The Effect of Geological Models on ML/ARD Characterization Program Design at the KSM Project

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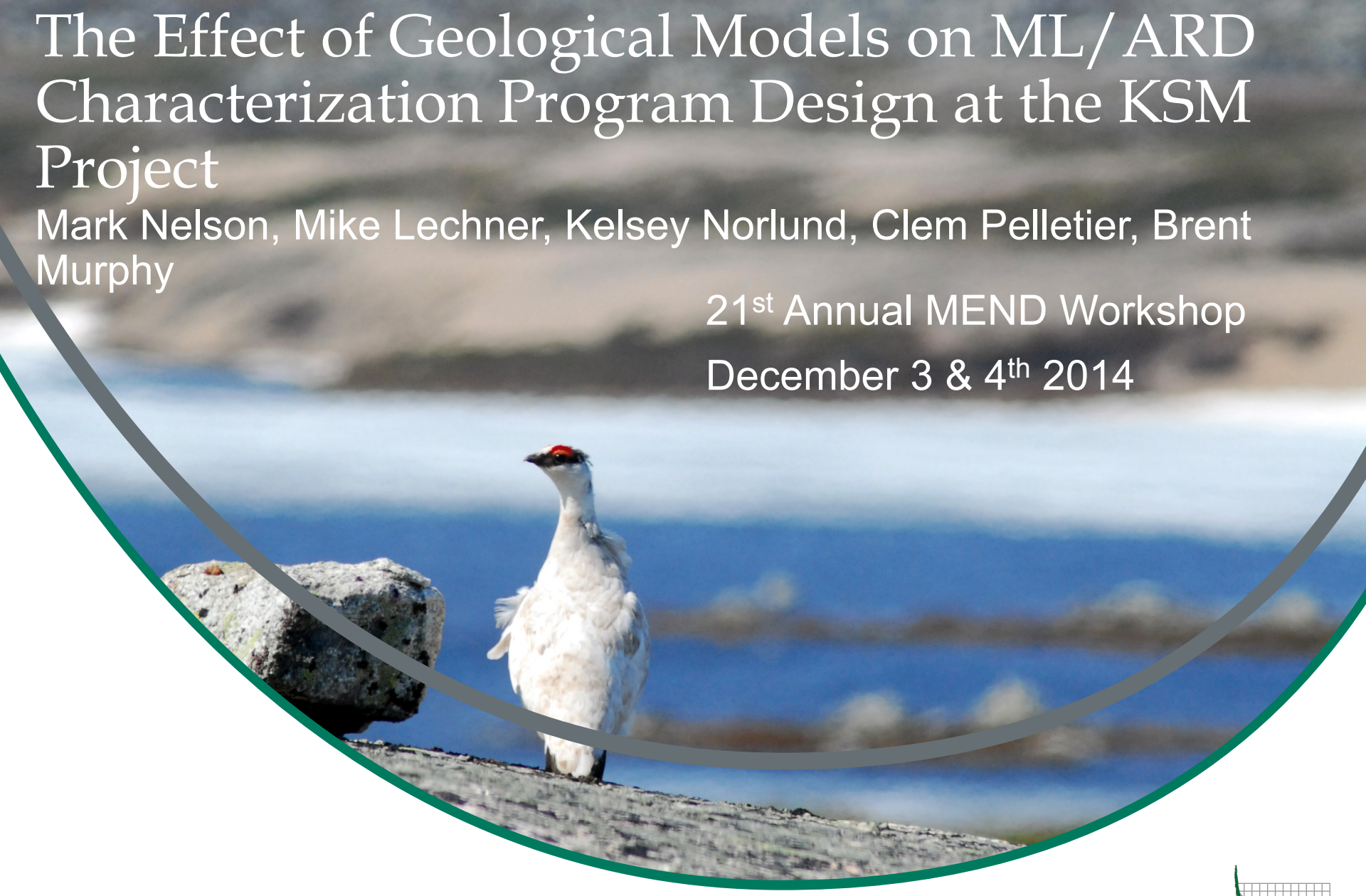

