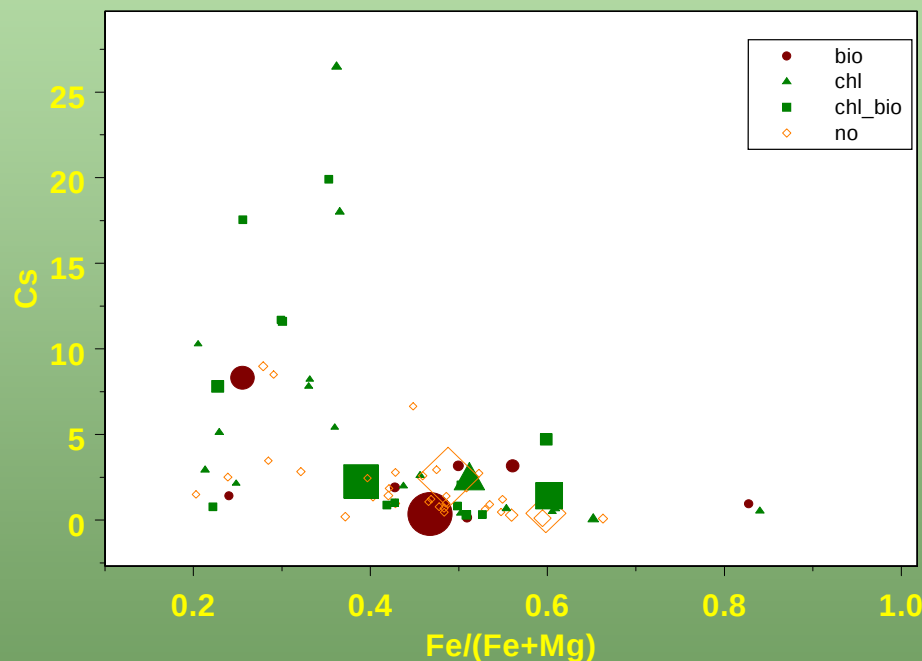
Albite



Muscovite

K feldspar

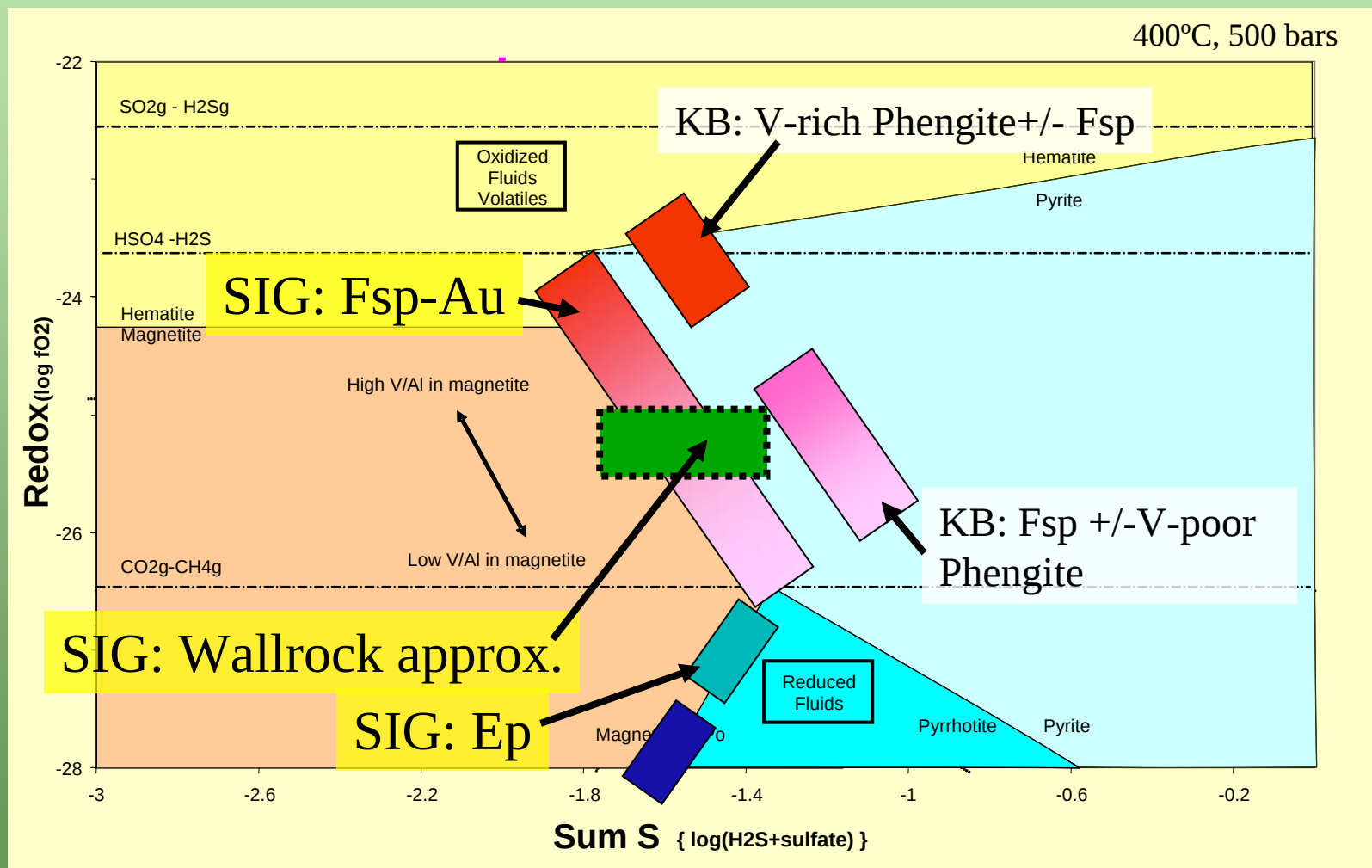
Size of symbol indicates Au grade



- Na/Al vs K/Al plots map out biotite/chlorite alteration zones
- Fe/(Fe+Mg) ratios map out Au-related biotite/chlorite: Au occurs with intermediate compositions
- Cs does not correlate with Au-related biotite

