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GUIDE TO THE GEOLOGY OF AUSTRALIA

W.D. PALFREYMAN

DEPARTMENT OF RESOURCES & ENERGY
BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

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Guide to the geology of Australia

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ABSTRACT

The geology of onshore continental Australia is presented as a series of data sheets in which each geological province or entity is described in terms of key geological parameters: age, size, margins, physiography, elements, stratigraphy, igneous activity, metamorphism, deformation, and economic geology. An outline is given of Australian landforms, and a short geological history is presented. The Bulletin is designed as a ready reference to the geology of Australia and as a companion to regional and continent-wide geological maps.

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INTRODUCTION

This account of the geology of onshore Australia is based in part on a number of regional or continent-wide geological texts which have appeared over the last twenty-five years and which in turn are a summation of knowledge derived principally from the post-war systematic geological mapping of the continent. One exception is the oldest, although still the most comprehensive, publication, the 'Geology of the Commonwealth of Australia by T. W. E. David (1950), which is based on prewar knowledge. More recent publications include the States' geological volumes published by the Geological Society of Australia, the monograph series on the 'Economic Geology of Australia and Papua New Guinea' published by The Australasian Institute of Mining and Metallurgy, the general text 'The Geological Evolution of Australia and New Zealand' (Brown & others, 1968), and short texts in the 'Encyclopedia of World Geology, Part 1 (Fairbridge, 1975). A more popular account of Australian geology is given in 'Ancient Australia' (Laseron, 1951, revised Brunnschweiler, 1969), of which a third edition is in press (Brunnschweiler, in press).

The Bulletin provides an amplification of the geological framework of Australia as depicted on recent continent-wide geological maps, especially the 1:2 500 000-scale map, 'Geology of Australia' (BMR, 1976), and the 1:10 000 000-scale maps in the BMR Earth Science Atlas of Australia. An account of the compilation and philosophy behind the 1976 BMR map is given in the Appendix.

OUTLINE OF AUSTRALIAN LANDFORMS

The landscape of Australia, the smallest of the continents, is distinct from that developed on other continents owing to the absence of high mountain ranges, active volcanoes, or glaciers, and the presence of extensive low plateaus behind narrow coastal plains. It is essentially a flat continent (Jennings & Mabbutt, 1977).

The present-day landscape has been shaped by a long period of subaerial erosion, in part dating from the continental glaciation of Permian times (Ollier, 1977), punctuated by periods of shallow-marine sedimentation in the late Mesozoic and during the Tertiary. Throughout this period of over 250 million years the exposed land surfaces have been subjected to varying climates, mostly warm to hot and varying from dry to humid, which has given rise to mantles of deeply weathered rock (laterites, silcretes, and bauxites). Cainozoic epeirogenic movements, warping, and faulting with associated dissection have led to a topography of gently sloping plateaus cut around their margins by deep narrow gorges. These processes have resulted in a continent of generally gentle relief with large expanses of plains and dissected tablelands, the average elevation of which is about 330 m above sea level and 39 per cent of which is less than 200 m above sea level (Jennings & Mabbutt, 1977). Furthermore, the tablelands, behind the narrow coastal plains, rim a vast depressed region of interior lowlands.

The continent can be divided into three major geomorphic divisions (David, 1950; King, 1967; Mabbutt, 1973, 1980; Jennings & Mabbutt, 1977): the Western Plateau, the Interior Lowlands, and the Eastern Uplands (Fig. 1). These divisions have been subdivided further into 22 provinces and 197 sections by Jennings & Mabbutt (1977), broadly following the approach adopted by Fenneman (1928) for his physiographic map of USA.

The *Western Plateau* division coincides structurally with the Archaean to Proterozoic shields and basins and to the marginal and intracratonic Phanerozoic basins of western, northern, central, and southern Australia. The landscape is dominated by sand plains and low tablelands in the west, combined with longitudinal uplands of greater relief in the north, centre, and east. The *Interior Lowlands* division is formed on the flat, low lying, and generally deeply weathered Mesozoic and Cainozoic platform sediments of central-eastern Australia. The landscape consists of depositional sand and flood plains in the interior and erosional landforms of low relief along the western and eastern margins. The *Eastern Uplands* division coincides with the Phanerozoic fold belts and marginal basins of eastern Australia. Here the landscape is more complex, with elevated remnants of the Tasman Fold Belt standing at various levels above smaller and younger marginal basins containing generally flat-lying sediments; the

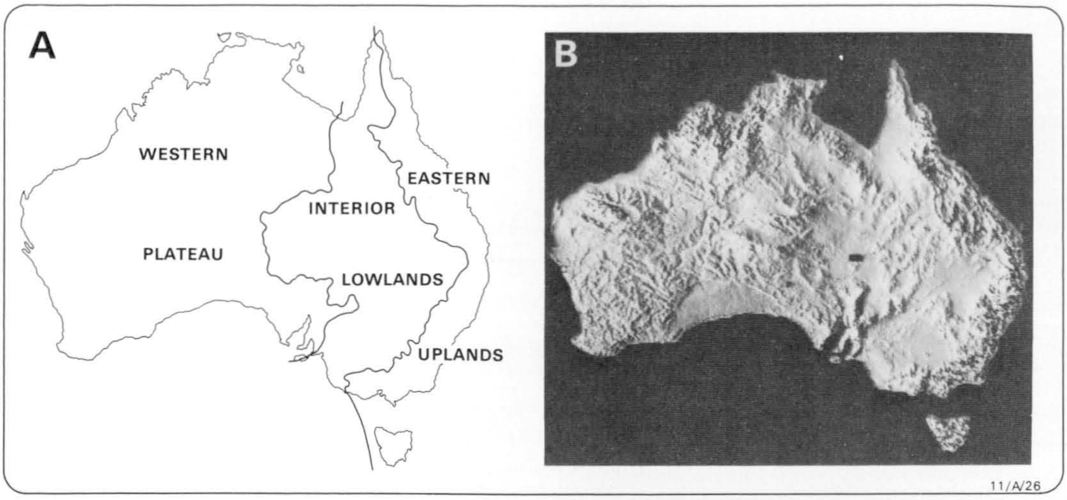


Fig. 1. A. Main geomorphological subdivisions of Austtralia. B. Digital terrain model of Australia.

whole division slopes gradually westward to the Interior Lowlands and eastward to narrow coastal plains.

The climate of Australia, though ranging from tropical in the north to cool temperate in the south, is generally dry, with a mean annual precipitation of about 420 mm (Warner, 1977). About sixty-five percent of the landmass can be classified as arid or semi-arid; the mean annual runoff over the whole continent is about 50 mm (Warner, 1977), less than fifteen percent of total precipitation. This general aridity, combined with the nature of Australian landforms outlined previously, results in a generally narrow zone of coordinated external drainage bounding the continent in the west, north, and east. But even in this region, permanent water flow occurs only in the areas of highest rainfall. The interior of the continent is drained by two major coordinated drainage systems, an internal system which connects with the usually dry Lake Eyre, and the external Murray-Darling system. Elsewhere, drainage is either uncoordinated or non-existent except during rare periods of heavy rain when, especially in the west of the continent, runoff follows lines of ancient drainage established in former times of higher rainfall.

The continental shelf is a relatively flat terrace which extends from the shoreline to depths of around 150 m (D'Addario & Jones, 1982). It varies in width from about 40 km off eastern Australia to over 400 km off northern Australia. During periods of Pleistocene low sea levels, the greater part of the shelf was exposed, thus joining the islands of Tasmania and New Guinea to the main continental mass.

Seaward lie the continental slope and continental rise—irregular sloping zones extending down to the abyssal plain at around 4000 m depth and in places broken by terraces, troughs, and plateaus. These features are also cut by submarine canyons, steep-sided valley-like features, some of which are continuous with present-day rivers.

The abyssal plain, a flat, featureless zone, lies at depths of from 4000-6000 m (D'Addario & Jones, 1979) and is broken only by seamounts (small, steep-sided features) or by oceanic ridges (larger, gently-sloping features), which, off eastern Australia, consist of blocks of continental material detached during rifting in the Late Cretaceous.

GEOLOGICAL HISTORY

The geological evolution of the Australian continent commenced in the Pilbara region of Western Australia some 3500 million years ago (Archaean—see Fig. 2) when a thick sequence of intermediate, basic, and ultrabasic lavas and comagmatic high-level intrusive rocks, volcanogenic sediments, banded iron formation, and chert was deposited on an unknown basement. This sequence was subsequently folded and partially melted to form acid to basic intrusive and volcanic rocks. Further deposition of banded iron formation and arenaceous and argillaceous sediments then took place and final stabilisation occurred around 2500 million years ago with the emplacement of granite accompanied by low-grade metamorphism of the sedimentary and volcanic sequences.

The evolution of the Yilgarn Block to the south commenced sometime before 3100 million years ago with the deposition of arenaceous and argillaceous sediments and minor mafic volcanics. This sequence was subsequently metamorphosed to form a gneissic granulite belt which now forms the western

EON	ERA	PERIOD	EPOCH	AGE
PHANEROZOIC	CAINOZOIC	Quaternary	Recent	0.015
			Pleistocene	1.8
		Tertiary	Pliocene	5
			Miocene	24
			Oligocene	37
			Eocene	53.5
			Paleocene	65
	MESOZOIC	Cretaceous		135
		Jurassic		195
		Triassic		235
	PALAEOZOIC	Permian		290
		Carboniferous		345
		Devonian		410
		Silurian		435
		Ordovician		490
		Cambrian		570
PRECAMBRIAN	PROTEROZOIC	Late		900
		Middle		1600
		Early		2300
	ARCHAEAN			>3800 (greatest age so far measured)

16/1–1

Fig. 2. Geological time scale, showing age of base of each period or epoch in millions of years.

and possibly the northern part of the block. Whether this sequence formed a basement to the greenstone granite belt to the east remains conjectural. The latter sequence closely resembles the one to the north in the Pilbara Block and presumably had a similar geological history although commencing at a younger date (around 2700 million years ago).

Further to the east, in the Gawler Block area in South Australia, arenaceous and argillaceous sediments, banded iron formation, and basic volcanics were laid down around 2600 million years ago. This sequence was subsequently metamorphosed and intruded by granite during the Early Proterozoic. Similarly, in the northern part of the Northern Territory various sediments, banded iron formation, and acid to basic volcanics were deposited during the late Archaean, around 2600 million years ago. Again, this sequence was metamorphosed and intruded by granite during the Early Proterozoic. Today these sequences are exposed only in small inliers in the Rum Jungle area where they form a basement to the Early Proterozoic Pine Creek Geosyncline sequence. Similar rocks crop out to the west in the Litchfield Complex and these may also be of Archaean age.

Following final cratonisation of the Archaean blocks around 2500 million years ago, sedimentation and associated volcanic activity became centred on the now unexposed Archaean basement areas represented in the west by the Hamersley and Nabberu Basins. The Hamersley Basin, lying to the south of the Pilbara Block, was initiated betwen 2400 and 2300 million years ago. An initial flood-basalt sequence was followed by a thick sequence of shallow and deep-water marine sediments including shale, dolomite, and banded iron formation together with acid to basic lavas. This sequence was unconformably overlain in the south by terrestrial and shallow-marine arenaceous sediments and dolomites. Sedimentation ceased in the Hamersley Basin between 1800 and 1700 million years ago with folding and regional metamorphism and granite emplacement in the southwest. A similar geological history has been postulated for the Nabberu Basin which lies along the northern margin of the Yilgarn Block.

Adjoining the Archaean nucleii to the north, trough-like structures formed during the Early Proterozoic. These quickly filled with thick sequences of geosynclinal sediments—siltstone, mudstone, greywacke, and acid to basic volcanics—later to be metamorphosed and intruded by a variety of igneous rocks. The belts now form the Halls Creek Province, Pine Creek Geosyncline, and Arnhem Block. To the south the Proterozoic element of the Gawler Block represents a shallow-marine shelf sequence, rather than a trough sequence as described above. Again this sequence subsequently underwent metamorphism and granite intrusion.

