

# 3D Geological Model of the Central Domain in the Pine Creek Orogen

A reinterpretation and integration of the existing regional database

Gemma Mitjanas

Steven Micklethwaite

Sustainable Minerals Institute



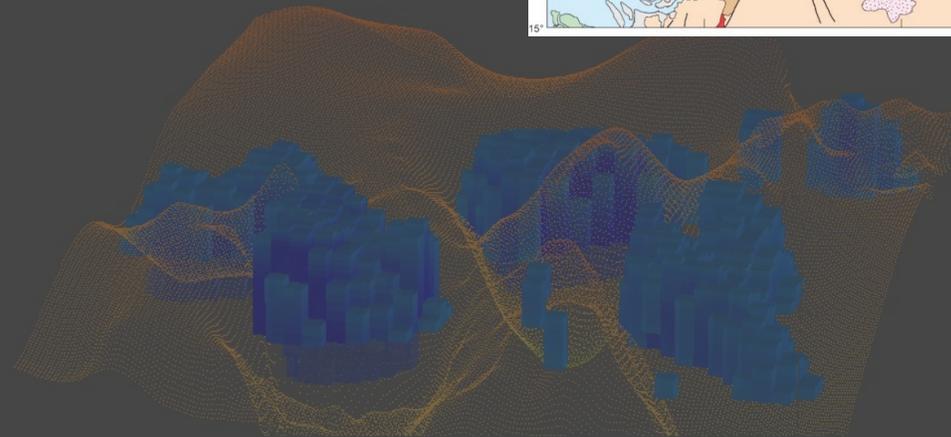
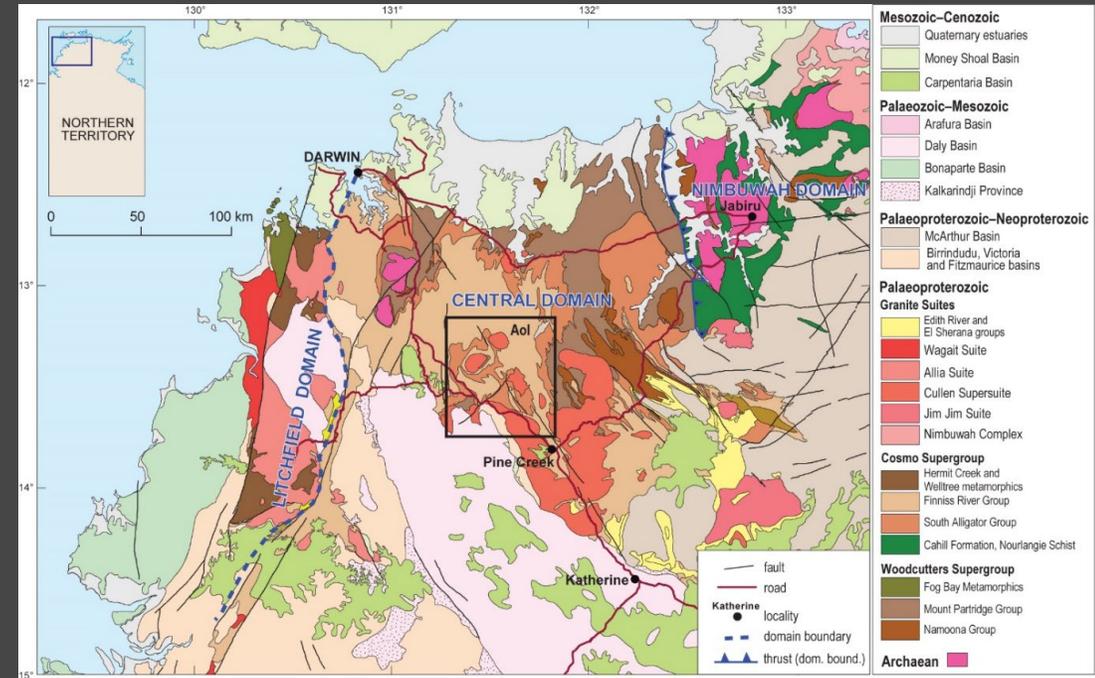
# Project overview

**Task 1.** Data compilation, review, QAQC

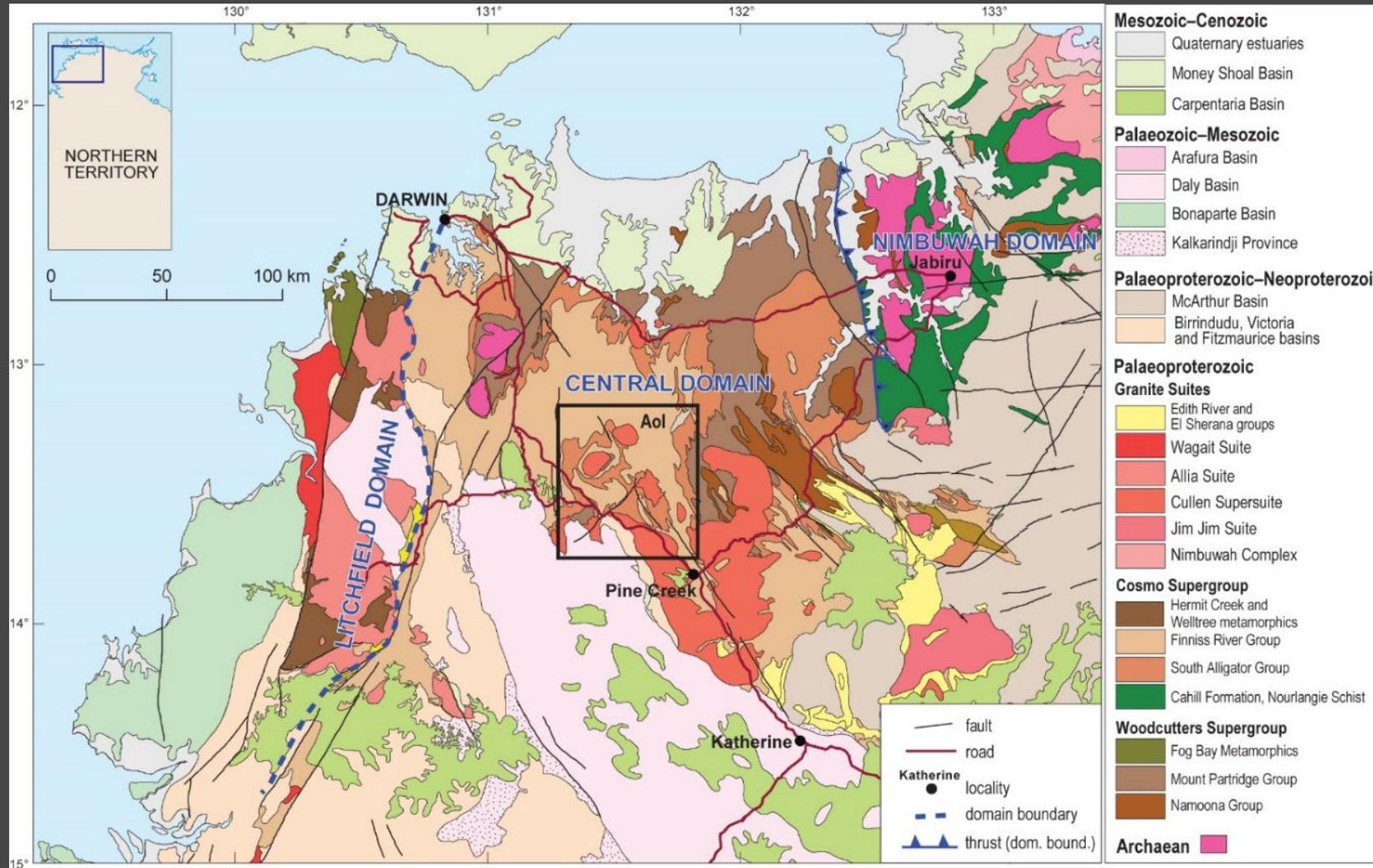
**Task 2.** Validation and Update of the Geological Map

**Task 3.** Cross-sections, Geophysical Forward and Inverse models

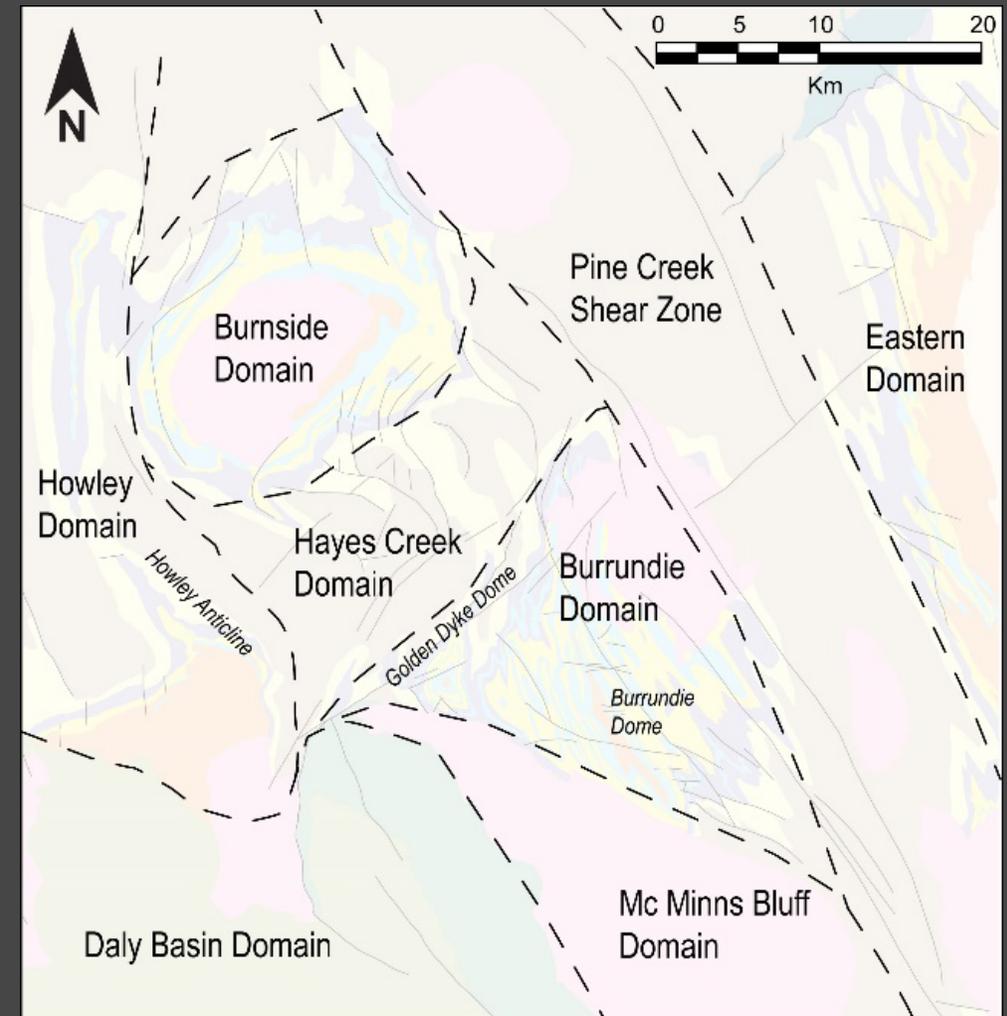
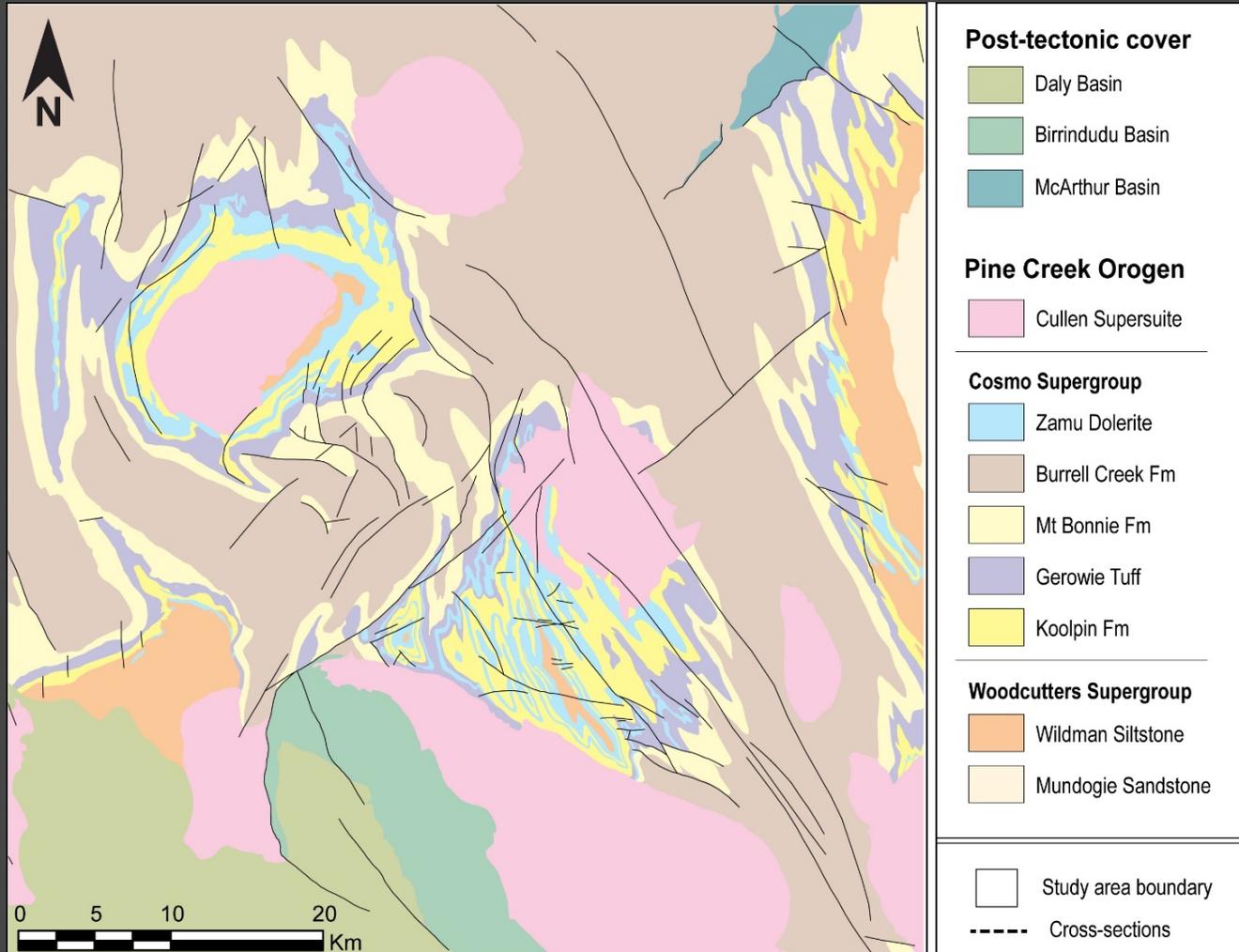
**Task 4.** Geological model



