GIS code and map unit symbology update for South Australian geology

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Government of South Australia
Department for Energy and Mining

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Acknowledgement of Country
The Department for Energy and Mining acknowledges Aboriginal people as the First Nations Peoples of South Australia. We recognise and respect the cultural connections as the traditional owners and occupants of the land and waters of South Australia, and that they continue to make a unique and irreplaceable contribution to the state.

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GIS code and map unit symbology update for South Australian geology

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INTRODUCTION

Map symbols are a short code used for identifying the various map units used for the geological map series and other digital products of the Geological Survey of South Australia. These codes and symbols are also applied to assign rocks, encountered as outcrops, intersected in drillholes or collected for geological analysis, to specific map units in our principal geospatial database 'SA Geodata'. This information is publicly accessible via SARIG, e.g. under field observation sites, drillholes and rock samples. Each map unit, including formally and informally named stratigraphic units as well as unnamed age and lithology units, has a unique code, representing a shortened version of the hierarchical GIS Search Code (Cowley and Rossi 2010; Gatehouse and Cowley 1994). The current system has been in use since the commencement of compilation of the state-wide digital map layers in 1988.

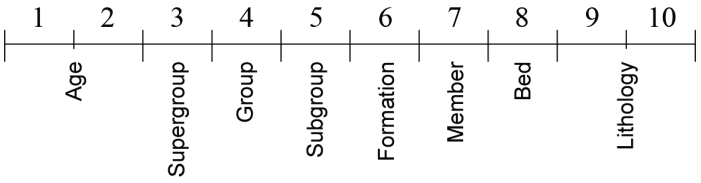
Over time, with changes to the state's stratigraphy, map symbols have changed or became obsolete. In order to avoid confusion, these obsolete codes were usually not reused, resulting in a smaller pool of available codes for newly defined or mapped units. The current map unit coding system has recently undergone a major update to alleviate this issue.

Please note that this map unit symbology update has been applied to our three principal digital 'Surface Geology' datasets, the 100K, 2M and 7M scale layer sets, but not to the 'Solid Geology' dataset. These surface geology and solid geology datasets, currently accessible via SARIG, will not be updated anymore as these datasets will be replaced by a new state-wide seam-less geology dataset currently developed within the scope of the South Australian Discovery Mapping Project (SADM). Map unit symbology for the various scale geology datasets can be activated and displayed in SARIG, and more detailed map unit information can be retrieved by interrogating individual map polygons using the 'Identify' tool. Alternatively, for downloaded geology datasets displayed in an GIS environment, the map symbology can be interrogated via an 'Identify' function or by accessing the attribute tables for the individual map polygon layers.

THE GIS SEARCH CODE

As the GIS search codes provide the basis for the map symbols, it is necessary to understand the structure of the GIS search codes to understand the recent changes to the map symbology.

The GIS search code comprises ten character positions:

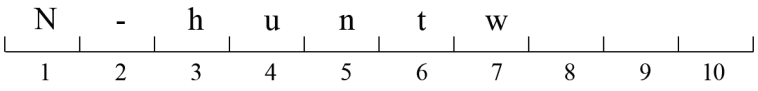


Character positions 1 and 2 identify the age of the unit (Period or span of Periods). The two allocated spaces must both be filled, with the second character filled with a hyphen if unused. Characters 1 and 2 are always uppercase letters except for Cenozoic units, which use lowercase letters for Epoch or span of Epochs.

Character positions 3 through 8 represent the formal stratigraphic hierarchy of the unit. These characters are always lowercase letters. A hyphen is inserted for unused character positions to the left of the last used character to maintain the hierarchical position of lower-order units.

Character positions 9 and 10 are termed ‘Lithology’ and are used for unnamed but mappable units. These may be unnamed subunits of named units, informal groupings of units made for specific map products or units not named or informally named because of uncertain stratigraphic identity or insufficient information. Numbers are used in these character positions instead of letters to emphasise the fact that they are not formal stratigraphic units.