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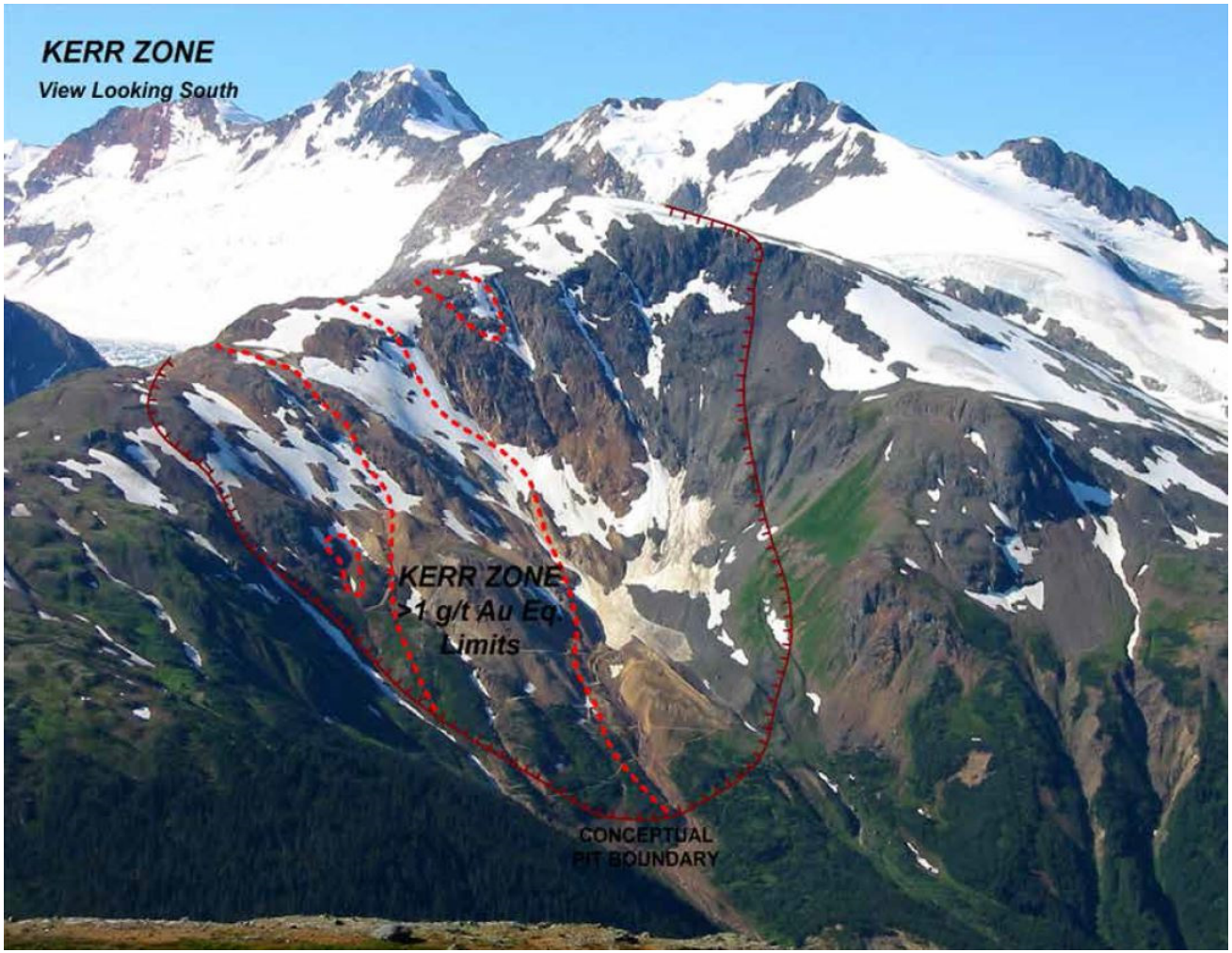
Outline

- Introduction
- Methodology
- Geology
- Block Model
- Results
- Conclusions



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Introduction

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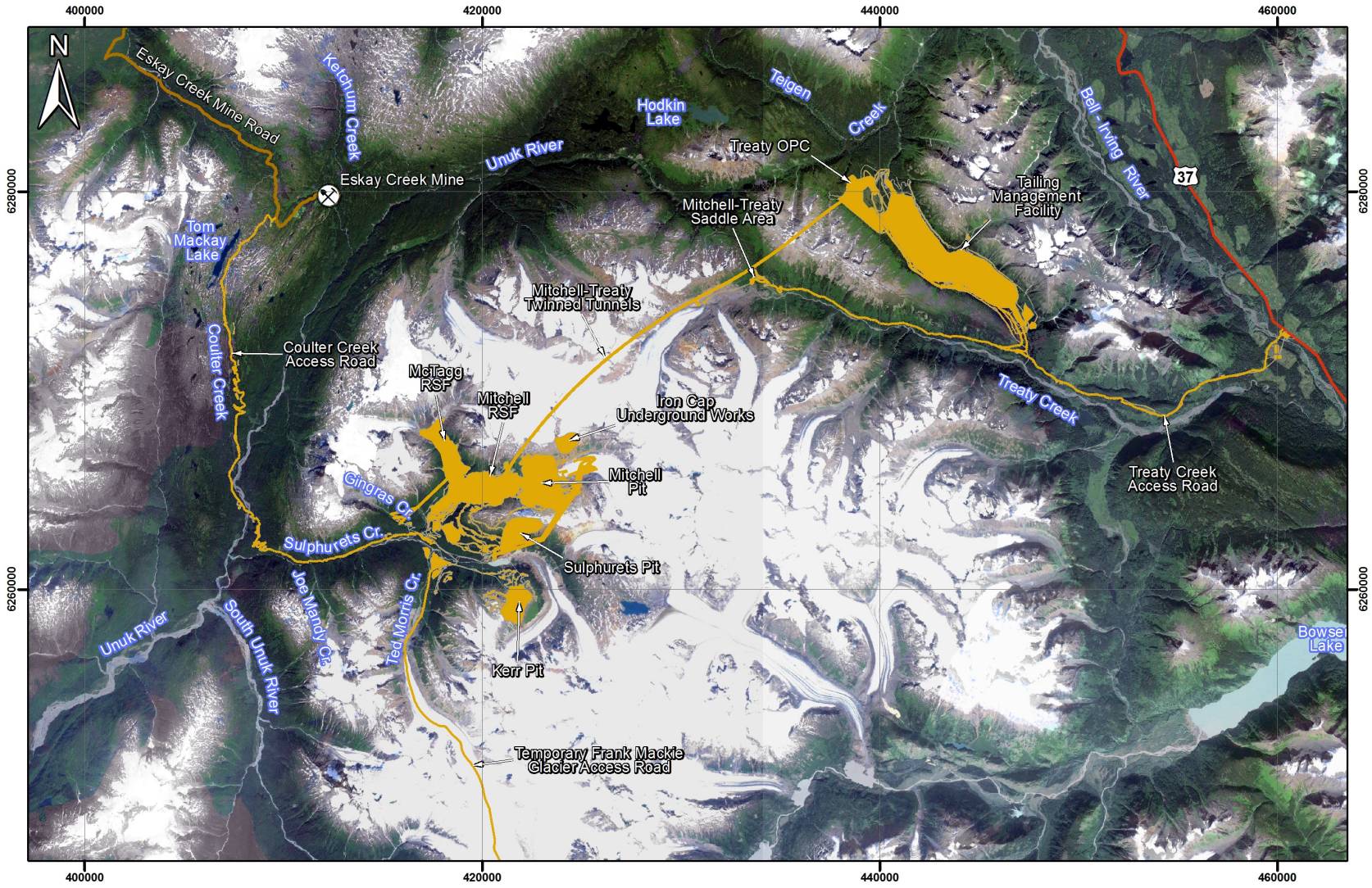
Introduction



