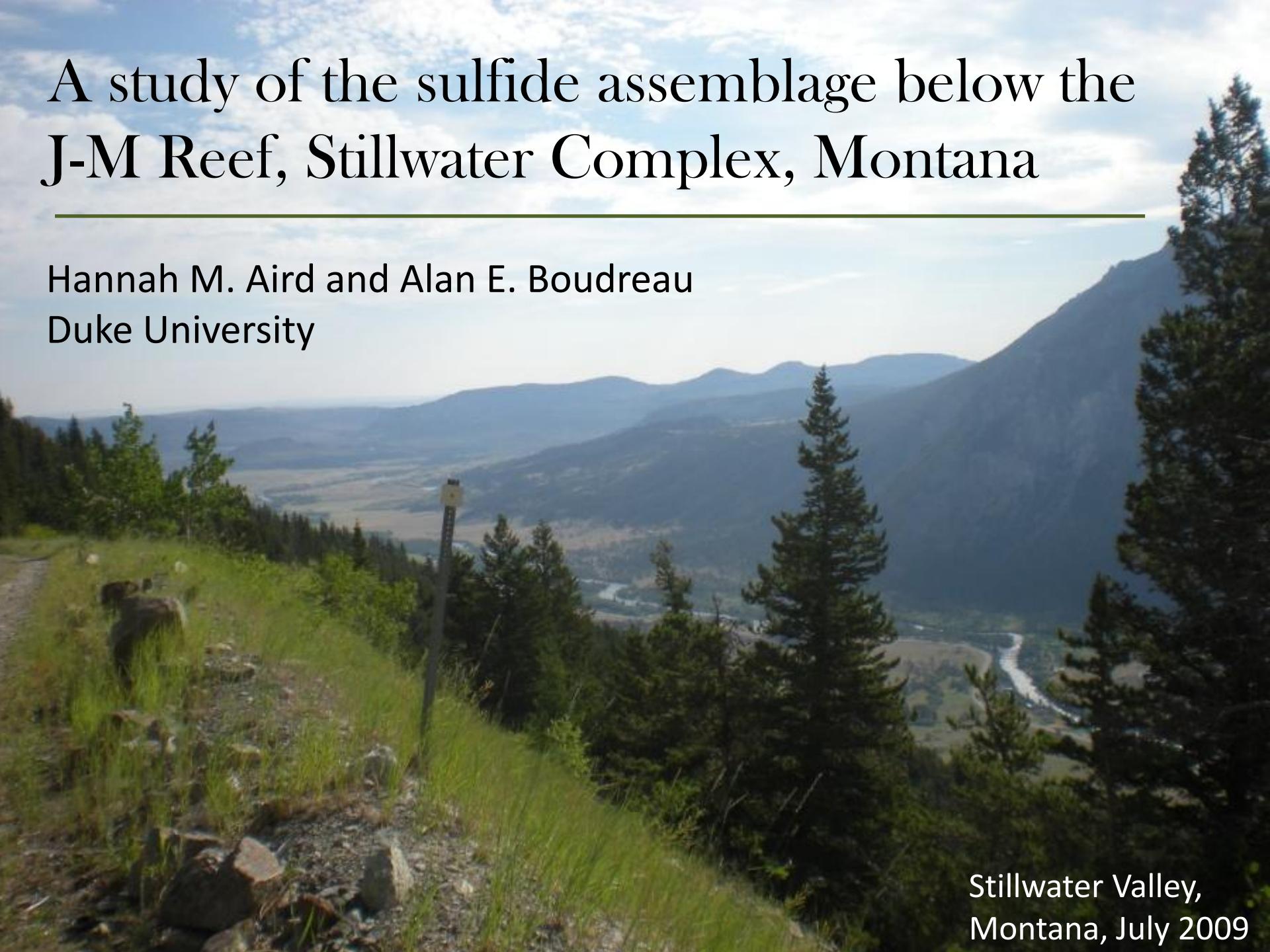


# A study of the sulfide assemblage below the J-M Reef, Stillwater Complex, Montana

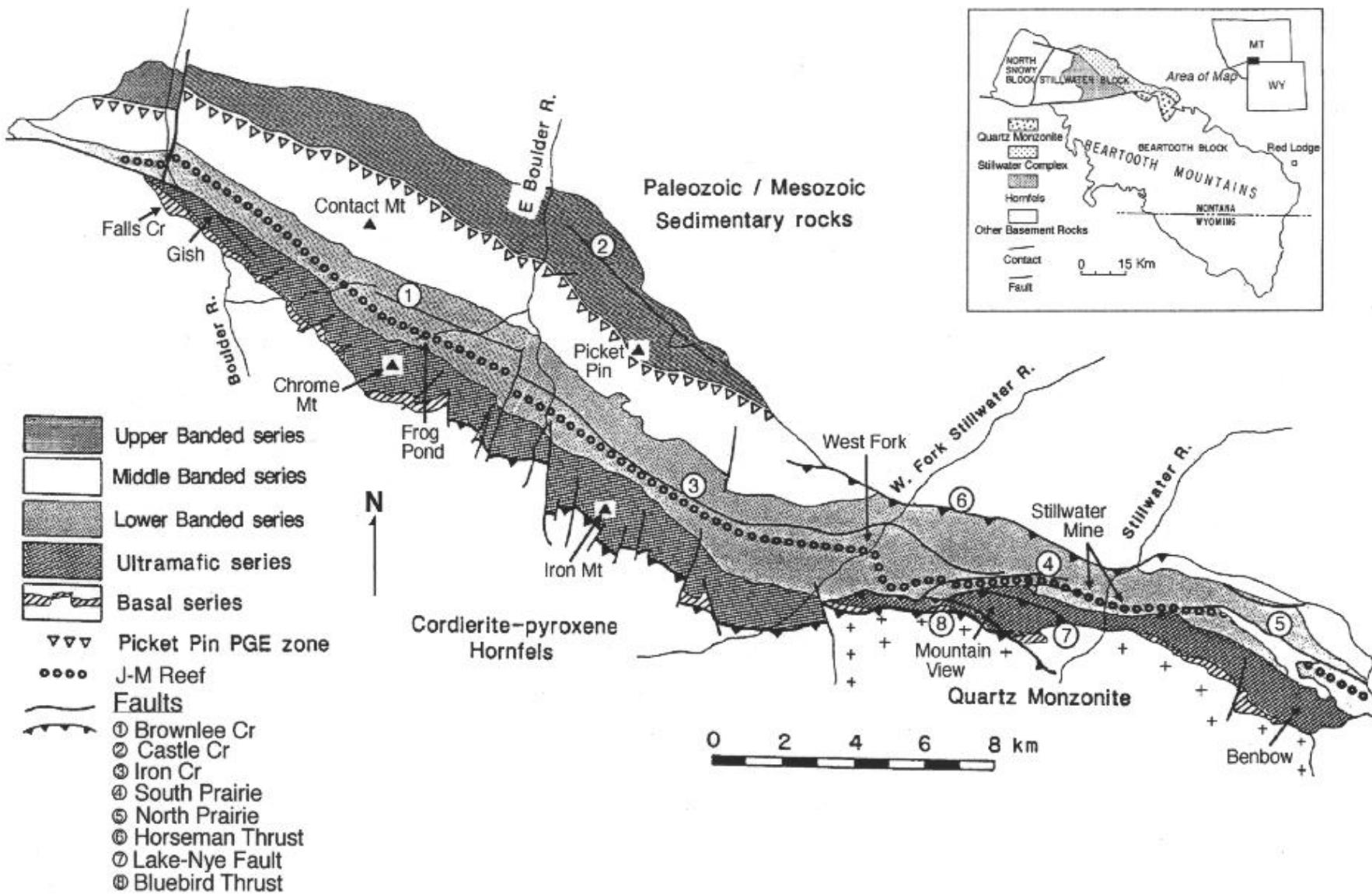
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Hannah M. Aird and Alan E. Boudreau  
