The SA Discovery Mapping project – how GSSA are tackling spatial and textural geoscience data

Mark Pawley on behalf of the SADM team

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energymining.sa.gov.au

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Department for Energy and Mining

What is the problem?

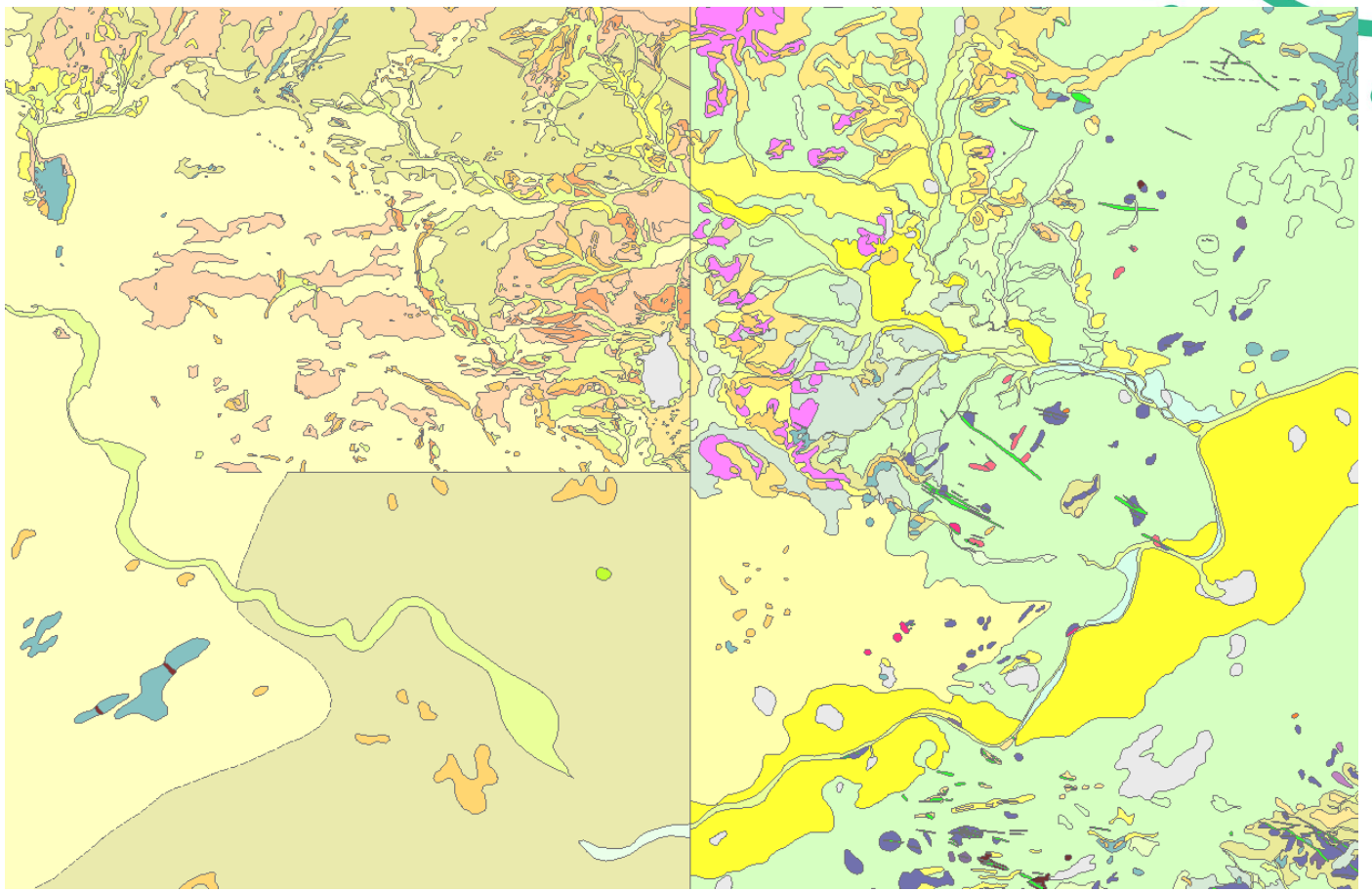
Our current geological data is often the aggregation of digitised paper maps.

Poor attribution of spatial features.

GSSA data is currently stored in several databases across several departments.

Slow release of new data.

Consequently, our digital data often does not take recent findings into account.



The Gawler Challenge competitors found our data to be non-seamless with coarse resolution. A large part of their time was massaging the data into a useable form.

Opportunities provided by SADM

We can take control of our database.

Control how the data is compiled, stored, and released.

Ability to update our spatial and textural geological data.

Generation of data-rich geological information.

Allows the timely release of new and updated data.

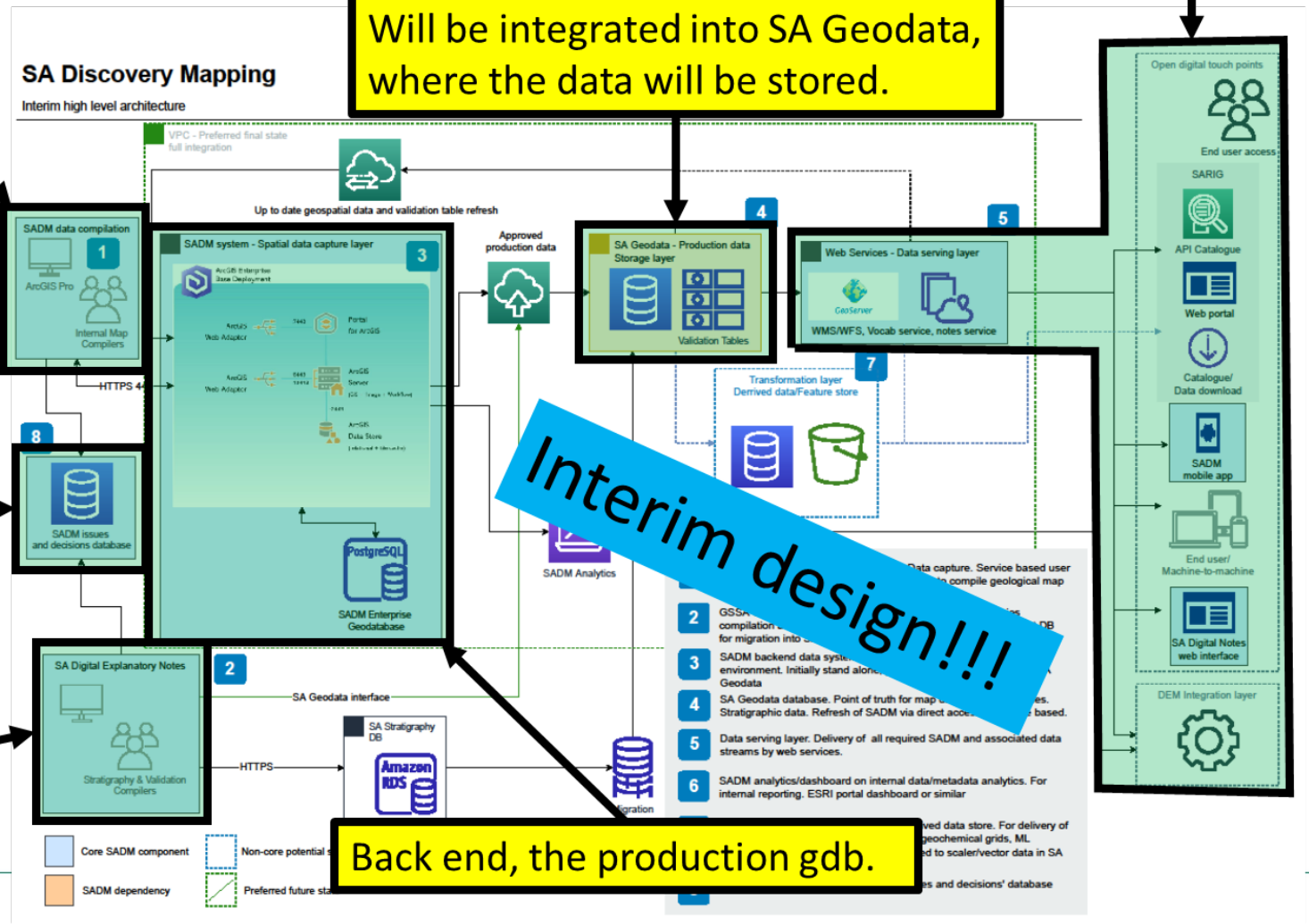
SADM is modernising the capture, management, delivery, and scope of South Australia's precompetitive geological data.

Components of the SADM project

Front end, which will deal with data delivery.

Map compilation team, who will compile the spatial data.

Will be integrated into SA Geodata, where the data will be stored.



Interim design!!!

Issues and decisions register.

SA DEN team, who will compile the text-based data.