Example code:



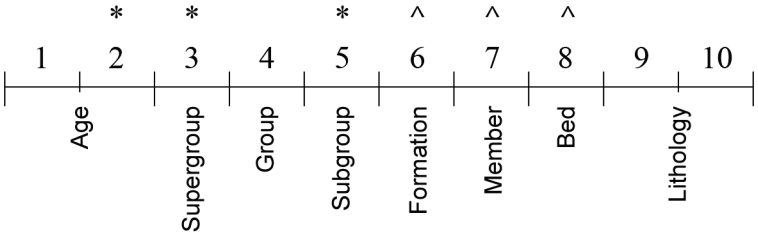
Character	Rank	Unit Name	Symbol
1 and 2	Age	Neoproterozoic	N-
3	Supergroup	Heysen Supergroup	h
4	Group	Umberatana Group	u
5	Subgroup	Nepouie Subgroup	n
6	Formation	Tapley Hill Formation	t
7	Member	Woocalla Dolomite Member	w
8	Bed	(none specified)	
9 and 10	Lithology	(none specified)	

Special cases including Cenozoic units, paleosols and miscellaneous mapping units are described in detail in Cowley and Rossi (2010) and Gatehouse and Cowley (1994). GIS search codes and map symbols for these units have not been changed in the current update.

MAP SYMBOLS

Previously, map symbols were not strictly hierarchical because variable guidelines existed for simplification from the GIS search code. For example, the characters for supergroup and group (character positions 3 and 4) could be dropped from the map code. This resulted in shorter codes, but a greater proportion of characters in use in the map symbols. In this update, these guidelines have become stricter.

In the updated system, characters may only be dropped from the codes where they are unused (i.e. a hyphen in the GIS search code). Additionally, the character for group (position 4) cannot be dropped for any lower order unit, that is where any character position to the right is filled. This means that ungrouped formation-level stratigraphic units will always have a hyphen between the age character(s) and formation character. Character positions to the right of the last used character are empty in both the GIS search code and map symbol.

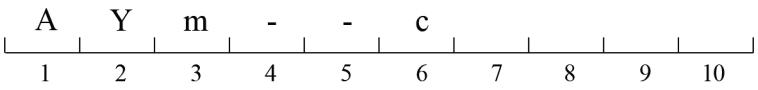


* character can be dropped if unused; ^ only dropped for unnamed lithologies if unused

Below are some examples of GIS search codes and corresponding map symbols:

Christie Gneiss

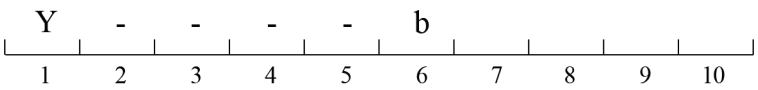
GIS Search Code



Map Symbol AYm-c

Labyrinth Formation

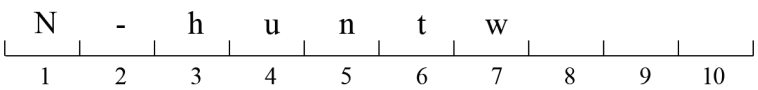
GIS Search Code



Map Symbol Y-b

Woocalla Dolomite Member

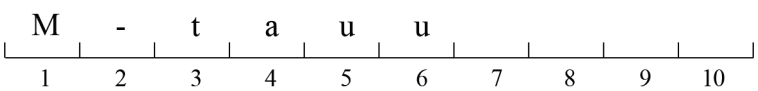
GIS Search Code



Map Symbol Nhuntw

Eucarro Rhyolite

GIS Search Code



Map Symbol Mtauu

Cenozoic units follow a different system which is largely based on depositional environments and map symbols may have up to three characters to designate the age of the unit. These map codes have not been changed in this update and are described in Cowley and Rossi (2010) and Gatehouse and Cowley (1994).

AGE CHARACTERS FOR GIS CODES AND MAP SYMBOLS

Within this update the Age character for the Paleoproterozoic has been changed from L to Y. This represents a major change which affects both GIS search codes and map symbols. The change applies to all units in our stratigraphic database with ages spanning the Paleoproterozoic. This change was made due to an extreme lack of available codes within this time period.

Below is a list of all age characters used in the GIS and map code systems (Table 1).

Table 1. Age characters for GIS codes and map symbols.