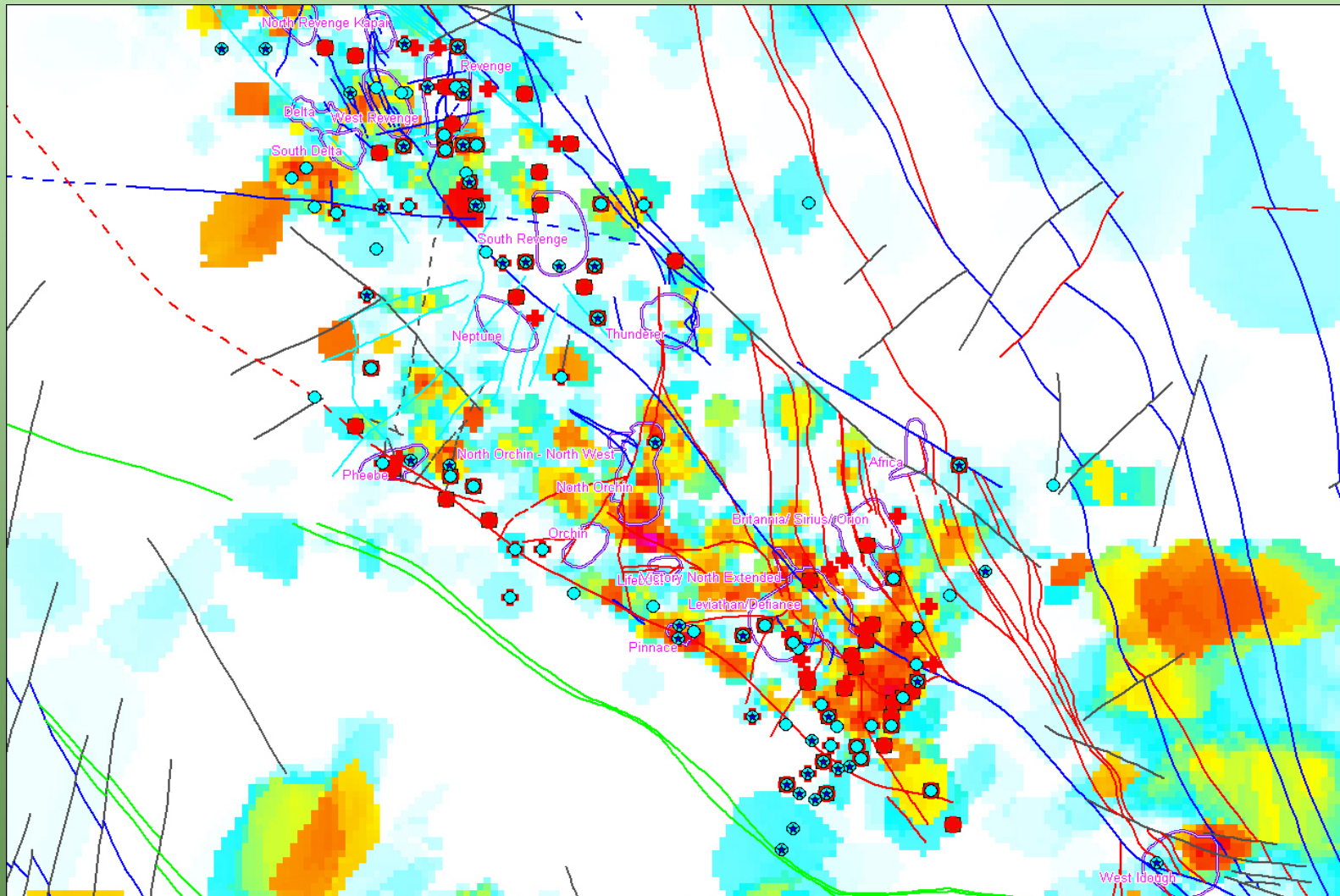
St. Ives

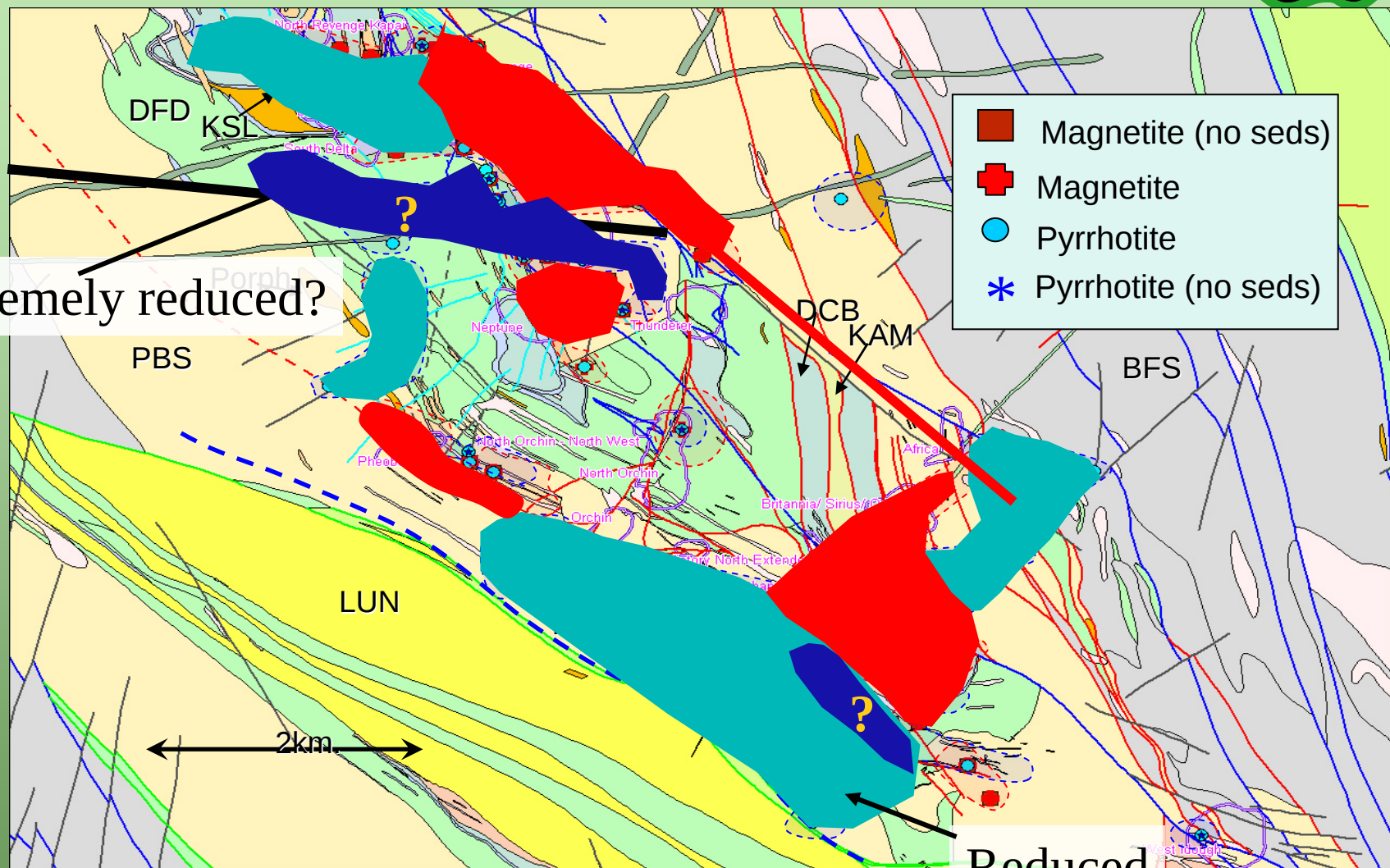