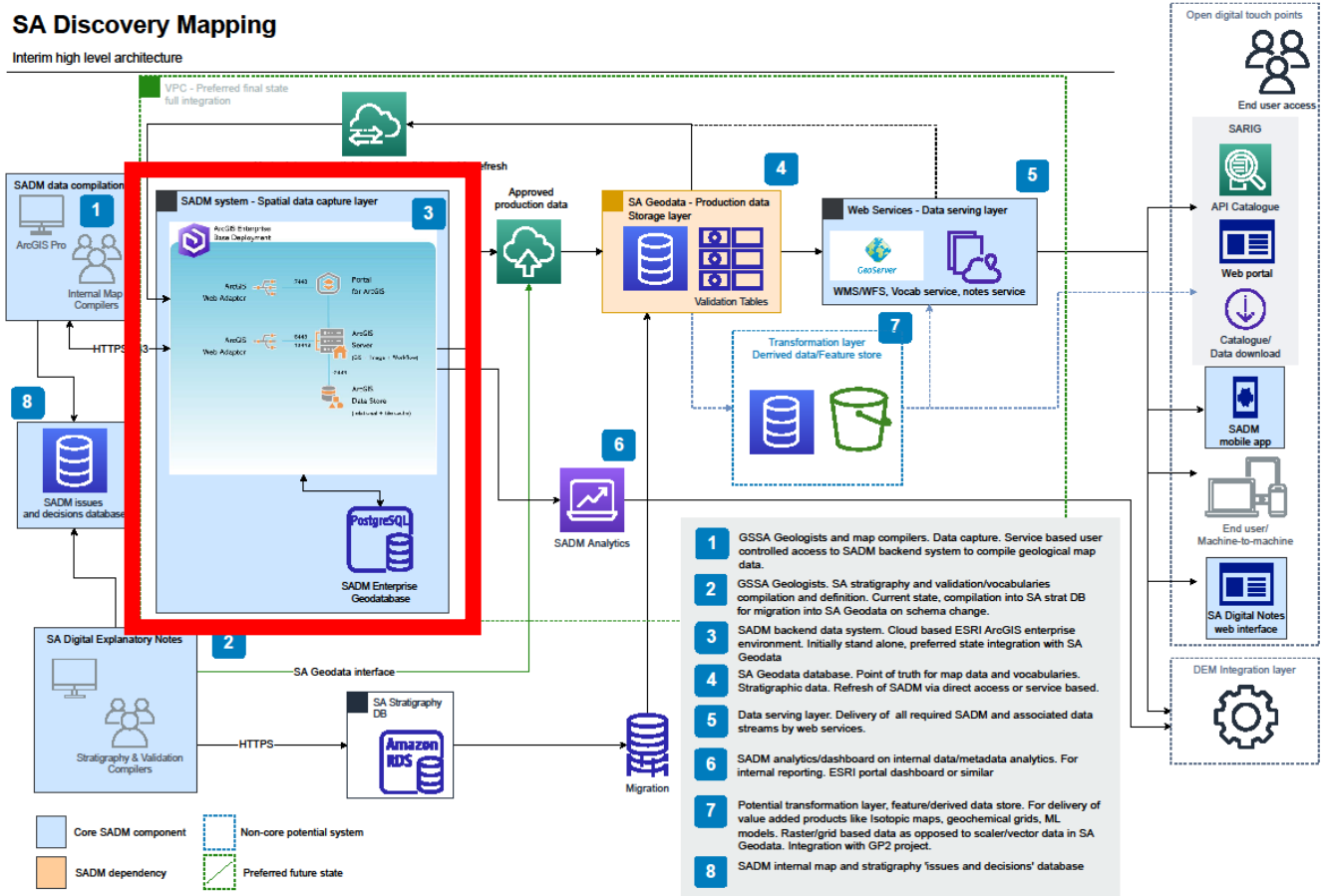
Back end, the production gdb.

Back-end system

We’re working with an Enterprise database.

This system is:

- Relational database.
- Service-based architecture (connected through web services).
- Cloud-based deployment.
- Uses ArcGIS PRO for compilation.



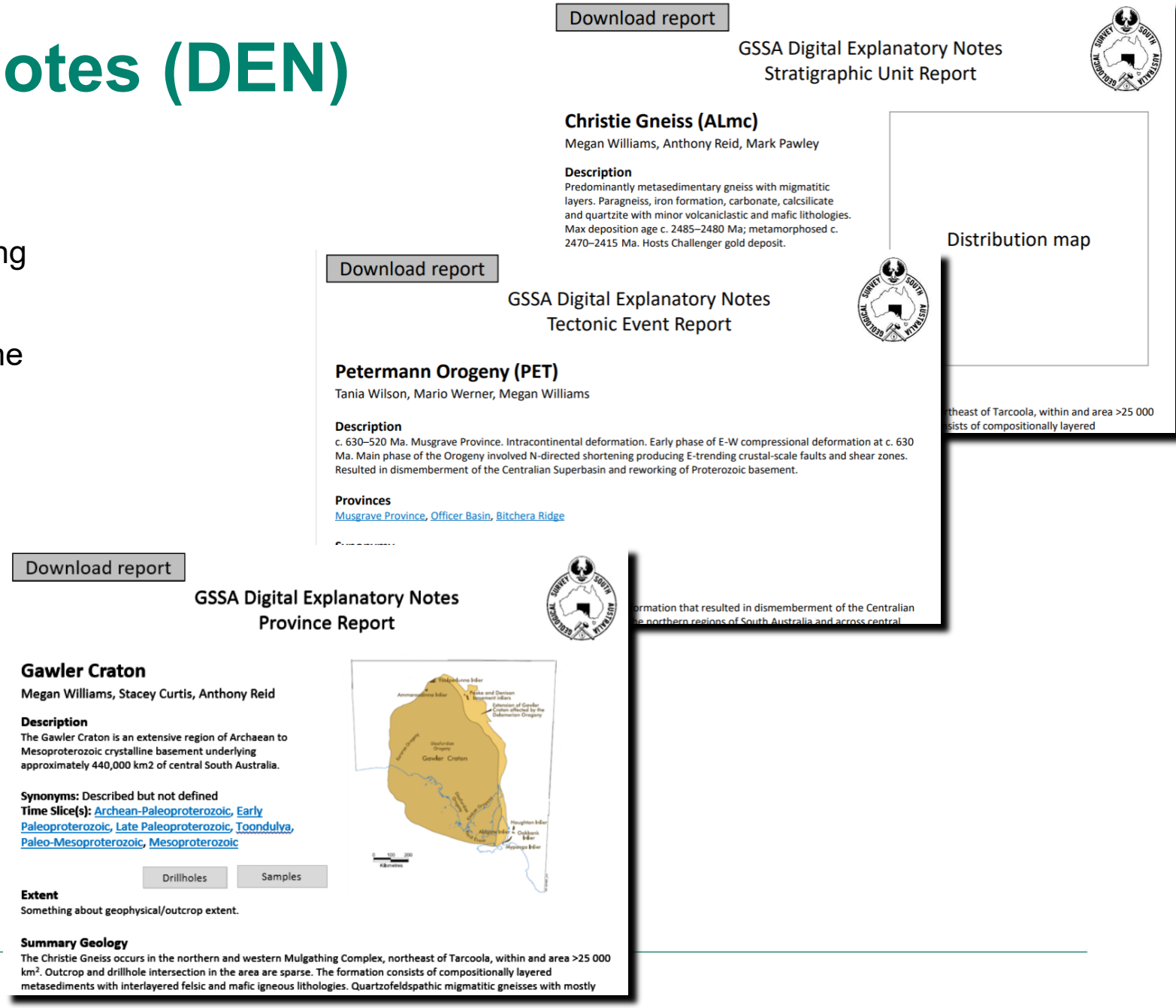
Digital explanatory notes (DEN)

Stratigraphic unit descriptions are currently being reviewed, updated or rewritten.

Descriptions for the Provinces, Events, and Time Slices are being updated or prepared.

The DEN will comprise live ‘documents’.

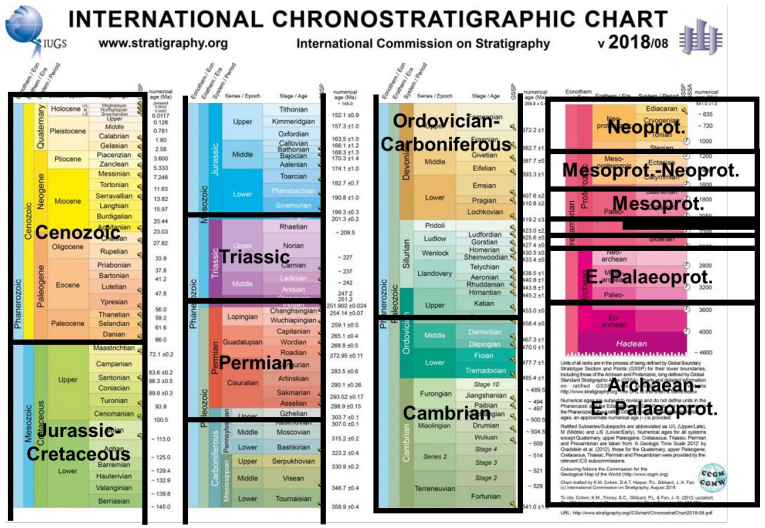
These ‘documents’ will be linked to the spatial features.

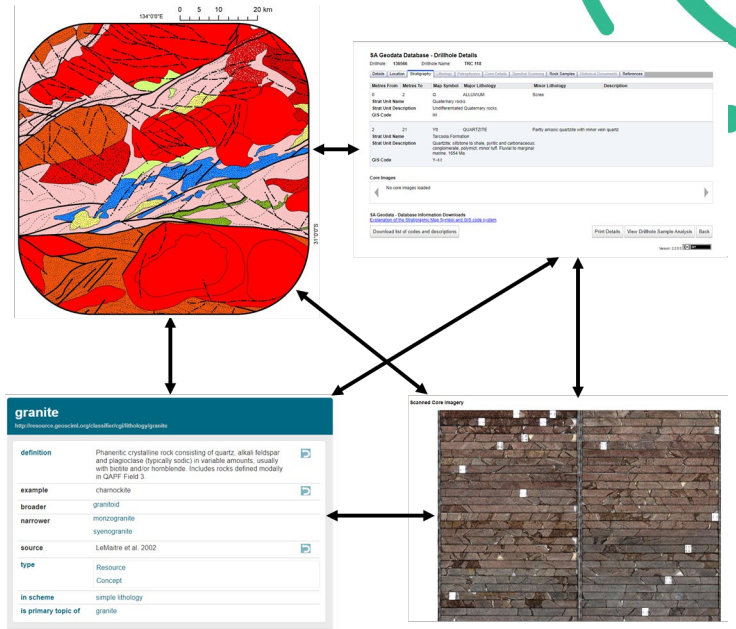


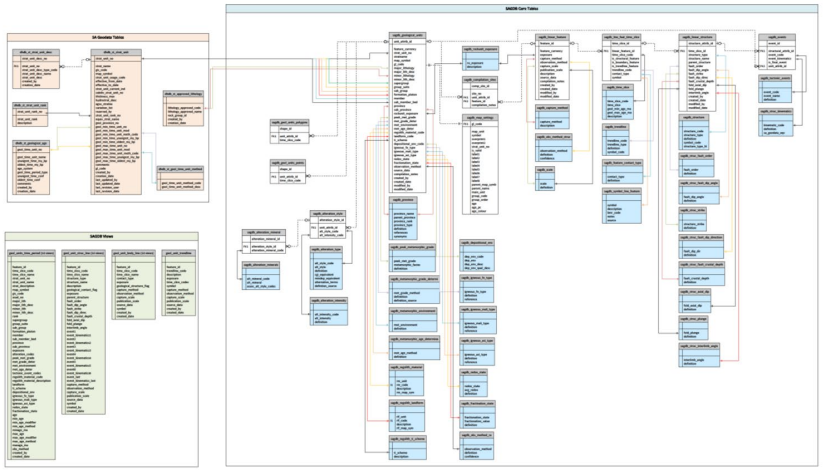
Compilation of spatial data

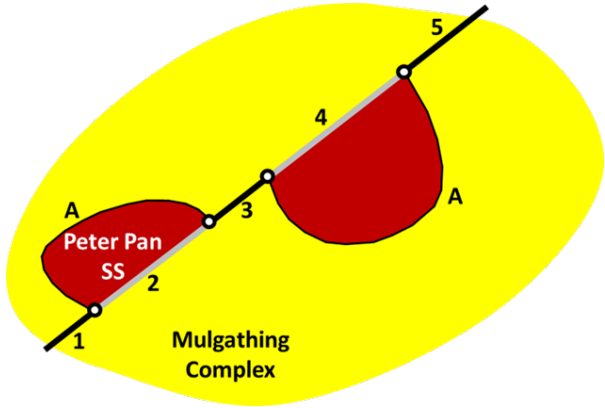
New system that includes:

- 15 time slices.
- Greater attribution.
- Standard vocabulary.
- One to many relationship.