Following cratonisation of these Early Proterozoic blocks, younger sedimentary sequences were laid down in the Early and Middle Proterozoic along their southern and eastern margins. A central core of volcanic, metamorphic, and granitic rocks, probably resting on an older Early Proterozoic basement, formed in the Mount Isa region around 1900 million years ago. This core is flanked on the west by a younger sequence of sediments and basic volcanics, and on the east by shelf sediments. Both sequences underwent folding, metamorphism, and granitic intrusion. Further to the east, Middle Proterozoic shelf sediments and basic volcanics were deposited in the Georgetown and Coen Blocks. These were later folded during five periods of deformation extending into the Palaeozoic.

In the south, sedimentation was initiated sometime before 1800 million years ago with the laying down of mostly trough-type deposits, dominated initially by acid to basic volcanics but becoming more sediment-rich with time. This initial sedimentation was followed by metamorphism, granite emplacement, and dolerite intrusion over a long period with final cratonisation taking place around 1000 million years ago to form the Arunta Block and its offshoots, the Tennant Creek Block, The Granites-Tanami Block, Murphy Inlier, and Davenport Geosyncline.

Similarly, Early to Middle Proterozoic mobile zones flank the Yilgarn Block on the southeast, west, and northwest. The Albany-Fraser Province is a northeasterly trending zone, initiated around 1900 million years ago, of reworked Archaean and Proterozoic sediments and volcanics which have undergone several periods of metamorphism and intrusion over a long period of time, to about 1200 million years ago. This zone is probably continuous with the Musgrave Block to the east which occupies a similar position tectonically with the Archaean to Proterozoic Gawler Block to the south.

The Gascoyne Block, to the northwest of the Yilgarn Block, is another complex zone of reworked Archaean basement overlain by a metamorphic and igneous complex with ages spanning the Middle Proterozoic. The small Proterozoic inliers lying to the west of the Darling Fault—the Leeuwin and Northampton Blocks—and to the east of the Pilbara—the Paterson Province—appear to have had similar geological histories.

In the south of the continent, in the Gawler Block area, a shallow-marine succession of arenaceous sediments, dolomite, banded iron formation, and basic volcanics dating from about 2400 to 1800 million years ago was laid down on the Archaean basement and thus is broadly similar to the Hamersley Basin succession. However, unlike the latter, it was subsequently regionally metamorphosed and intruded and overlain by acid igneous rocks in the Middle Proterozoic.

Contemporaneous with the development of these marginal troughs, sedimentation also took place during various periods through the Proterozoic on the cratonised blocks themselves: during the Early Proterozoic in the Kimberley Basin area, Middle Proterozoic in the McArthur, Birrindudu, Victoria River, and Bangemall Basin areas, and Late Proterozoic-Palaeozoic in the Amadeus, Ngalia, Georgina, and Officer Basin areas. Throughout this time in all these areas sedimentation was remarkably consistent—sands, silts, carbonates, and evaporites were deposited in fluvial, lagoonal, and shallow-marine environments in a generally cyclic manner, building up sediment piles over 12 000 metres thick in the case of the McArthur and Bangemall basins. The older basins contain flood basalts and some acid lavas low in their sequences and are usually intruded by varying amounts of dolerite. The basin sediments are mostly little deformed although, in the eastern Bangemall Basin and the Amadeus and Ngalia Basins, sediments show strong local deformation and are in places metamorphosed.

At the end of the Proterozoic, localised events in central and northwestern Australia folded, thrusted, and in places metamorphosed, belts of already cratonised basement and overlying platform-cover sediments. In southern, north-central, and northern Australia, sedimentation continued unabated from the Late Proterozoic into the Cambrian (mainly carbonates) and Ordovician (interbedded clastic sediments) in the Adelaide Fold Belt and the Amadeus, Georgina, Daly River, Wiso, Ord and Bonaparte Basins, interrupted only by extensive flood basalt in the Middle Cambrian. Sedimentation was also initiated in the Arafura

Basin in the far north (clastic sediments) and in the Arrowie Basin in the south (carbonates).

The Early Cambrian was also the time of the start of sedimentation in the Tasman Fold Belt in eastern Australia. An early event was the rapid filling of the Kanmantoo Fold Belt adjoining the Adelaide Fold Belt on the east by a thick clastic sequence which was folded, metamorphosed, and intruded by granites in the Late Cambrian. Similar, though less extensive, troughs simultaneously developed in Victoria, Tasmania, and central Queensland and likewise filled rapidly with clastic sediments, and acid to basic and ultrabasic volcanics; shelf sedimentation took place during this time in western New South Wales. The evolution of the Tasman Fold Belt continued through the Silurian and into the Middle Devonian with the development of a series of generally north to northwest-trending troughs, shelfs, and volcanic arcs which became progressively cratonised eastwards by metamorphism and granite emplacement. Trough and shelf-type sedimentation commenced during this time in the New England and Hodgkinson Fold Belts. Over the cratonised central and western parts of the continent, sedimentation was restricted to troughs within the Amadeus, Canning, Carnarvon, and Perth Basins.

With the cratonisation of the Tasman Fold Belt in the Middle to Late Devonian, sedimentation in eastern Australia was confined to the north (Hodgkinson Fold Belt) and the extreme east (New England Fold Belt), which were progressively cratonised in the Late Devonian to Early Carboniferous and in the Late Carboniferous to Triassic respectively. Transitional-type basins characterised by clastic sediments, acid volcanics, and high-level granites, developed in Victoria and central Queensland. During the Devonian and Carboniferous, central and western Australia was characterised by the rapid filling of troughs in the Canning and Bonaparte Basins, by intense faulting and metamorphism in central Australia (Arunta and Musgrave Blocks), and by the development of thick continental sedimentary sequences in the nearby Amadeus, Ngalia, and Officer Basins. Shelf clastic and carbonate sediments were deposited in the Carnarvon Basin in the far west. Glacial and fluvioglacial sediments were deposited over much of the continent commencing in the Late Carboniferous and extending into the Permian.

The easternwards cratonisation of the continent was completed during the Late Permian to Triassic with granite emplacement, acid volcanism, and continental sedimentation in the eastern New England Fold Belt. During the Permian and Triassic, major marine transgressions of the continent commenced, reaching their peak in the Cretaceous. Trough and shelf sedimentation started in the Sydney, Bowen, and Tasmania Basins, to be followed by continental and deltaic coal measures. Sedimentation became more widespread in the Perth, Canning, Officer, and Bonaparte Basins, and commenced with continental sediments in the Galilee, Pedirka, Arckaringa, and the other basins to the east—Cooper, Stansbury, subsurface-Murray, Oaklands, Tasmania, Sydney, Bowen, and Galilee Basins.

The Late Triassic, Jurassic, and Cretaceous saw a general expansion of continental and shallow-marine sedimentation, especially over northern and eastern Australia in the Eromanga, Carpentaria, Laura, Clarence-Moreton, subsurface-Murray, Eucla, and Canning Basins. Thicker marine sedimentation took place in marginal basins, especially in the west such as the Perth and Carnarvon Basins where the rifting away of Australia from Gondwanaland to the west commenced. Small-scale acid volcanism and granite intrusion was confined to northeastern Australia. Thick sills of dolerite were extruded into Permian and Triassic sediments in Tasmania.

A major regression in the mid-Cretaceous resulted in sedimentation in the Late Cretaceous to mid-Tertiary being confined to present-day offshore areas, except in the south where sedimentation continued in the Eucla, Murray, Otway, and Gippsland Basins as the continent broke away from Antarctica. Basaltic volcanism became widespread in eastern Australia during the mid to late Tertiary and continued in isolated areas into the Holocene. Sedimentation in the late Tertiary to Holocene was confined to thin veneers of continental sands and silts and small isolated troughs. Minor glacial and fluvioglacial sediments were deposited in the eastern highlands during the Pleistocene.

GEOLOGICAL FRAMEWORK OF AUSTRALIA

Australia can be divided into three major geological regions, the Western Cratons, Central Cratons, and Eastern Craton. This threefold division is based on the tectonic divisions shown on the Tectonic Map of Australia and New Guinea (GSA, 1971) and the Geology of Australia 1:2 500 000-scale map (BMR, 1976), and is similar to that used by Rutland (1976). The term 'craton' refers to crustal regions which have developed through a cycle of sedimentation, deformation, metamorphism, igneous intrusion, and volcanism (a process called cratonisation) but which now are relatively stable and subject only to epeirogenic movements and which in places are overlain by thin marine or continental sedimentary sequences.

The three major geological regions reflect the gross crustal development of the continent, i.e. an eastward evolution from Archaean in the west through Proterozoic in the centre of Phanerozoic in the east. The present-day pattern of crustal structure is believed to be representative of ancient patterns as the individual cratons have not moved relative to each other since the time of their formation and thus have developed independent of any plate movements—an exception being the Eastern Craton where new crustal material accreted eastwards on older oceanic crust (Plumb, 1979a).

Geological provinces or entities within each major geological region are described here individually in terms of the following key parameters:

Age—Age range of rocks within each geological province or entity, indicated by the standard geological age divisions (see Fig. 2).

Size—Approximate area of the onshore portion, neglecting unknown, unexposed extensions.

Margins—Names and ages of neighbouring geological provinces or entities.

Physiography—Major physiographic elements.

Elements—Main geological elements.

Stratigraphy—Details of sedimentary and volcanic elements.

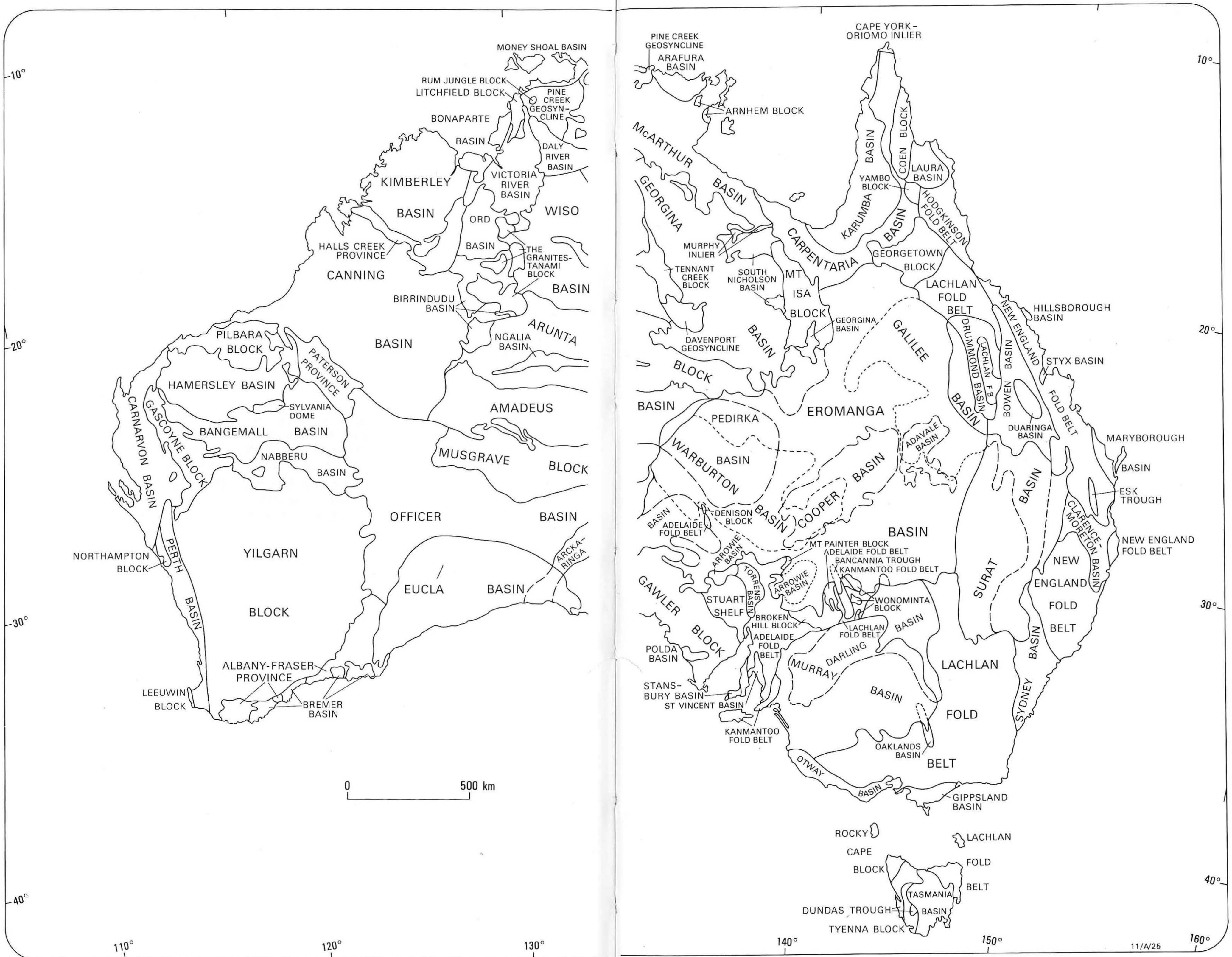
Igneous activity—Details of intrusive igneous activity.