# Project overview



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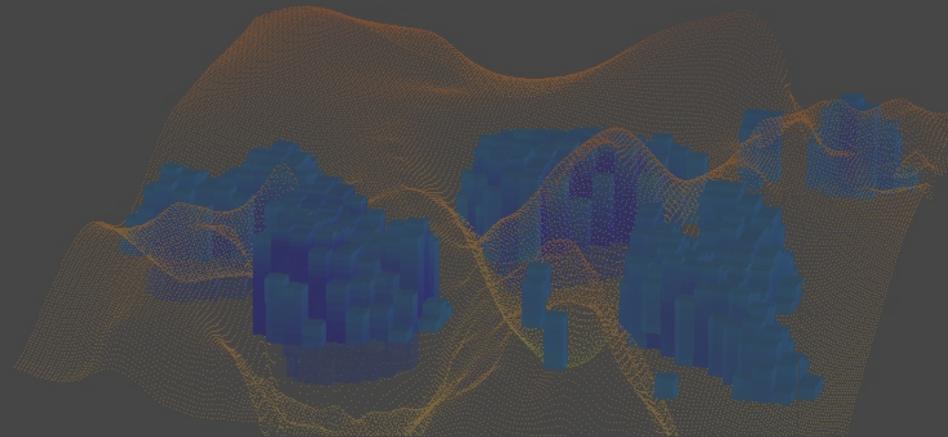
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**Task 1. Data compilation, review, QAQC**

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**Task 4. Geological model**



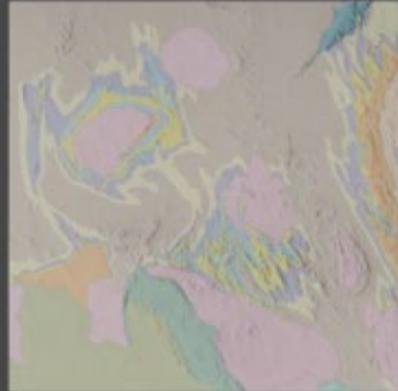
# Geological Map Update

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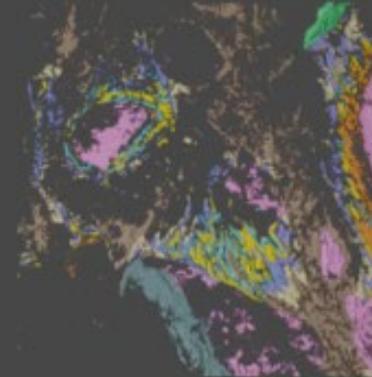
DEM



Interpreted Geology



Outcrop Geology



# Geological Map Update

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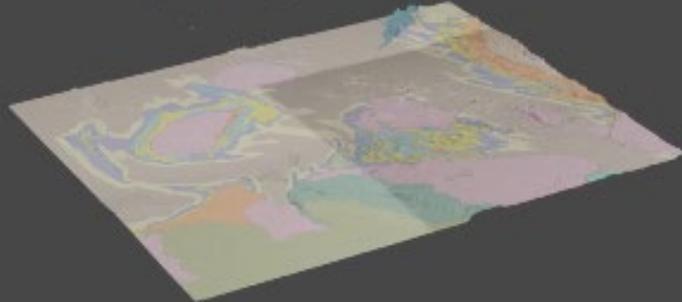
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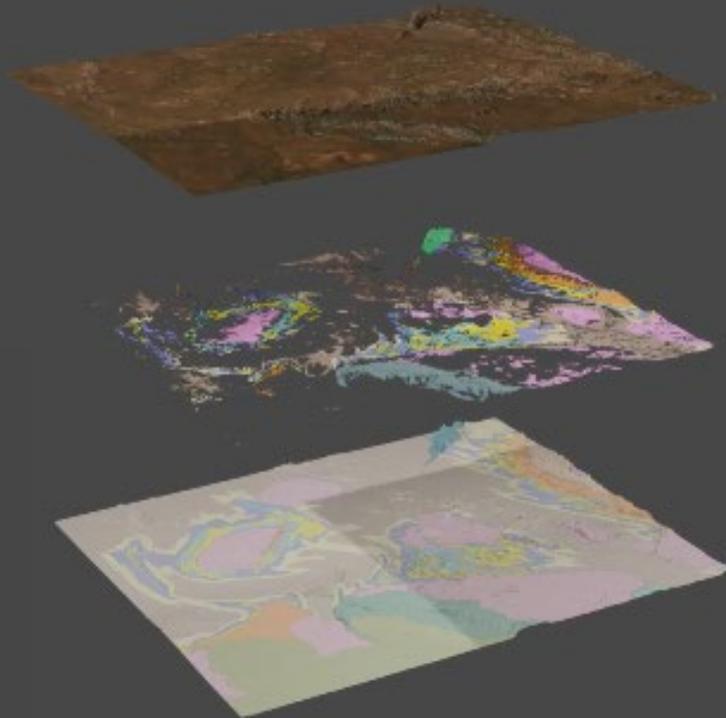
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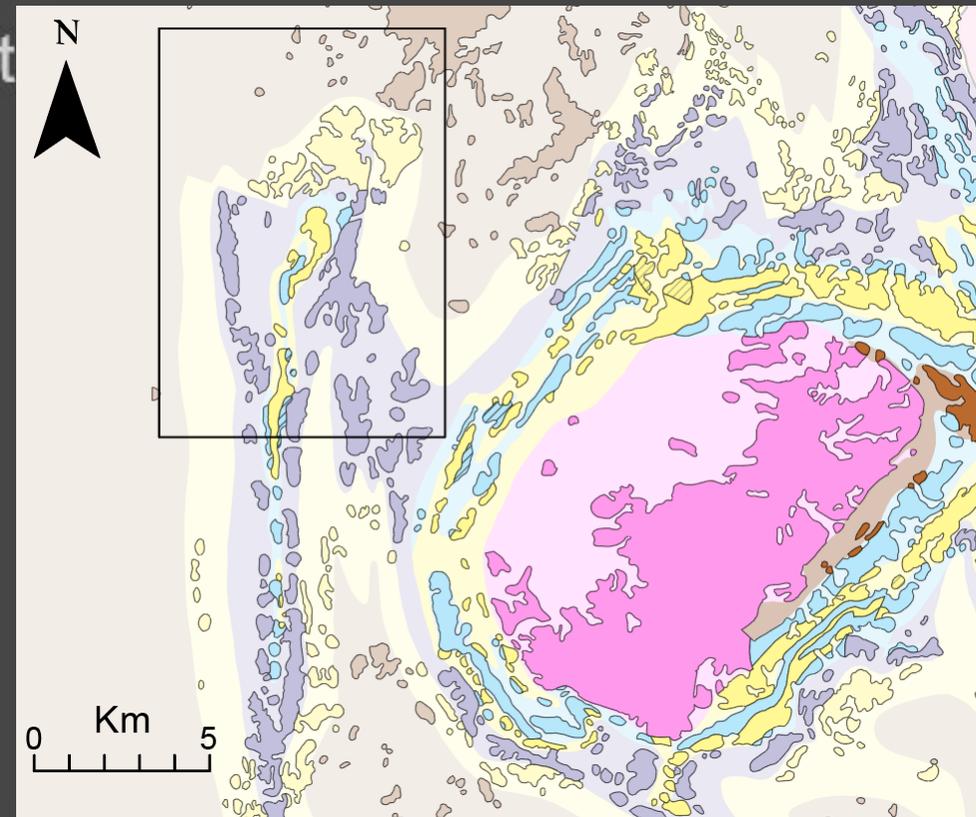
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DEM

Interpret

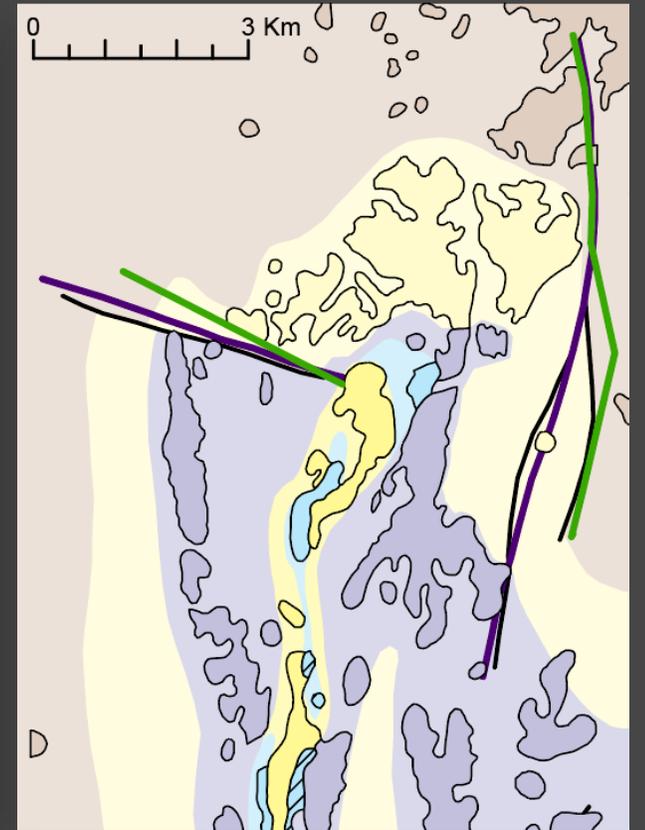
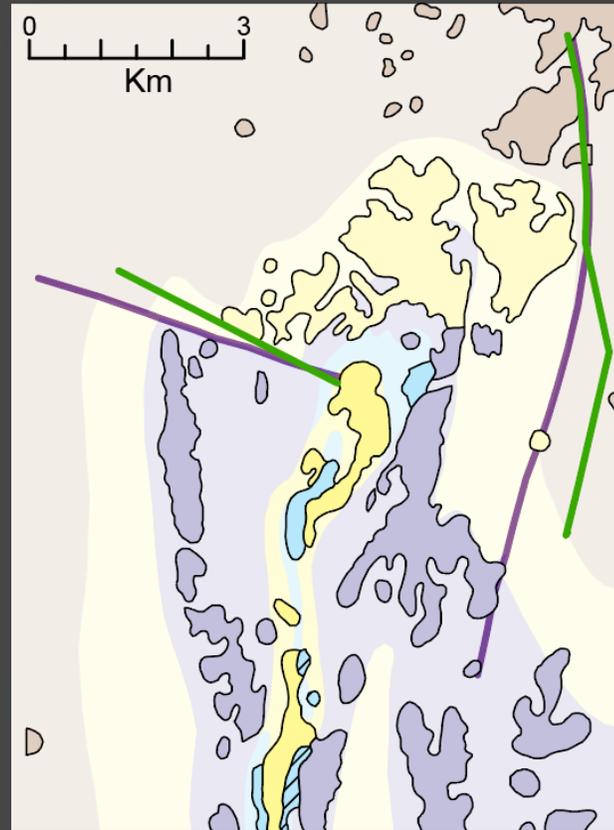
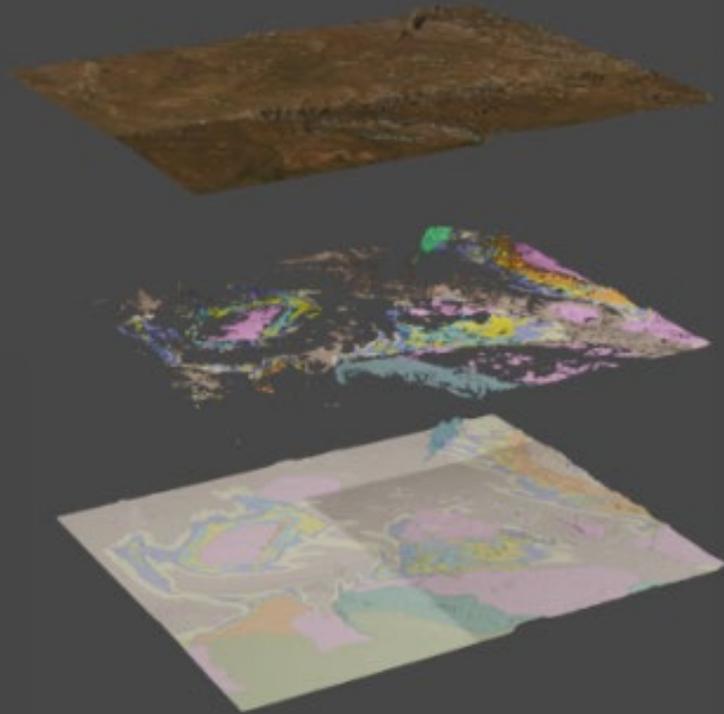


- Cullen Supersuite (Burnside)
- Zamu Dolerite
- Burrell Creek Fm
- Mount Bonnie Fm
- Gerowie Tuff
- Koolpin Fm
- Mount Partridge Group