Time slices

15 time slices (currently 5).

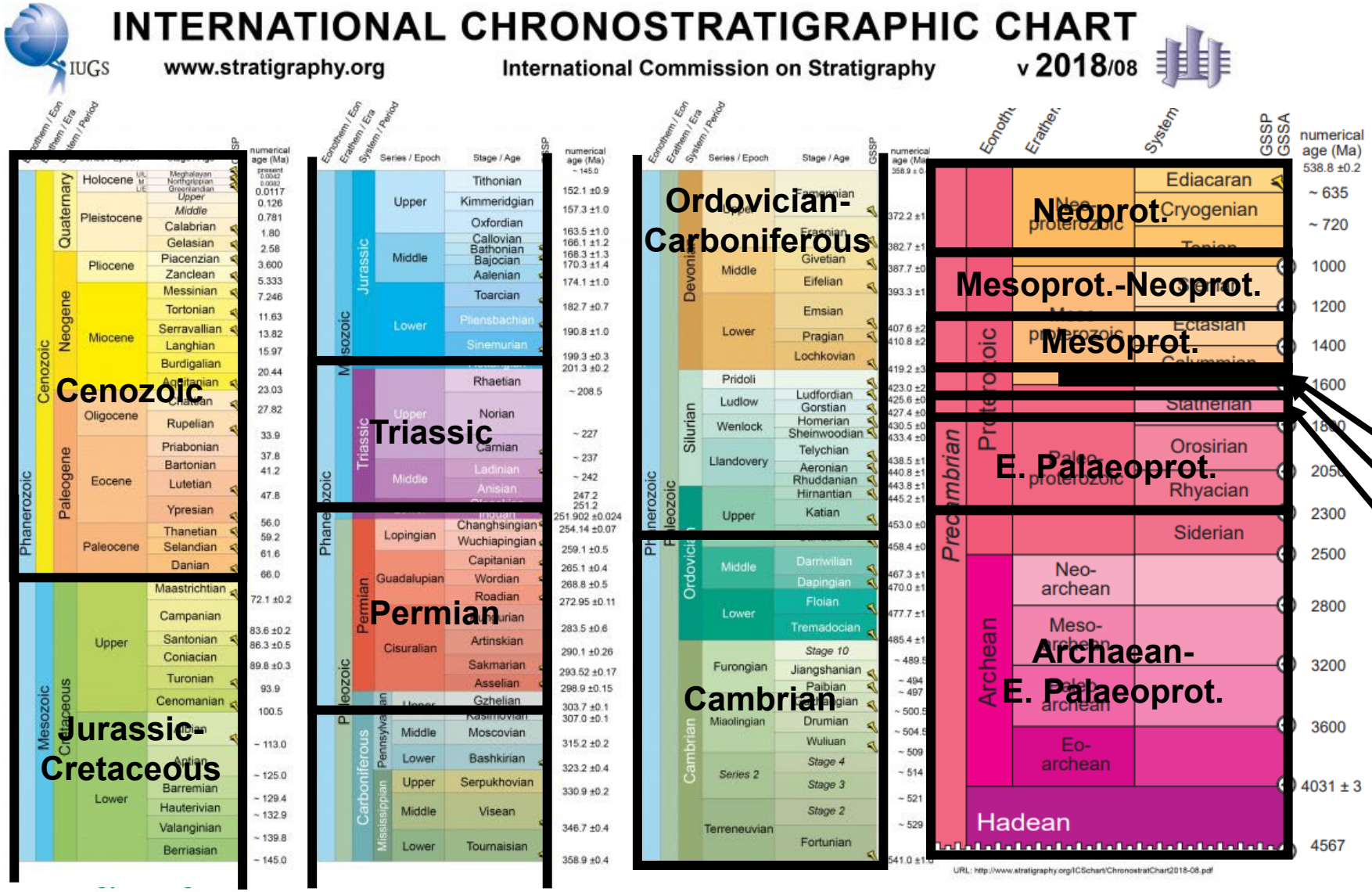
Chronological approach.

Not depth slices!

Based on periods of broadly similar geological activity in SA.

Certain events are differentiated.

Greater flexibility when examining the data and generating bespoke digital ‘maps’.

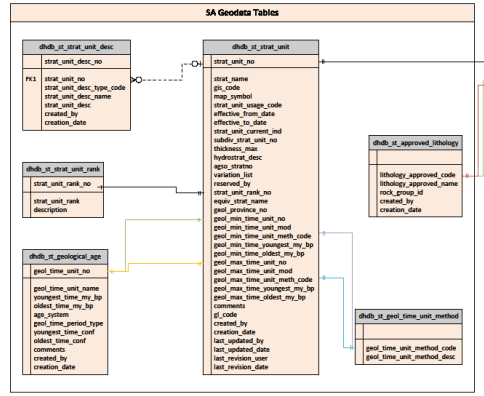


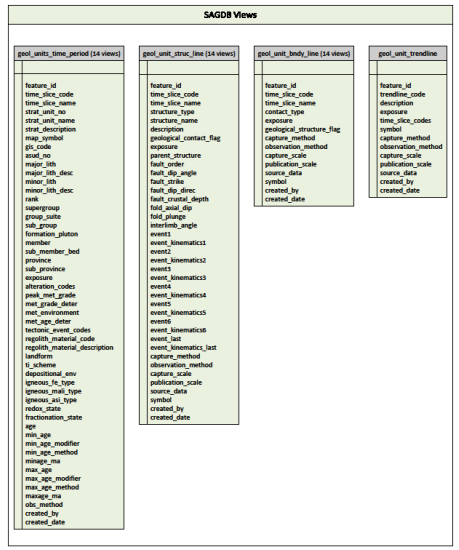
Data-rich attribution

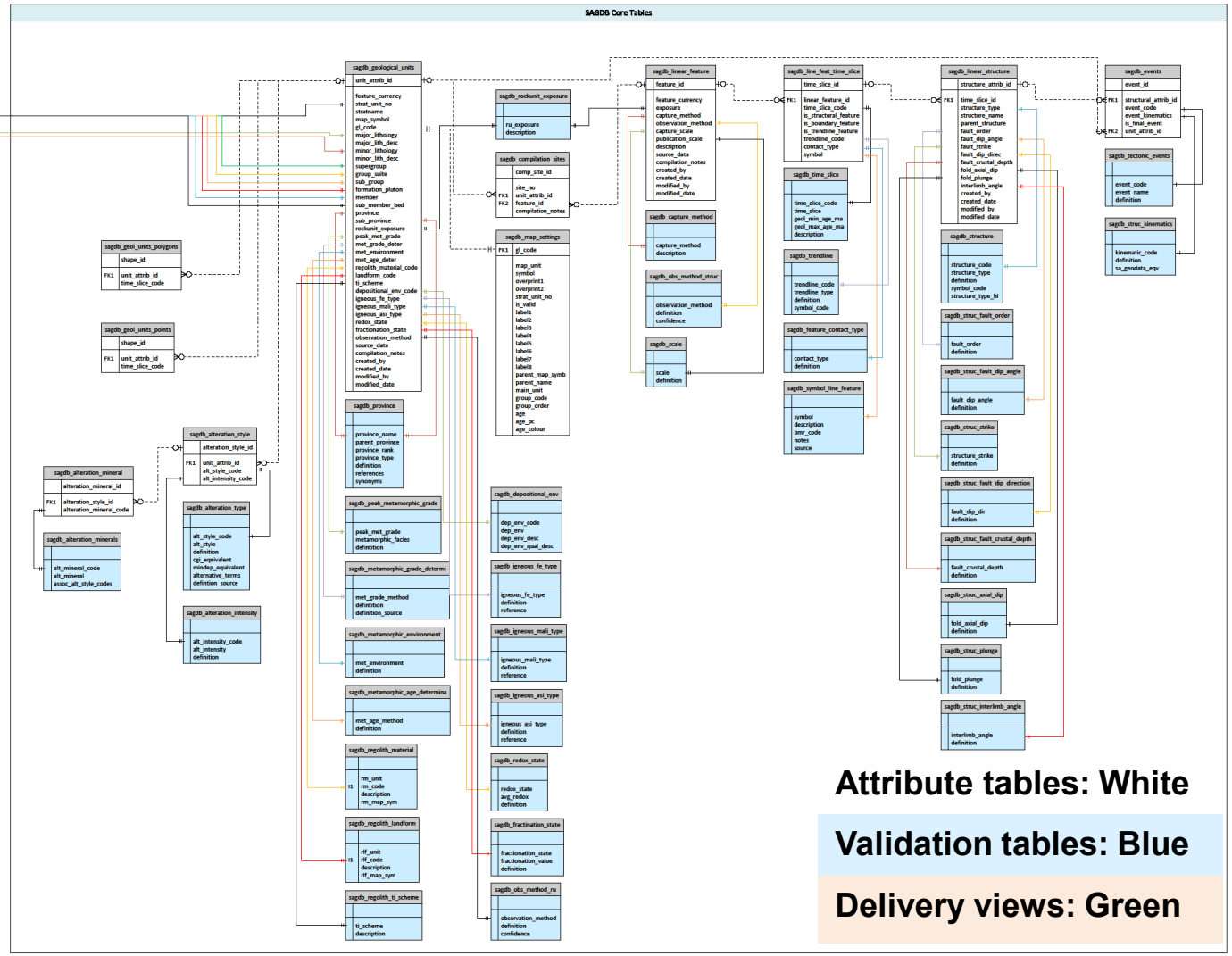
Greater attribution of spatial features across several tables.