Metamorphism—Type and degree of metamorphism.

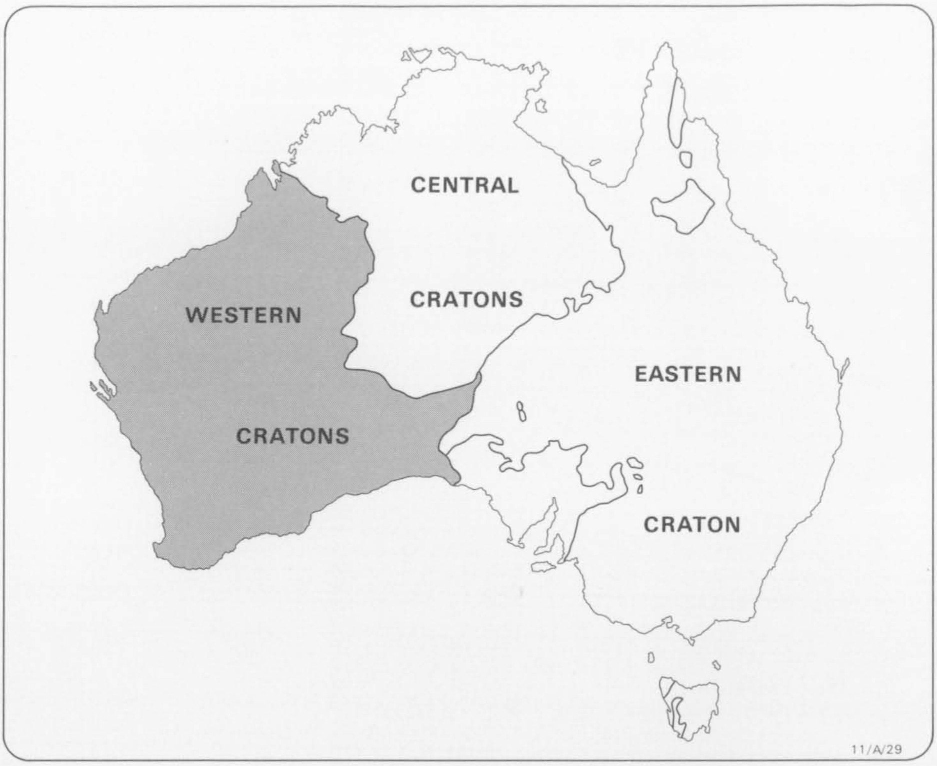
Deformation—Intensity and style of main folds and faults.

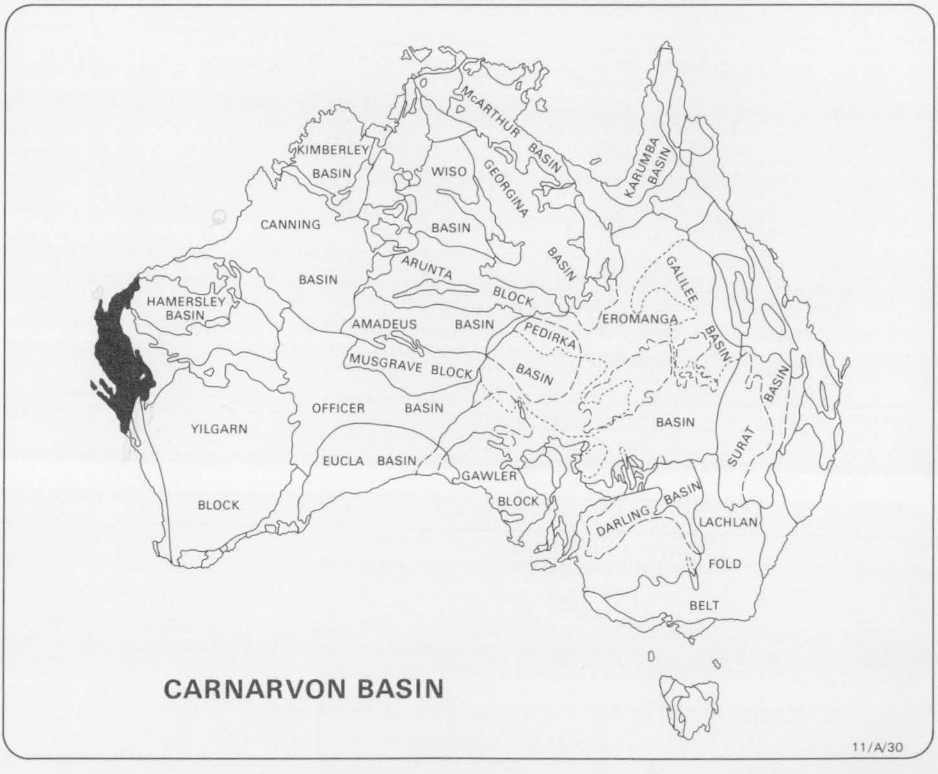
Economic geology—Summary of known mineral deposits or occurrences, including energy resources.

Reference—Main, comprehensive, and up-to-date reference; more than one reference may be given in the case of extensive or well-documented areas.



Australian geological provinces or entities.


CENTRAL
CRATONS
WESTERN
CRATONS
EASTERN
CRATON
11/A/29


KIMBERLEY
BASIN
McARTHUR BASIN
WISO
GEORGINA
BASIN
KARUMBA BASIN
CANNING
BASIN
ARUNTA
BLOCK
GALILEE
HAMERSLEY BASIN
AMADEUS
BASIN
PEDIRKA
BASIN
EROMANGA
BASIN
MUSGRAVE BLOCK
OFFICER
BASIN
SURAT
BASIN
YILGARN
BLOCK
EUCLA BASIN
GAWLER
BLOCK
DARLING BASIN
LACHLAN
FOLD
BELT
CARNARVON BASIN
11/A/30

WESTERN CRATONS

The Western Cratons consist of two major Archaean blocks separated, and almost completely surrounded by Proterozoic mobile belts (Gee, 1979) which are overlain and flanked by relatively undeformed Proterozoic, and even less deformed Phanerozoic, platform cover. The Western Cratons are bounded on the east by the Central Cratons and in part by platform cover of the Eastern Craton. The Western Cratons are flanked on the north, west, and south by offshore Phanerozoic basins (see Branson, 1978).

Two Archaean cratons, the Yilgarn and Pilbara Blocks, form the central core of the Western Cratons. They consist of complexes of granite, greenstone, and high-grade metamorphic rocks. Separating these two blocks is a belt of Proterozoic sediments, metamorphics, and granites comprising the Gascoyne Block and Nabberu Basin (the latter, previously regarded as cratonic cover (D'Addario & others, 1979), is now assigned to the orogenic domain category; Gee, 1979). Flanking the Archaean blocks are other similar Proterozoic belts: the Albany-Fraser Province to the south and southeast, the Paterson Province to the east, and the Norhampton and Leeuwin Blocks to the west. Further separating the Archaean blocks is the cratonic cover of the Hamersley Basin, a Proterozoic shelf and trough sequence separated by an unconformity from the younger Proterozoic shelf sequence of the Bangemall Basin. Flanking the Archaean-Proterozoic nucleus are undeformed to slightly deformed Late Proterozoic to Phanerozoic sedimentary basins: the Officer Basin to the east contains a number of unconformable units ranging from Late Proterozoic to Cretaceous in age; the Canning Basin to the northeast contains unconformable marine and continental sequences of Ordovician to Cretaceous age; the Carnarvon and Perth Basins to the west contain marine and continental sequences of Silurian to Tertiary age; the Eucla Basin to the southeast contains Cretaceous and Tertiary marine sediments; and the Bremer Basin to the south contains Tertiary marine sediments.

CARNARVON BASIN

Age—Silurian to Tertiary.

Size—110 000 km^2.

Margins—Proterozoic Gascoyne Block to east; Proterozoic Northampton Block and Phanerozoic Perth Basin to south; Archaean Pilbara Block and Proterozoic Hamersley Basin to northeast; extends offshore.

Physiography—Dissected plateaus; calcareous sand plains and dune fields; alluvial plains.

Elements—Marine and continental sediments; maximum thickness about 12 000 m.

Stratigraphy—Basal continental Silurian sediments overlain by Devonian deltaic and Carboniferous shallow-marine sediments; unconformably overlain by Permian glacial, fluvioglacial, and shallow-marine sediments; these overlain by alternating sequences of marine and continental sediments extending through the Triassic, Jurassic, Cretaceous, and Tertiary.

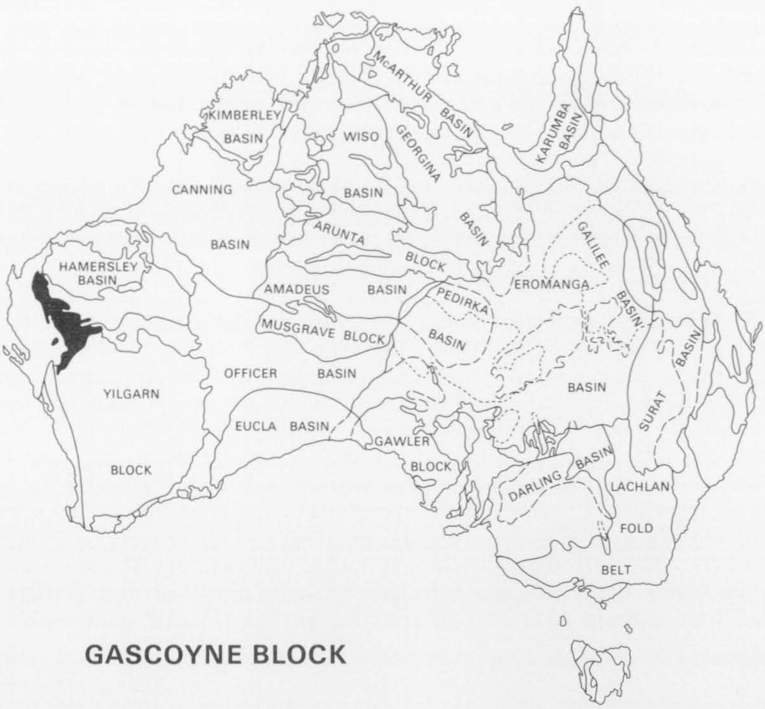
Igneous activity—Minor acid volcanics.

Metamorphism—None.

Deformation—Extensive faulting; moderate folding.