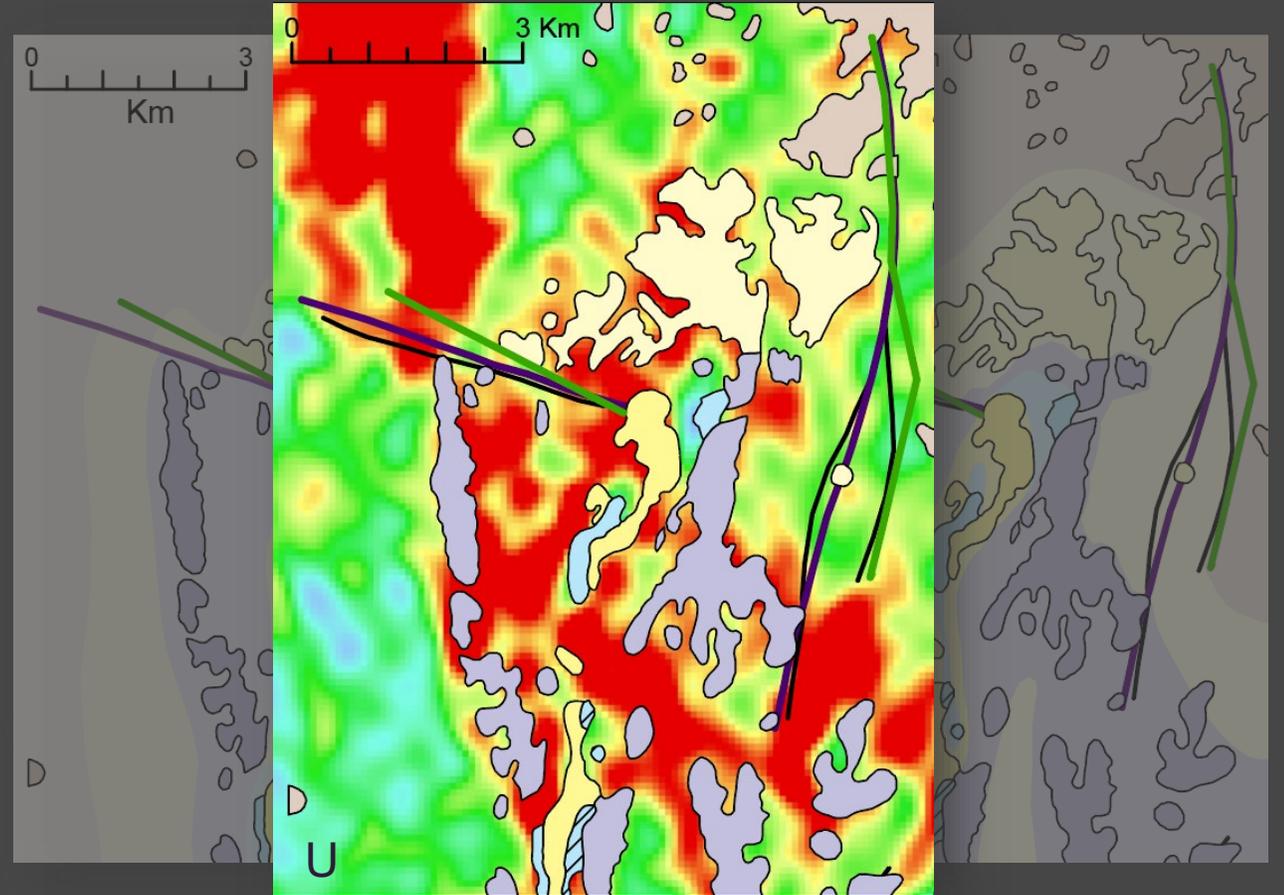
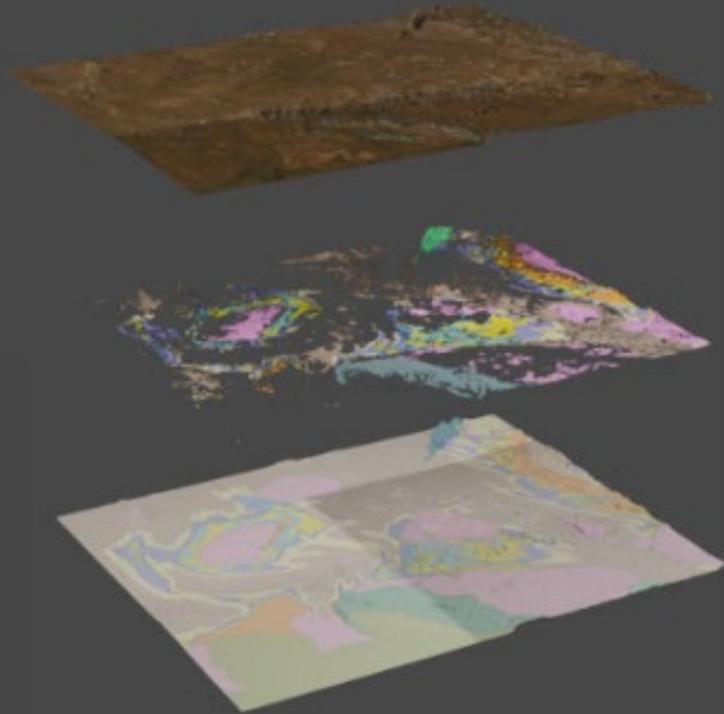
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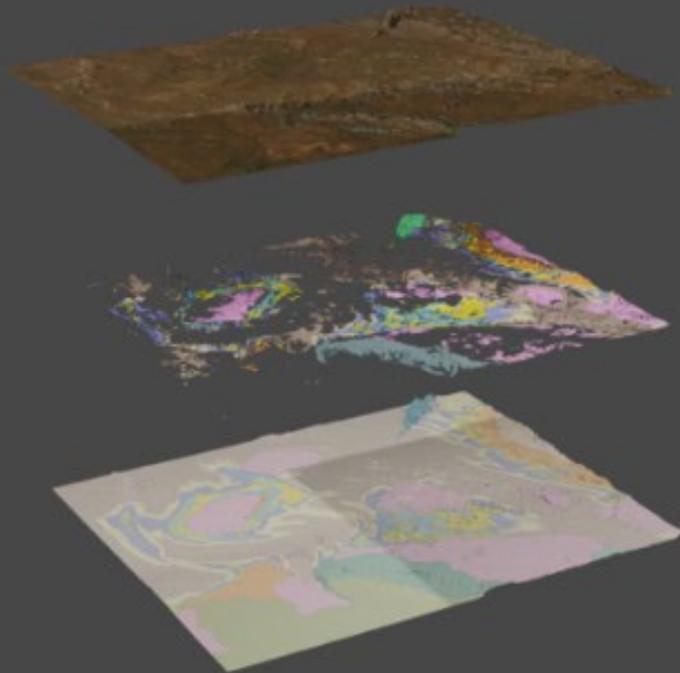
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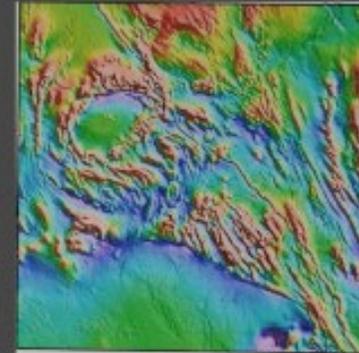
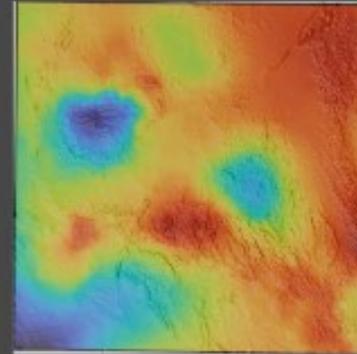
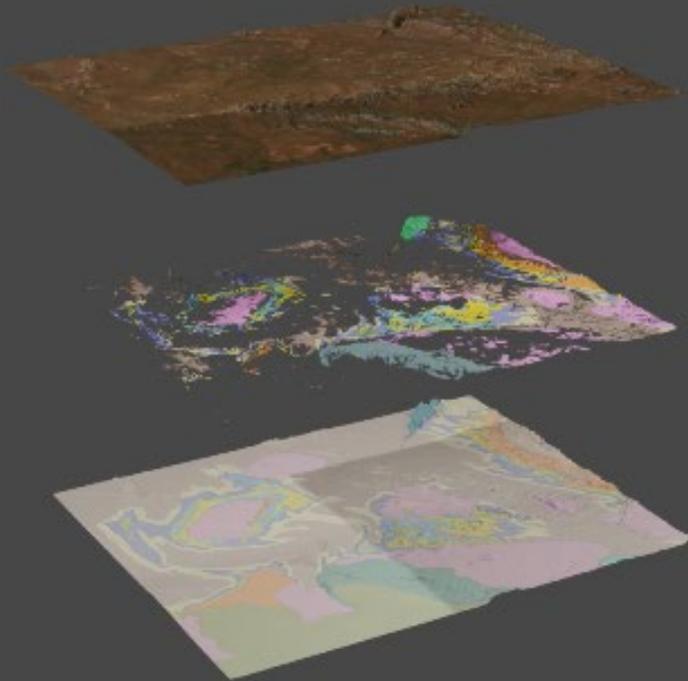
# Geological Map Update → Cross-sections

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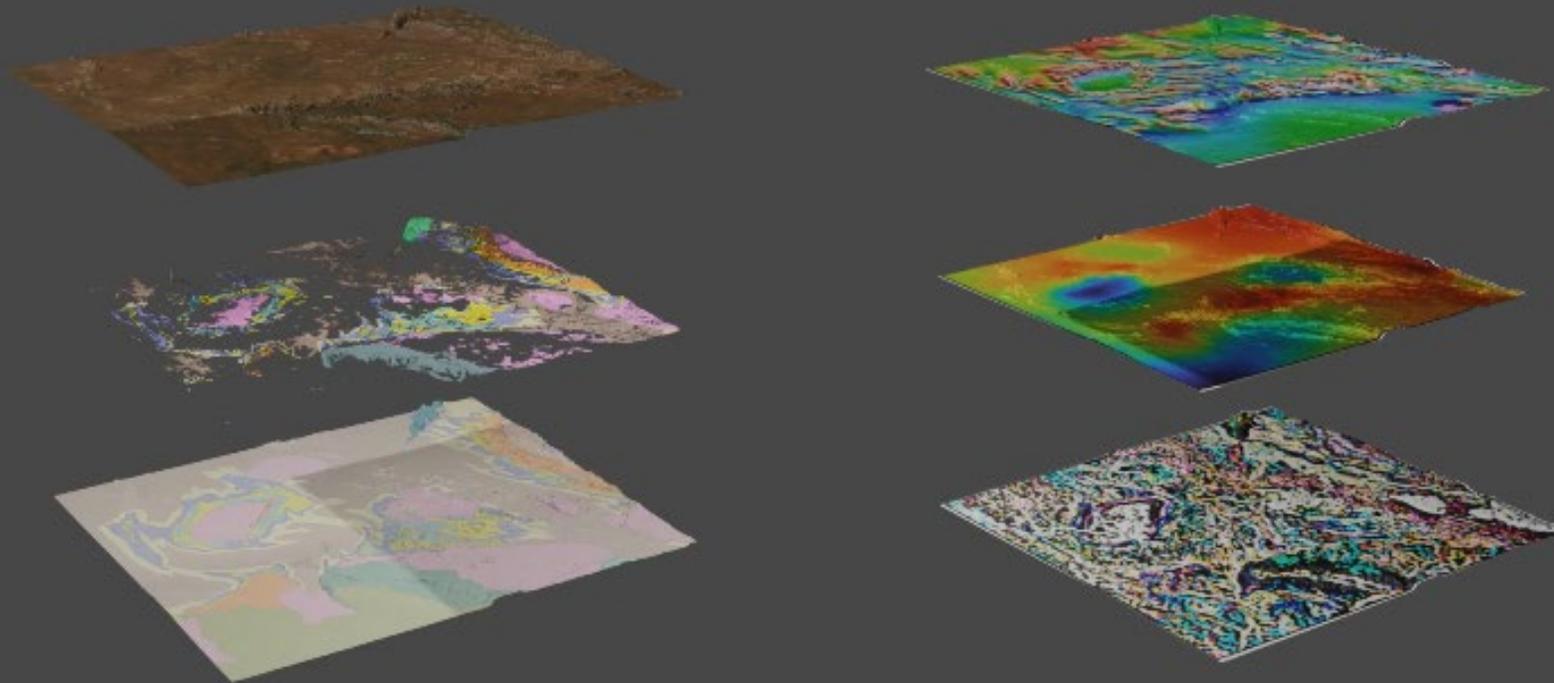
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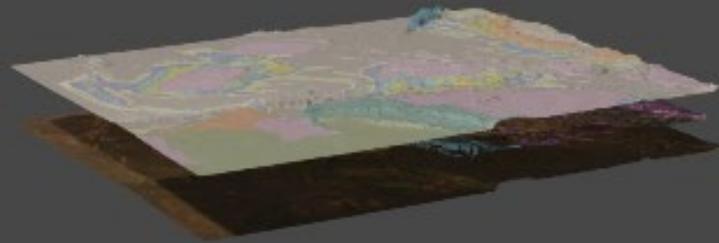
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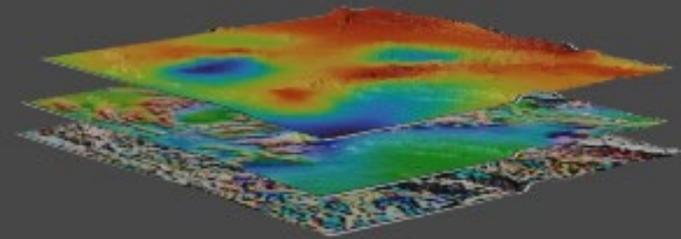


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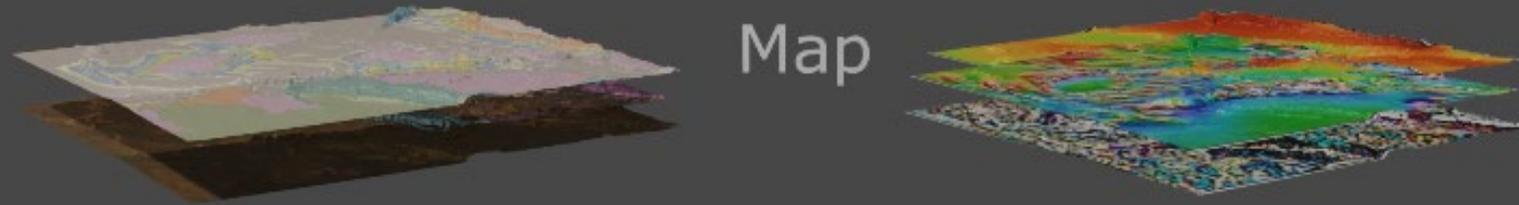
Map