Attributes drawn from vocabularies.

One-to-many relationship.







Attribute tables: White

Validation tables: Blue

Delivery views: Green

Vocabulary

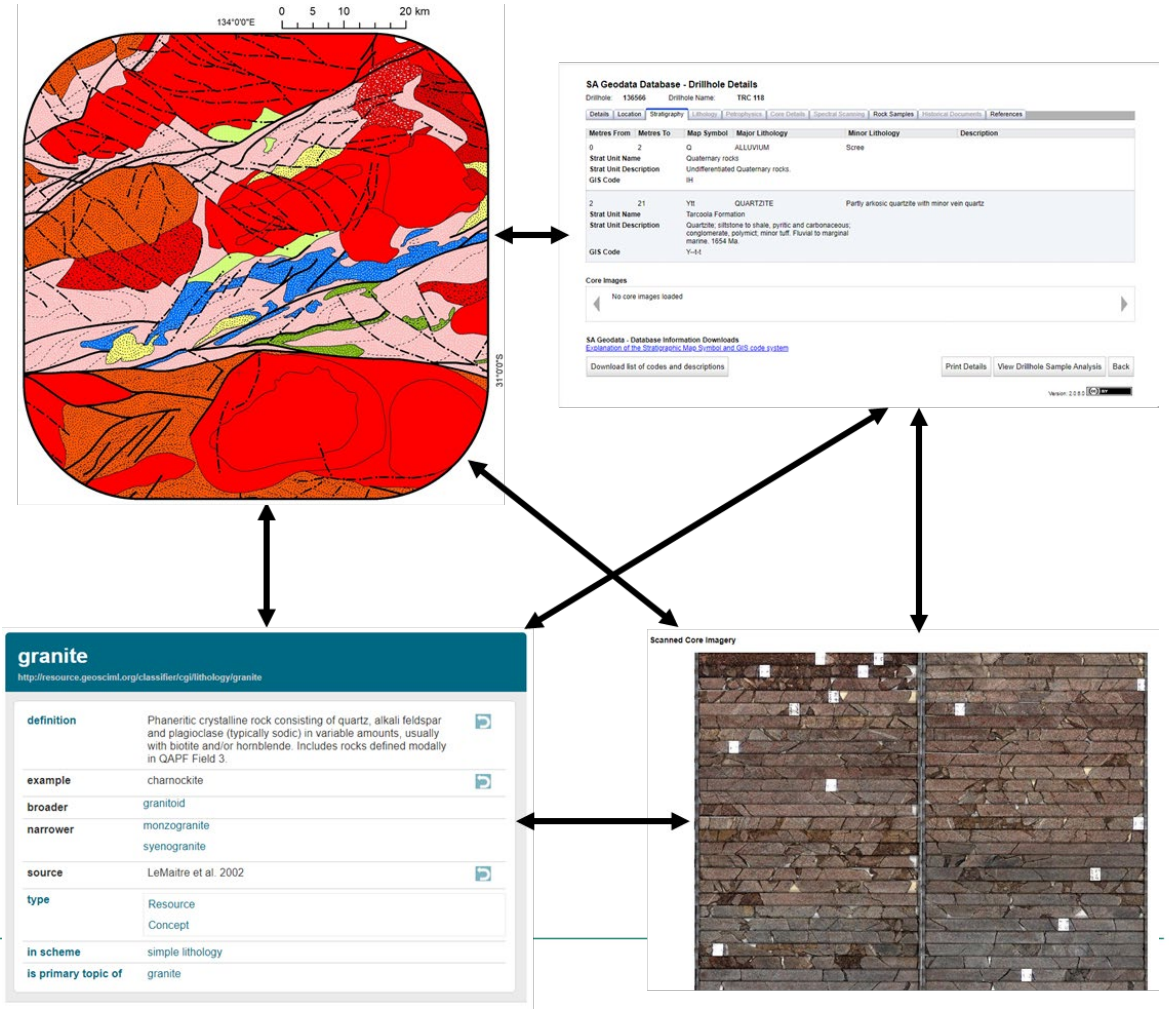
SADM will use vocabularies- lists of standard terminology and concept relationships.

GeoSciML provides an international standard.

Allows SADM to harmonise with other GSSA databases, e.g. downhole logs, MINDEP.

Increased interoperability will enable the next generation of machine learning, AI, and mineral exploration.

CGI Home | GeoSciML Home | GeoSciML Wiki | EarthResourceML | Vocabularies



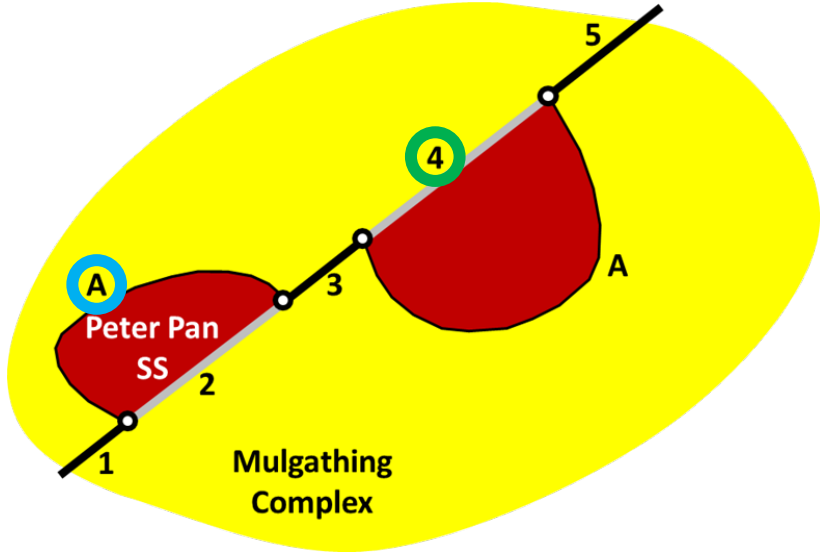
One to many relationship

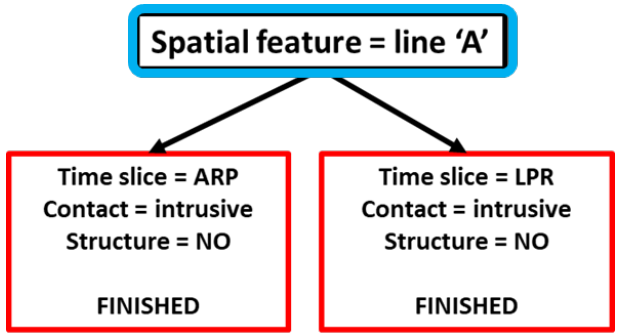
System where a single linear feature is drawn, with the option of relating >1 sets of attribution.

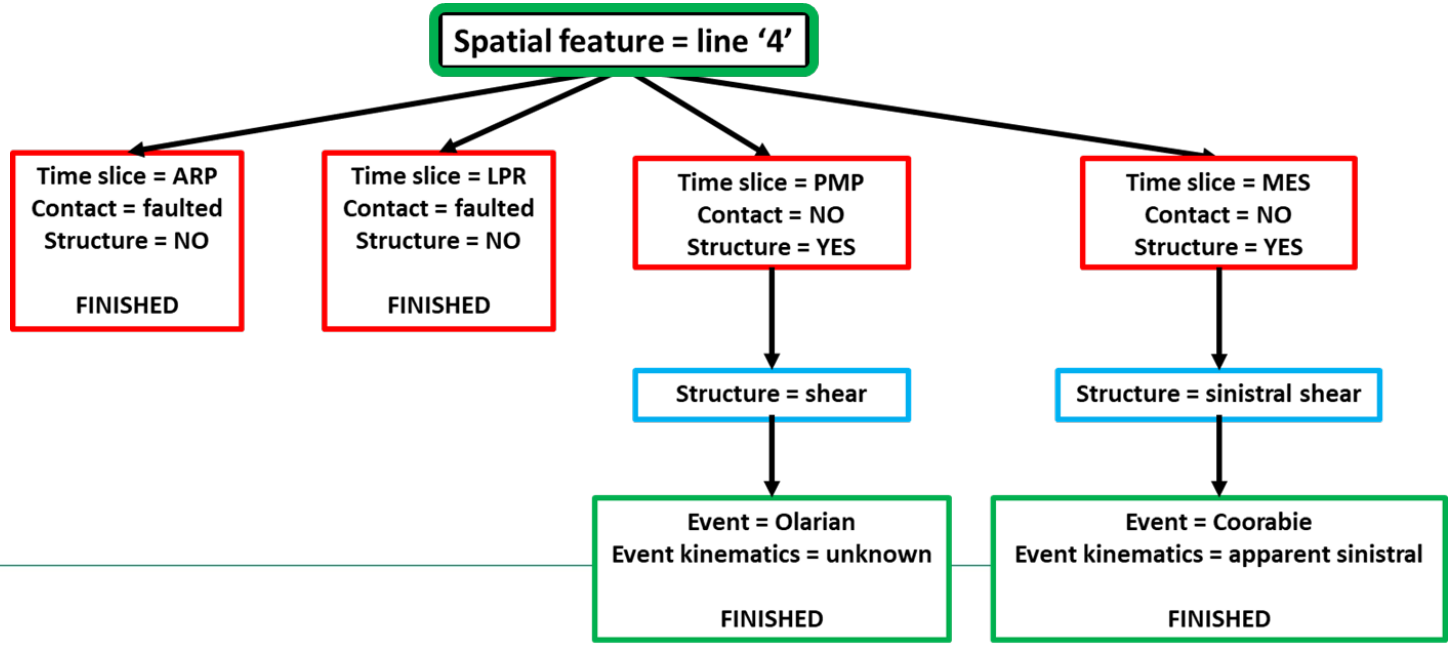
This allows for the easy attribution of reactivated structures and boundaries across one or more time slices.