Map	GIS	Time period/era/eon
Q	IH	Quaternary
Qh	H	Holocene
Qp	I	Pleistocene
T	ap	Paleogene-Neogene (prev. Tertiary)
Tp	p	Pliocene
Tm	m	Miocene
To	o	Oligocene

Map	GIS	Time period/era/eon
Te	e	Eocene
Ta	a	Paleocene
K	K	Cretaceous
J	J	Jurassic
R	R	Triassic
P	P	Permian
C	C	Carboniferous
D	D	Devonian
S	S	Silurian
O	O	Ordovician
E	E	Cambrian
N	N	Neoproterozoic
M	M	Mesoproterozoic
Y	Y	Paleoproterozoic
A	A	Archean

Note that for map codes, Q followed by any other letter than above denotes a lithological group within the Quaternary and T followed by any lowercase letter other than listed above denotes a named group or subgroup.

GROUPING OF STRATIGRAPHIC UNITS

Associated with this update are some significant changes to the grouping of stratigraphic units, particularly in the Paleoproterozoic and Mesoproterozoic. These changes are described in the following sections. New GIS and map codes are denoted using square brackets in the format [GIS code, map symbol].

HUTCHISON (SUPER)GROUP

Significant changes to the Hutchison Group stratigraphy were proposed by Szpunar et al. (2011a) more than ten years ago. For this map symbology update, changes have been made to implement some of the stratigraphic hierarchy and nomenclature presented in that article. Geochemical and geochronological analyses revealed that the sedimentary succession previously recognised as the Hutchison Group, and previously considered to be a single stratigraphic succession deposited between 2000 Ma and 1850 Ma (Parker 1993), consists of three temporally and isotopically distinct groups. From oldest to youngest these are the Middleback Group, the Darke Peak Group and the Cleve Group. Although many questions remain open in relation to the Hutchison-Middleback stratigraphy, the Geological Survey of South Australia reached a consensus to follow a proposal by Preiss (Appendix 1) that the former Hutchison Group should be elevated to Hutchison Supergroup to incorporate the Darke Peak and Cleve groups. Furthermore, we follow the suggestion to elevate the former Middleback Subgroup to Middleback Group and to exclude it from the Hutchison Supergroup. The Middleback Group now forms a stand-alone stratigraphic group that may be age-equivalent to some stratigraphic components of the Sleaford and Mulgathing complexes (Szpunar et al. 2011b). In addition, rocks from east of the Kalinjala Shear Zone and the Middleback Range, which are here proposed as age-equivalents of either the Darke Peak or the Cleve groups, have been included into the redefined Hutchison Supergroup (Fig. 1).

We suggest an older age limit of about 2000 Ma and a younger age limit of about 1770 Ma for the deposition of Hutchison Supergroup sediments. The older age limit refers to the younger maximum depositional age group for the Warrow Quartzite containing detritus of the c. 2000 Ma Miltalie Gneiss. The younger age limit marks the end of deposition of the c. 1795–1770 Ma Myola Volcanics – Broadview Schist succession, which is proposed here to be a lateral equivalent of the Cleve Group metasedimentary succession (Fig. 1). Sedimentation was terminated by a tectonic

event that imparted a penetrative deformational fabric on the Broadview Schist and that was associated with intrusion of the c. 1770 Ma Tip Top Granite (McAvaney et al. 2016a, 2016b, 2017). This tectono-magmatic event is coincident with the Yambah Event recognised in rocks of the Northern Territory (Scrimgeour 2013; McAvaney et al. 2016a; Reid et al. 2017). Volcano-sedimentary rocks emplaced and deposited after c. 1770 Ma and before the onset of the Kimban Orogeny at c. 1730 Ma are considered part of the Wallaroo Group depositional system.