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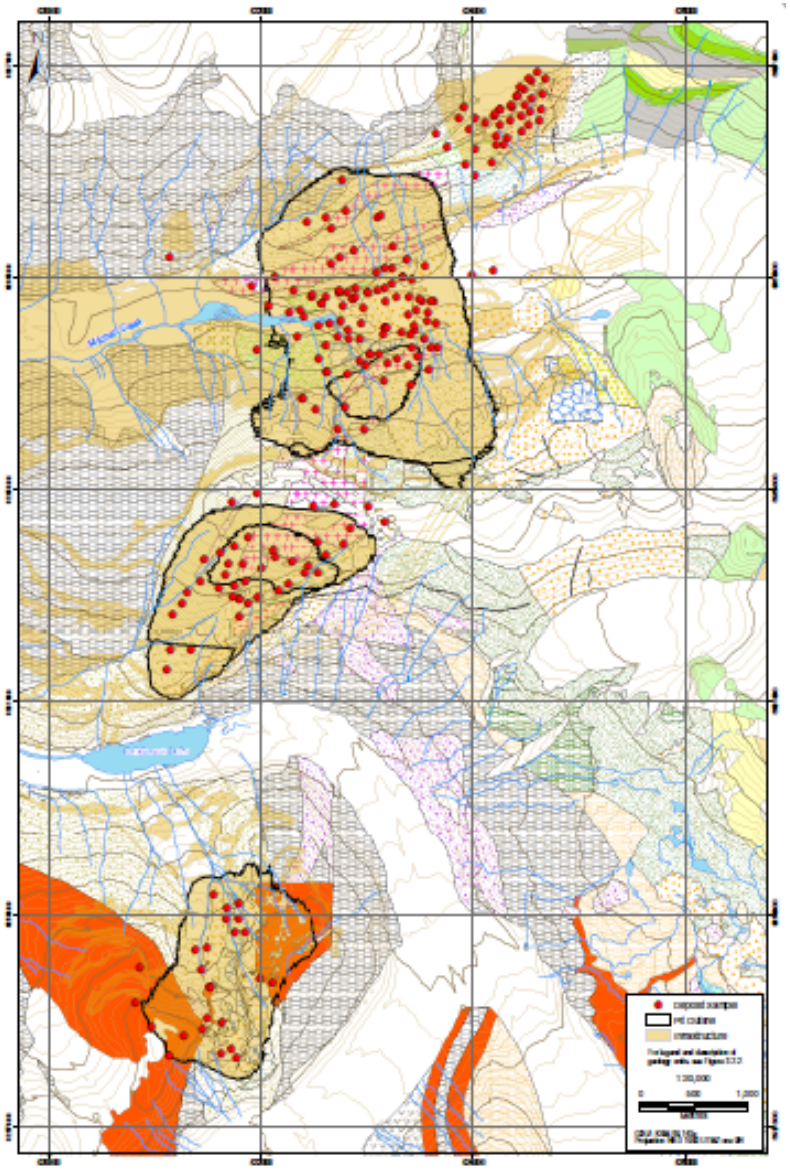
Methodology



- 2222 samples
  - 432 from Kerr Deposit
- Acid Potential (AP)
- Neutralization potential (NP)
- Net Potential Ratio (NPR)