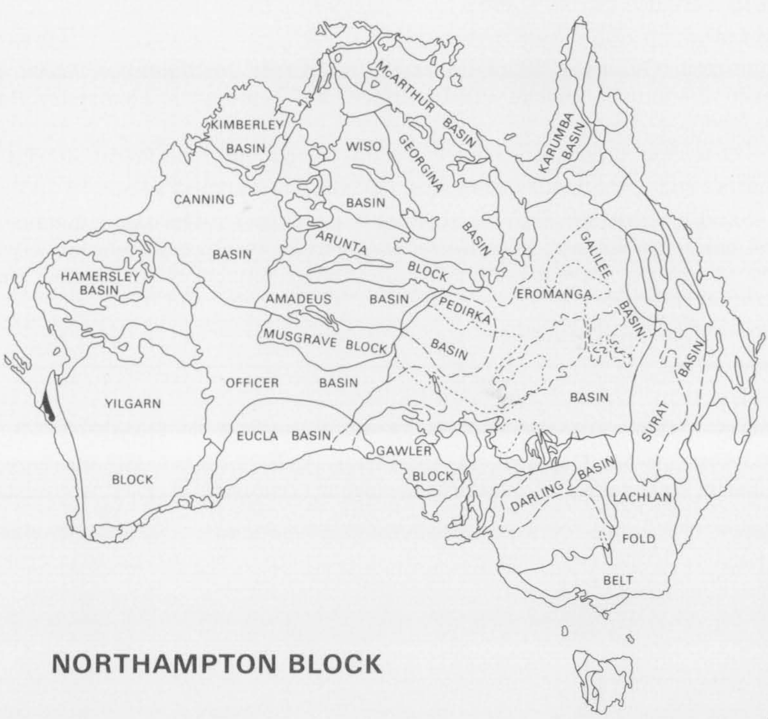
Economic geology—Hydrocarbons have been found throughout the basin.

Reference—Playford, P. E., Cope, R. N. Cockbain, A. E., Low, G. H., & Lowry, D. C., 1975 —Carnarvon Basin. *In* Geology of Western Australia. *Geological Survey of Western Australia, Memoir* 2.



GASCOYNE BLOCK

11/A/31



NORTHAMPTON BLOCK

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GASCOYNE BLOCK

Age—Early to Middle Proterozoic.

Size—56 000 km^2.

Margins—Phanerozoic Carnarvon Basin to west and north; Archaean Yilgarn Block to south; Proterozoic Nabberu, Bangemall, and Hamersley Basins to east.

Physiography—Weakly dissected plains and ridges of low relief.

Elements—Metasediments and metabasalt in north; high-grade metamorphics in south; intrusive granites; sandstone, shale, dolomite.

Stratigraphy—Reworked Hamersley Basin sequence in north, the original stratigraphy becoming progressively more obscure towards the south; schist, gneiss, and migmatite probably represent reworked Yilgarn Block sequence in south; Middle Proterozoic sediments developed in small basins throughout the province.

Igneous activity—Post-orogenic granites intrude all sequences.

Metamorphism—Low to medium-grade in north; retrogressed high-grade metamorphics derived from Archaean granulites in south; Middle Proterozoic sediments cleaved during a second phase of low-grade regional metamorphism.

Deformation—Original Hamersley Basin trends overprinted by deformation accompanying later metamorphism in north; original Archaean trends similarly overprinted by deformation in south; younger terrigenous sequence folded by post-orogenic deformation phase.

Economic geology—Minerals containing beryllium, niobium, and tantalum occur in pegmatites.

Reference—Goode, A. D. T., 1981—Proterozoic geology of Western Australia. *In* Hunter, D. R. (Editor)—DEVELOPMENTS IN PRECAMBRIAN GEOLOGY. 2. Precambrian of the Southern Hemisphere. *Elsevier Scientific Publishing Company, Amsterdam.*

NORTHAMPTON BLOCK

Age—Middle Proterozoic.

Size—4000 km^2.

Margins—Phanerozoic Carnarvon Basin to west and north; Phanerozoic Perth Basin to west, south, and east.

Physiography—Low dissected plateaus; sandy plains.

Elements—Granulite; granite; migmatite.

Stratigraphy—Layered sequence of acid to basic granulite, quartzite, and pegmatite.

Igneous activity—Porphyritic granite intruding layered sequence with band of migmatite along granite margins; whole sequence cut by dolerite sills and dykes.

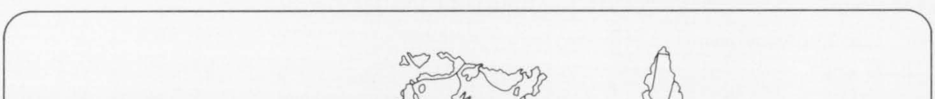
Metamorphism—Very high-grade regional metamorphism; some metasomatism along granite margin.

Deformation—Open folding about northerly to northwesterly trending axes; some doming.

Economic geology—Small lead and copper deposits associated with dolerite dykes which cross-cut granulite.

Reference—Goode, A. D. T., 1981—Proterozoic geology of Western Australia. *In* Hunter, D. R. (Editor)—DEVELOPMENTS IN PRECAMBRIAN GEOLOGY. 2. Precambrian of the Southern Hemisphere. *Elsevier Scientific Publishing Company, Amsterdam.*


McARTHUR BASIN
KIMBERLEY BASIN
WISO BASIN
GEORGINA BASIN
KARUMBA BASIN
CANNING BASIN
ARUNTA BLOCK
GALILEE BASIN
HAMERSLEY BASIN
AMADEUS BASIN
PEDIRKA BASIN
EROMANGA BASIN
MUSGRAVE BLOCK
SURAT BASIN
YILGARN BLOCK
OFFICER BASIN
EUCLA BASIN
GAWLER BLOCK
DARLING BASIN
LACHLAN FOLD BELT
PERTH BASIN
11/A/33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EUCLA BASIN
GAWLER BLOCK
DARLING BASIN
LACHLAN FOLD BELT
LEEUWIN BLOCK
11/A/34

PERTH BASIN

Age—Silurian to Tertiary.

Size—55 000 km^2.

Margins—Archaean Yilgarn Block to east; Palaeozoic and Mesozoic Carnarvon Basin to north; Proterozoic Northampton and Leeuwin Blocks to west; extends offshore.

Physiography—Low dissected plateaus; calcareous dune fields; alluvial plains in south.

Elements—Continental and marine sediments; maximum thickness about 1200 m.

Stratigraphy—Basal continental Silurian sediments unconformably overlain by Permian glacial, and shallow-marine sediments; overlain by marine Triassic sediments, continental and marine Jurassic and Cretaceous sediments, and Tertiary carbonates.

Igneous activity—Minor Cretaceous dolerite intrusions.

Metamorphism—None.

Deformation—Some faulting; minor folding.

Economic geology—Natural gas in several wells, coal in thin seams in Permian and Jurassic sequences; ilmenite in coastal Holocene sands.

Reference—Playford, P. E., Cope, R. N., Cockbain, A. E., Low, G. H., & Lowry, D. C., 1975—Perth Basin. *In* Geology of Western Australia. *Geological Survey of Western Australia, Memior* 2.

LEEUWIN BLOCK

Age—Middle Proterozoic.

Size—1000 km^2.

Margins—Phanerozoic Perth Basin to east; extends offshore.

Physiography—Low ridge overlain by coastal dune field.

Elements—Metamorphic complex of acid to basic granulite.

Stratigraphy—Sequence of four metamorphic belts of acid to basic composition.

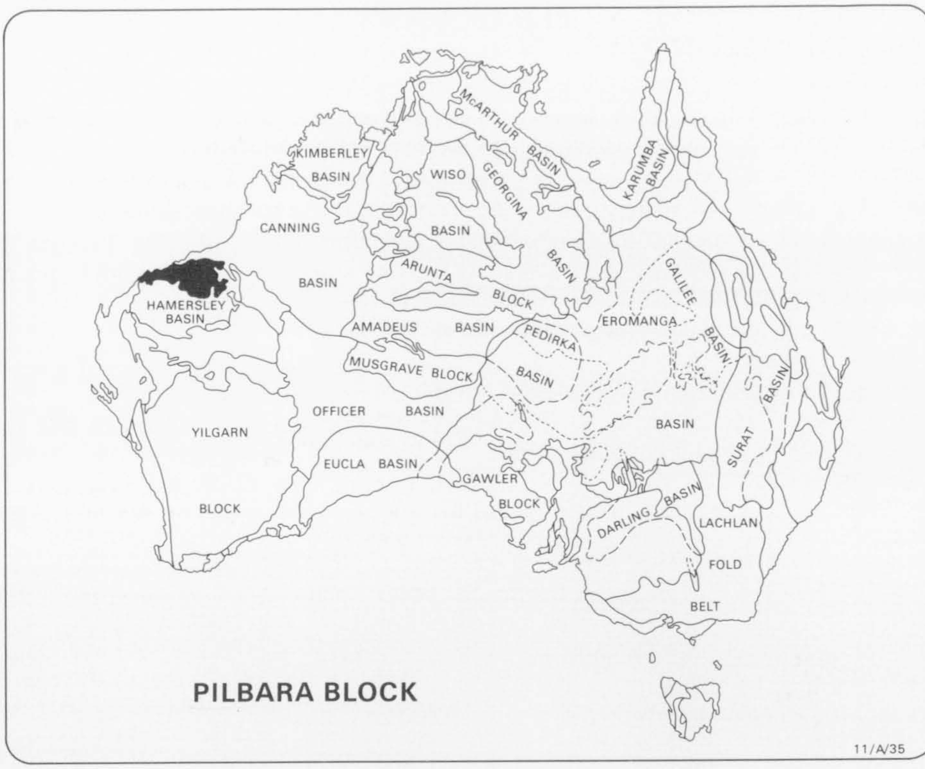
Igneous activity—None.

Metamorphism—High-grade to very high-grade regional metamorphism.

Deformation—Broad folds about north to northeasterly axes; crossfolds give rise to basins and domes.

Economic geology—Ilmenite in coastal beach sands.

Reference—Goode, A. D. T., 1981—Proterozoic geology of Western Australia. *In* Hunter, D. R. (Editor)—DEVELOPMENTS IN PRECAMBRIAN GEOLOGY. 2. Precambrian of the Southern Hemisphere. *Elsevier Scientific Publishing Company, Amsterdam.*



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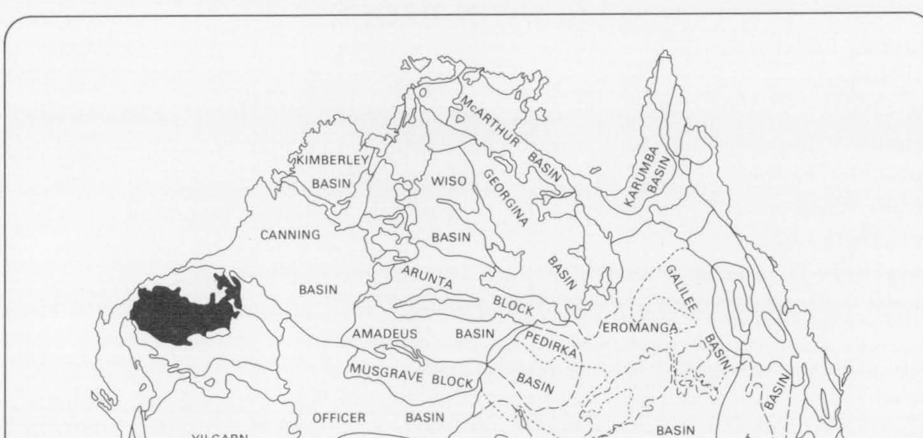
EUCLA BASIN
GAWLER BLOCK
DARLING BASIN
LACHLAN FOLD BELT
PILBARA BLOCK
11/A/35



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GAWLER BLOCK
DARLING BASIN
LACHLAN FOLD BELT
HAMERSLEY BASIN
11/A/36

PILBARA BLOCK

Age—Archaean.

Size—45 000 km^2.

Margins—Proterozoic Hamersley Basin to south and southeast; Phanerozoic Carnarvon Basin to west; Phanerozoic Canning Basin to north and northeast; extends offshore.

Physiography—Dissected flat-topped hills; lowlands; flood and deltaic plains.

Elements—Layered volcanic, volcanoclastic, and clastic succession in synclines between granitoid batholithic domes.

Stratigraphy—Volcanic belts of tholeiitic basalt with interbedded volcanogenic sediments and acid lavas, minor chert, and banded iron formation; unconformably overlain by downfaulted troughs of greywacke turbidite sequences and by clastic shelf sediments.