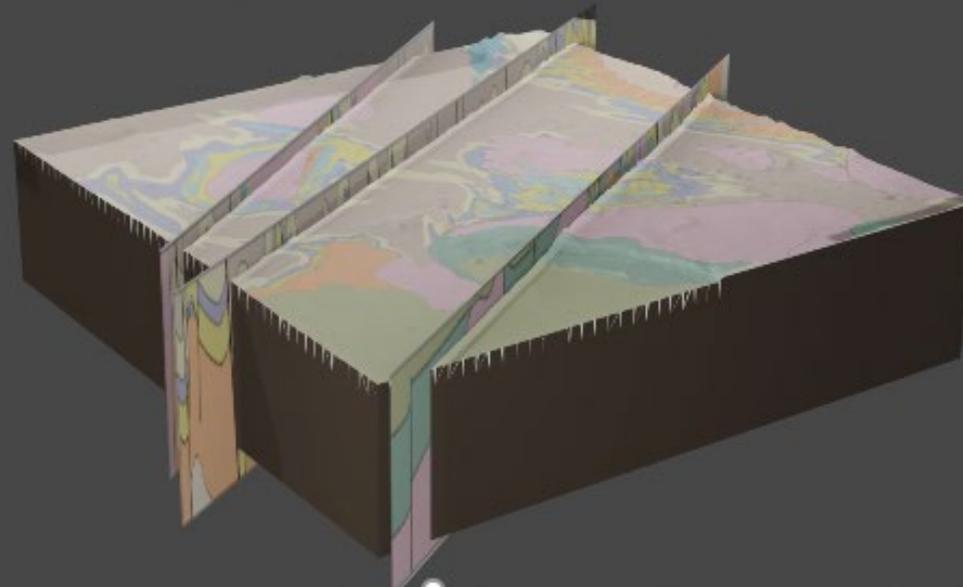
2D Section

# Geological Map Update → Cross-sections

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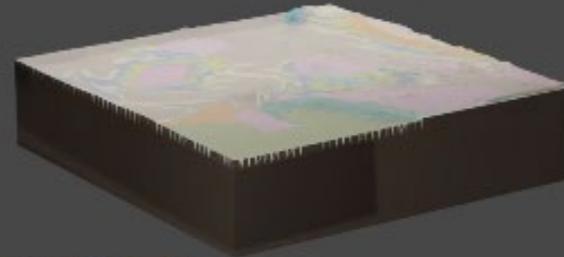
2D Section



# Geological Map Update → Cross-sections



2D Section



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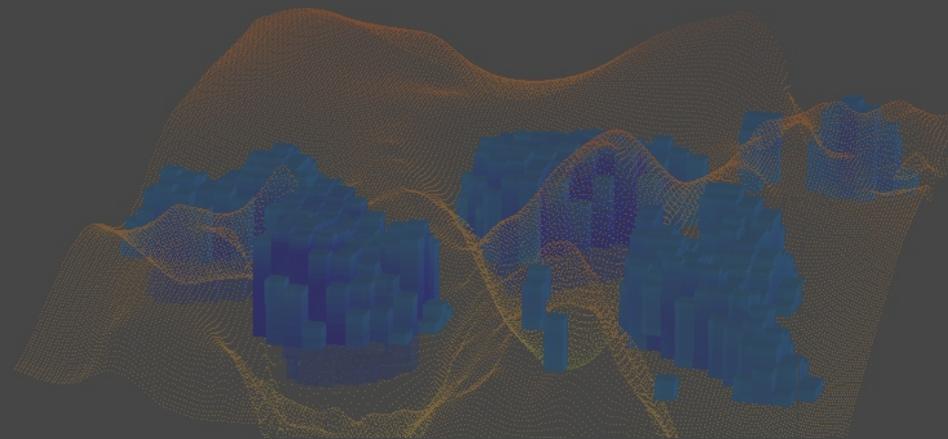
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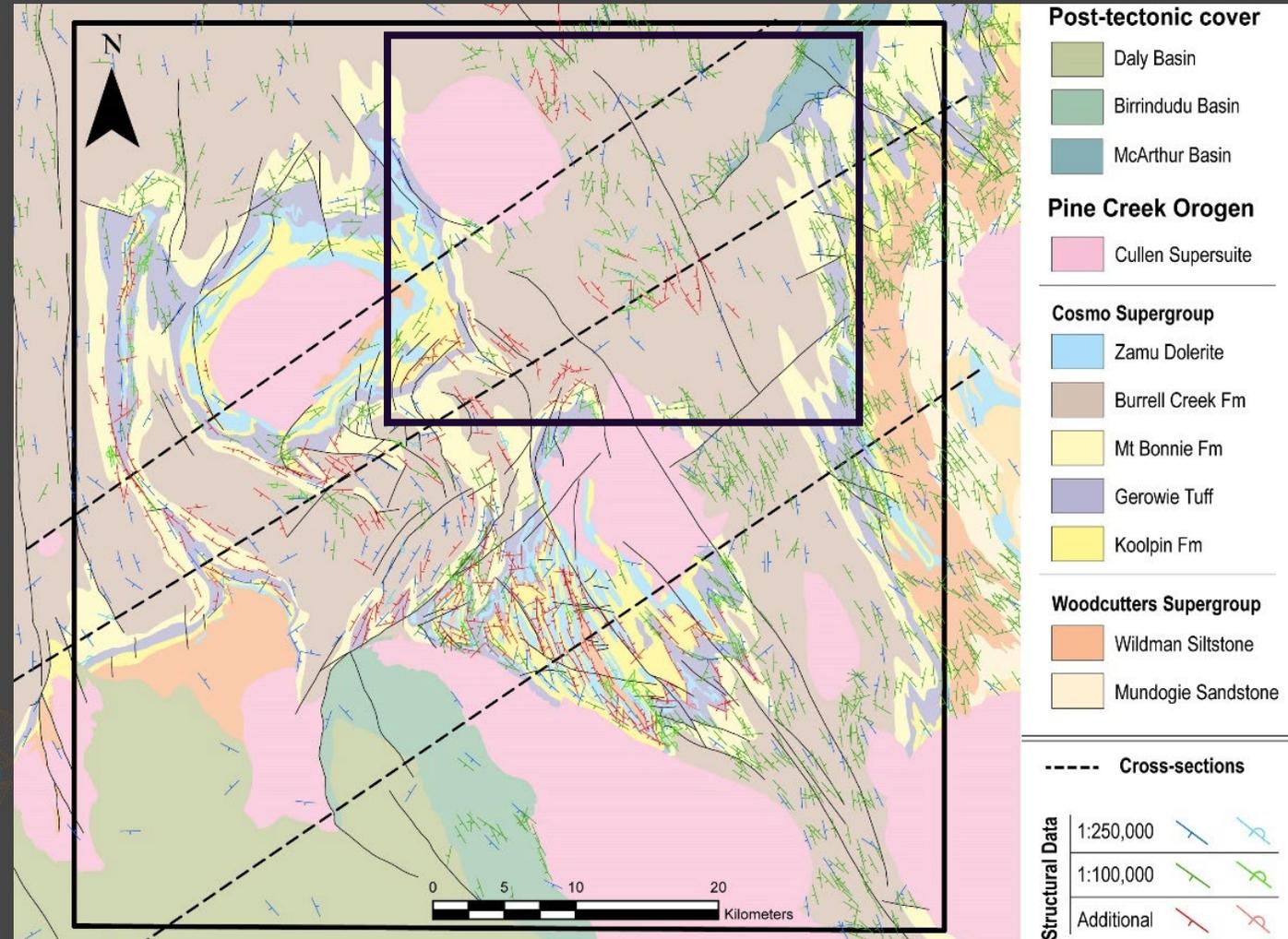


# 2D Analysis

## Cross-sections

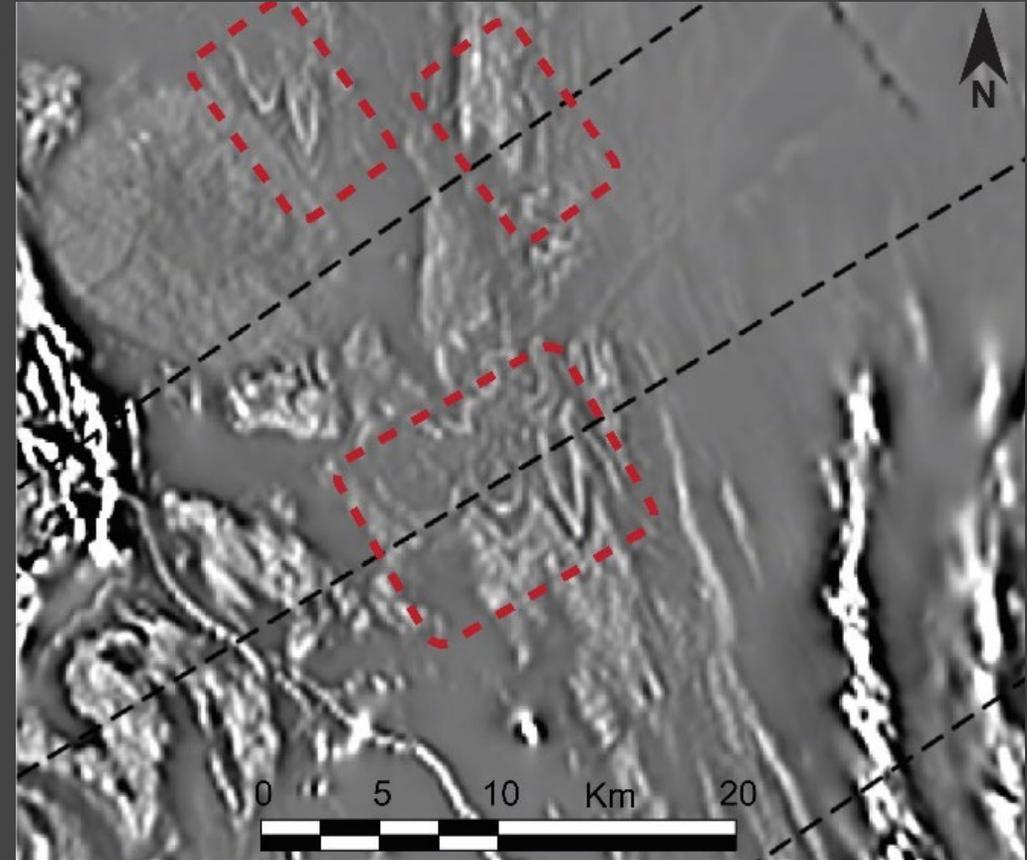
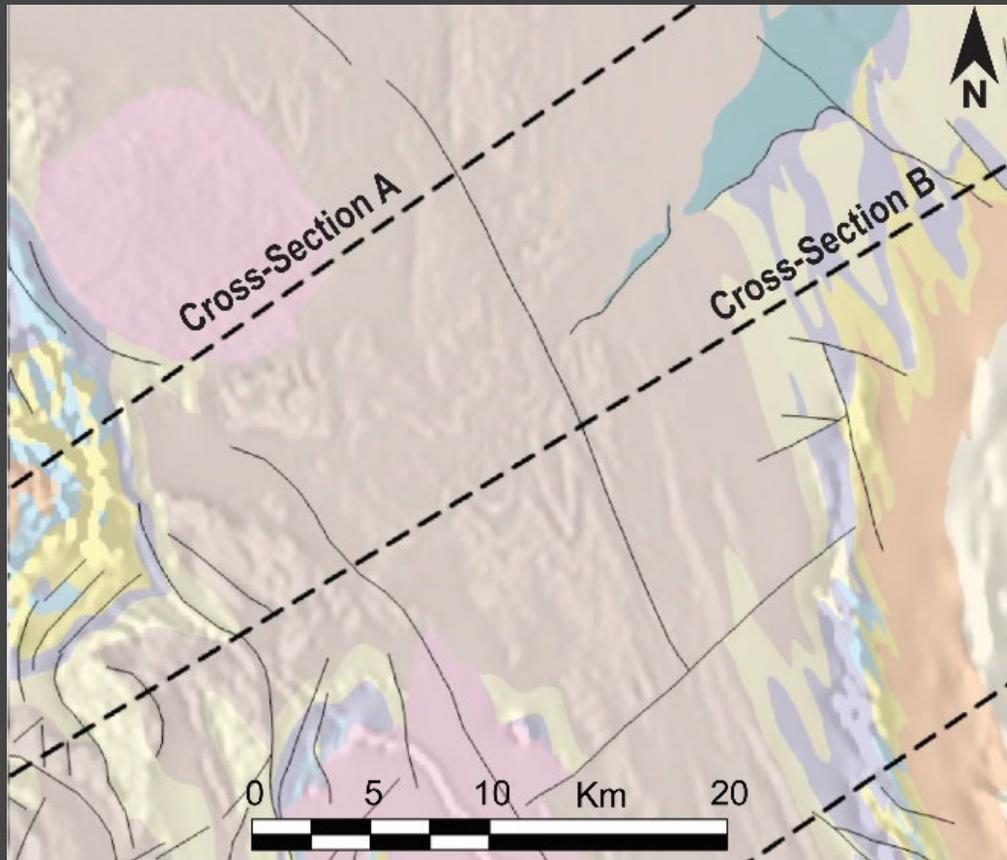
- Profile selection
- Transfer geological boundaries
- Projecting structural data