In contrast, a one-to-one relationship would require a separate linear feature for each line of attribution. This means that separate lines would need to be drawn for each relevant time slice.

Example with a c. 1730 Ma pluton in c. 2480 Ma rocks cut by a 1580 Ma shear that is reactivated at c. 1450 Ma.







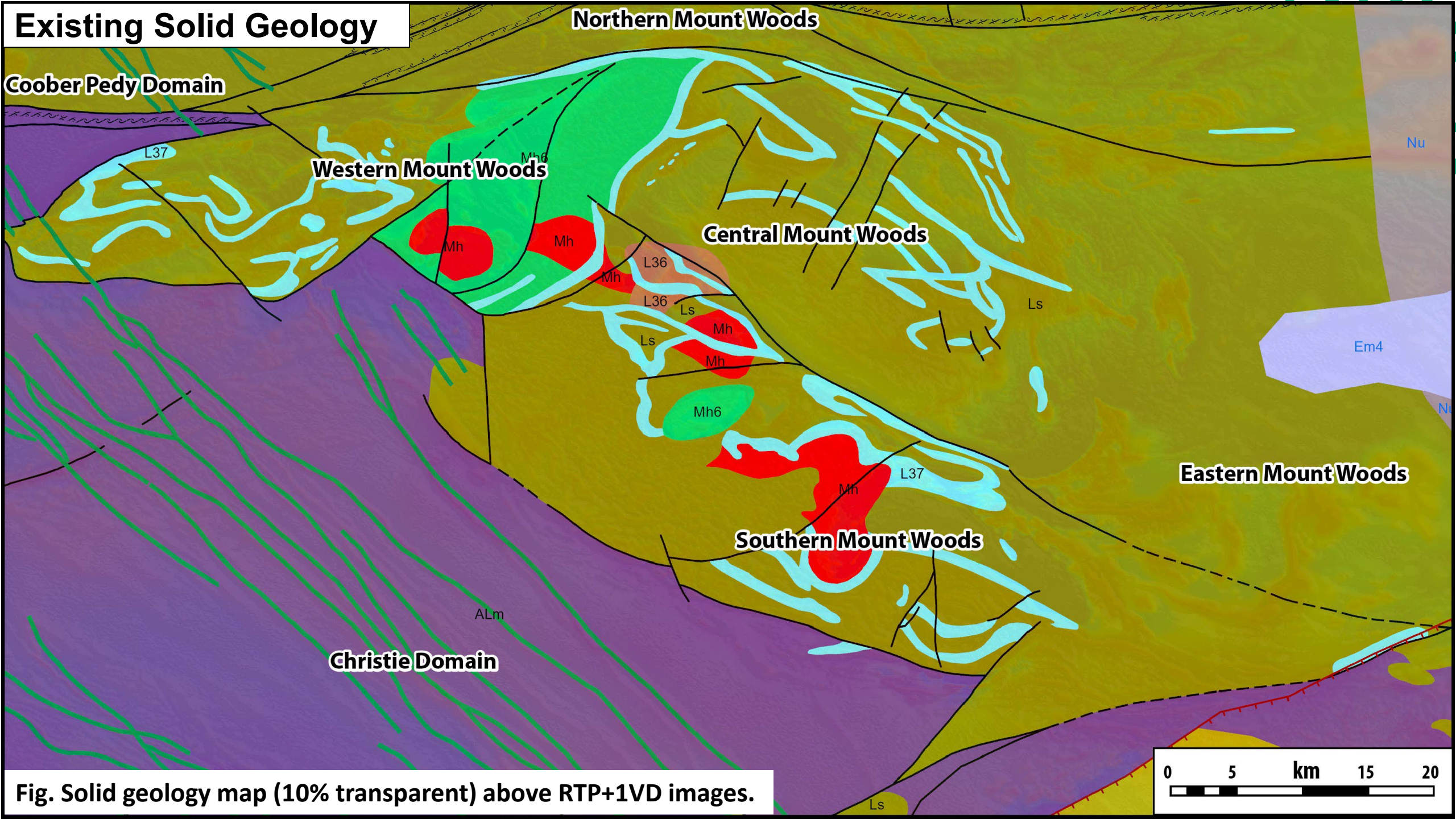


Fig. Solid geology map (10% transparent) above RTP+1VD images.

SADM compilation work

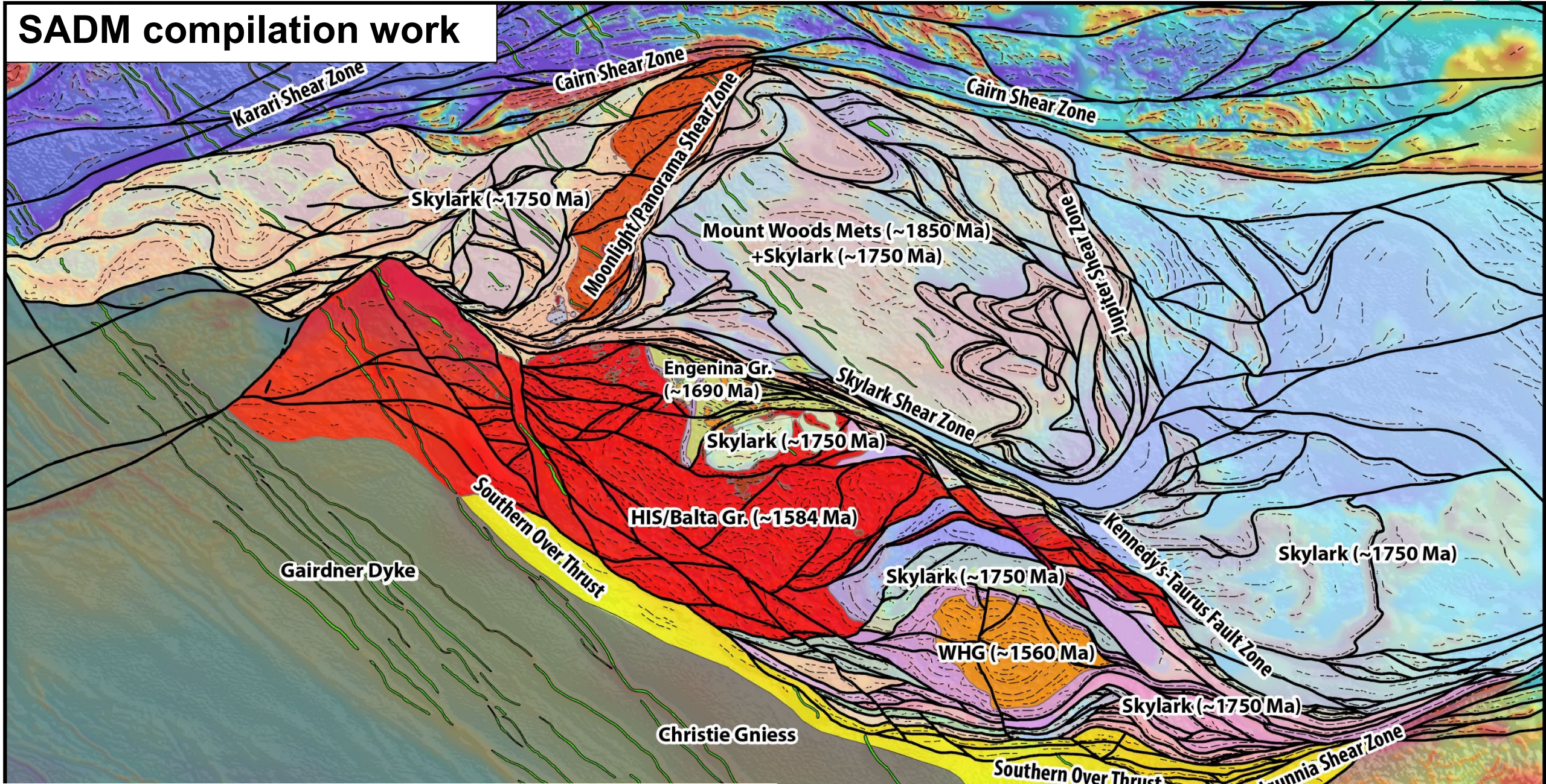
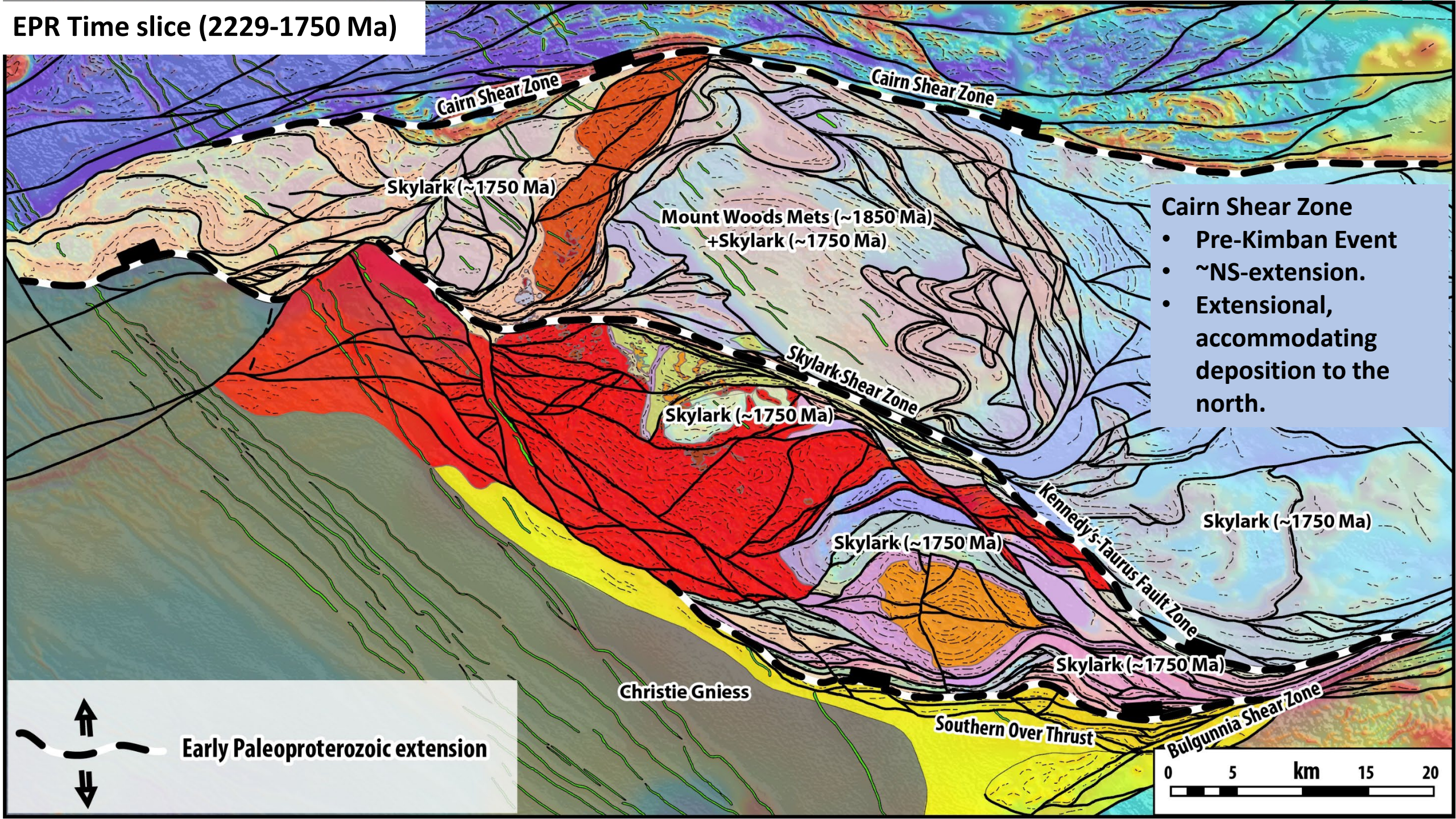
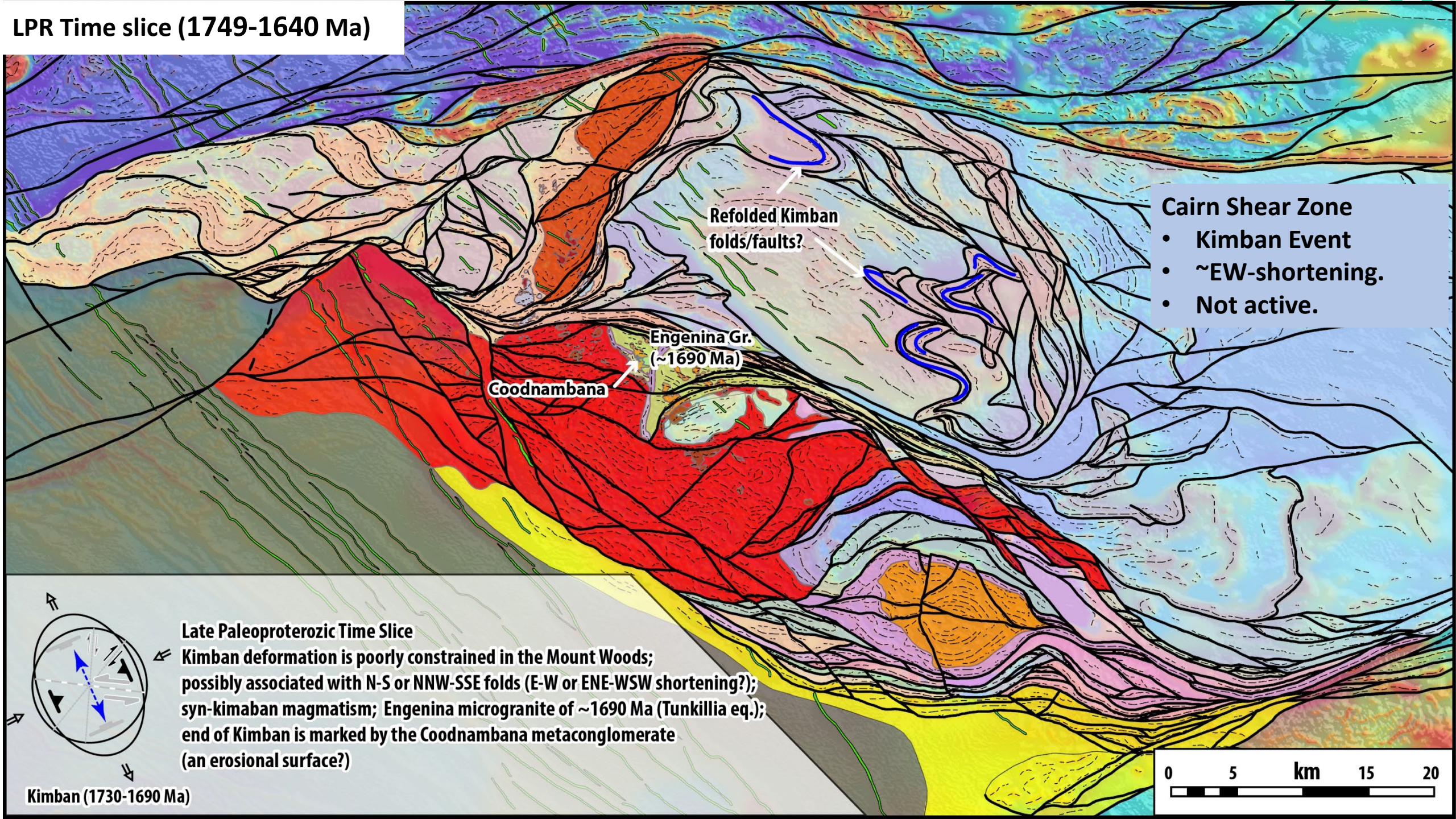