Igneous activity—Volcanic succession intruded by rare ultrabasic, basic, and acid dykes and sills; layered sequences intruded by large concordant domes of granite, gneissic granite, and migmatite; domes may have developed concurrently with deposition of sedimentary succession.

Metamorphism—Low-grade regional metamorphism in volcanic belts; granite domes ringed by zones of gneiss, and contain rafts of metamorphosed country rock.

Deformation—Layered succession tightly to openly folded and in places overturned; volcanic belts folded about axes of variable trends; sediments folded about easterly trending axis.

Economic geology—Gold in altered basic volcanics; copper and zinc sulphides in acid volcanics within greenstone belts; iron in banded iron formation within the greenstone belts; minor minerals include beryllium, lithium, bismuth, molybdenum, tungsten, and tin.

Reference—Hallberg, J. A., & Glikson, A. Y., 1981—Archaean Granite-Greenstone terrains of Western Australia. *In* Hunter, D. R. (Editor)—DEVELOPMENTS IN PRECAMBRIAN GEOLOGY. 2. Precambrian of the Southern Hemisphere. *Elsevier Scientific Publishing Company, Amsterdam.*

HAMERSLEY BASIN

Age—Early Proterozoic.

Size—110 000 km^2.

Margins—Archaean Pilbara Block to north; Phanerozoic Carnarvon Basin to northwest; Proterozoic Gascoyne Block to west; Proterozoic Bangemall Basin to south; Archaean Sylvania Dome to southeast; Proterozoic Paterson Province to east.

Physiography—Dissected flat-topped plateaus and ranges; alluvial lowlands in northeast and southwest.

Elements—Shelf-facies sequences; basal basic lavas; maximum thickness about 6000 m.

Stratigraphy—Basal basic lavas interbedded with lesser clastic sediments and dolomite; overlain by clastic sedimentary sequence with dolomite and banded iron formation; overlain by sequence of clastic sediments, dolomite, and basic volcanics.

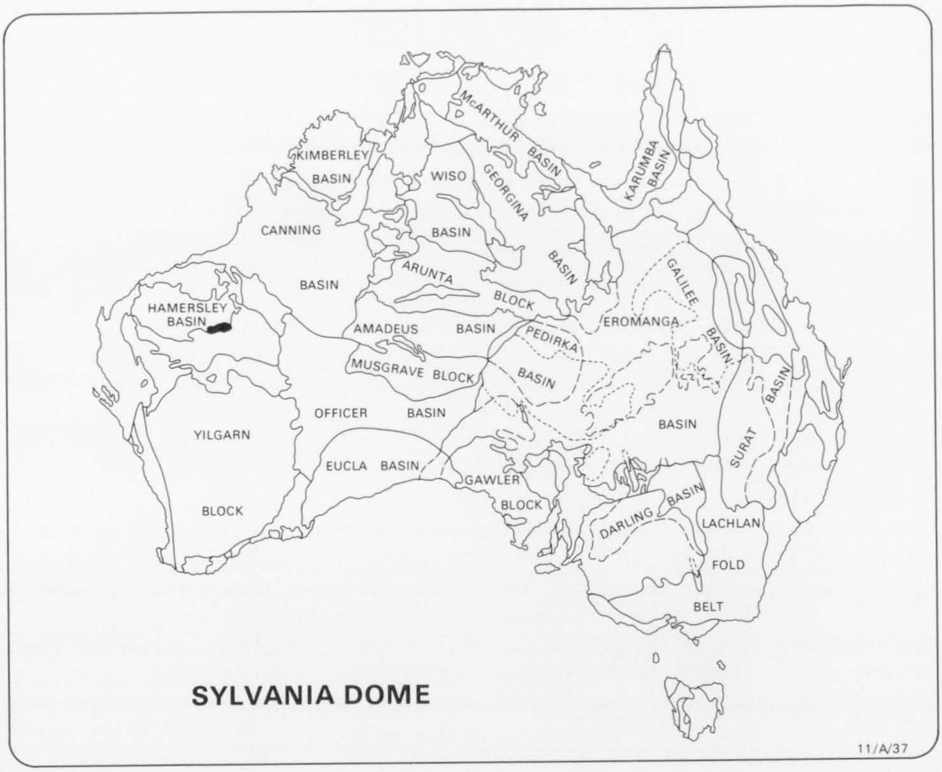
Igneous activity—Basal basic lava flows, dolerite, gabbro; dolerite dykes intrude whole basin sequence.

Metamorphism—Low-grade; development of slaty cleavage in southwest and west.

Deformation—In north, gentle folding with southwest trends reflecting basement structure; in south, tighter folding with northwest trends; western and southeastern margins bounded by normal faults.

Economic geology—Large deposits of iron in banded iron formation; small amounts of silver, lead, and zinc associated with basic volcanics; minor metals include copper, gold, and uranium; asbestos in economic quantities in banded iron formation.

Reference—Goode, A. D. T., 1981—Proterozoic geology of Western Australia. *In* Hunter, D. R. (Editor)—DEVELOPMENTS IN PRECAMBRIAN GEOLOGY. 2. Precambrian of the Southern Hemisphere. *Elsevier Scientific Publishing Company, Amsterdam.*



SYLVANIA DOME

BANGEMALL BASIN

SYLVANIA DOME

Age—Archaean.

Size—5600 km^2.

Margins—Proterozoic Hamersley Basin to north and west; Proterozoic Bangemall Basin to south and east.

Physiography—Undulating sand plain; low rocky hills.

Elements—Igneous and metasedimentary complex.

Stratigraphy—Complex of metamorphosed sedimentary and basic and ultrabasic volcanics.

Igneous activity—Granite, with marginal migmatite and aplite; dolerite dykes; serpentinite.

Metamorphism—Low to medium-grade; some high-grade.

Deformation—Strongly folded and faulted.

Economic geology—Small deposits of gold and copper in veins in basic schists; chromium in serpentinite.

Reference—Hallberg, J. A., & Glikson, A. Y., 1981—Archaean Granite-Greenstone terrains of Western Australia. *In* Hunter, D. R. (Editor)—DEVELOPMENTS IN PRECAMBRIAN GEOLOGY. 2. Precambrian of the Southern Hemisphere. *Elsevier Scientific Publishing Company, Amsterdam.*

BANGEMALL BASIN

Age—Middle Proterozoic.

Size—117 000 km^2.

Margins—Proterozoic Hamersley Basin and Archaean Sylvania Dome to north; Proterozoic Gascoyne Block to west; Proterozoic Nabberu Basin to south; Proterozoic-Phanerozoic Officer Basin to east; Proterozoic Paterson Province to northeast.

Physiography—Dissected low ranges and plateaus; intervening sand plains.

Elements—Marine sediments; some terrestrial sediments, acid lavas, and dolerite; maximum thickness about 15 000 m.

Stratigraphy—A sequence of alternating lagoonal and shallow-marine sediments (with minor carbonates and evaporites); minor fluvial arenites and lutites.

Igneous activity—Some interbedded acid lavas; dolerite sills and dykes intruding whole basin sequence.

Metamorphism—Slaty cleavage in west; low-grade in east.

Deformation—Broad, open folding in west; tight folding in east.

Economic geology—Gold in strata-bound quartz-limonite reefs; minor copper in cross-cutting quartz veins or fault infillings in west.

Reference—Goode, A. D. T., 1981—Proterozoic geology of Western Australia. *In* Hunter, D. R. (Editor)—DEVELOPMENTS IN PRECAMBRIAN GEOLOGY. 2. Precambrian of the Southern Hemisphere. *Elsevier Scientific Publishing Company, Amsterdam.*

NABBERU BASIN

11/A/39

YILGARN BLOCK

11/A/40

NABBERU BASIN

Age—Early to Middle Proterozoic.

Size—56 000 km^2.

Margins—Proterozoic Bangemall Basin to north; Proterozoic-Phanerozoic Officer Basin to east; Archaean Yilgarn Block to south and west; Proterozoic Gascoyne Block to west.

Physiography—Tablelands; stony and sandy plains; salt lakes; dune fields.

Elements—Marine sediments; thick trough sequence in west (about 10 000 m thick); thinner shelf sequence in east (about 6000 m thick).

Stratigraphy—Western sequence of minor basal shelf sediments in south rapidly thickening northwards where thick turbidite sequence occurs; unconformably overlain by shallow-marine sequence; eastern sequence of shelf sediments including carbonates.

Igneous activity—Volcaniclastic sediments present in western sequence.

Metamorphism—Sequence cleaved in north; local dynamic metamorphism in northwest and west.

Deformation—Broad easterly trending synclinorium; strong deformation north of axial zone reflects reworking of Archaean basement resulting in basement doming.

Economic geology—Iron within banded iron formation; manganese as secondary deposits in Tertiary drainage channels; minor gold and copper in veins and fault breccias.

Reference—Goode, A. D. T., 1981—Proterozoic geology of Western Australia. *In* Hunter, D. R. (Editor)—DEVELOPMENTS IN PRECAMBRIAN GEOLOGY. 2. Precambrian of the Southern Hemisphere. *Elsevier Scientific Publishing Company, Amsterdam.*

YILGARN BLOCK

Age—Archaean.

Size—595 000 km^2.

Margins—Phanerozoic Perth and Carnarvon Basins to west; Proterozoic Gascoyne Province to northwest; Proterozoic Nabberu Basin to north; Proterozoic-Phanerozoic Officer Basin to east; Proterozoic Albany-Fraser Province and Tertiary Bremer Basin to south and southeast.

Physiography—Residual and alluvial plains; low ridges; salt lakes; sand plains; dune fields.

Elements—Layered volcanic, volcaniclastic, and clastic succession in east; high-grade metasedimentary and igneous succession in west; intruded by granitic batholiths and plutons.

Stratigraphy—Probable older basement of high-grade, metasedimentary sequence (in part migmatised) in southwest and west; layered sequence of low-grade ultrabasic to acid volcanic and volcanogenic sediments in east.

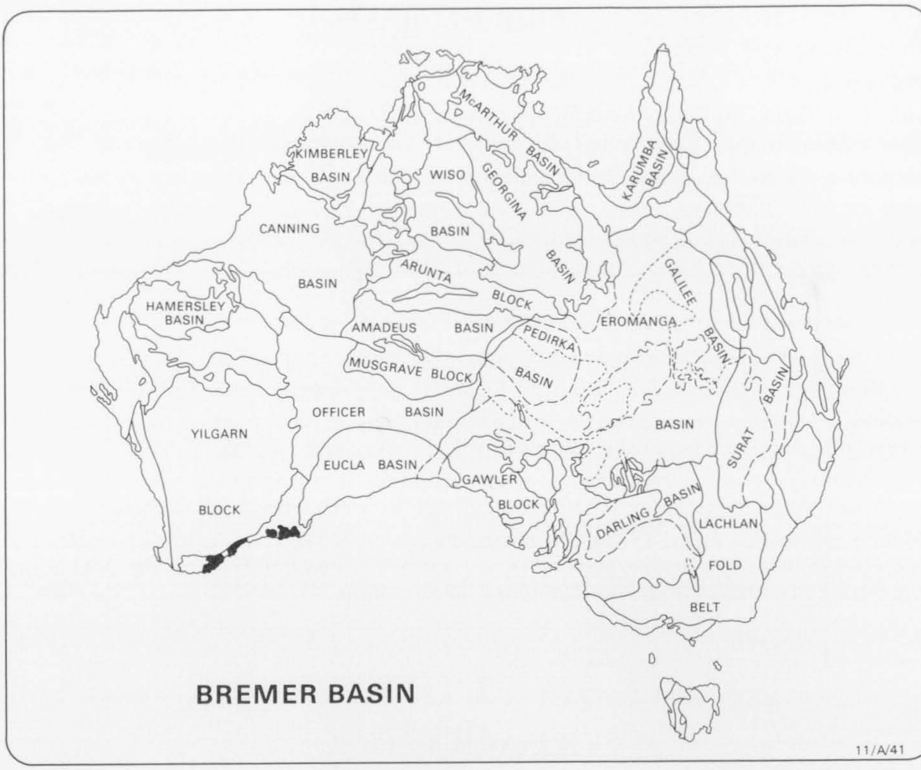
Igneous activity—Two phases of acid intrusion; elongate, concordant domes and batholiths of adamellite and granodiorite; equant discordant plutons of granite and tonalite.