Hutchison Group/Supergroup changes include:

- Elevation to Hutchison Supergroup [Y-h, Yh]
- Creating codes for the Darke Peak [Y-hd, Yhd] and Cleve groups [Y-hc, Yhc]
- Recoding the Warrow Quartzite [Y-hd-w Yhdw], Bosanquet Formation [Y-hd-q, Yhdq] and Corny Point Paragneiss [Y-hd-c, Yhdc] as parts of the Darke Peak Group
- Creating codes for the proposed Poolalalie Dolomite [Y-hd-p, Yhdp] and Yabmana Iron Formation [Y-hd-y, Yhdy] as parts of the Darke Peak Group
- Recoding the Mangalo Schist [Y-hc-m, Yhcm] and Yadnarie Schist [Y-hc-y, Yhcy] as parts of the Cleve Group
- Creating a code for the proposed Mount Shannon Iron Formation [Y-hc-s, Yhcs] as part of the Cleve Group
- Recoding the former Paleoproterozoic Grouping Y rocks, an informal group including the Myola Volcanics and Broadview Schist, as Hutchison Supergroup grouping B [Y-hb, Yhb]
- Recoding the Peak Metamorphics [Y-he Yhe] as part of the Hutchison Supergroup.

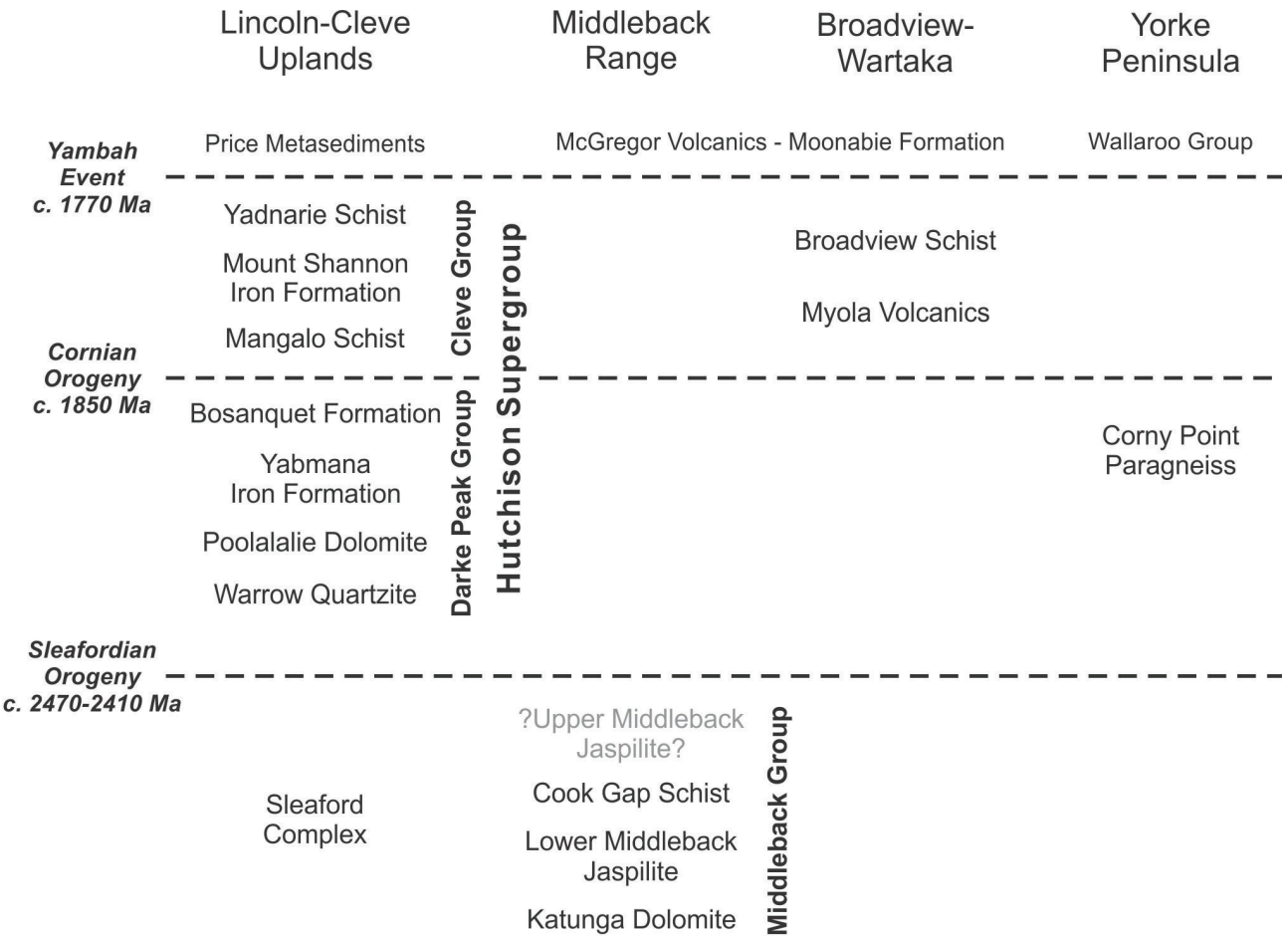


Figure 1. Proposed stratigraphy of the redefined Hutchison Supergroup and Middleback Group, southern Gawler Craton (after Preiss 2011 and Szpunar et al. 2011a, b).

MIDDLEBACK (SUB)GROUP

The redefined Middleback Group, representing the metasediments of the Middleback Range of the NE Eyre Peninsula, was previously a subgroup within the former Hutchison Group, but has been elevated to group rank by Szpunar et al. (2011a). The metasediments of the Middleback Group are thought to be considerably older than other rocks included in the former Hutchison Group (c. 2565 Ma vs c. 1890–1730 Ma; Szpunar et al. 2011a, b) and are therefore not included in the redefined Hutchison Supergroup (Fig. 1). In this update, the Middleback Group [AY-i, Ayi] has been recoded as a stand-alone Archean-Paleoproterozoic group.

Note that the 100K, 2M and 7M scale state-wide surface geology maps delivered via SARIG have not been remapped to align with the proposed stratigraphic schemes for the redefined Hutchison Supergroup and the Middleback Group. These updates will eventually be reflected in future editions of a state-wide seamless geology for South Australia as part of the *South Australian Discovery Mapping* project (SADM). In the meantime, the reader is referred to Szpunar et al. (2011a, b) for the distribution and extent of the Middleback, Darke Peak and Cleve groups.