Duke University

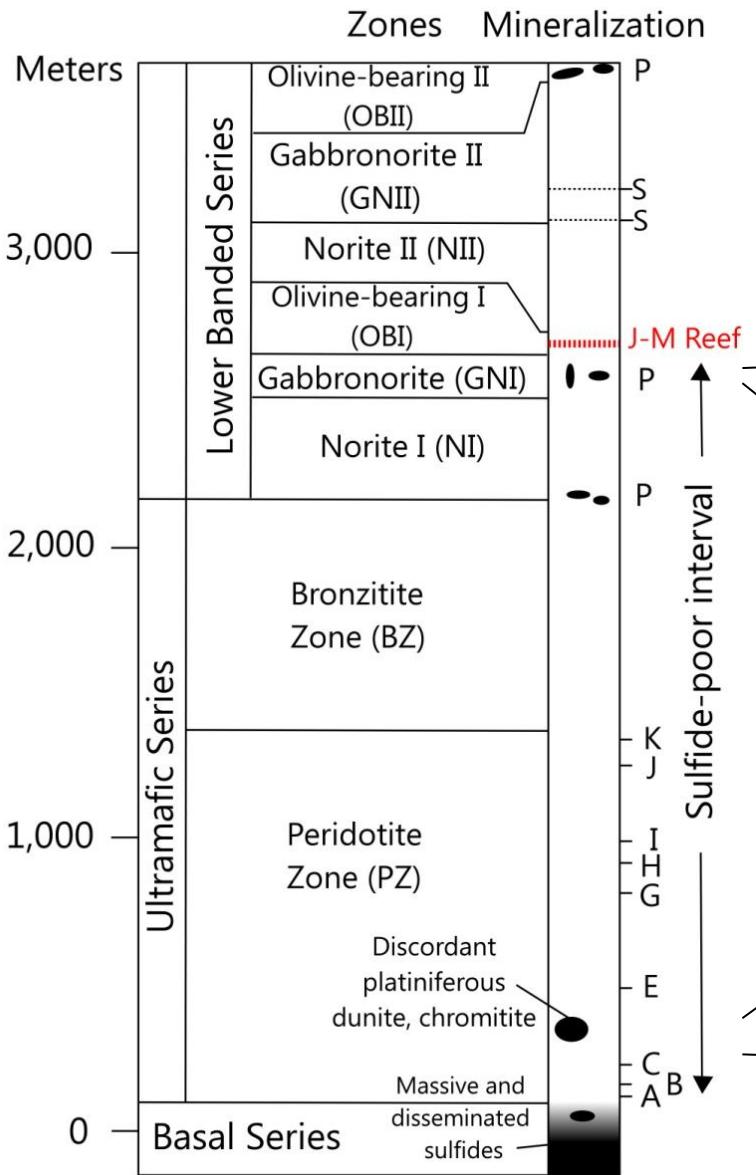


Stillwater Valley,  
Montana, July 2009

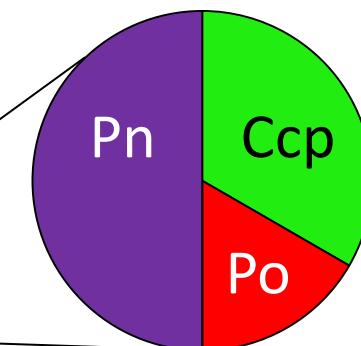
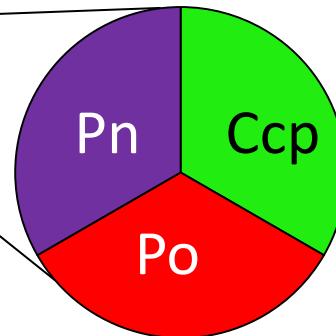
# Location