Metamorphism—High-grade, metasedimentary (in part migmatised) and minor metamorphosed basic and ultrabasic intrusive rocks in southwest and west; low to medium-grade regional and medium to high-grade dynamic metamorphism of layered volcanic and volcanogenic sequences in east.

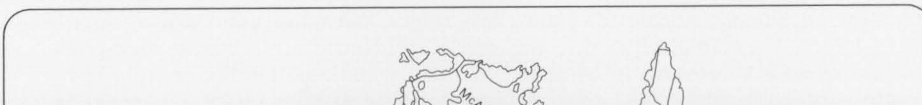
Deformation—Up to four phases of deformation in layered sequence: (i) macroscopic isoclinal folding; (ii) isoclinal folding with development of regional slaty cleavage; (iii) open folding; (iv) crenulation folding adjacent to granite domes.

Economic geology—Gold and nickel associated with altered basic and ultrabasic volcanics and intrusive units in greenstone belts; minor copper and zinc in volcanics of rhyolitic to basaltic composition in greenstone belts; iron and minor manganese and gold in banded iron formation in greenstone belts; iron, titanium, and vanadium in layered basic sills; minor metals include tin, silver, bismuth, molybdenum, tungsten, tantalum, niobium, lead, and antimony; bauxite developed on granite and granulite in southwest.

Reference—Hallberg, J. A., & Glikson, A. Y., 1981—Archaean Granite-Greenstone terrains of Western Australia. *In* Hunter, D. R. (Editor)—DEVELOPMENTS IN PRECAMBRIAN GEOLOGY. 2. Precambrian of the Southern Hemisphere. *Elsevier Scientific Publishing Company, Amsterdam.*



BREMER BASIN



ALBANY-FRASER PROVINCE

BREMER BASIN

Age—Tertiary.

Size—5000 km^2.

Margins—Proterozoic Albany-Fraser Province to east and west; Archaean Yilgarn Block to north; extends offshore.

Physiography—Coastal sand and alluvial plains.

Elements—Marine sediments.

Stratigraphy—Thin sequence of mid-Tertiary marine sediments.

Igneous activity—None.

Metamorphism—None.

Deformation—None.

Economic geology—Minor lignite.

Reference—Playford, P. E., Cope, R. N., Cockbain, A. E., Low, G. H., & Lowry, D. C., 1975—Bremer Basin. *In* Geology of Western Australia. *Geological Survey of Western Australia, Memoir* 2.

ALBANY-FRASER PROVINCE

Age—Early to Middle Proterozoic.

Size—63 000 km^2.

Margins—Archaean Yilgarn Block to northwest; Proterozoic-Phanerozoic Officer Basin to northeast; Mesozoic-Cainozoic Eucla Basin to east; Tertiary Bremer Basin to south; extends offshore.

Physiography—Sand plain with low hills and scattered small salt lakes; rocky headlands; offshore islets.

Elements—Consists of four elements which are (progressing to southeast): partially assimilated Archaean volcanics, sediments, granite, and amphibolite, containing high-grade gneiss and alkali granite; mafic granulite and gneiss; high-grade gneiss and alkali granite; and intrusive granite.

Stratigraphy—Transition zone of re-metamorphosed Archaean Yilgarn Block volcanics, sediments, and granite in west; bounded to the southeast by a zone of high-grade gneissic granite and amphibolite (again probably reworked Archaean); further to the southeast is a block of mafic granulite bordered by zones of mylonite which are bounded by a zone of high-grade gneissic granite and amphibolite.

Igneous activity—Leucocratic, alkali, and rapakivi granite intrude the transitional zone and the two zones of high-grade gneiss; younger granite intrudes and bounds metamorphics to southeast.

Metamorphism—All metamorphic zones contain high-grade, high-pressure sequences.

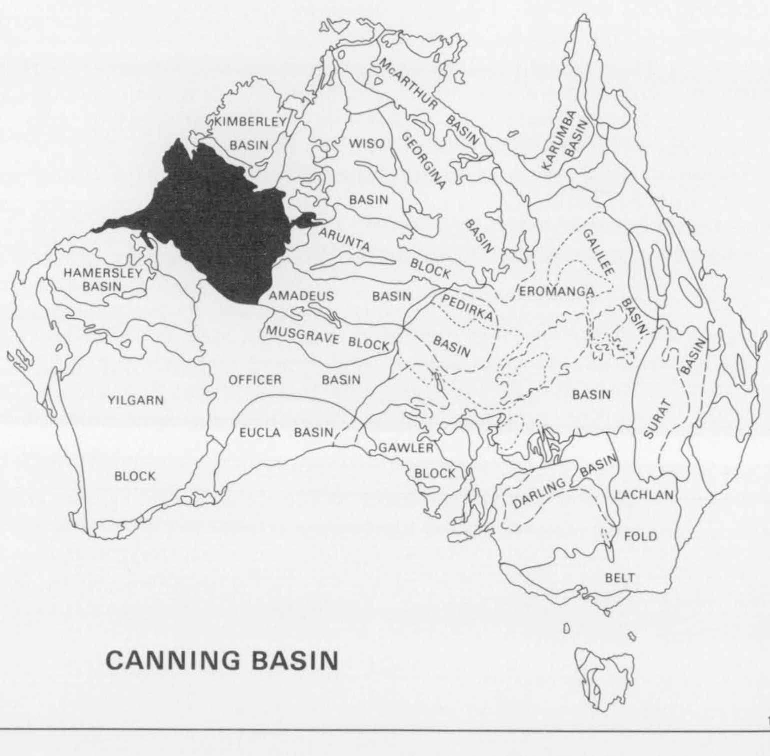
Deformation—Granulite zone is a northeasterly plunging synform bounded on southeast by a major shear zone and on northeast by a zone of downwarping; macrostructures developed in the bounding Archaean continue with lessening certainty through transition zone into first gneissic zone.

Economic geology—Nickel and copper sulphides in ultrabasic lenses within granulite in west; probably represent reworked Yilgarn Block material.

Reference—Goode, A. D. T., 1981—Proterozoic geology of Western Australia. *In* Hunter, D. R. (Editor)—DEVELOPMENTS IN PRECAMBRIAN GEOLOGY. 2. Precambrian of the Southern Hemisphere. *Elsevier Scientific Publishing Company, Amsterdam.*

PATERSON PROVINCE

11/A/43



CANNING BASIN

11/A/44

PATERSON PROVINCE

Age—Early to Middle Proterozoic.

Size—30 000 km^2.

Margins—Proterozoic Hamersley Basin to west; Proterozoic Bangemall Basin to southwest; Proterozoic-Phanerozoic Officer Basin to southeast; Phanerozoic Canning Basin to northeast.

Physiography—Low dissected tablelands.

Elements—High-grade metamorphics; acid and basic intrusives; shelf sediments; minor younger granite intrusives.

Stratigraphy—Basement complex (acid to basic gneiss, schist, and quartzite) unconformably overlain by shelf sediments including dolomite; these unconformably overlain by younger shelf sediments.

Igneous activity—Acid to basic intrusions into basement complex; granite intrusions into shelf sediments in north.

Metamorphism—High-grade; confined to basement complex.

Deformation—Several phases in basement complex; broad north to northwesterly trending folds in overlying sediments.

Economic geology—Gold in stratabound quartz-limonite reefs within Middle Proterozoic sandstone.

Reference—Goode, A. D. T., 1981—Proterozoic geology of Western Australia. *In* Hunter, D. R. (Editor)—DEVELOPMENTS IN PRECAMBRIAN GEOLOGY. 2. Precambrian of the Southern Hemisphere. *Elsevier Scientific Publishing Company, Amsterdam.*

CANNING BASIN

Age—Ordovician to Cretaceous.

Size—430 000 km^2.

Margins—Proterozoic Halls Creek Province to north; Proterozoic The Granites-Tanami and Arunta Blocks and Birrindudu Basin and Proterozoic-Palaeozoic Amadeus Basin to east; Proterozoic-Phanerozoic Officer Basin to south; Archaean Pilbara Block and Proterozoic Paterson Province and Hamersley Basin to southwest; extends offshore.

Physiography—Low dissected tablelands, mesas, and buttes; stony plains; dune fields; sand plains; salt lake systems in south.

Elements—Marine clastic and carbonate sediments; minor continental sediments; maximum thickness about 17 000 m.

Stratigraphy—Ordovician marine sediments unconformably overlain by Devonian evaporite and continental sediments; unconformably overlain in the northeast by Late Devonian marine carbonates and by Carboniferous fluviatile, estuarine, and marine sediments; unconformably overlain by marine sediments of Permian, Triassic, and Jurassic age with unconformities at the end of the Permian and Triassic; onshore sedimentation ceased after the deposition of continental sediments in the Cretaceous.

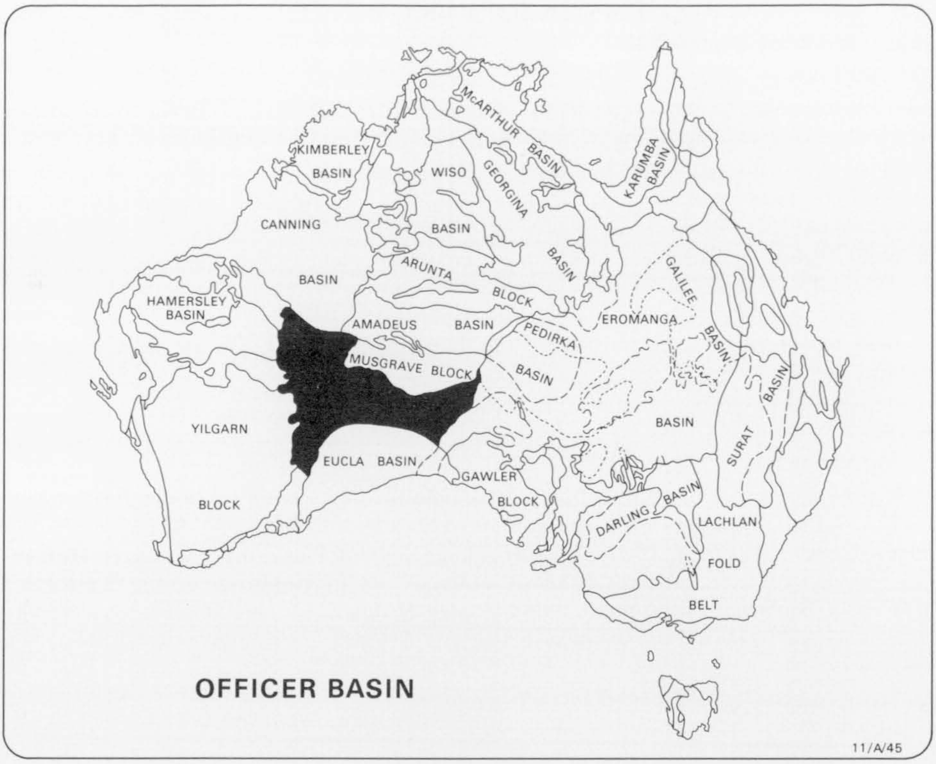
Igneous activity—Minor Triassic intrusives; small intrusive plugs of Cainozoic age.

Metamorphism—Very minor contact metamorphism.

Deformation—Major faulting and folding in northeast with general east-southeast trends; minor deformation elsewhere.

Economic geology—Thin coal seams at various levels within Permian sequence in north; some oil and gas; large quantities of salt and gypsum in Holocene lake deposits; diamonds in kimberlite plugs, which cut basin sequences, and in recent gravels.