EBA FORMATION

The best available geochronology for the Eba Formation gives a maximum depositional age of c. 2540–2517 Ma (Howard et al. 2011). The formation has therefore been recoded as Archean-Paleoproterozoic [AY---e, AY-e] (formerly Paleoproterozoic).

ST FRANCIS SUITE/GRANITE

The c. 1630 Ma St Francis Suite was formerly defined as a suite distinct from the St Peter Suite on the basis of geochronology (Flint and Rankin 1991; Swain et al. 2008). Recent geochronology on the St Peter Suite has expanded the time range of the suite to c. 1650–1605 Ma (previously c. 1620–1615 Ma), making the separation of the St Francis Suite from the St Peter Suite arbitrary. In this update, the St Francis Suite has been revised to its original name St Francis Granite [Y--p-f, Ypf] and has been included as a formation rank unit in the St Peter Suite.

C. 1790–1760 MA GRANITES

There are a series of granites in the Gawler Craton with ages c. 1790–1760 Ma which have been informally grouped as Paleoproterozoic Grouping J [Y--j, Yj]. These include the Wertigo Granite [Y--j-g, Yjg], Wirriecurrie Granite [Y--j-w, Yjw], Tip Top Granite [Y--j-t, Yjt] and Investigator Granite Gneiss [Y--j-v, Yjv].

WALLAROO GROUP

The McGregor Volcanics [Y--x-c, Yxc] and the Moonabie Formation [Y--x-o Yxo] are considered stratigraphically equivalent to the Wallaroo Group [Y--x, Yx] and have therefore been recoded as parts of this group.

CORRUNNA CONGLOMERATE AND BLUE RANGE BEDS

The existing informal Paleoproterozoic T Grouping, previously including only the c. 1650 Ma Tarcoola Formation [Y--t-t, Ytt] and intercalated Ward Volcanics [Y--t-w, Ytw], has been expanded to include the Corunna Conglomerate [Y--t-r, Ytr] and the Blue Range Beds [Y--t-b, Ytb], two sedimentary successions that were also deposited during the c. 1660–1600 Ma time interval (Fraser and Neumann 2010; McAvaney and Reid 2017; Jagodzinski et al. 2020).