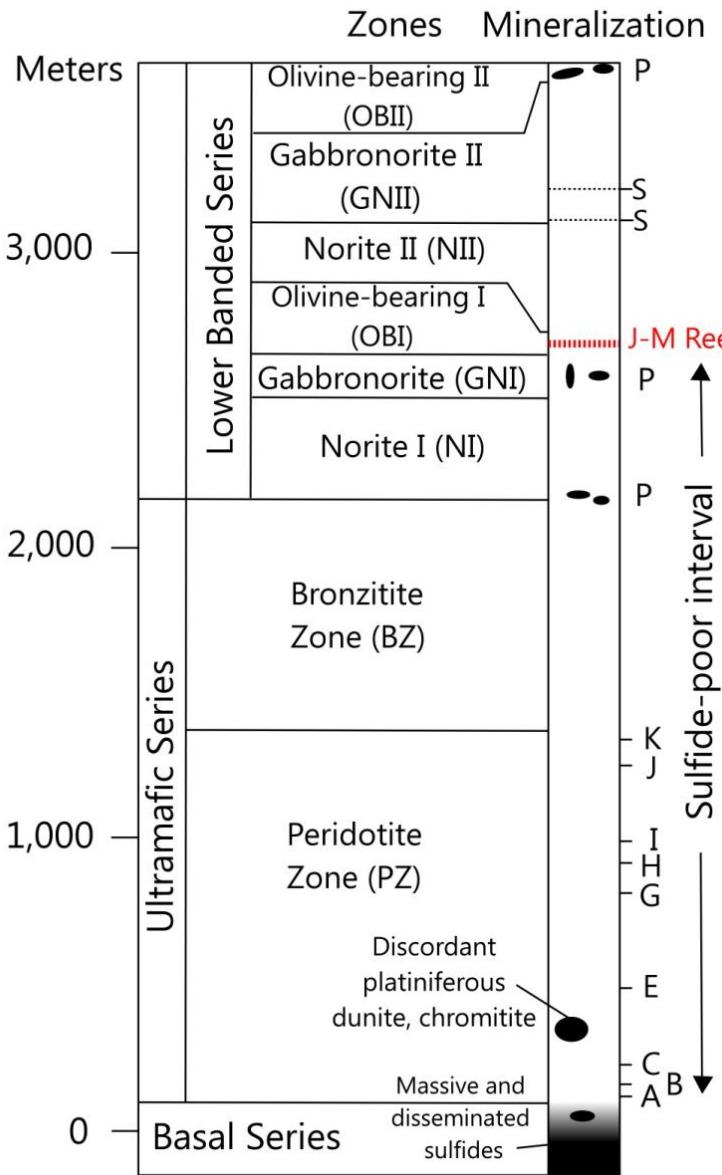
# Problem: orthomagmatic or hydromagmatic?



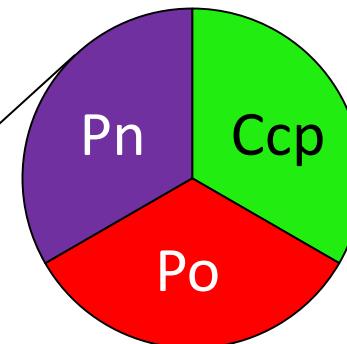
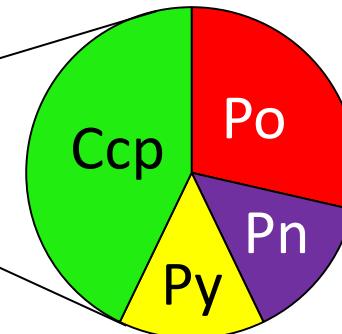
**'Downers' Model**  
Magmatic sulfide  
accumulation