Regional Geology

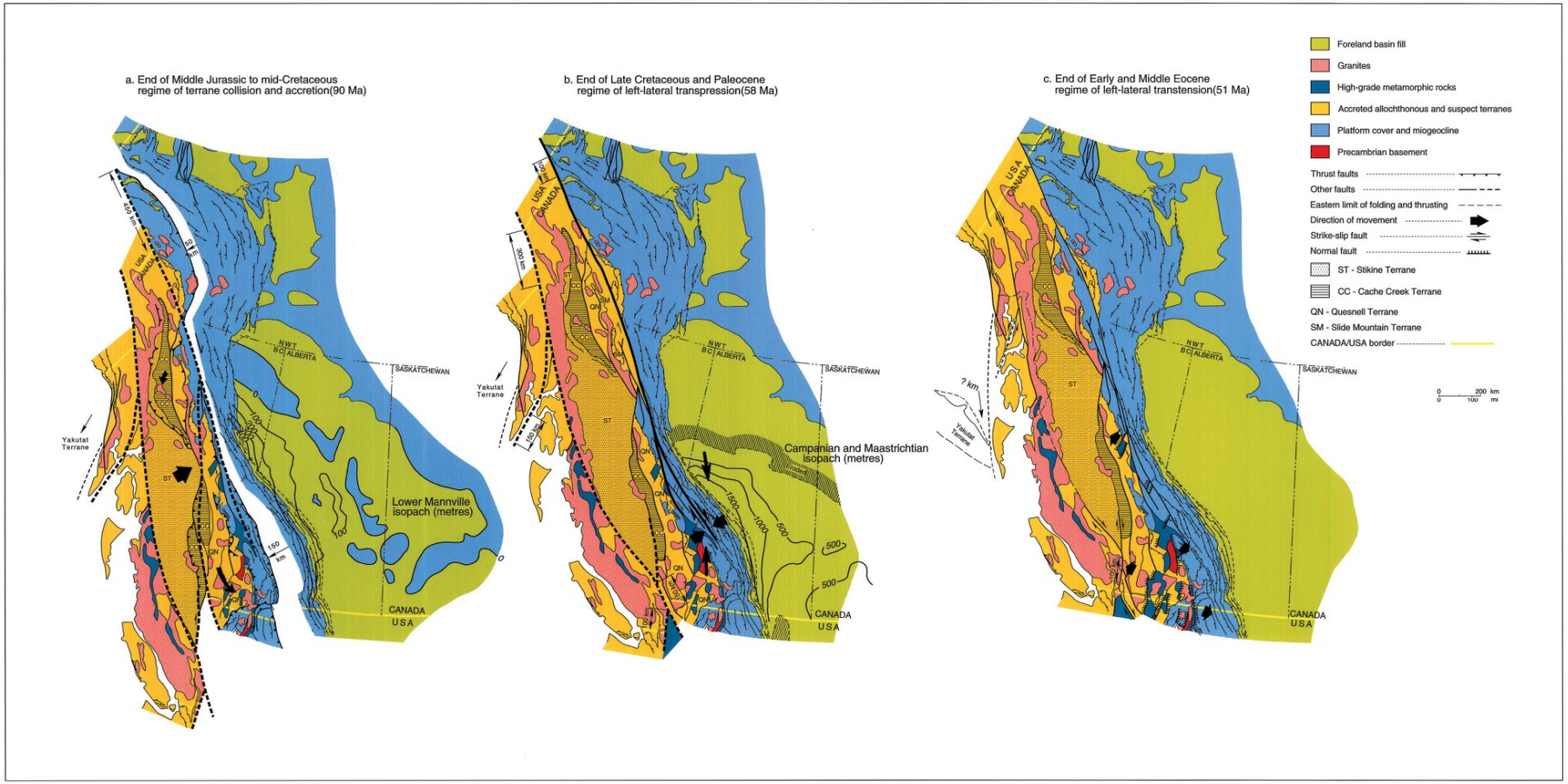
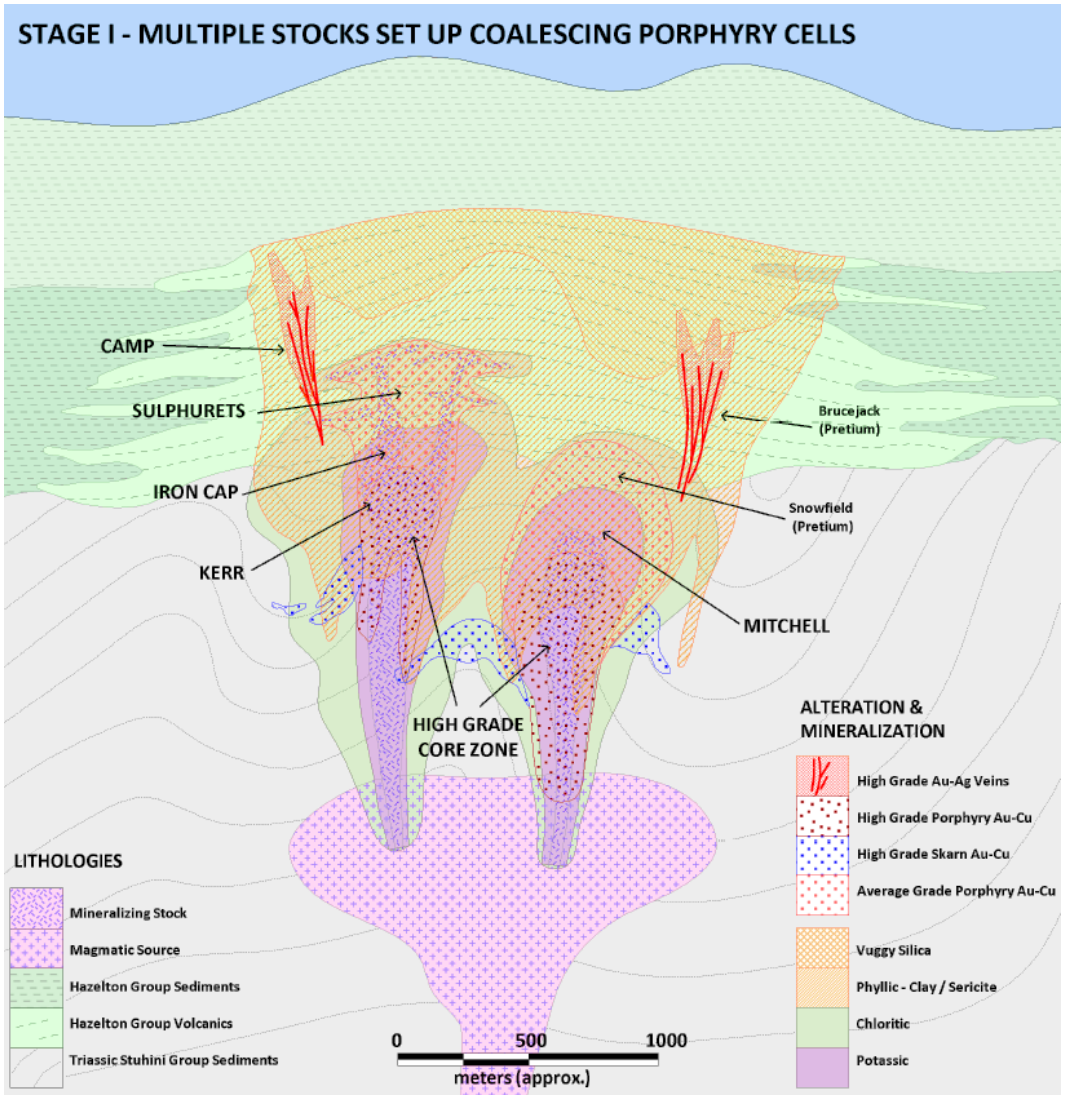


Figure 2.16 Three stages in the tectonic evolution of the Canadian Cordillera: **a.** end of Early Cretaceous and Late Jurassic regime of terrane collision, indentation and lateral escape; **b.** end of Late Cretaceous and Paleocene regime of left-lateral transpression; **c.** end of Early and Middle Eocene regime of left-lateral transtension.