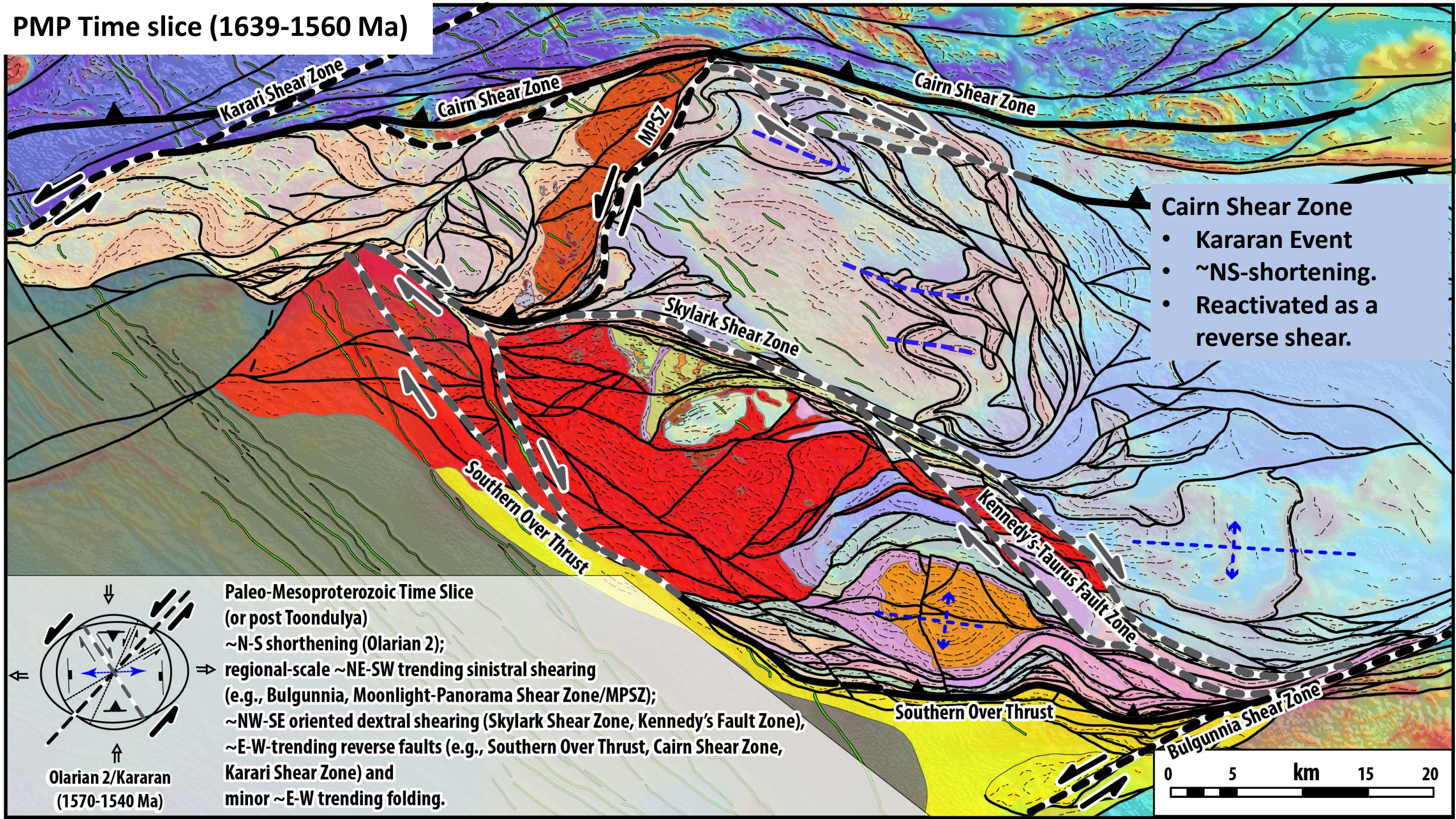
Fig. On-going solid geology map (30% transparent) over RTP and 1VD images with structures, trend lines, boundaries.