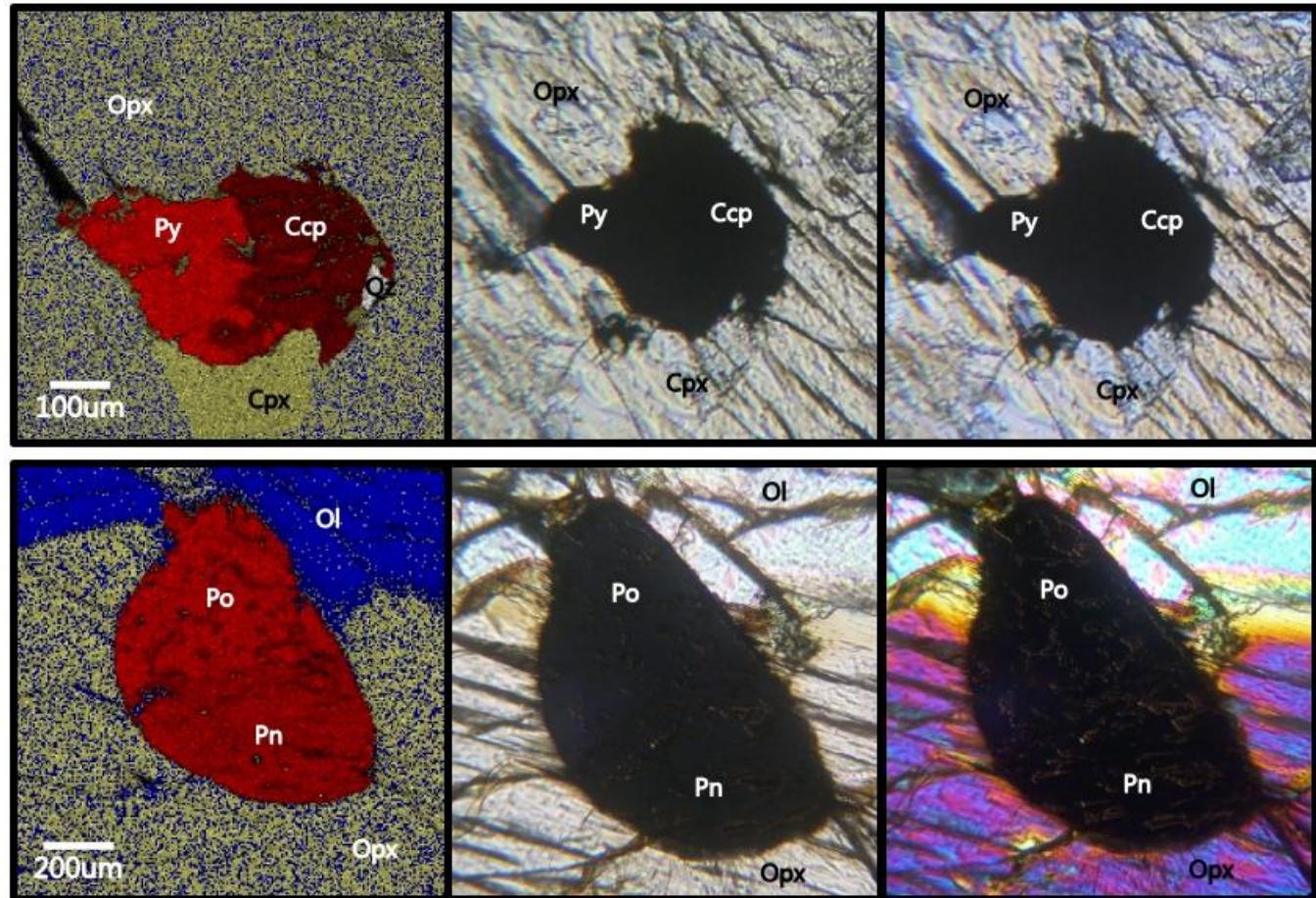
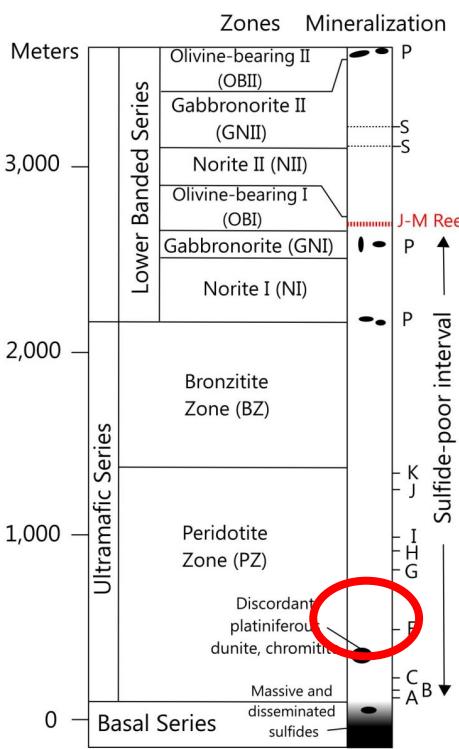
# Problem: orthomagmatic or hydromagmatic?



**'Uppers' Model**  
Vapor refining



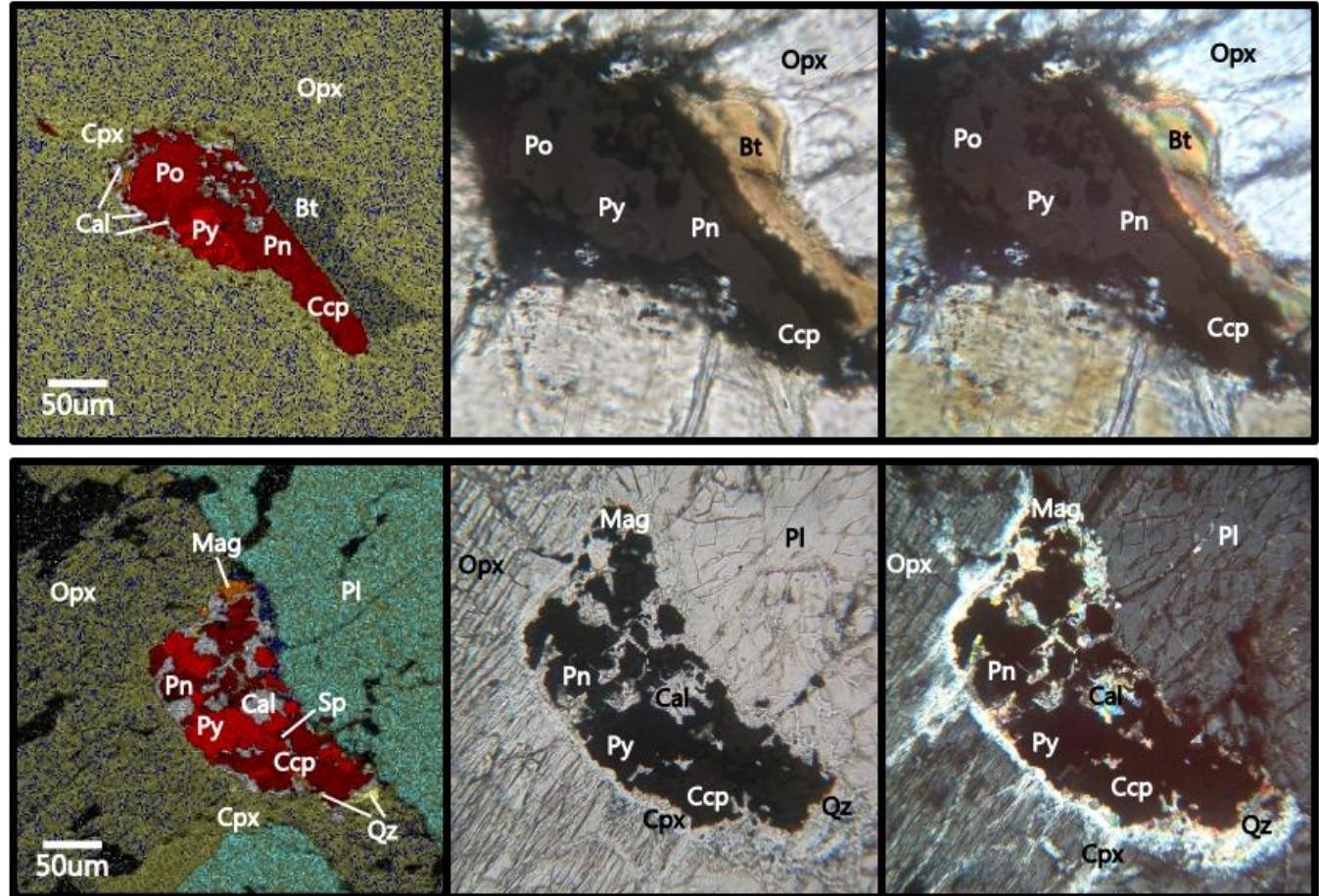
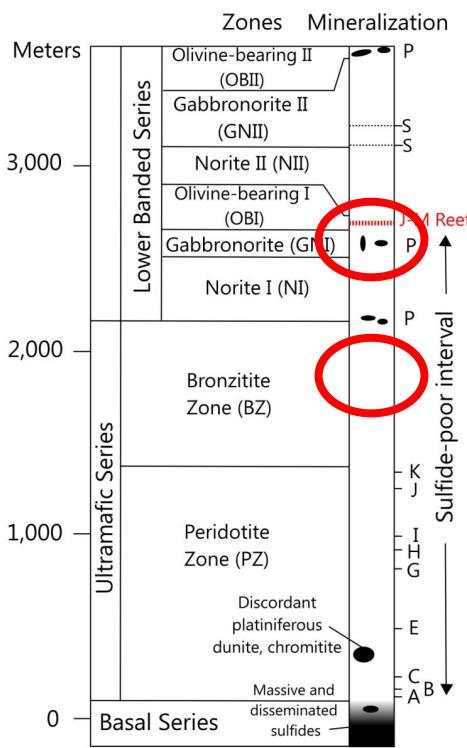
# Results: Igneous sulfides (PZ)