Deposit Evolution



Youngest

Oldest

Mitchell Intrusions:
Monzonite, granite, granodiorite, syenite

Hazelton Group:
Marine sediments with pillowed flows
Volcanic/volcaniclastic transitioning from mafic to felsic
Basal sedimentary sequence

Stuhini Group:
Pillowed flows and volcaniclastics
Turbidites and sandstones

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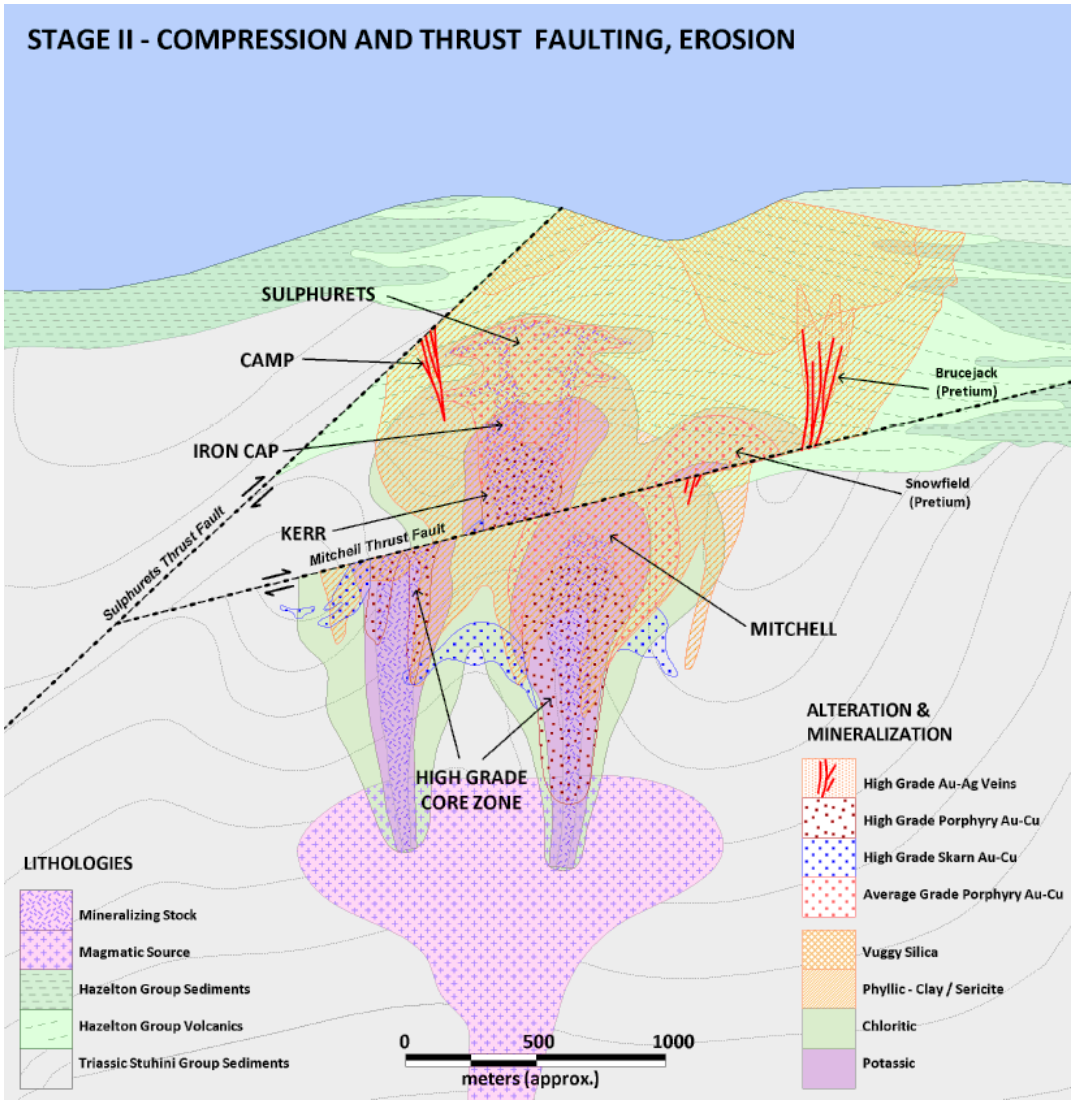
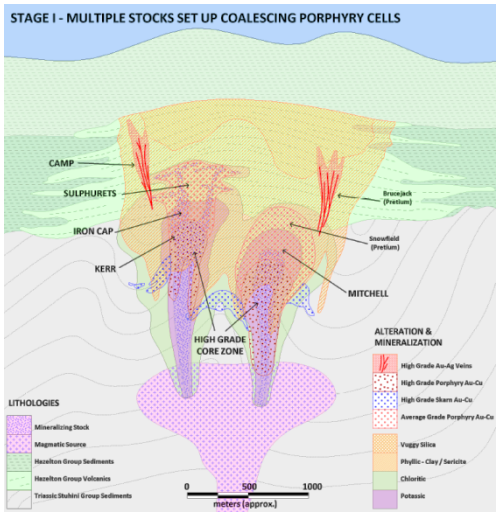
Deposit Evolution





Thrust Faults:
Sulphurets Thrust Fault (STF)
Mitchell Thrust Fault (MTF)