- \*Layer thickness assumptions
- \*Zamu Dolerite
- \*Structural evolution



# 2D Analysis

## Cross-sections



# 2D Analysis

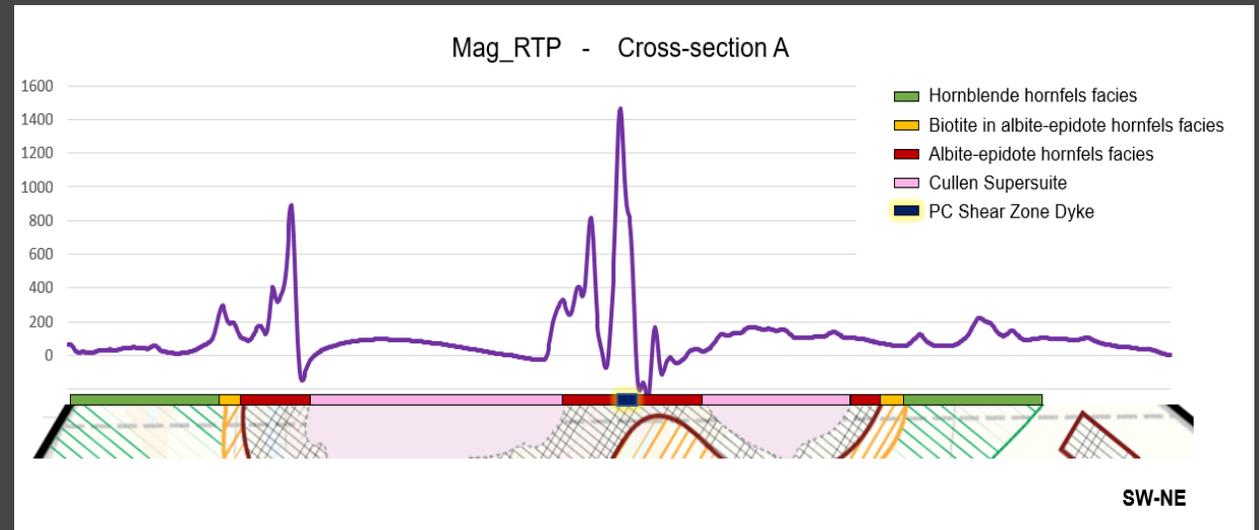
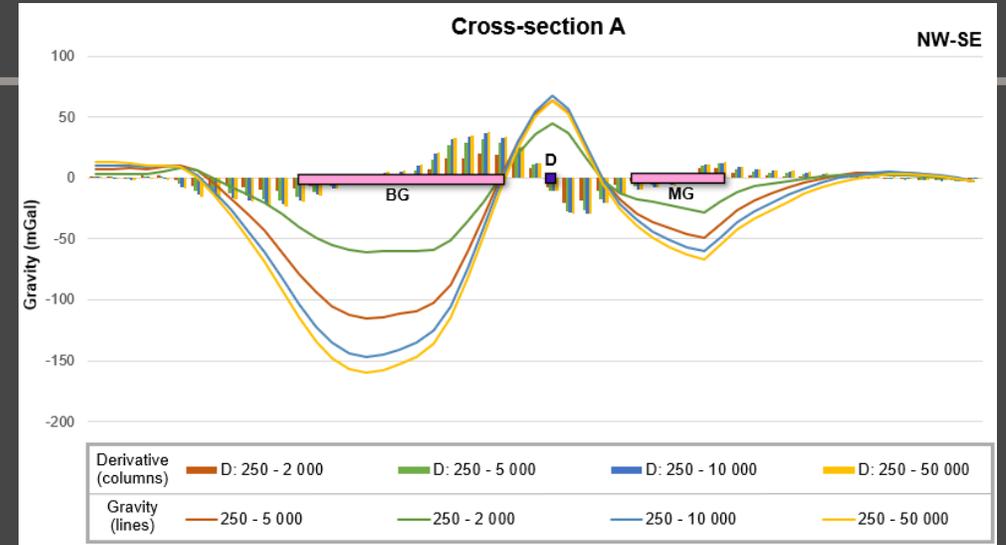
Cross-sections



Geophysical section analysis



Forward models (grav and mag)



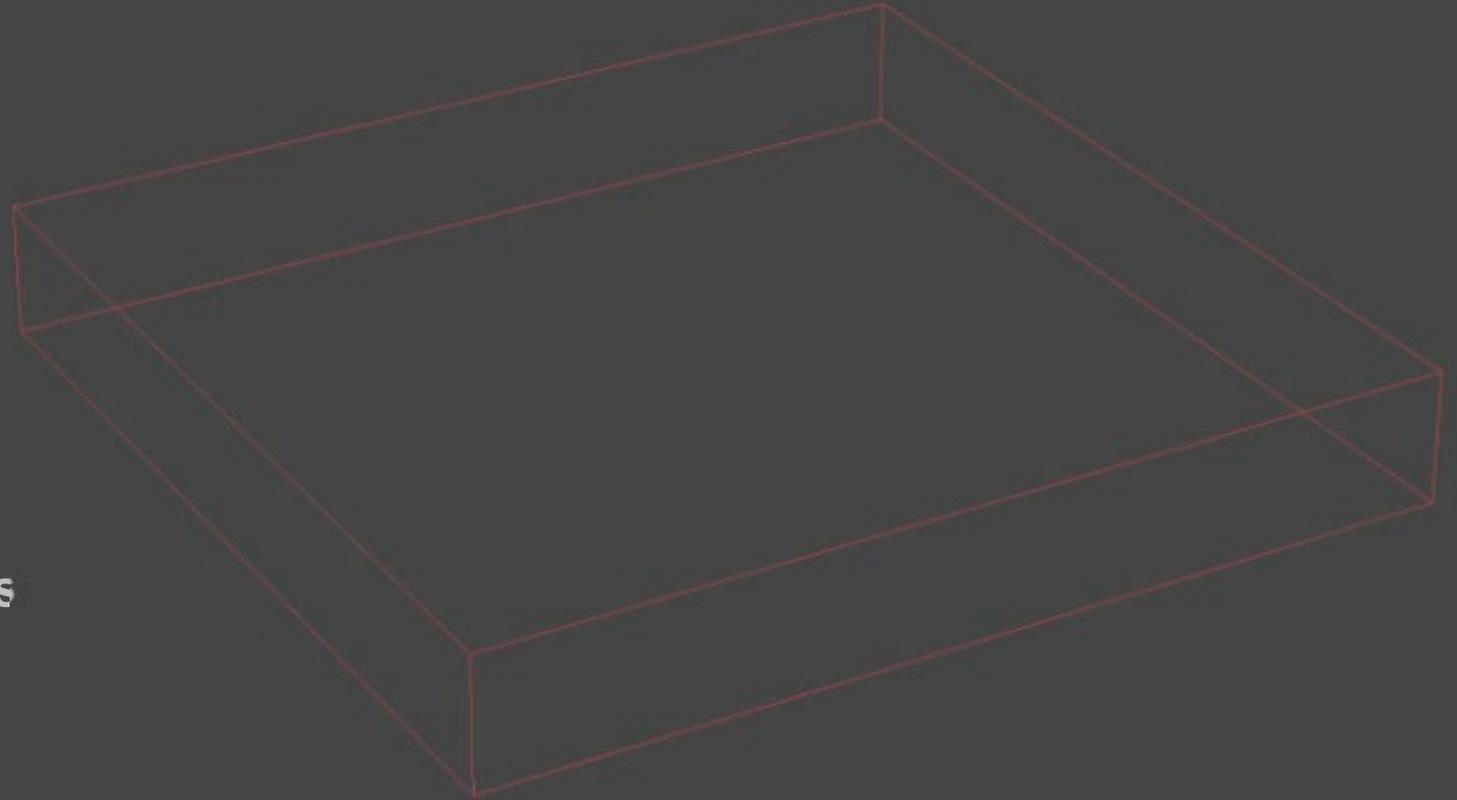
# 3D Geological Model

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1. Cullen Supersuite model

2. Structural/Fault model

3. Rest of the geological units



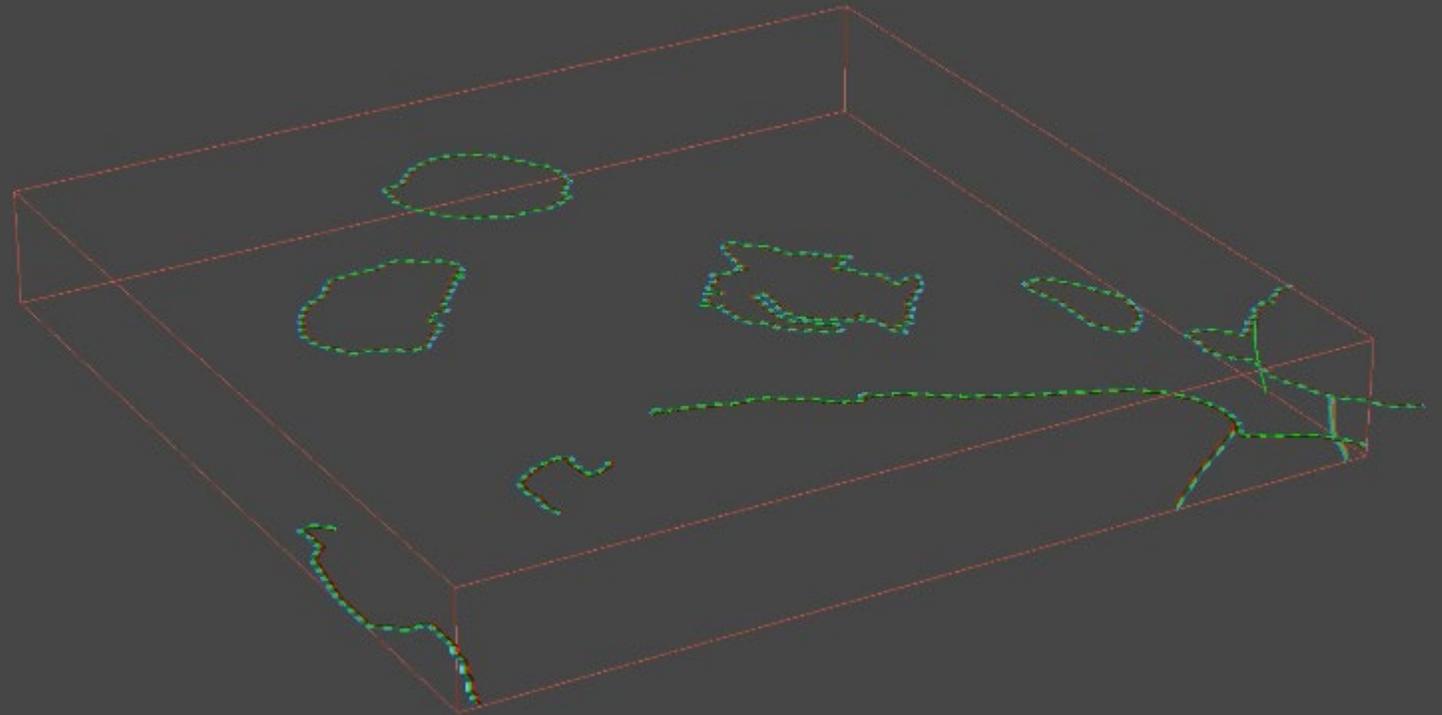
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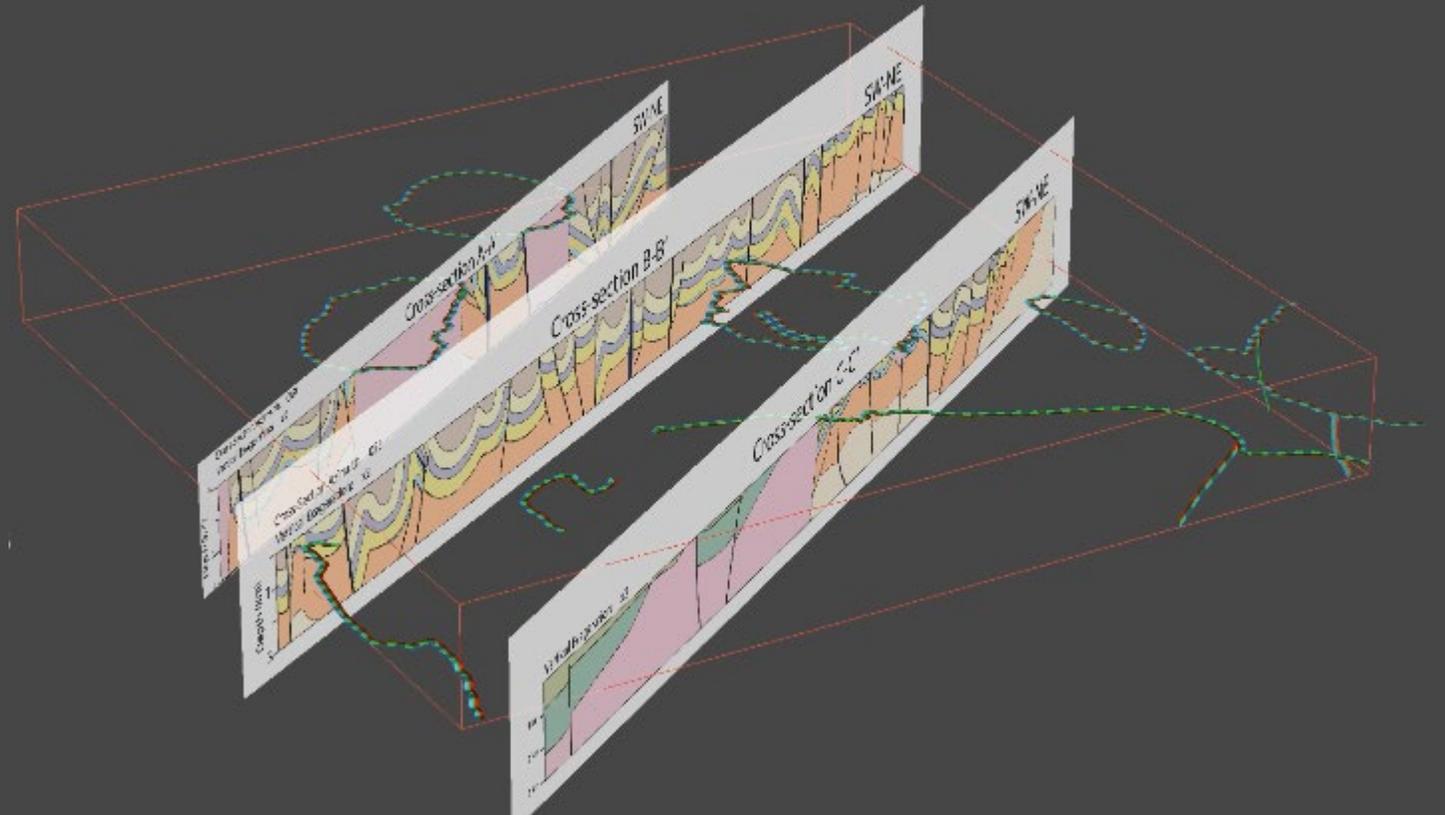