## Abbreviations:

Opx orthopyroxene; Cpx clinopyroxene; Ol olivine; Py pyrite; Ccp chalcopyrite; Pn pentlandite; Po pyrrhotite

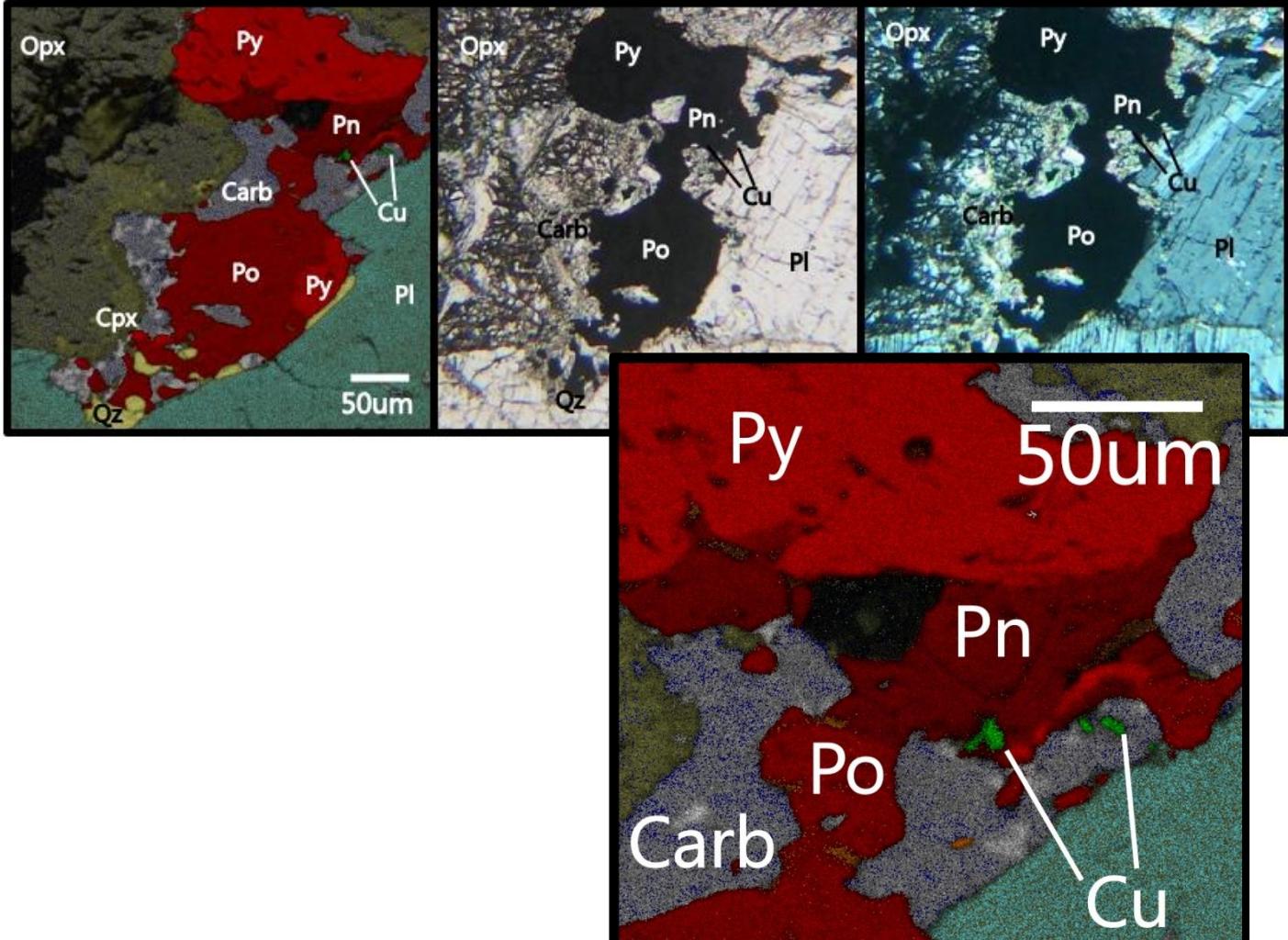
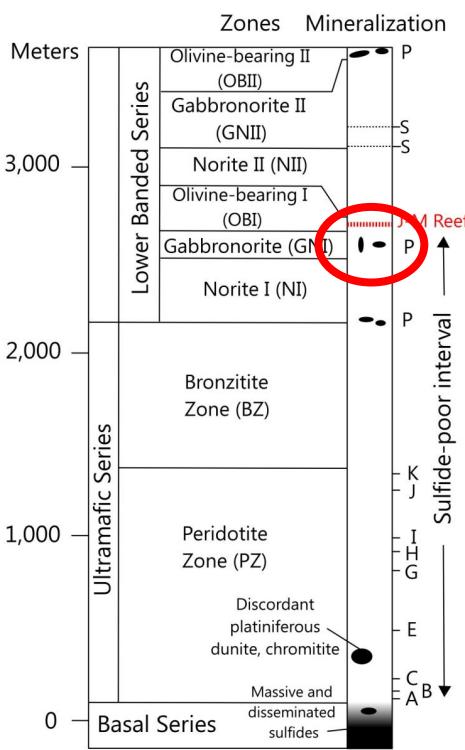
# Results: High-T sulfides (BZ and GN-I)