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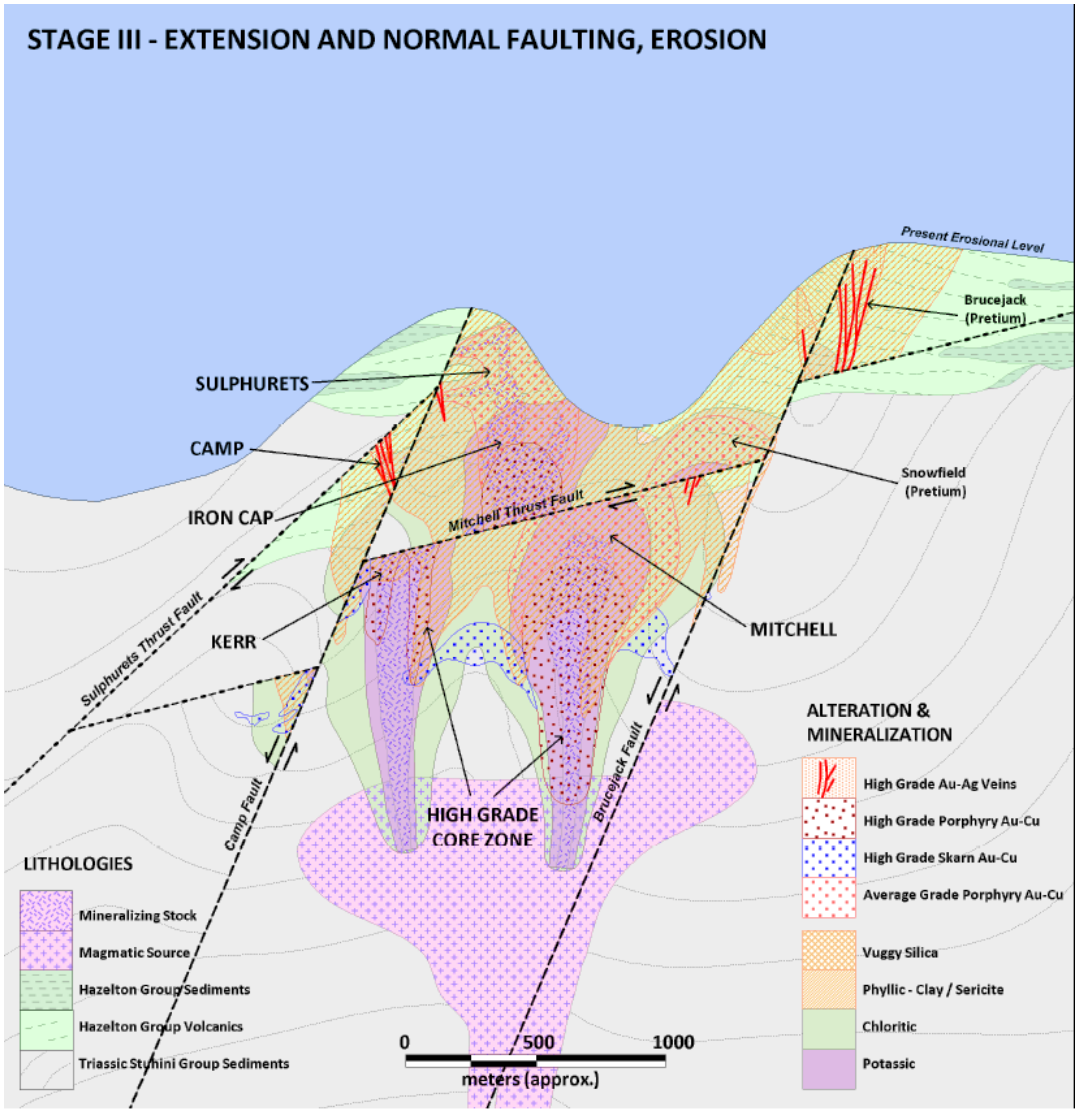
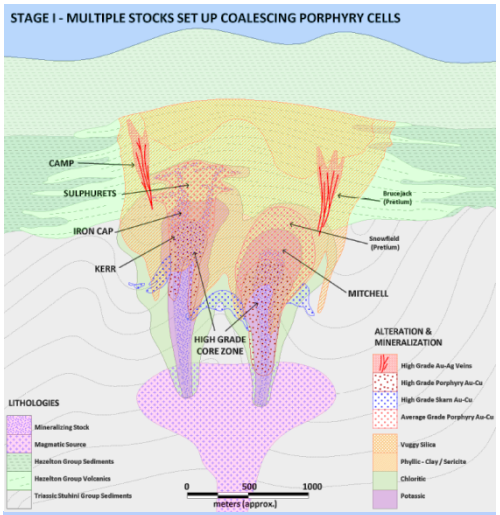
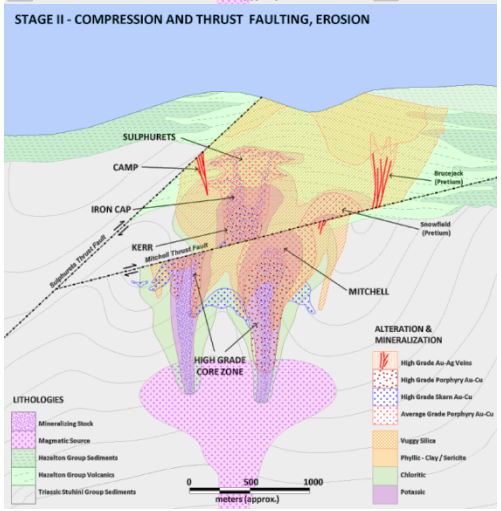
Deposit Evolution