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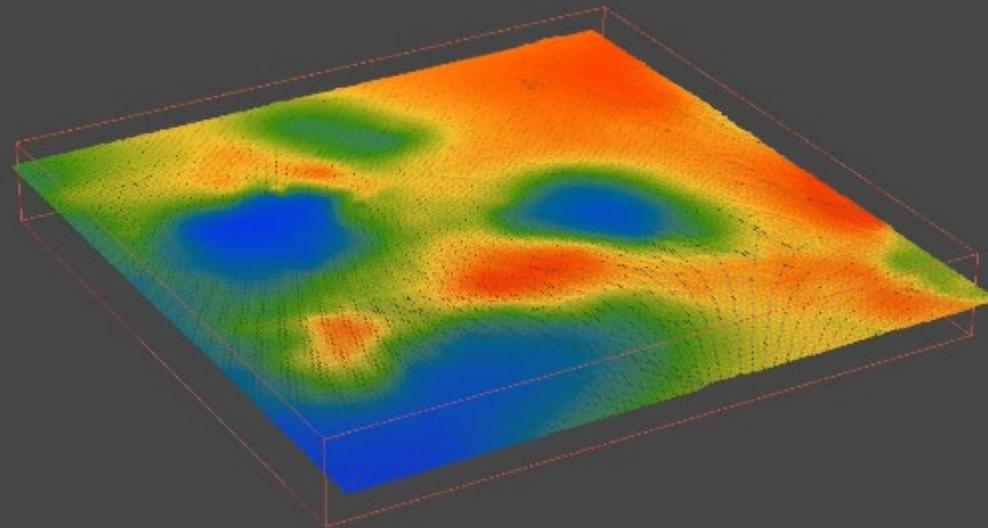
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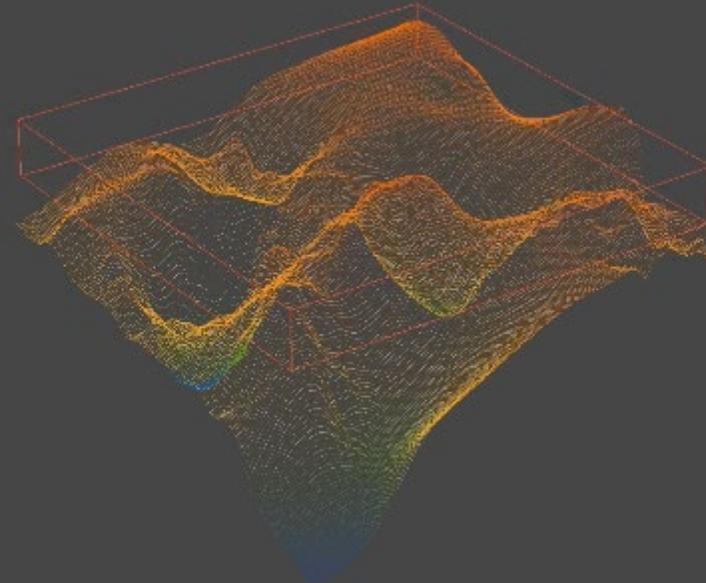
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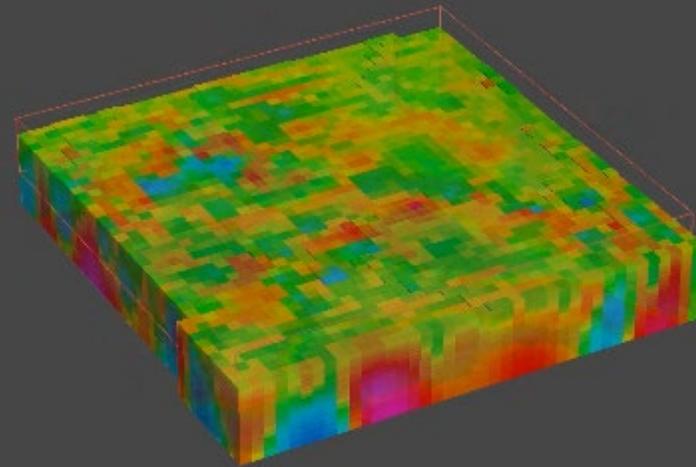
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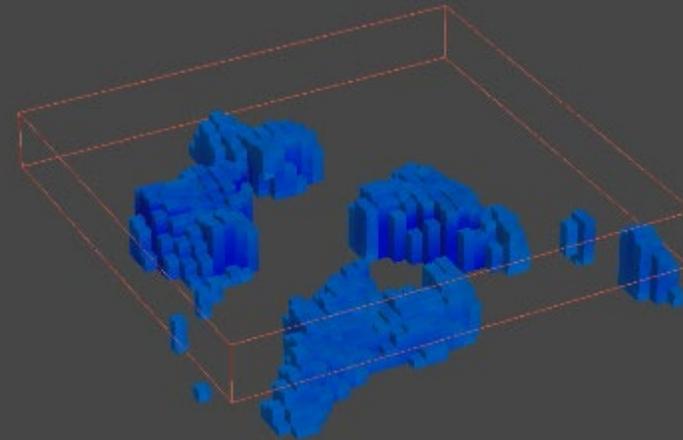
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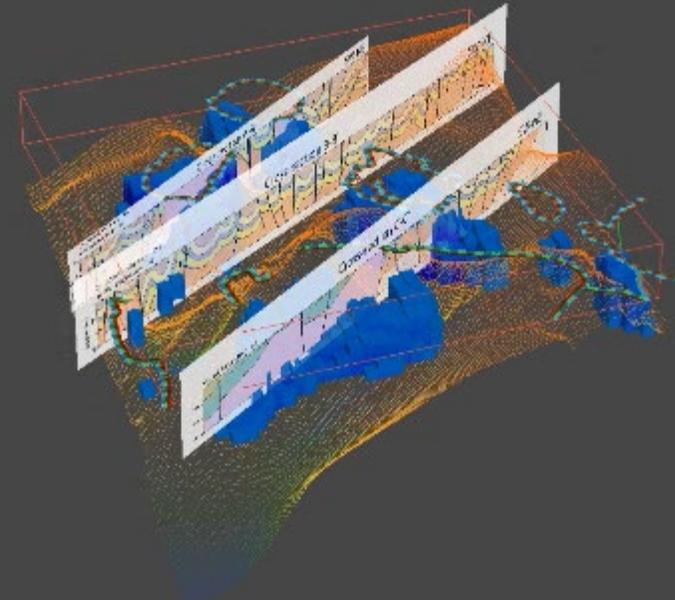
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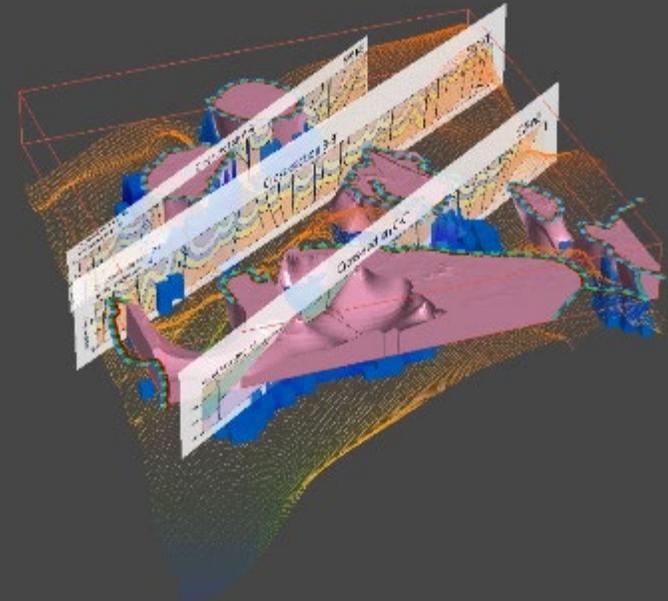
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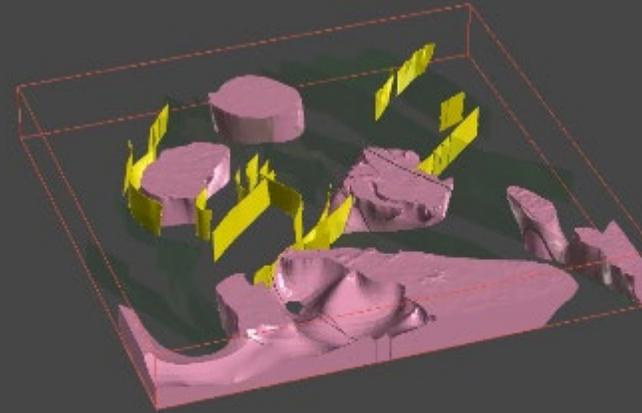
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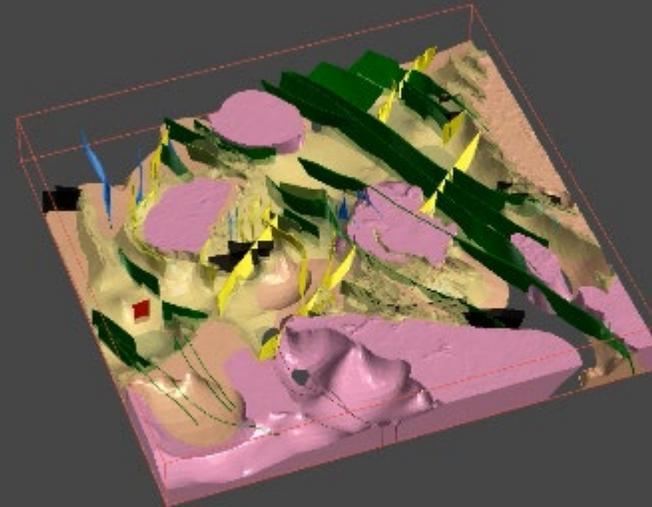
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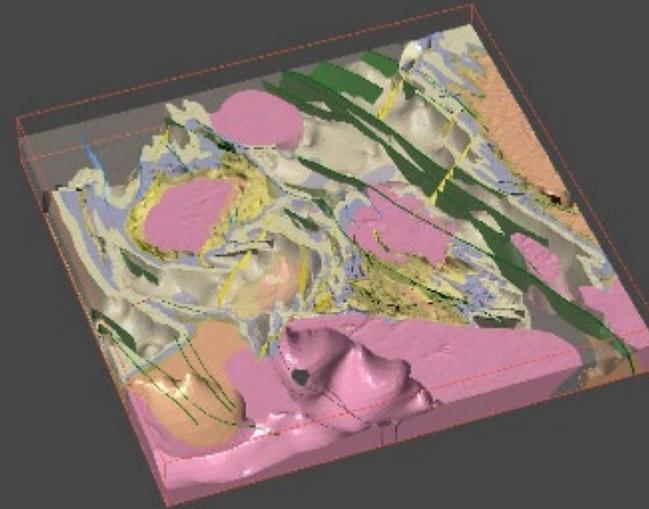
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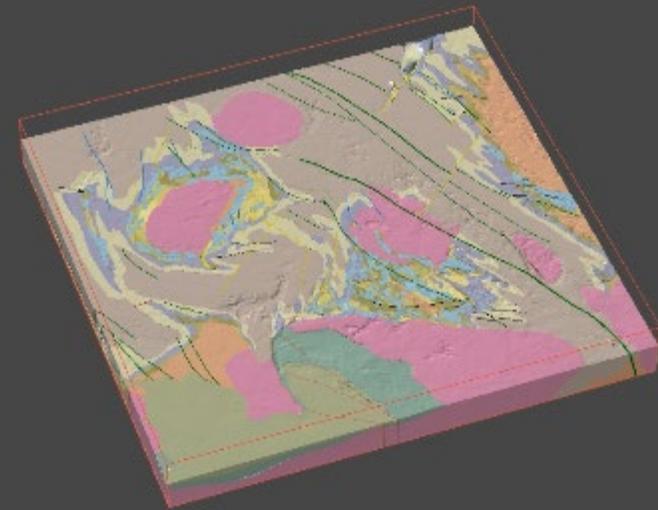
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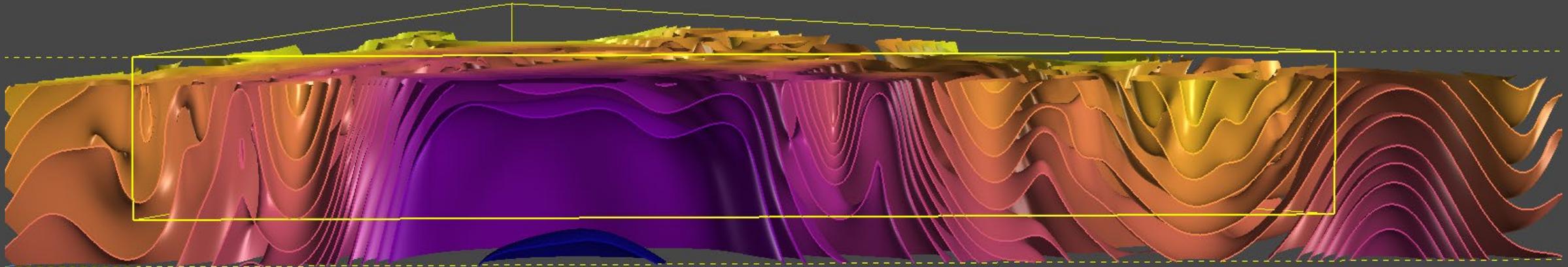
2. Structural/Fault model