## Abbreviations:

Opx orthopyroxene; Cpx clinopyroxene; Bt biotite; Pl plagioclase; Qz quartz; Cal calcite; Py pyrite; Ccp chalcopyrite; Pn pentlandite; Po pyrrhotite; Sp sphalerite; Mag magnetite

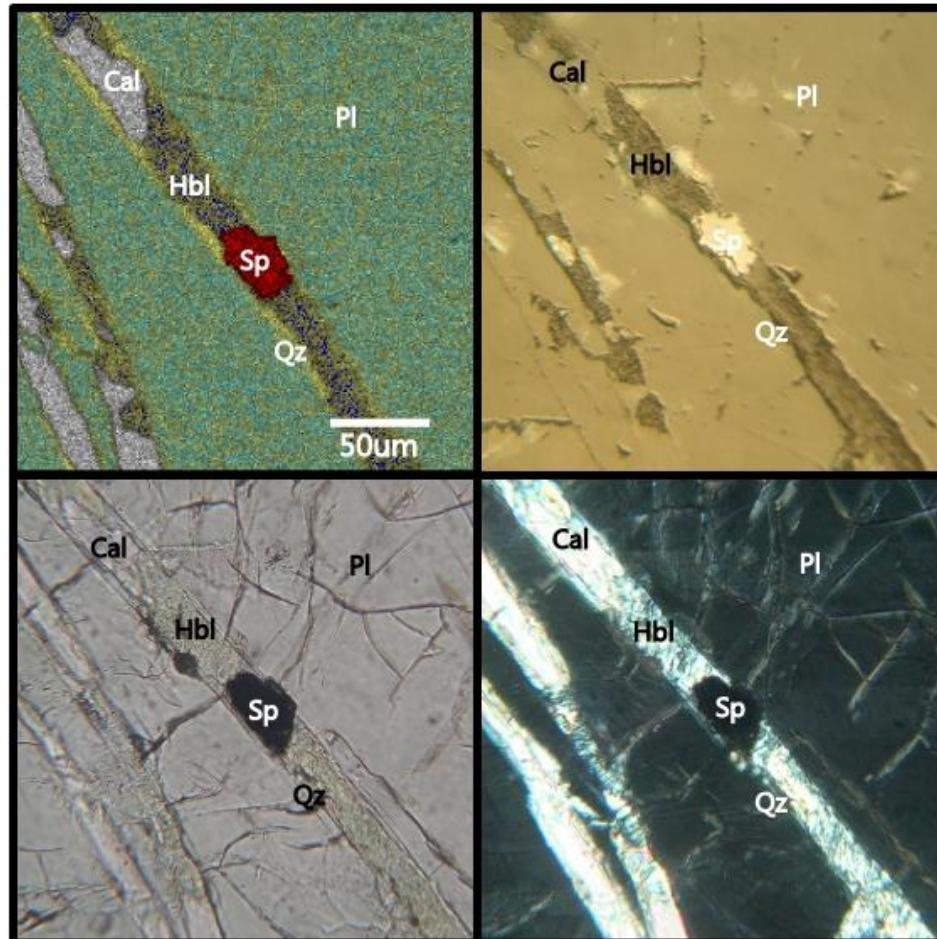
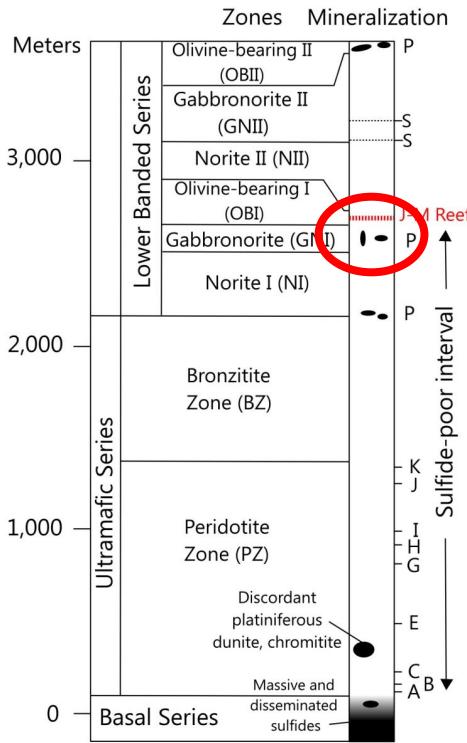
# Results: Native Copper (GN-I)



## Abbreviations:

Opx orthopyroxene; Cpx clinopyroxene; Pl plagioclase; Qz quartz; Carb carbonate; Py pyrite; Pn pentlandite; Po pyrrhotite; Cu native copper