TOONDULYA SUPERSUITE

The Hiltaba Suite [M-th, Mth] and the Gawler Range Volcanics [M-ta, Mta] have been grouped under the Toondulya Supersuite [M-t, Mt] in recognition of their shared petrogenesis. The existing and often referenced but informal groupings of the Gawler Range Volcanics into the lower and upper Gawler Range Volcanics have also been implemented in the stratigraphic hierarchy.

The lower Gawler Range Volcanics [M-tal, Mtal] include the Bittali Rhyolite [M-talb, Mtalb], Fresh Well Formation [M-talf, Mtalf], Angle Dam Dacite [M-talg, Mtalg], Spearfelt Rhyodacite [M-tals, Mtals], Ealbara Rhyolite [M-tale, Mtale], Konkaby Basalt [M-talk, Mtalk], Roopena Basalt [M-talr, Mtalr], Waganny Dacite [M-talw, Mtalw], and Lake Gairdner Rhyolite [M-tall, Mtall].

The upper Gawler Range Volcanics [M-tau, Mtau] include the Eucarro Rhyolite [M-tauu, Mtauu], Yardea Dacite [M-tauy, Mtauy], Carnding Rhyodacite [M-tauq, Mtauq], Mount Double Ignimbrite [M-taum, Mtaum], Mount Friday Formation [M-tauo, Mtauo] and Chandabooka Dacite [M-tauh, Mtauh].

The Gawler Range Volcanics also include the existing Glyde Hill [M-tay, Mtay] and Chitanilga [M-tai, Mtai] volcanic complexes.

COOMPANA STRATIGRAPHY

New codes have been added to cover stratigraphy identified and defined during the 2017 Coompana drilling campaign (Pawley et al. 2020). These include the Toolgana Supersuite [YMt, YMt], Koomalboogurra Suite [YMtk, YMtk], Warakurna Supersuite [M-r, Mr], Bunburra Suite [M--b, Mb], Undawidgi Supersuite [M-z, Mz], Gilgerabbie Suite [M-zg, Mzg], Merdayerrah Shoshonite [M-o--m, Mo-m], Koonalda Suite [M-ok, Mok] and Albala-Karoo Syenogranite [M-ok-a, Moka].

There are also additional changes associated with the creation of the Warakurna Supersuite, including:

- Giles Suite [M-rg, Mrg] and Angatja Granite [M-r—j, Mr-j] have been recoded as part of the Warakurna Supersuite
- Alcurra Dolerite [M-rg-a, Mrga] has been recoded as part of the Giles Suite
- Giants Head Suite [M-rh, Mrh], including members, and Warbla Suite [M-rw, Mrw] has been added to the Warakurna Supersuite

FURTHER STRATIGRAPHY UPDATES

The Stratigraphy module of SA Geodata will continuously be maintained and updated by the stratigraphy custodian of the Geological Survey of South Australia, in collaboration with the SA Stratigraphy Subcommission of the Geological Society of Australia and the national convener of the Australian Stratigraphy Commission at Geoscience Australia. Since implementation of this major map symbology update in early 2024, a series of additional changes to the stratigraphy database have been undertaken. These include:

- Changing the map symbols of unnamed ‘Tertiary unit 1’ and ‘Tertiary unit 2’ from T1 and T2 to Tap1 and Tap2, to avoid confusion of stratigraphic unit codes with groundwater aquifer codes in SA Geodata.
- Revision of the Nonning Rhyodacite, Yannabie Rhyodacite and Paney Rhyolite to Nonning Rhyolite Member [M-tauun, Mtauun], Yannabie Rhyolite Member [M-tauuy, Mtauuy] and Paney Rhyolite Member [M-tauup, Mtauup], grouping them under the parent unit Eucarro Rhyolite (Gawler Range Volcanics).
- Changing the GIS code and map symbol of the Yandoolka Rhyolite (Lake Everard area) from [M-taud, Mtaud] to [M-tayd, Mtayd], to group it with other intrusive subvolcanic units of the Gawler Range Volcanics occurring in the Glyde Hill Volcanic Complex.
- Changing the GIS code and map symbol of the Wiltabbie Volcanics (part of Gawler Range Volcanics) occurring as dykes in the Tarcoola area from [M-tali, Mtali] to [M-ta-w, Mtaw].