Reference—Forman, D. J., & Wales, D. W. (Compilers), 1981—Geological evolution of the Canning Basin, Western Australia. *Bureau of Mineral Resources, Australia, Bulletin* 210. Towner, R. R., & Gibson, D. L., 1983—Geology of the onshore Canning Basin. *Bureau of Mineral Resources, Australia, Bulletin* 215.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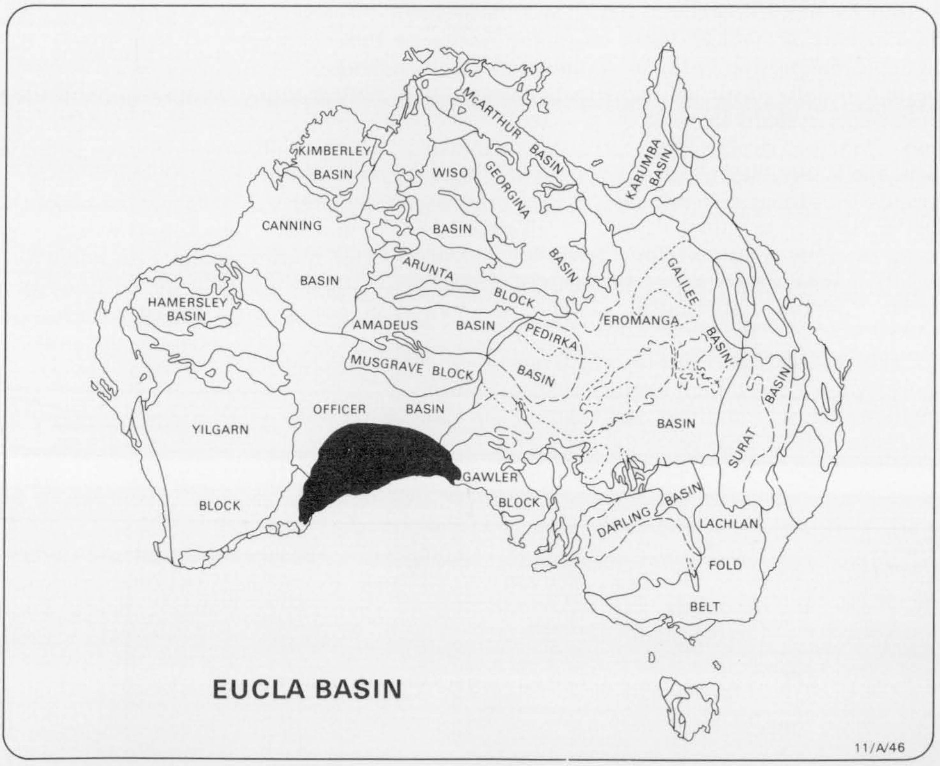
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YILGARN BLOCK
GAWLER BLOCK
DARLING BASIN
LACHLAN FOLD BELT
EUCLA BASIN
11/A/46

OFFICER BASIN

Age—Late Proterozoic to Cretaceous.

Size—375 000 km^2.

Margins—Archaean Yilgarn Block, and Proterozoic Albany-Fraser Province, Nabberu Basin, and Bangemall Basin to west; Proterozoic Paterson Province to northwest; Phanerozoic Canning Basin and Proterozoic Musgrave Block to north; Mesozoic Eromanga Basin to east; Mesozoic-Cainozoic Eucla Basin to south.

Physiography—Extensive dune fields and sand plains. Stony plains in north.

Elements—Alternating marine and continental sediments; minor volcanism; maximum thickness about 6000 m.

Stratigraphy—Proterozoic shallow-marine evaporitic and glacial sediments, unconformably overlain by further shallow-marine sediments; these unconformably overlain by Cambrian basalt, marine and continental evaporites, carbonates, and clastics, continental Devonian red beds, Permian fluvio-glacial sediments, and Cretaceous shallow-marine sediments.

Igneous activity—Widespread thin Cambrian tholeiitic basalt.

Metamorphism—None.

Deformation—Generally gentle folding and faulting; more intensive deformation adjoining the Musgrave Block; diapiric intrusions of Proterozoic to Early Cambrian evaporites.

Economic geology—Minor oil and gas shows in east; evaporites in east.

Reference—Jackson, M. J., & van de Graaff, W. J. E., 1981—Geology of the Officer Basin, Western Australia. *Bureau of Mineral Resources, Australia, Bulletin* 206.

Pitt, G. M., Benbow, M. C., & Youngs, B. C., 1981—A review of recent geological work in the Officer Basin, South Australia. *APEA Journal*, 20(1), 209-220.

EUCLA BASIN

Age—Cretaceous to Tertiary.

Size—225 000 km^2.

Margins—Proterozoic Albany-Fraser Province to west; Proterozoic-Phanerozoic Officer Basin to north and northwest; Mesozoic Eromanga Basin to northeast; Archaean-Proterozoic Gawler Block to east; extends offshore.

Physiography—Sand plain in north; flat undissected karst plain with narrow coastal dune-covered plain in south.

Elements—Marine sediments; maximum thickness about 600 m.

Stratigraphy—Basal Cretaceous marine conglomeratic sandstone overlain by Cretaceous to Tertiary fine terrigenous shallow marine sediments grading into carbonates.

Igneous activity—None.

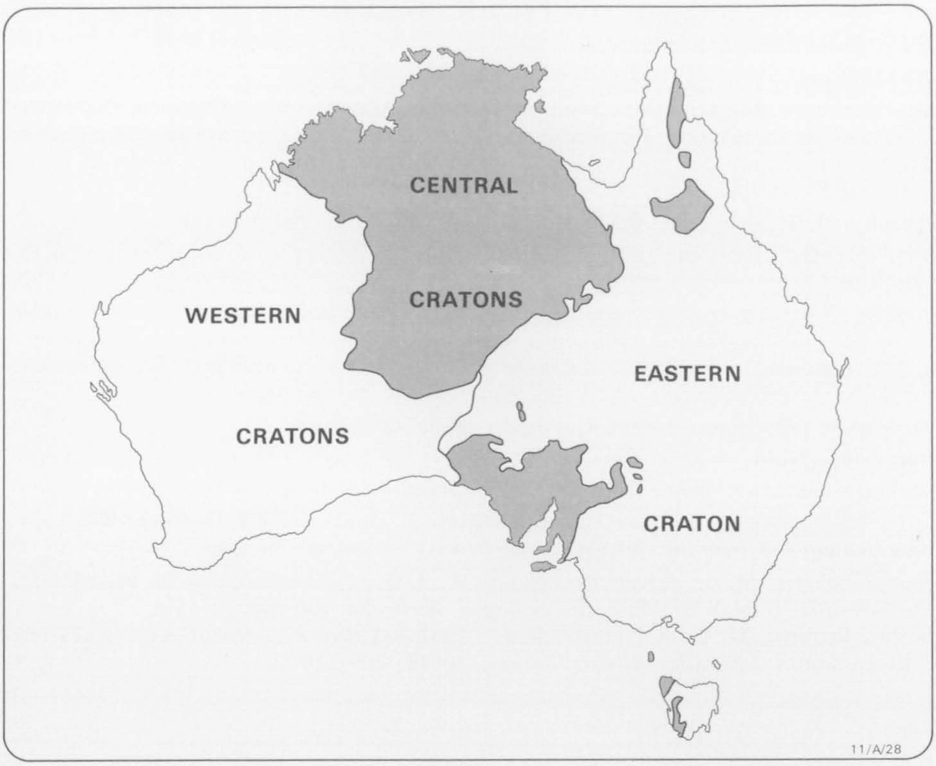
Metamorphism—None.

Deformation—Gentle regional tilting to south; some minor faulting.

Economic geology—Vast limestone deposits (too far from potential markets to be economic).

Reference—Lowry, D. C., 1970—The geology of the Western Australian part of the Eucla Basin. *Geological Survey of Western Australia, Bulletin* 122.

Parkin, L. W. (Editor), 1969—HANDBOOK OF SOUTH AUSTRALIAN GEOLOGY. *The Geological Survey of South Australia, Adelaide.*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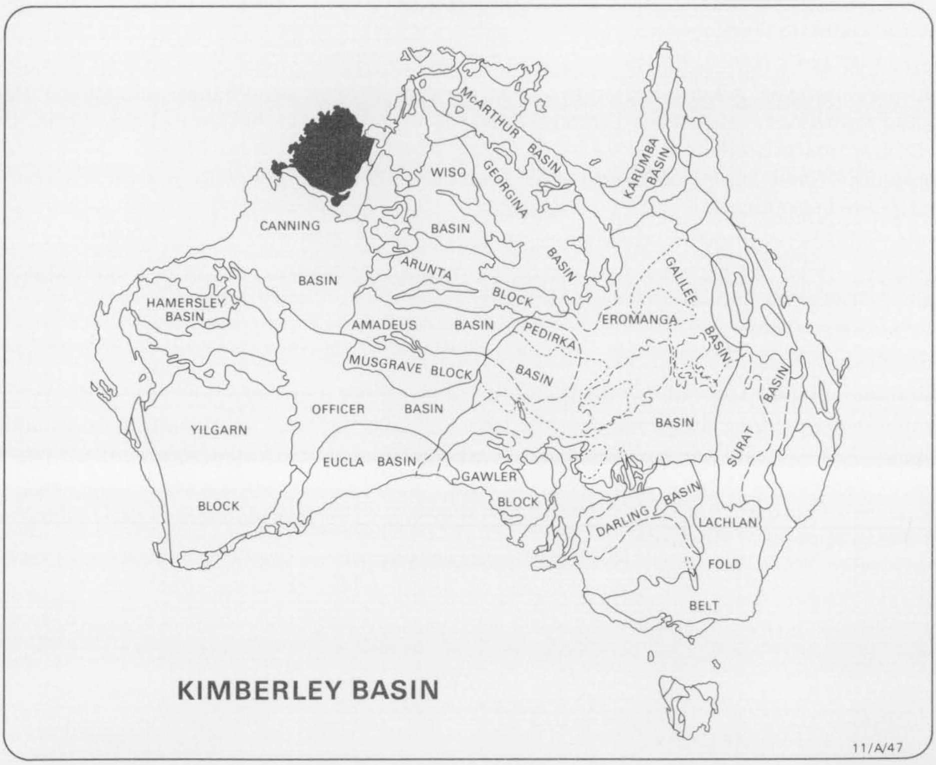
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BLOCK
KIMBERLEY BASIN
11/A/47

CENTRAL CRATONS

The Central Cratons occupy most of north and central Australia, with smaller detached areas in the northeast, south, and southeast of the continent.

The Archaean to Early Proterozoic components, the Rum Jungle Block and Nanambu Complex in the far north and the Gawler Block and its possible correlate, the Broken Hill Block, to the east consist mainly of intensely deformed metamorphic complexes and granite.

The Early Proterozoic complexes of the Central Cratons are of greater areal extent. They consist of trough sediments that have been metamorphosed to lower grades than similar rocks in the older basement complexes, and are intruded and overlain in part by cogenetic granite and acid volcanics. The Early to Middle Proterozoic complexes resemble the Early Proterozoic complexes, but are generally of still lower metamorphic grade.

Cratons of Middle to Late Proterozoic age lie to the south and east of the older cratons. As distinct from the older cratons, which show a geological uniformity, the younger cratons are more varied.

The cratonic cover spans the time interval Early Proterozoic to Mesozoic. The focus of sedimentation lay in the northwest in the Early Proterozoic, in the north in the Middle Proterozoic, and in the south in the Late Proterozoic. Sedimentation was characterised by shallow-water sediments with basic lavas near the base of the successions. Thick sedimentary sequences formed locally in narrow marginal mobile zones, which were subsequently deformed and slightly metamorphosed. The Phanerozoic successions are dominated by widespread basic Cambrian volcanism, Cambro-Ordovician and Devono-Carboniferous carbonate deposition, Devono-Carboniferous paralic sedimentation, and shallow shelf-type sedimentation in the Jurassic-Cretaceous.

KIMBERLEY BASIN

Age—Early Proterozoic.

Size—135 000 km^2.

Margins—Proterozoic Halls Creek Province to south and southeast; Proterozoic Victoria River Basin and Phanerozoic Bonaparte Basin to east; extends offshore.

Physiography—Flat tablelands; prominent cuestas; rocky, indented coastline.

Elements—Shallow-water sediments with interbedded volcanics; intruded by sills; maximum thickness about 5000 m.