EPR Time slice (2229-1750 Ma)
Cairn Shear Zone
Cairn Shear Zone
Skylark (~1750 Ma)
Mount Woods Mets (~1850 Ma)
+Skylark (~1750 Ma)
Skylark Shear Zone
Skylark (~1750 Ma)
Kennedy's-Taurus Fault Zone
Skylark (~1750 Ma)
Skylark (~1750 Ma)
Skylark (~1750 Ma)
Christie Gniess
Southern Over Thrust
Bulgunnia Shear Zone
Cairn Shear Zone
• Pre-Kimban Event
• ~NS-extension.
• Extensional, accommodating deposition to the north.
Early Paleoproterozoic extension
0
5
km
15
20

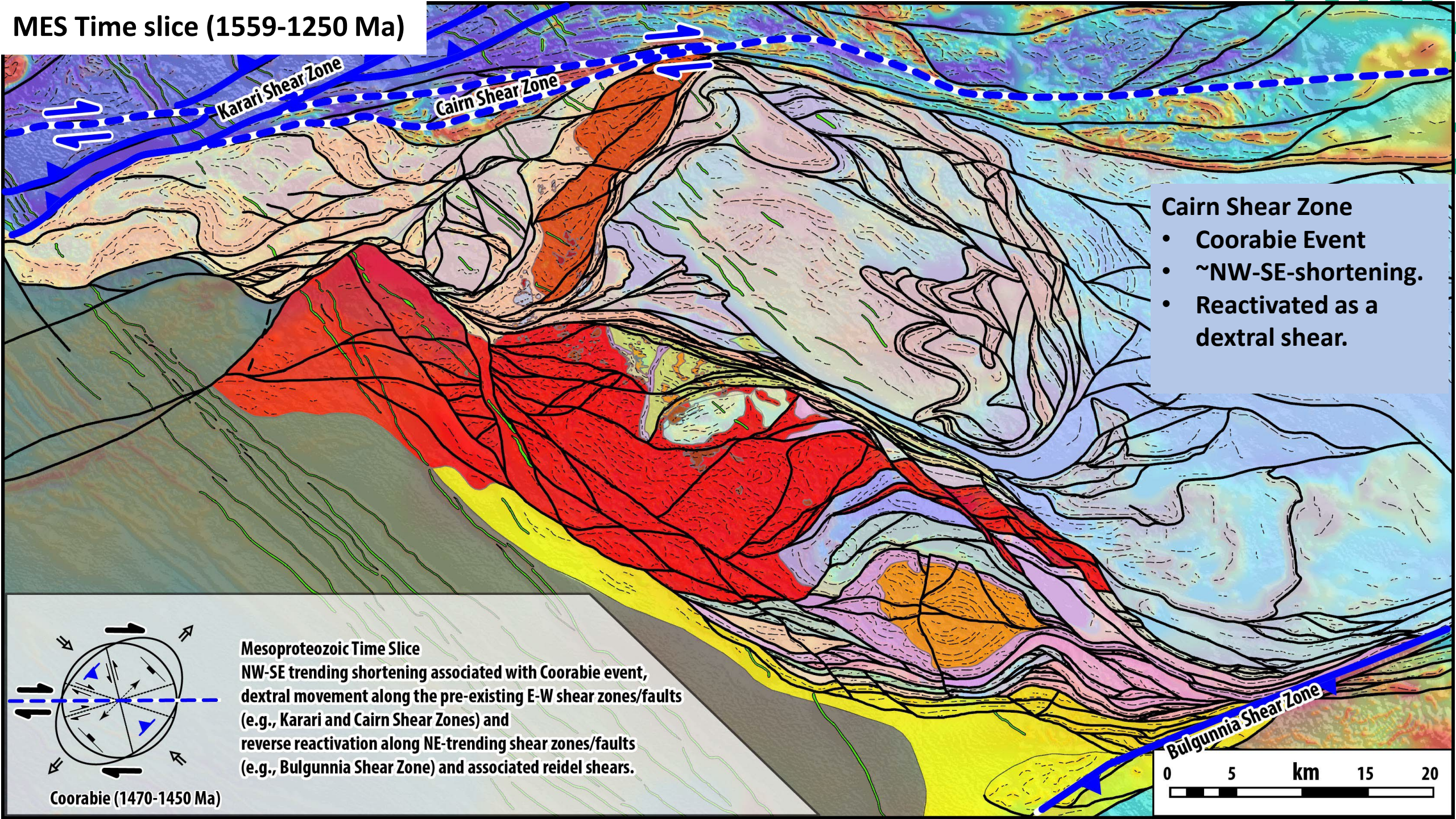
LPR Time slice (1749-1640 Ma)



PMP Time slice (1639-1560 Ma)



MES Time slice (1559-1250 Ma)



Delivery

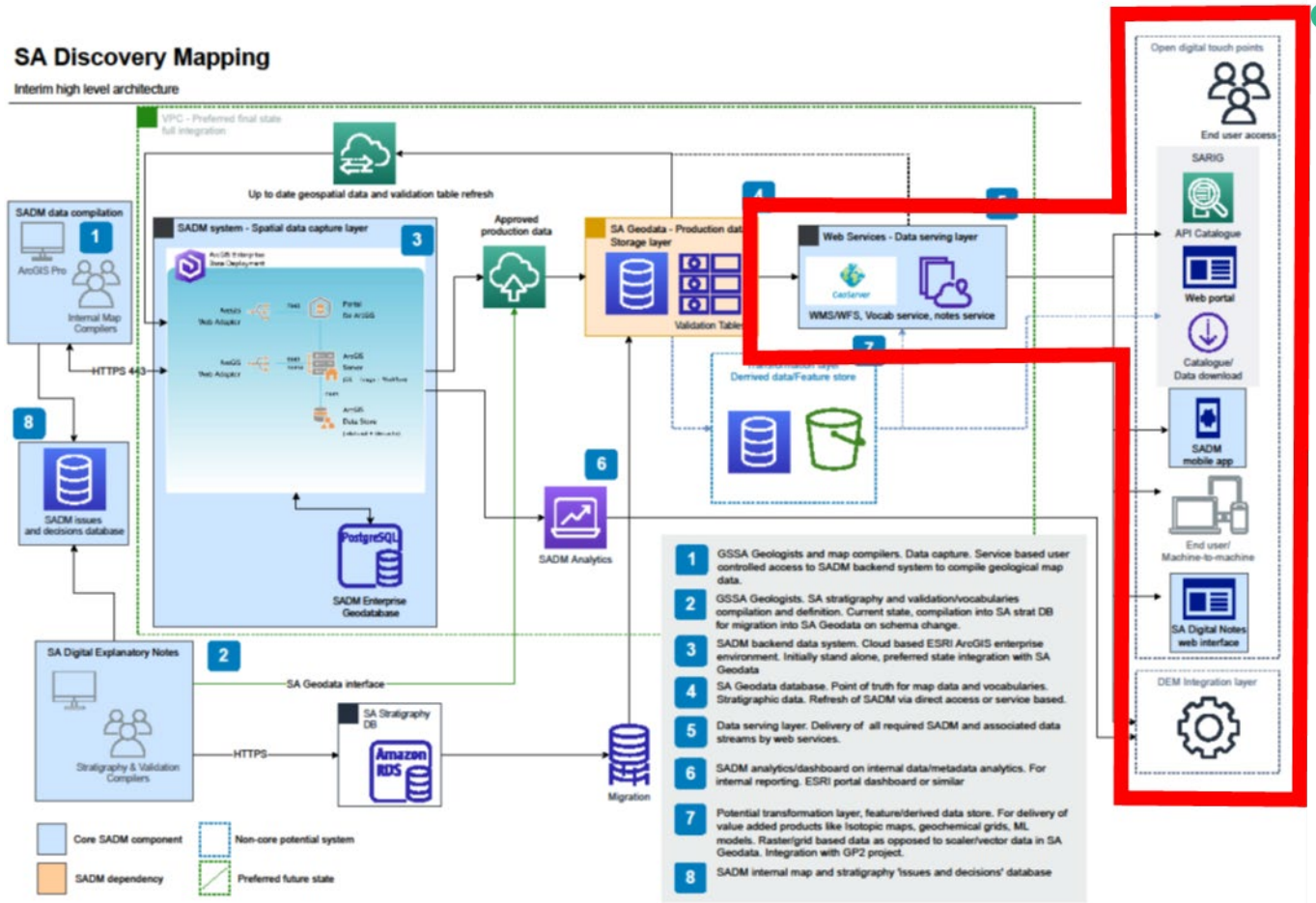
Currently working on the delivery system.

First release will be delivered mid 2025.

Delivery will be via SARIG and APIs.

Will include:

- Spatial data with extensive attribution.
- Data suitable for machine learning.
- Online access to Digital Explanatory Notes.



Team

Leadership

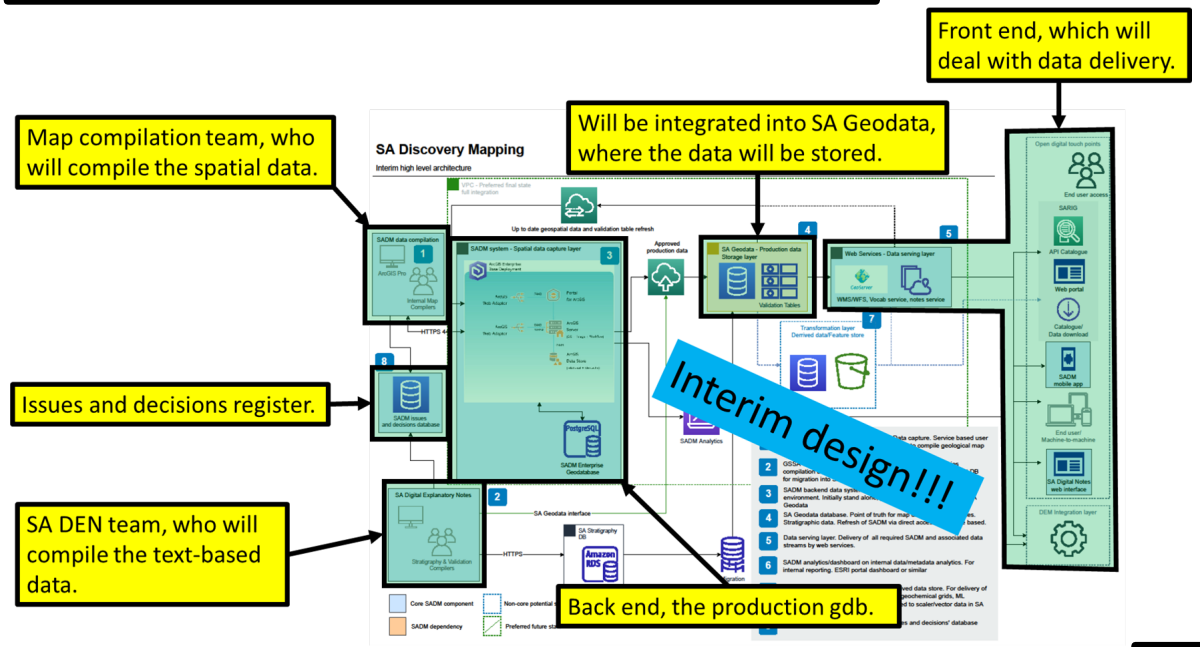
Bronwyn Camac	(Project Sponsor)
Peter Buxton	(Technical Lead)
Tom Wise	(Program Coordinator)
Anna Petts	(Project Management)
Kunj Mistry	(Project Management)
Andrew Nitschke	(Communication)