Redox Range of Alteration



KB: Felsic Hosts; SIG: Mafic Hosts

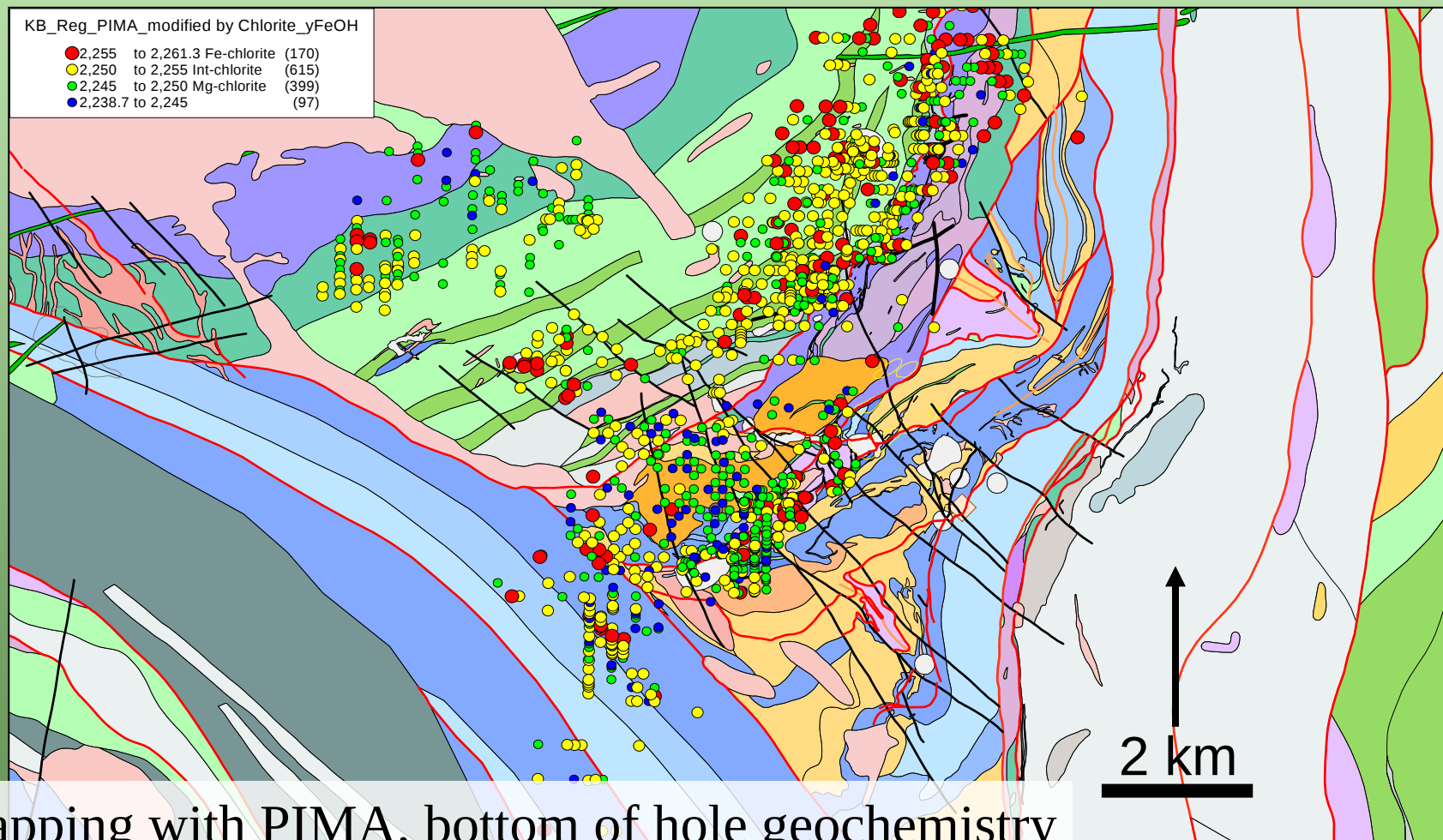
Porphyries and magnetite





Exploration “near mine”