3. Rest of the geological units



# 3D Geological Model

*\*Form Interpolant*



Plunge +03  
Azimuth 328



## 3. Rest of the geological units

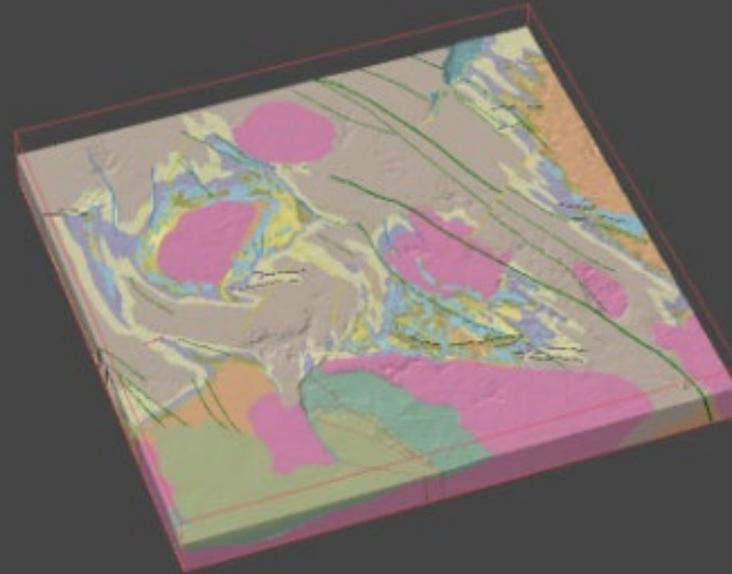
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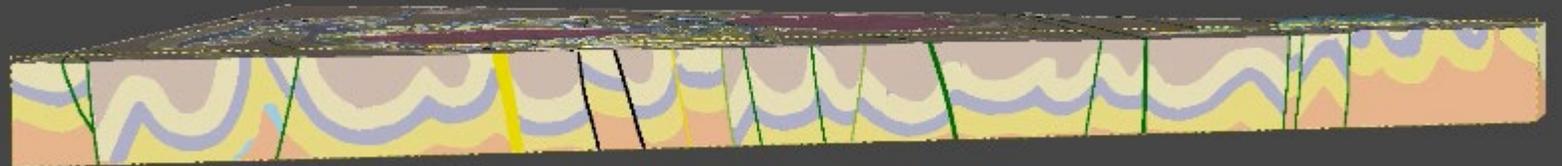
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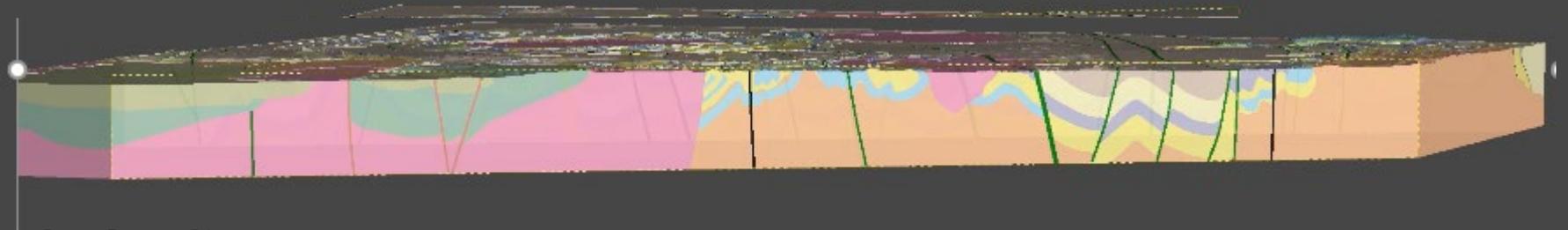
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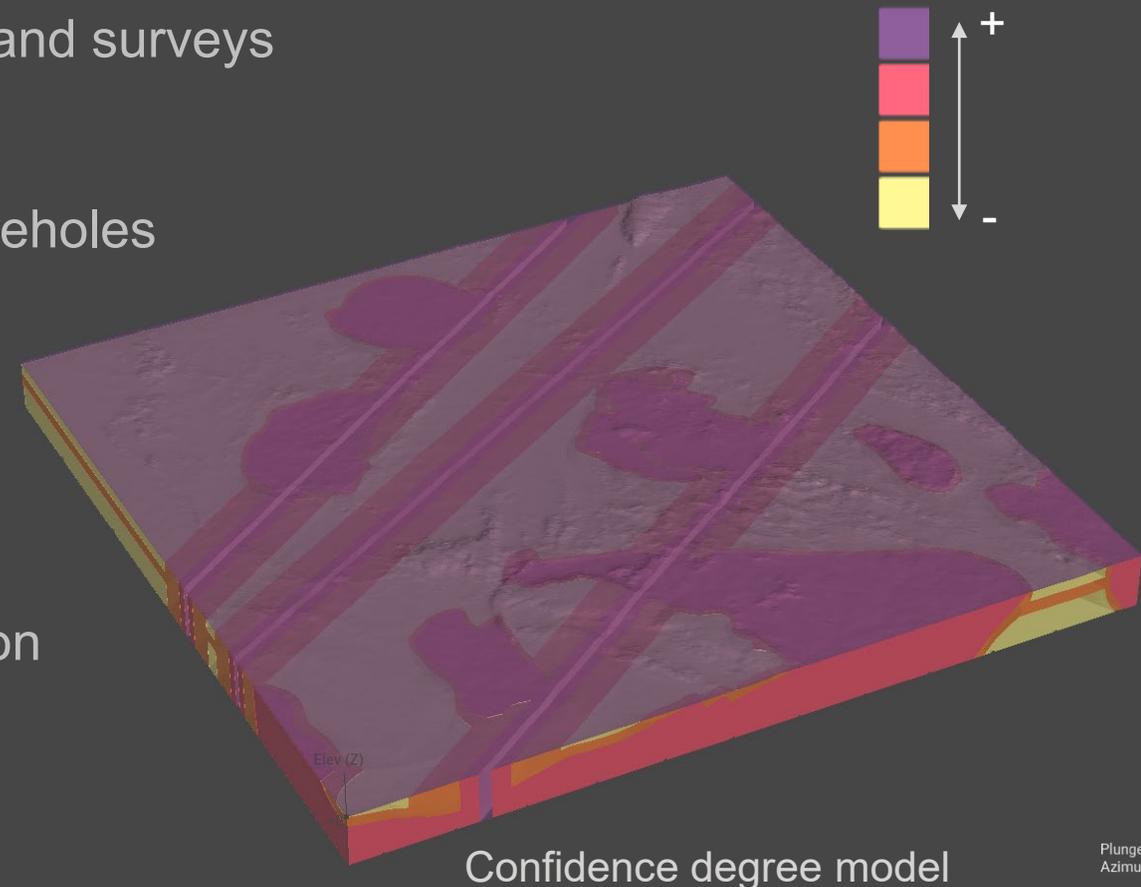
# Discussions

## - Improving the confidence degree of the 3D Geological Model

- Update with the improved geophysical grids and surveys
- Target smaller areas → Industry data
- Deep validation → Geophysics and deep boreholes
- **Fault Mapping**

## - Preliminary discussions

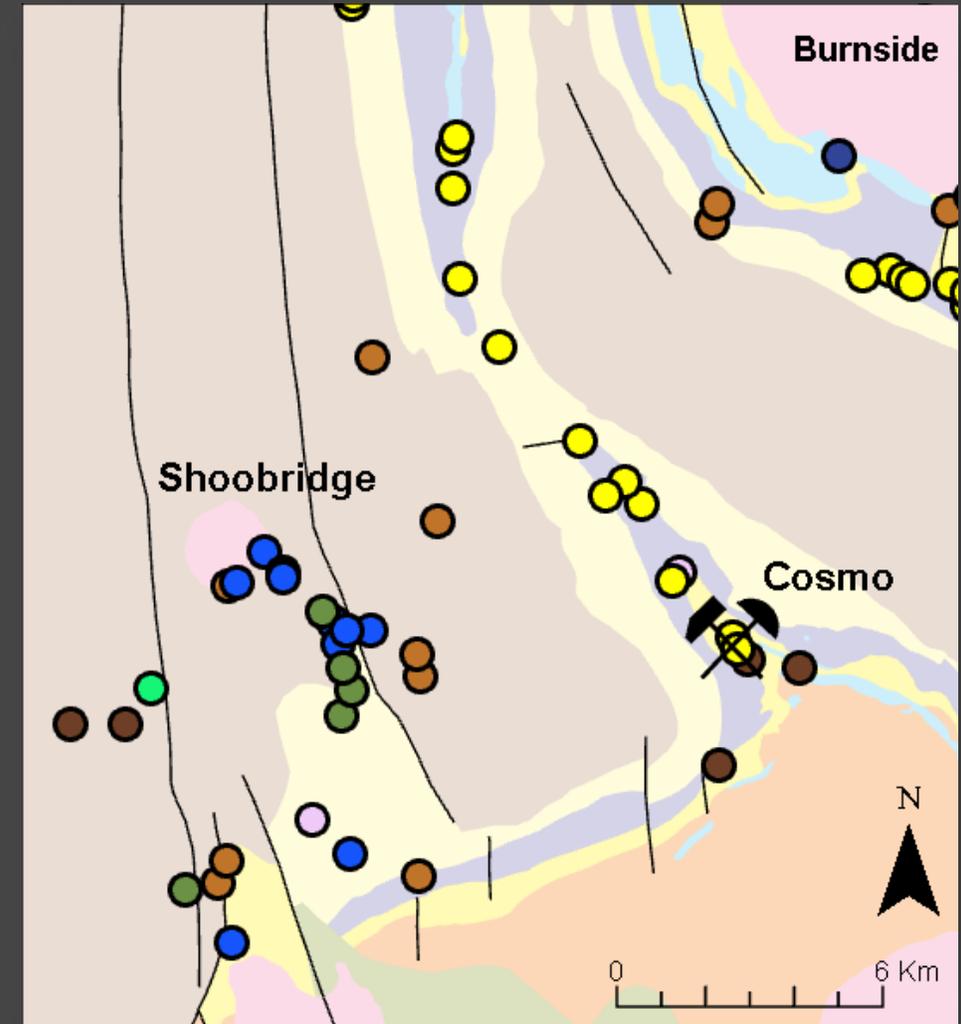
- Regional Structural Framework
- Structural influence in commodities distribution
- Cullen Supersuite analysis



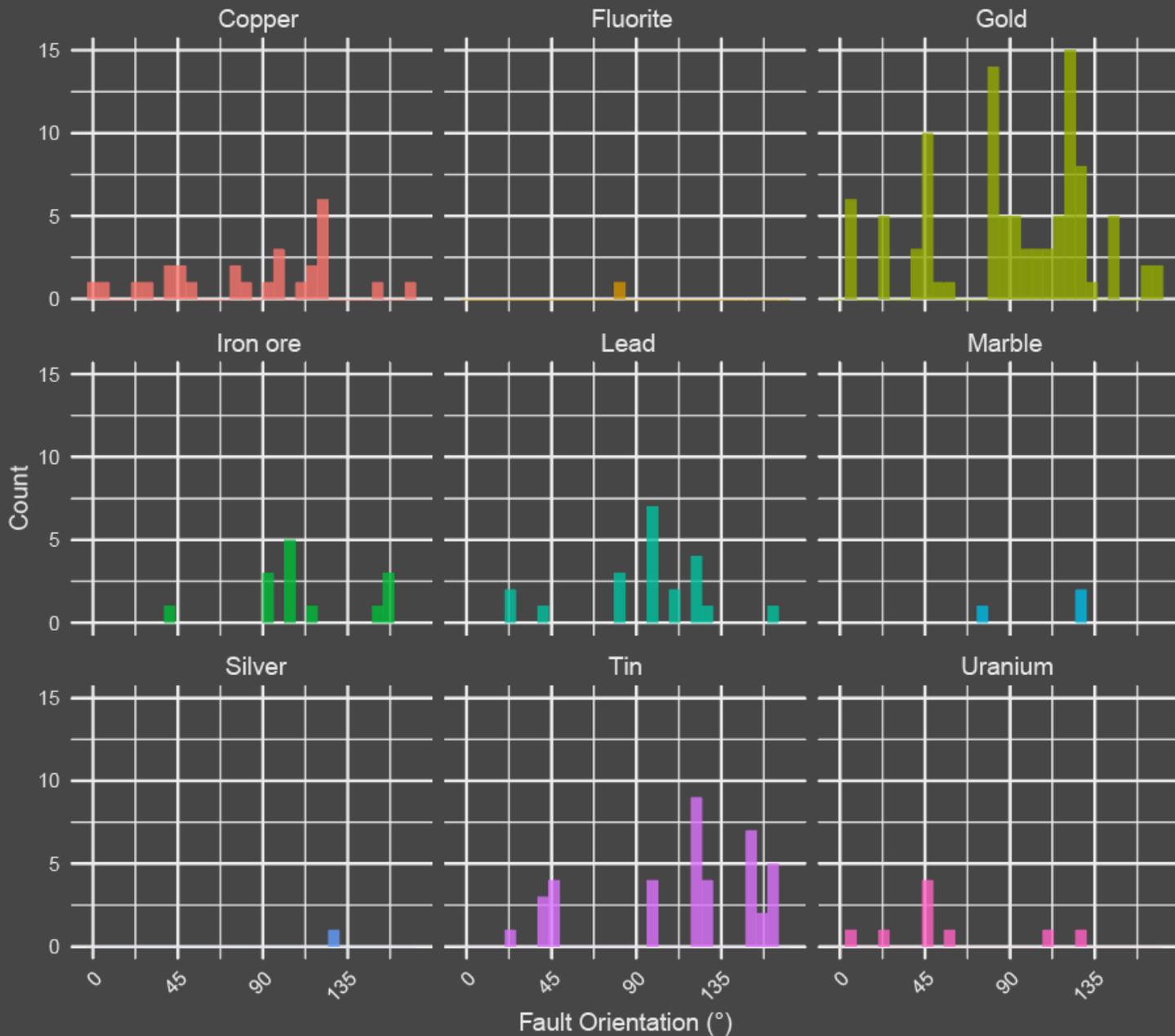
# Discussions

- REGIONAL STRUCTURAL FRAMEWORK
- **STRUCTURAL INFLUENCE IN COMMODITIES DISTRIBUTION**
- CULLEN SUPERSUITE ANALYSIS

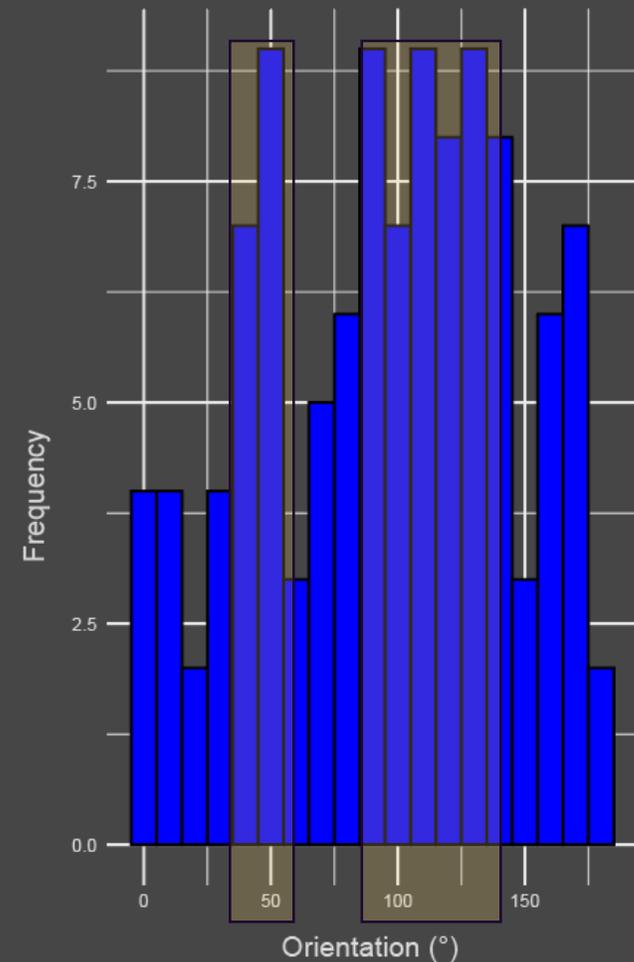
- Iron ore
- Manganese
- Lead
- Copper
- Gold
- Tin