- Changing the GIS code and map symbol of the Burrawing Amphibolite from [AY-i-r, AYir] to [Y-h--r, Yh-r], to reflect that this unit forms part of the Hutchison Supergroup and not the Middleback Group as its type locality lies within the Cleve-Lincoln Uplands (Schwarz 2003).
- Changing the GIS code and map symbol of the Wire Dam Dolerite, which intrudes the Broadview Schist as mafic sills, from [Y-hb-w, Yhbw] to [Y----w, Y-w].
- Ongoing replacement of database links to the former Lincoln Complex [L-l, Ll], following its official abandonment some years ago (Cowley et al. 2017).

For a complete and updated list of currently valid stratigraphic units used by the Geological Survey of South Australia go to https://minerals.sarig.sa.gov.au/RockSampleSearch.aspx and click on the 'Download list of Stratigraphic Units, Map Symbols and GIS codes' link in the lower left corner of the search window. This will initiate the download of a SAGeo_download.zip file, which contains a strat_unit_code_desc.csv file.

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APPENDIXES

1. A PROPOSAL FOR SUBDIVISION OF THE PRECAMBRIAN OF EYRE PENINSULA

By Wolfgang V Preiss, 4/7/2011

Preamble

Currently the Eyre Peninsula portion of the Gawler Craton is divided into the Nuyts, Coulta, Cleve and Spencer Domains (2003 Interpreted Crystalline Basement Geology Map of Gawler Craton).

The Coulta Domain comprises an earliest Paleoproterozoic orogenic belt (Sleafordian) involving protoliths that are only slightly older (latest Neoarchean).

The Hutchison Group, occupying the Cleve Subdomain, is the metasedimentary cover over the Coulta Subdomain, deformed in the Kimban Orogeny at 1.69–1.73 Ga. Together these constitute one crustal block.

The Kalinjala Shear Zone is a zone of intense dextral transpressional deformation associated with major right-lateral displacement. It separates the Coulta-Cleve block from the Spencer Domain to the east.

The Spencer Domain includes the 1.85 Ga Donington Suite, a number of high-grade metamorphics of uncertain age, and recently discovered Mesoarchean granites. The latter almost certainly form the basement to the Middleback Subgroup of northeastern Eyre Peninsula.

The Spencer Domain is a modification of the 1993 scheme (Drexel et al. 1993) in which the Cleve Subdomain extended beyond the Kalinjala to the western edge of the Moonta Subdomain.

Current Hutchison Group stratigraphy (Drexel et al. 1993)

The current stratigraphy is assembled from elements on central, southern and northern Eyre Peninsula:

- On southern Eyre Peninsula, the basal quartzite overlies Sleafordian basement, and is overlain successively by dolomite, banded iron formation (BIF) and pelite.
- On central Eyre Peninsula, the quartzite overlies the 2.0 Ga Miltalie Gneiss, and is similarly overlain by dolomite, BIF and pelite.
- On northeastern Eyre Peninsula, dolomite and BIF are overlain by pelite and possibly more BIF but there is no exposed basal quartzite or basement.
- These units are correlated across Eyre Peninsula and grouped as Hutchison Group, with formations named:
    - Warrow Quartzite at base, Katunga Dolomite, Mangalo Schist, Mt Shannon Iron Formation, and Yadnarie Schist on central Eyre Peninsula; Katunga Dolomite, lower Middleback Jaspilite, Cook Gap Schist, upper Middleback Jaspilite on northeastern Eyre Peninsula.
    - Formations above and including the Katunga Dolomite are grouped as the Middleback Subgroup.
- The metavolcanic Bosanquet Formation dated at 1.86 Ga is inferred to lie at the top of the Hutchison Group which is thus bracketed between 2.0 and1.86 Ga.
- The 1.79 Ga Myola Volcanics and Broadview Schist of northeastern Eyre Peninsula display no contact relationships with the Middleback Subgroup, but are inferred not to have undergone D1 of the Kimban Orogeny responsible for the layer-parallel foliation of the Hutchison Group.
- The Moonabie Formation and 1.74 Ga McGregor Volcanics are openly folded and essentially unmetamorphosed.