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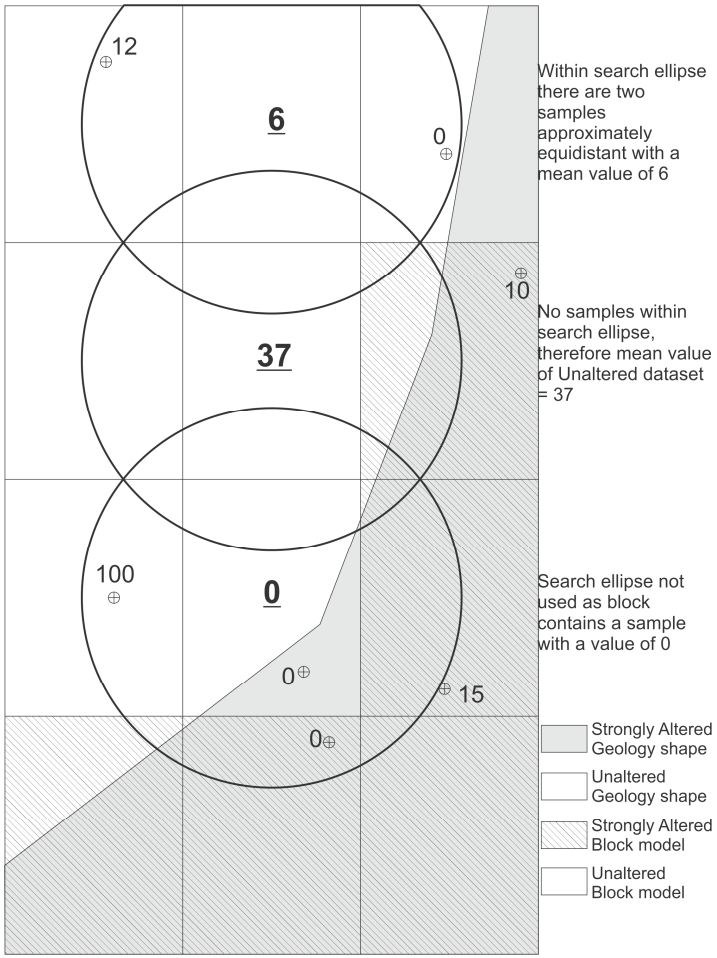
ABA Block Model



Three methods of block assignment

1. Direct
2. Two pass inverse distance estimation
3. Average based on geology model code

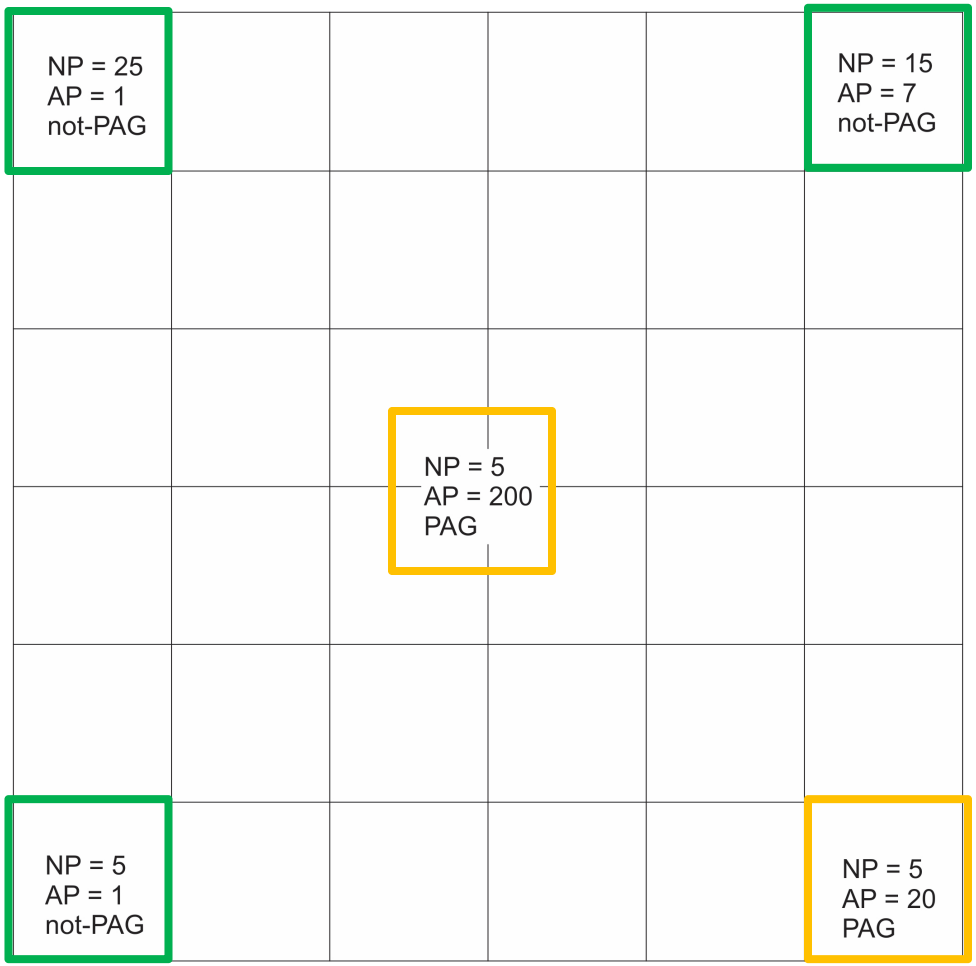
Results

	Block Model PAG	Block Model Not-PAG	ABA Samples PAG	ABA Samples Not-PAG	Tonnage of Waste (Mt)
Lithology Model					
HW Uncategorized			91%	9%	200.5
FW Uncategorized			50%	50%	240.6
Alteration Model					
QSP			86%	14%	208.2
Unaltered			43%	57%	311.0
Mine Model					
QSP			85%	15%	175.2
HW Propylitic			64%	36%	175.0

Results

	Block Model PAG	Block Model Not-PAG	ABA Samples PAG	ABA Samples Not-PAG	Tonnage of Waste (Mt)
Lithology Model					
HW Uncategorized	100%	0%	91%	9%	200.5
FW Uncategorized	99%	1%	50%	50%	240.6
Alteration Model					
QSP	99%	1%	86%	14%	208.2
Unaltered	79%	21%	43%	57%	311.0
Mine Model					
QSP	99%	1%	85%	15%	175.2
HW Propylitic	100%	0%	64%	36%	175.0