### Distribution of Nearest Fault Orientation by Mineral Occurrence



### Frequency Distribution of Fault Orientations



# Discussions

- REGIONAL STRUCTURAL FRAMEWORK
- STRUCTURAL INFLUENCE IN COMMODITIES DISTRIBUTION
- **CULLEN SUPERSUITE ANALYSIS**

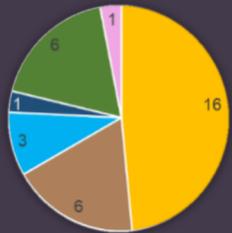
Names	Location	Radiometrics			Magnetics	Gravity	Geochronology	Zonation	Heat Production	Classification <i>(Wyborn &amp; Stuart-Smith, 1993)</i>		Major Commodity <i>(gold-dependant)</i>	Intrusion shape
	From N to S	K	Th	U	<i>Inner structure</i>	<i>Bouguer anomaly</i>		<i>Klominský et al. (1996)</i>	<i>Wyborn et al. (1997)</i>	<i>Plutons type</i>	<i>Granite type</i>	<i>4 km radius</i>	<i>Satellite/Massive</i>
MARGARET	1	Low	Mid	Mid	YES	Mid	EIS	NO	>7	Granite	Mixed	G3	S
BURNSIDE	2	High	High	High	NO	High	YIS	YES	>7	Leucogranite	-	G1	S
PRICES SPRINGS	3	High	High	High	NO	High	EIS	NO	5-7	Granite	Mixed	G1	S
McKINLAY	4	High	High	High	NO	Low	EIS	NO	<3	Granite	Mixed	G1	S
FENTON W	5	Mid	Mid	Low	NO	Low	YIS + Xenolith	NO	3-5	Leucogranite	-	G3	M
FENTON E	6	Mid	Low	Low	NO	Low	EIS	YES	5-7	Granite	Biotite	G3	M
McMINNS BLUFF	7	Mid	Low	Low	NO	Low	EIS	YES	3-5	Granite	Biotite	G2	M
MOUNT PORTER	8	High	High	High	NO	Low	TIS	NO	>7	Granite	Mixed	G1	S-M
ALLAMBER SPRINGS OUTER	9	High	High	High	YES	Low	TIS	YES	>7	Leucogranite	-	G2	M
ALLAMBER SPRINGS INNER	10	High	High	High	NO	Low	EIS	YES	5-7	Granite	Biotite	G2	M

# Discussions

- CULLEN SUPERSUITE ANALYSIS

## Early Igneous Suite

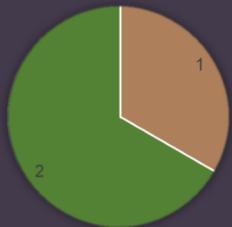
Prices Springs



McKinlay

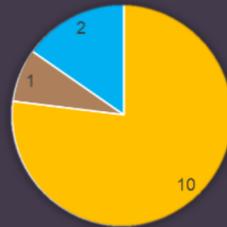


Margaret

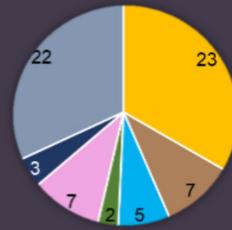


## Transitional IS

Mt Porter

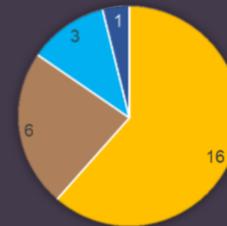


Allamber Springs

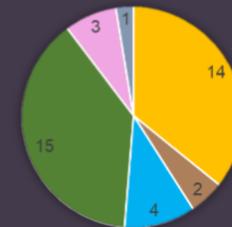


## Young IS

Burnside



McMinns Bluff



Fenton

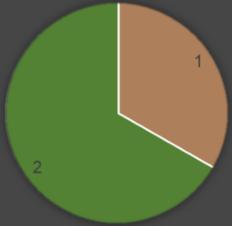


- Gold
- Tin
- Copper
- Iron ore
- Lead
- Uranium
- Marble
- Tantalum
- Tungsten

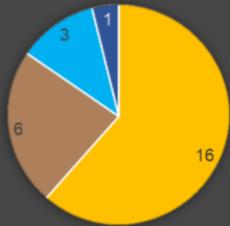
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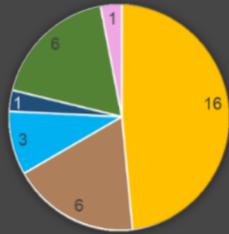
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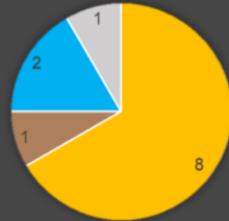
Burnside



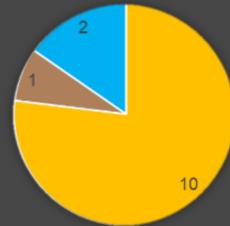
Prices Springs



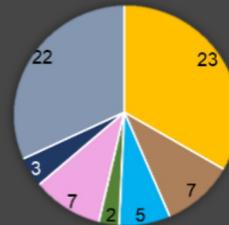
McKinlay



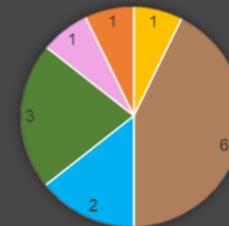
Mt Porter



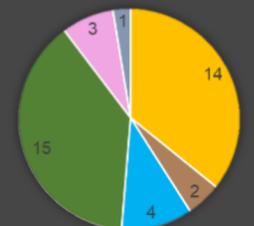
Allamber Springs



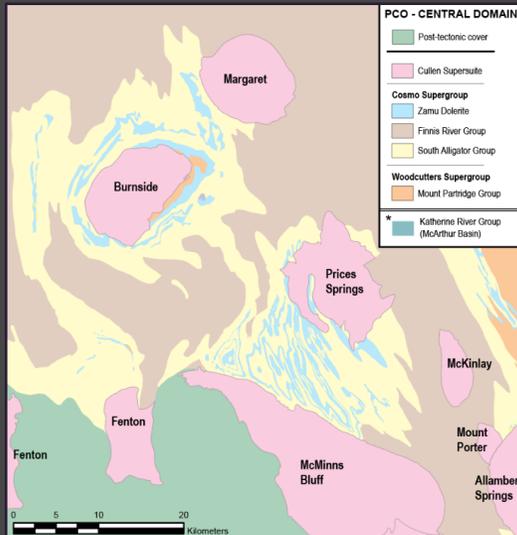
Fenton



McMinns Bluff



- Gold
- Tin
- Copper
- Iron ore
- Lead
- Uranium
- Marble
- Tantalum
- Tungsten



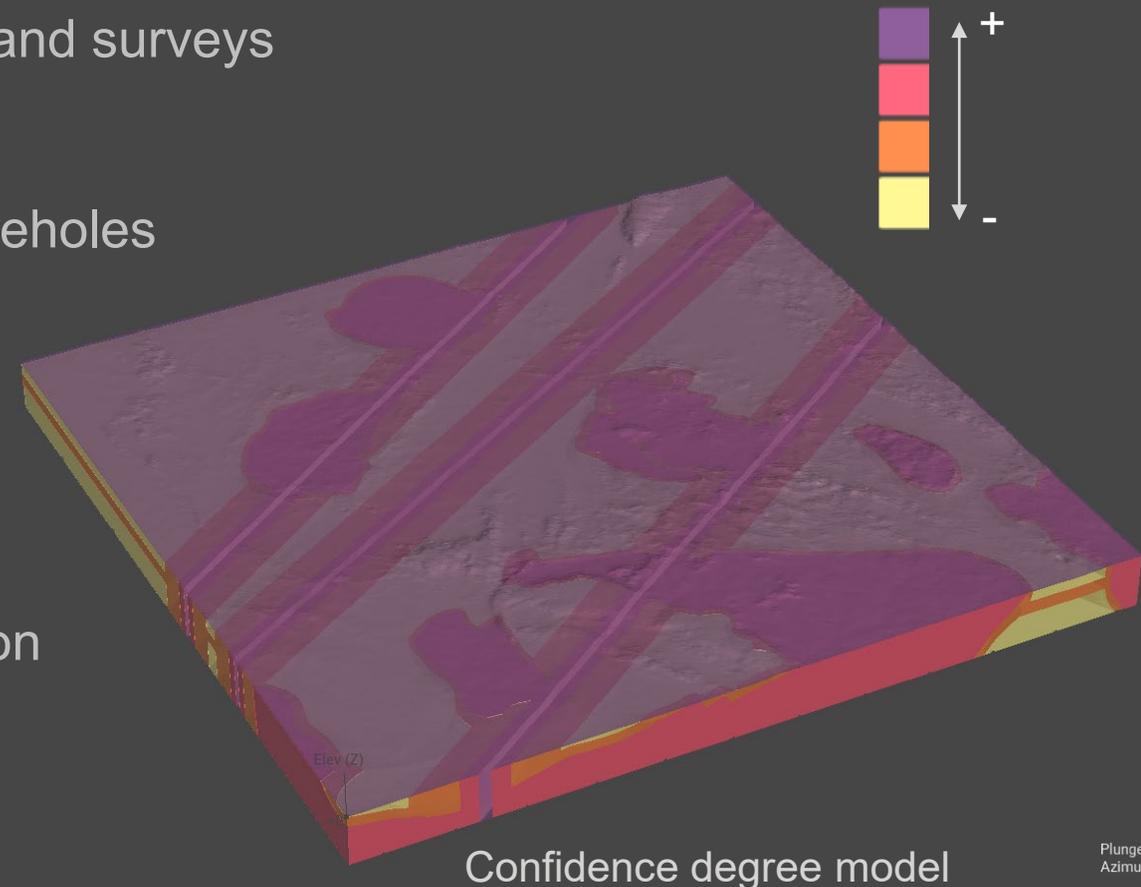
# Discussions

## - Improving the confidence degree of the 3D Geological Model

- Update with the improved geophysical grids and surveys
- Target smaller areas → Industry data
- Deep validation → Geophysics and deep boreholes
- **Fault Mapping**

## - Preliminary discussions

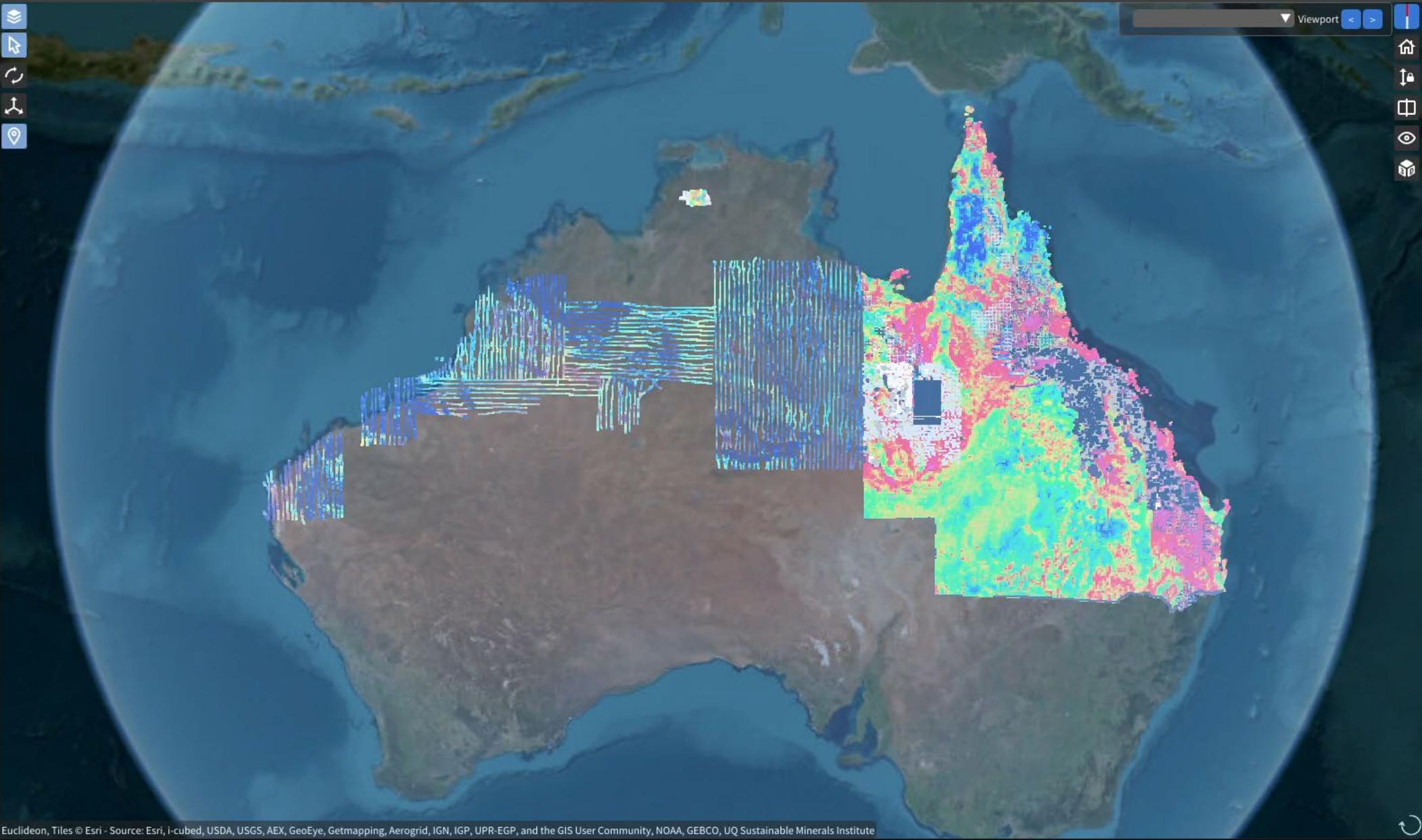
- Regional Structural Framework
- Structural influence in commodities distribution
- Cullen Supersuite analysis



# Mt Isa Atlas - Presentation

- Search name or description...
- Home Viewpoint
- Viewpoints
- Regional Geophysical Data
- Regional Geology Data
- Mine Site Data
- Box Filter 1
- Cartographic+infrastructure
- Map Tiles
- ESG Boundaries
- Mineral Atlas
- Live Services
- Temp
- Pine Creek 2024
  - Geophysical Data
    - Density\_clipped.uds
    - PointsGravGrid\_exp.uds
    - Mag\_RTP\_cropped.uds
    - AEM.uds
  - MinnOcc.uds
  - LeapfrogModels
  - Cross-sections
  - 5

- Deselect All
- 1
  - 2
  - 3



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Sustainable Minerals Institute