Compilation

Mark Pawley
Rashed Abdullah
Frank Rarity
Jack Percival

Delivery

Christie Gerrard
Ursula Michael



DEN

Sam Connell
Mario Werner
Amie Amir
Seth Tiddy
Farida Khanam
Charlotte Mitchell

Back End

Jonathan Irvine
Aiden Schulz

Scientific support

Dillon Brown	(Geochronology)
Liz Jagodzinski	(Geochronology)
Claire Wade	(Geochemistry)

Benefits of SA Discovery Mapping (SADM)

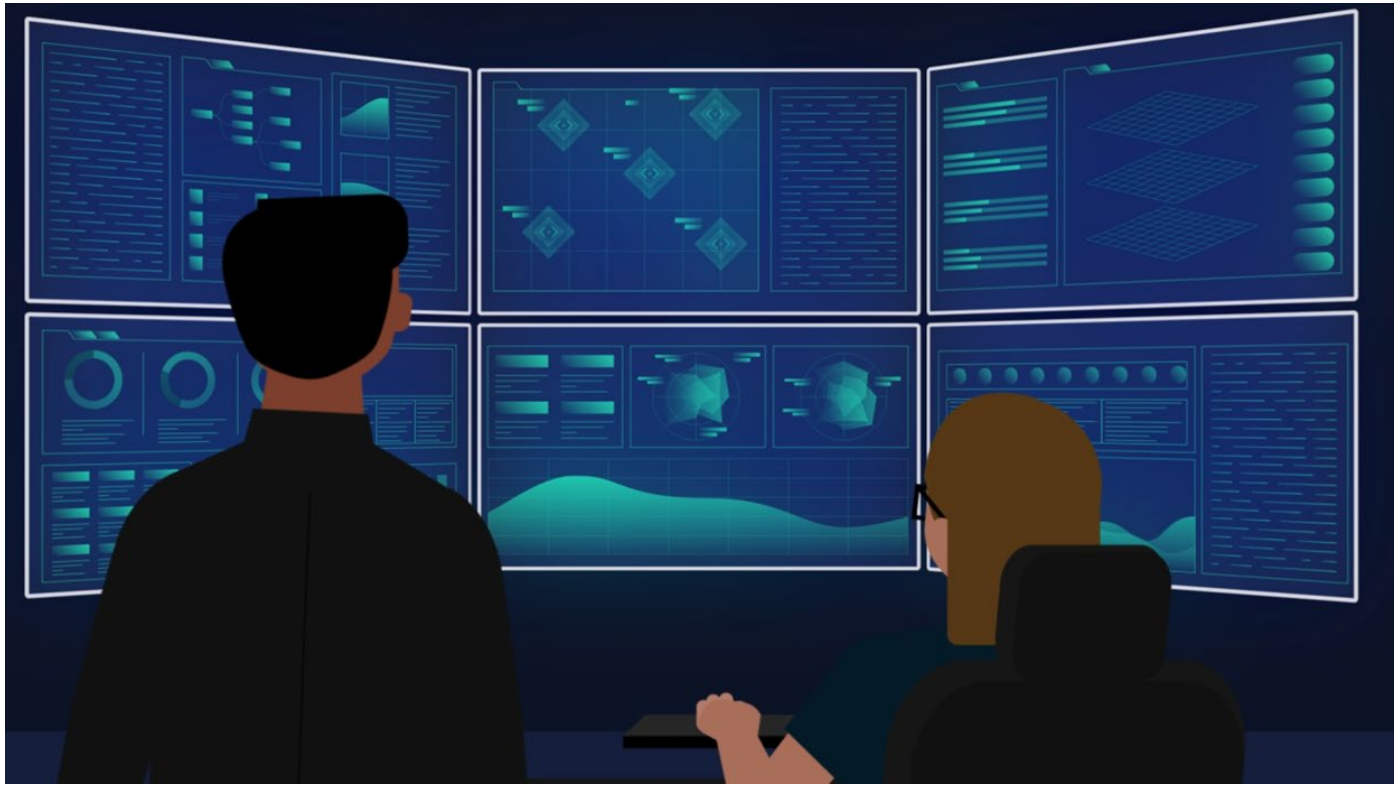
Extensive attribution of lines and polygons will allow interrogation of the data.

The breakdown of the geology into more time slices will allow greater flexibility when:

- generating digital ‘maps’ and datasets specific to the users’ requirements, and
- analysing the data.

Spatial data will be related to the DEN, and other GSSA databases.

Near real time release of updates. Allowing quick incorporation of new results.

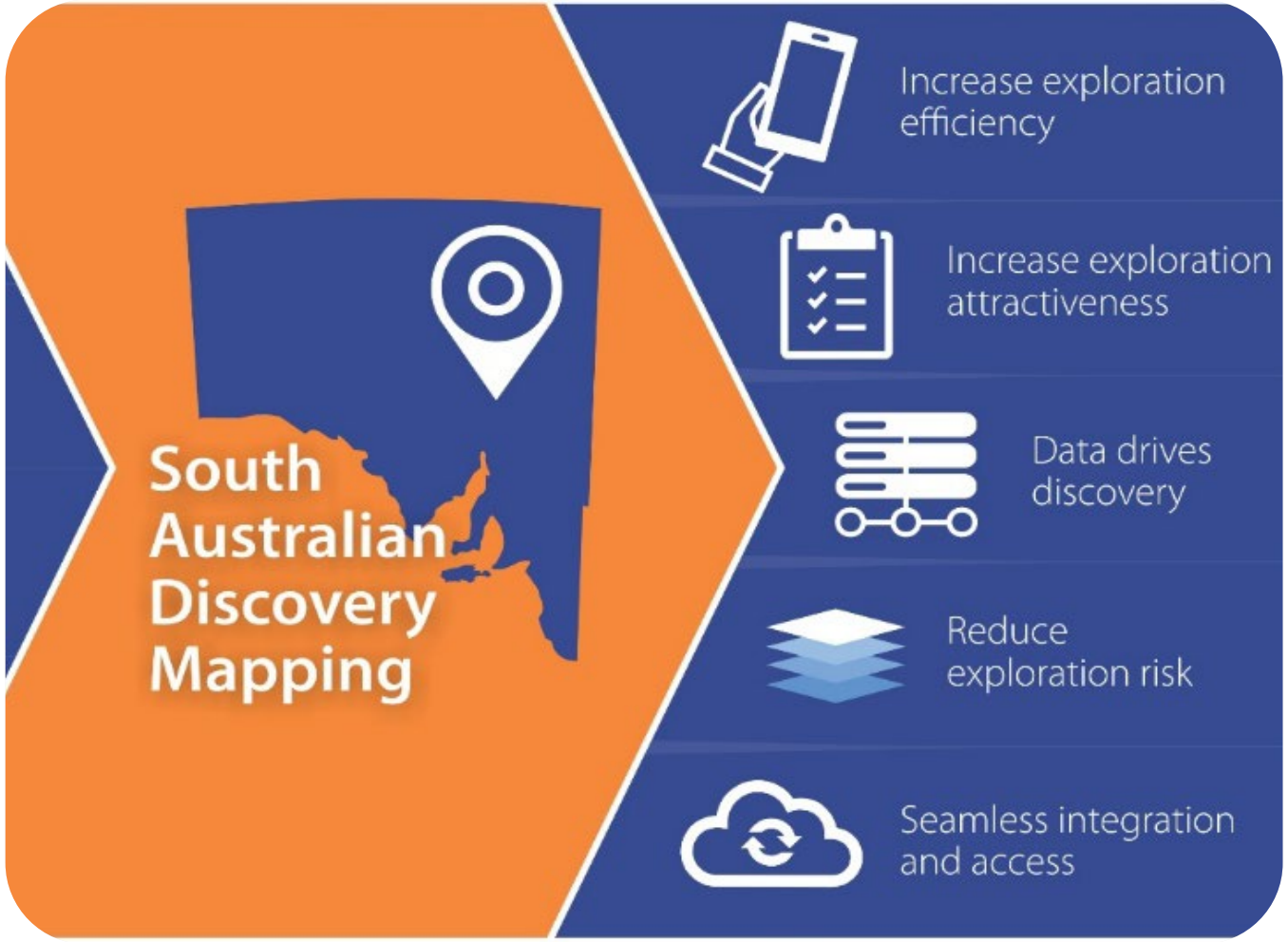


Benefits of SA Discovery Mapping (SADM)

Data will be in a range of formats, suitable for machine learning.

Data will be released via web services or mobile applications.

SADM is designed to be robust and flexible, future proofing the system.



Contacts

Mark Pawley, Senior Geologist

Department for Energy and Mining

11 Waymouth Street,
Adelaide, South Australia 5000
GPO Box 320
Adelaide, South Australia 5001
E: mark.pawley@sa.gov.au

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Acknowledgement of Country

As guests here on Kaurna land, we acknowledge everything this department does impacts on Aboriginal country, the sea, the sky, its people and their spiritual and cultural connection which have existed since the first sunrise. Our responsibility is to share our collective knowledge, recognise a difficult history, respect the relationships made over time, and create a stronger future. We are ready to walk, learn and work together.

Ngaityalngadlu taikunthitya yalaka

Yantupinarna Kaurna yartangka, ngadlu tampinthi tupa yaintya pirku wapinthi, wiwunthi yaitya yarta, yarlu, ngayirda, miyurnakuma parnaku tuwila tapa purruna tarraitpayinthi. Muna tirntu parrka-parrka wanti.

Ngadluku taingi ngutu yungkurrinthi, tampinthi yurni ngantanthi pukingka, niipurna pintyathi mankurrititya, taingintya tarrkarri pintyanthi.

Nata ngadlu padnitha, tirkatha Kuma kumangka warpulayi-utha.

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