POST-1993 REVISIONS

- Working on southern Eyre Peninsula, Jeff Vassallo proposed that the Hutchison Group is *younger* than the Donington Suite. This was not widely accepted in SA *until*:
- Liz Jagodzinski dated the youngest detrital zircons in the upper Hutchison Group at 1790 Ma.

- In addition, Karin Barovich found from Sm-Nd isotopes that the upper, pelitic part of the Hutchison Group is isotopically more juvenile than the lower part.

MIKE SZPUNAR

- Used geochemical and detrital zircon data to distinguish the 'Hutchison Group' of the Middleback Ranges from that of central and southern Eyre Peninsula.
- Favoured a latest Neoarchean age for the Middleback Group, based on its youngest detrital zircons and comparisons with the Hamersley Group of Western Australia.
- Proposed erection of two new groups (Darke Peak and Cleve Groups) to replace the Hutchison Group of central and southern Eyre Peninsula.
- Defined the age of the Cleve Group as younger than its youngest detrital zircons (1.78 Ga).
- Used geochemistry to relate pelites in the Broadview drillhole to the Darke Peak Group.
- Based on the intercalation of these pelites with the 1.86 Ga Bosanquet Formation metavolcanics, argued that the Darke Peak Group is also of 1.86 Ga age.

PROPOSAL

My proposal acknowledges Mike Szpunar's contribution while at the same time not making a commitment to particular ages or correlations. It uses Mike's new subdivisions but leaves open a number of hypotheses to be tested by further work. I suggest:

1. That the Hutchison Group be elevated to Supergroup to incorporate the new Darke Peak and Cleve Groups of the Cleve Domain.
2. That the Kalinjala Shear Zone be recognised as a major crustal boundary, representing either a major strike slip structure juxtaposing two parts of a single continent that were originally widely separated along strike, or the oblique docking of two continents or micro-continents.
3. That the Spencer Domain be regarded a suspect terrane (in the strict tectonic sense).
4. That Mike Szpunar's proposal for the Middleback Subgroup be accepted, i.e. that it be elevated to Middleback Group, excluded from the Hutchison Supergroup, and applied only to the Middleback Ranges region (east of the Kalinjala Shear Zone) because:
    - it lacks the young detrital zircons of the Hutchison Supergroup, and
    - it lies within the suspect Spencer Terrane.
5. That the age of the Darke Peak Group be specified only within the range 2.0–1.73 Ga.
6. That the age of the Cleve Group be specified only within the range 1.78–1.73 Ga.
7. That the age of the Middleback Group be specified only within the range 2.57–1.73 Ga.

The fact that no unconformity has been mapped between the Darke Peak and Cleve groups is no obstacle to the latter being significantly younger. It took a century for all the major disconformities in the far less deformed Adelaidean succession to be recognised. In the Willyama Supergroup, the 15–20 m.y. hiatus between the Curnamona and Saltbush Groups inferred from geochronology could never have been identified from mapping alone.

The weakest link in Mike's argument is, in my view, the age of the Darke Peak Group. The critical relationships are in the Broadview drillhole, but the cored rocks are extremely tectonised and no stratigraphic relationship can be inferred with any confidence. Equally plausible is the possibility that the 1.86 Ga metavolcanics formed a basement to the Darke Peak Group, and that the two are tectonically interleaved.

This proposal will allow for both possibilities. Either:

- **the Darke Peak Group is significantly older (1.86 Ga) than the Cleve Group (<1.79 Ga), and there is a significant unconformity between them,**

or

- **Both groups are <1.79 Ga and there is no significant break in deposition between them.**

Even if the Middleback Group can be shown by future work to be a partial or total correlative of the Hutchison Supergroup, their occurrence on separate tectonic terranes still justifies their separate nomenclature**.**

2. LIST OF CHANGED CODES

A list of stratigraphic units which were affected by GIS code and map symbol changes in the January 2024 map symbology update is attached to this document.

View list of stratigraphic units

For a complete and updated list of currently valid stratigraphic units used by the Geological Survey of South Australia go to https://minerals.sarig.sa.gov.au/RockSampleSearch.aspx and click on the 'Download list of Stratigraphic Units, Map Symbols and GIS codes' link in the lower left corner of the search window. This will initiate the download of a SAGeo_download.zip file, which contains a strat_unit_code_desc.csv file.