Exploration “district scale”

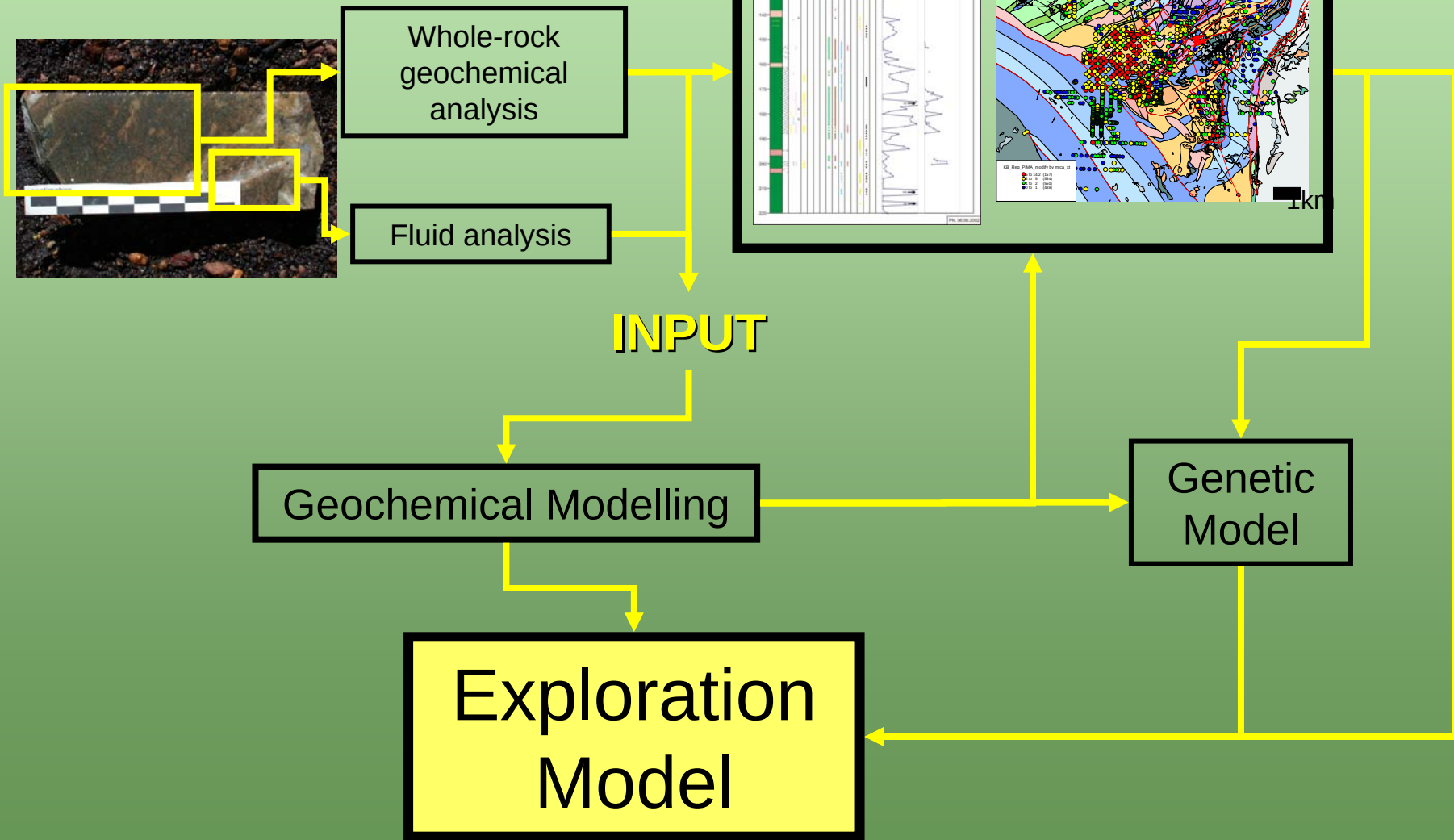


Mapping with PIMA, bottom of hole geochemistry

Kanowna Belle

Whole-rock and Fluid Chemistry

- Concept



Conclusions

- **Spatial and temporal variations in fluid chemistry**
- **Gradients win!!!**
- **Map flow paths & reservoirs**
- **Build Scale Integrated Models!!!**

Tools:

- **Alteration mapping (PIMA, Core Logger)**
- **Whole-rock geochemistry**
- **Isotopes S,C & O**