ABA Results



Based on ABA
60% not-PAG
40% PAG

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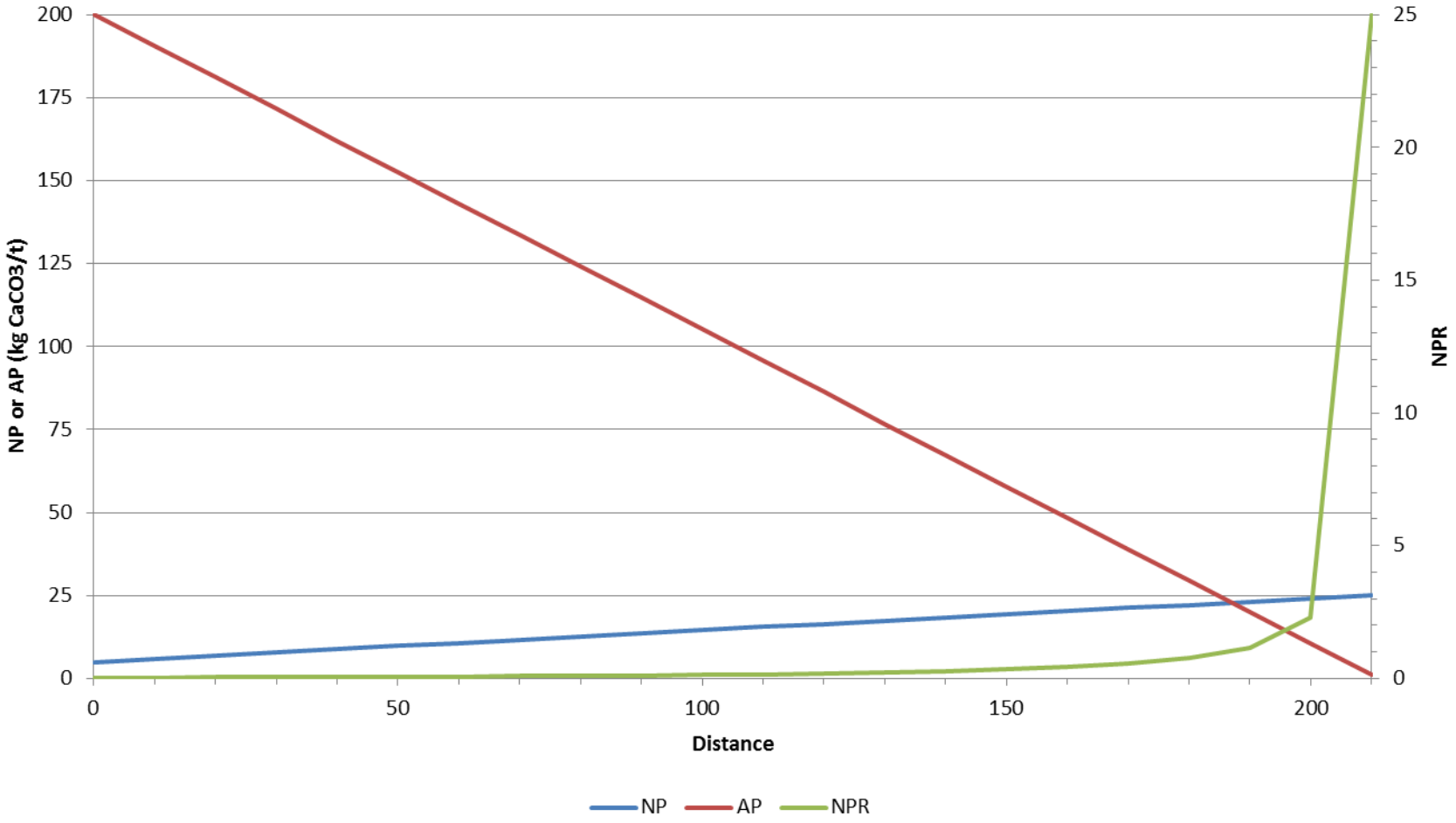
Inverse Distance Weighting



Block Model Results

NP = 25 AP = 1 not-PAG	AP = 32	AP = 77	AP = 68	AP = 26	NP = 15 AP = 7 not-PAG
AP = 32	AP = 88	AP = 145	AP = 115	AP = 53	AP = 23
AP = 76	AP = 145	NP = 5 AP = 200 PAG	AP = 152	AP = 84	AP = 49
AP = 66	AP = 114	AP = 152	AP = 124	AP = 76	AP = 49
AP = 22	AP = 49	AP = 82	AP = 75	AP = 46	AP = 30
NP = 5 AP = 1 not-PAG	AP = 18	AP = 47	AP = 48	AP = 30	NP = 5 AP = 20 PAG

Based on ABA
60 % not-PAG
40 % PAG

Based on Blocks
9 % not-PAG
91 % PAG

Results

	Block Model PAG	Block Model Not-PAG	ABA Samples PAG	ABA Samples Not-PAG	Tonnage of Waste (Mt)
Lithology Model					
HW Uncategorized	100%	0%	91%	9%	200.5
FW Uncategorized	99%	1%	50%	50%	240.6
Alteration Model					
QSP	99%	1%	86%	14%	208.2
Unaltered	99%	1%	43%	57%	311.0
Mine Model					
QSP	99%	1%	85%	15%	175.2
HW Propylitic	100%	0%	64%	36%	175.0

Conclusions

- Each geological model contains 2 major units that comprise more than 50% of the waste rock from the Kerr Deposit
- When using ABA data results each geological model contained one major unit that had large proportion of not-PAG material
- When the same data was used in an ABA block model each geological unit was nearly 100% PAG
- ABA block models are conservative and can account for geospatial variations

Questions?