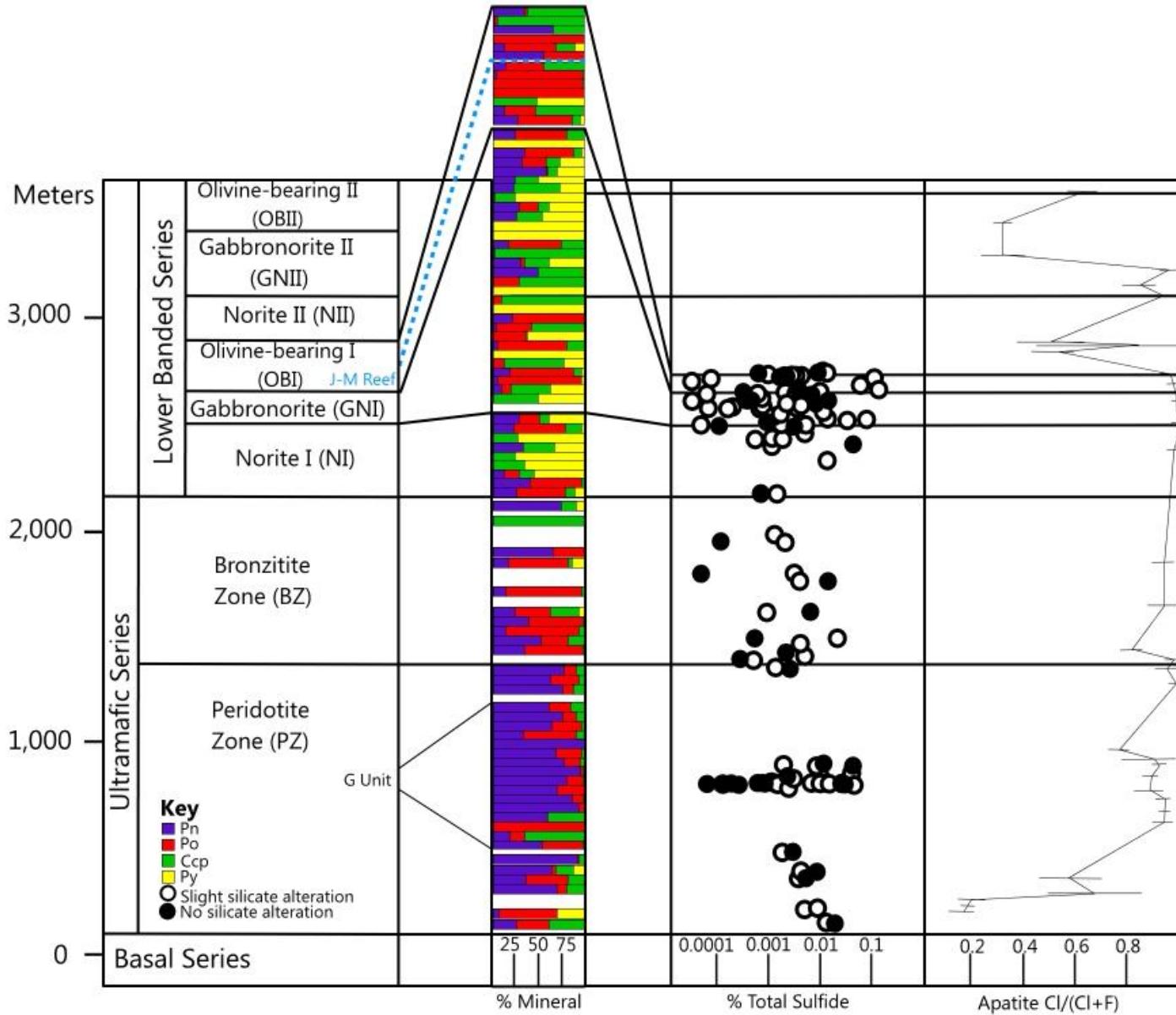
# Results: Sphalerite (GN-I)



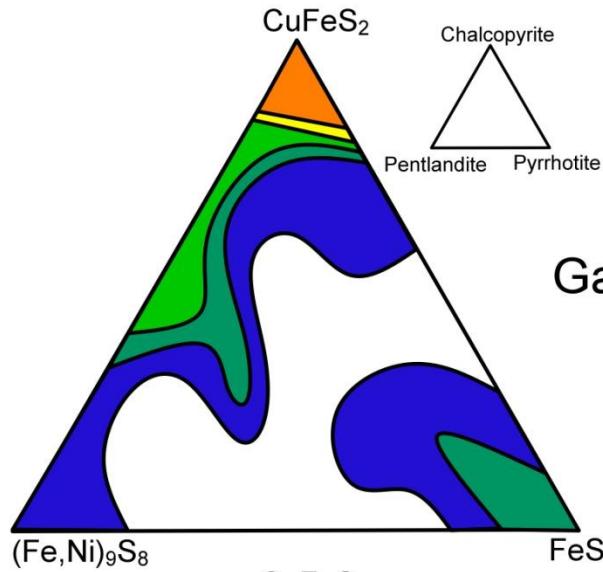
## Abbreviations:

Sp sphalerite; Pl plagioclase; Hbl hornblende; Qz quartz;  
Cal calcite

# Results: Quantitative sulfide data

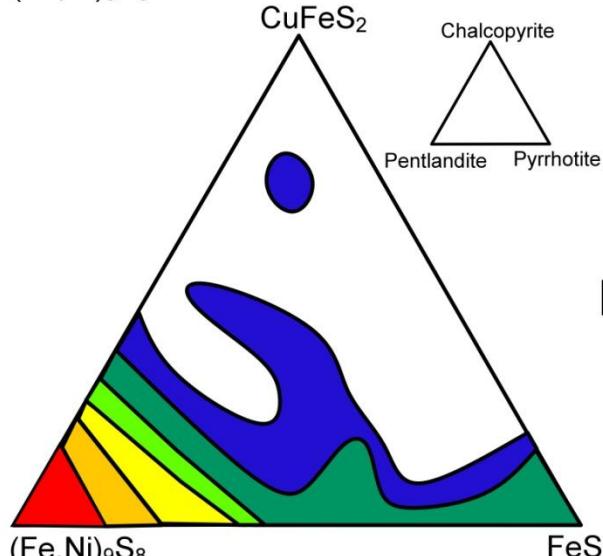


# Results: Sulfide distribution



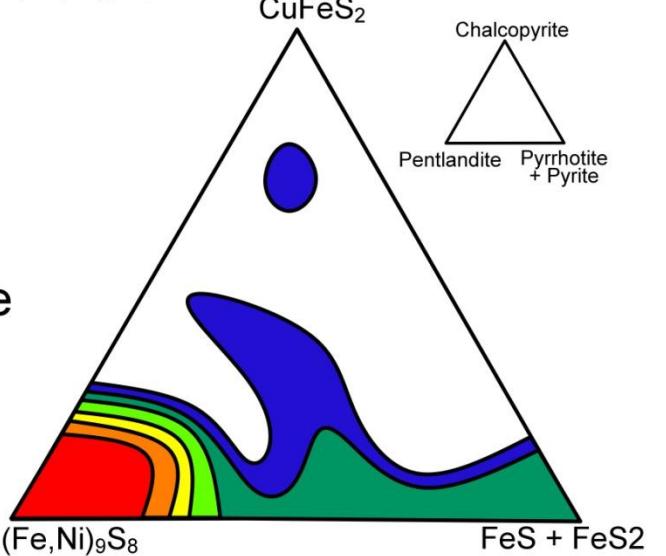
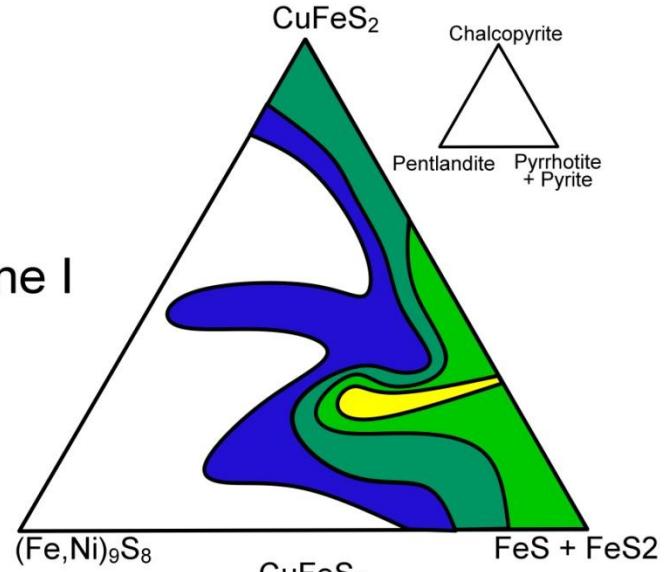
Gabbronorite Zone I

( $n = 24$ )

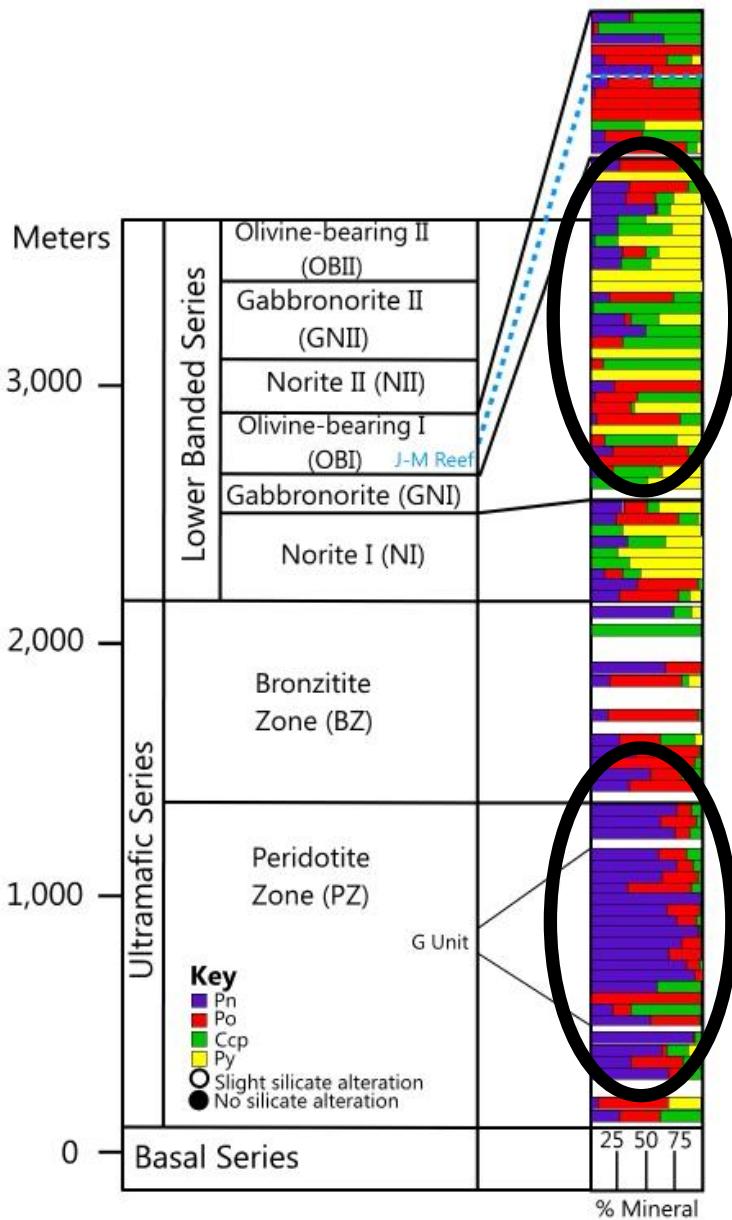


Peridotite Zone

( $n = 25$ )



# Conclusions



- Much Py and Ccp
  - Native Copper
  - High-T veins
  - Igneous and high-T assemblages
- 
- Little Py and Ccp
  - Much Pn
  - Igneous and high-T assemblages

# Acknowledgements

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