Stratigraphy—Thick succession of shelf sediments, including carbonates, and interbedded basic volcanics.

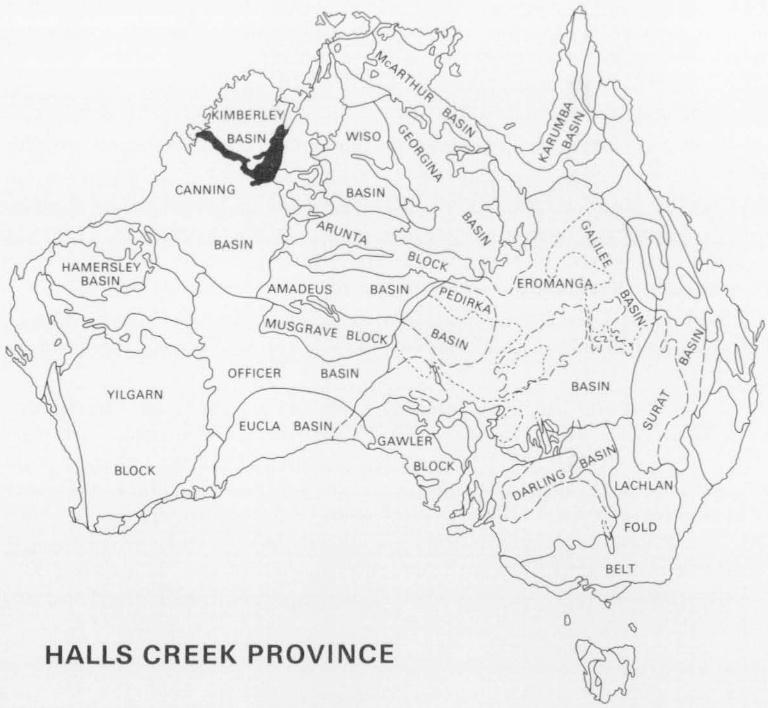
Igneous activity—Interbedded basic volcanics; sills of gabbro, dolerite, and derived granophyre; small amounts of acid porphyry.

Metamorphism—Generally absent except low to medium grade along margins with Hall Creek Province.

Deformation—Generally gentle folding increasing in intensity towards Hlls Creek Province in association with major strike-slip faulting in east and thrusting in southwest.

Economic geology—Iron in hematite conglomerate and hematite quartzite in far west; minor copper mineralisation in shale over a wide area in east; uranium in pebble conglomerate in southeast; minor lead; Tertiary bauxite developed on basic volcanics and associated sediments in north.

Reference—Dow, D. B., & Gemuts, I., 1969—Geology of the Kimberley region, Western Australia; the East Kimberley. *Bureau of Mineral Resources, Australia, Bulletin* 106.



HALLS CREEK PROVINCE

11/A/48

BONAPARTE BASIN

11/A/49

HALLS CREEK PROVINCE

Age—Early Proterozoic.

Size—30 000 km^2.

Margins—Proterozoic Kimberley Basin to north; Phanerozoic Canning Basin to south; Proterozoic Birrindudu and Victoria River Basins and Palaeozoic Ord Basin to east.

Physiography—Rounded low to moderate hills; prominent strike ridges in north and northwest; minor undulating plains.

Elements—Metamorphosed turbidite sequence with associated basic volcanics, intruded by basic dykes and sills and acid plutons; overlain by acid volcanics.

Stratigraphy—Turbidites and interbedded basic volcanics; unconformably overlain by acid volcanics.

Igneous activity—Major ultrabasic to basic and acid intrusions in trough sediments; unconformably overlain by acid volcanics; late granite intrusions.

Metamorphism—Complex deformation history resulting in a suite of metamorphics ranging from low to high-grade.

Deformation—Superposed tight to isoclinal cleavage folds trending west-northwest in west and north-northeast in east; major strike-slip faults in east and reverse to strike-slip faults in west.

Economic geology—Gold in quartz fissure veins; minor metal occurrences include: chromium, nickel, and platinum in basic and ultrabasic intrusions; copper in a number of stratigraphic horizons; lead in quartz carbonate zones; tin and tungsten in pegmatite; uranium in shales and basic dykes in granite.

Reference—Gemuts, I., 1971—Metamorphic and igneous rocks of the "Lamboo" Complex, East Kimberley region, Western Australia. *Bureau of Mineral Resources, Australia, Bulletin* 107.

BONAPARTE BASIN

Age—Cambrian to Cretaceous.

Size—8000 km^2.

Margins—Proterozoic Kimberley Basin to west; Proterozoic Victoria River Basin to east; extends offshore.

Physiography—Sandy coastal plains and tidal flats; alluvial plains; irregular residual ridges.

Elements—Continental and marine sediments; basic volcanics; maximum thickness about 6000 m.

Stratigraphy—Basal basic volcanics unconformably overlain by Cambrian-Early Ordovician shelf sediments with carbonates; unconformably overlain by Late Devonian-Early Carboniferous marine sediments, Late Carboniferous-Early Permian continental sediments; and mid-Permian marine sediments; finally unconformably overlain by marine Triassic and Cretaceous sediments.

Igneous activity—Thin basal Cambrian basic volcanics and tuff.

Metamorphism—None.

Deformation—Minor to moderate folding and faulting; some folding caused by intrusive salt diapirs.

Economic geology—Minor deposits of lead and zinc in sedimentary units; some gas; thin Early Permian coal seams.

Reference—Laws, R. A., & Brown, R. S., 1976—Bonaparte Gulf Basin—south-eastern part. *In* Leslie, R. B., Evans, H. J., & Knight, C. L. (Editors)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 3. Petroleum. *The Australasian Institute of Mining and Metallurgy, Monograph Series* No. 7.

ORD BASIN

11/A/50

BIRRINDUDU BASIN

11/A/51

ORD BASIN

Age—Middle Cambrian to Devonian.

Size—40 000 km^2.

Margins—Proterozoic Victoria River and Kimberley Basins and Halls Creek Province to west; Proterozoic Birrindudu Basin to south; Victoria River Basin, Proterozoic The Granites-Tanami Block, and Palaeozoic Wiso Basin to east; Palaeozoic-Mesozoic Bonaparte Basin to north.

Physiography—Undulating rocky plains; alluvial plains.

Elements—Marine sediments; maximum thickness about 1000 m.

Stratigraphy—Middle Cambrian carbonates unconformably overlain by Late Devonian marine sandstone.

Igneous activity—None.

Metamorphism—None.

Deformation—Moderate folding; some faulting.

Economic geology—Traces of hydrocarbons in limestone.

Reference—Jones, P. J., 1976—Ord Basin. *In* Leslie, R. B., Evans, H. J., & Knight, C. L. (Editors)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 3. Petroleum. *The Australasian Institute of Mining and Metallurgy, Monograph Series* No. 7.

BIRRINDUDU BASIN

Age—Middle to Late Proterozoic.

Size—48 000 km^2.

Margins—Palaeozoic-Mesozoic Canning Basin and Proterozoic Halls Creek Province to west; Proterozoic The Granites-Tanami and Arunta Blocks to south; The Granites-Tanami Block and Palaeozoic Wiso Basin to east; Palaeozoic Ord Basin to north.

Physiography—Sand plains; scattered low ranges.

Elements—Marine sediments; maximum thickness about 9000 m.

Stratigraphy—Middle Proterozoic marine sediments including carbonates; unconformably overlain by Late Proterozoic marine sediments with carbonates.

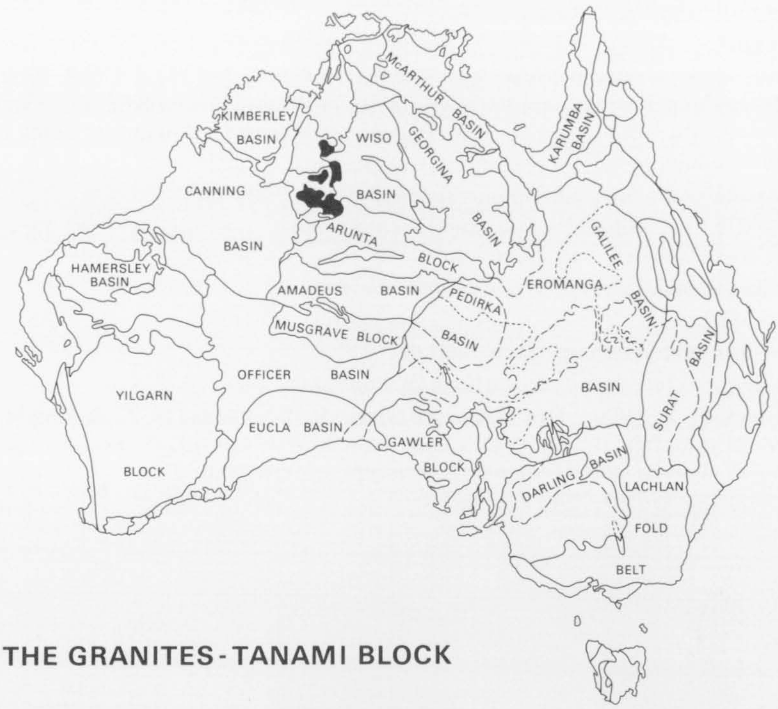
Igneous activity—None.

Metamorphism—None.

Deformation—Mild to moderate folding.

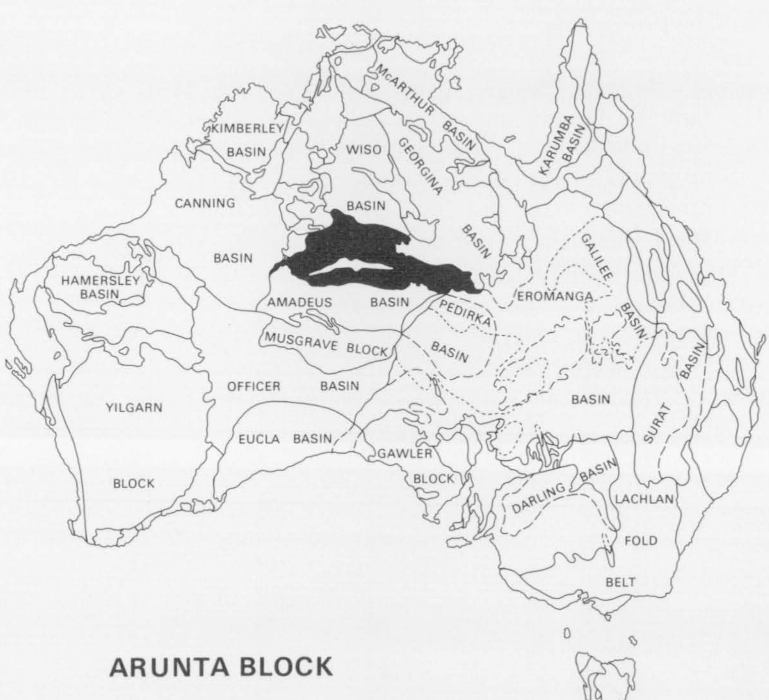
Economic geology—Uranium and associated rare earth metals in basal conglomerates overlying basement metamorphics.

Reference—Blake, D. H., Hodgson, I. M., & Muhling, P. C., 1979—Geology of The Granites-Tanami region, Northern Territory and Western Australia. *Bureau of Mineral Resources, Australia, Bulletin* 197.



THE GRANITES - TANAMI BLOCK

11/A/52



ARUNTA BLOCK

11/A/53

THE GRANITES-TANAMI BLOCK

Age—Early Proterozoic

Size—30 000 km^2.

Margins—Proterozoic Birrindudu Basin to west, north, and south; Proterozoic Arunta Block to south; Phanerozoic Canning Basin to south and west; Palaeozoic Wiso Basin to east; Palaeozoic Ord Basin to north.

Physiography—Sand plains; scattered low hills and tablelands.

Elements—Marine and continental sediments; acid intrusives; acid and basic volcanics.

Stratigraphy—Early Proterozoic trough sediments with acid and basic volcanics; unconformably overlain by Early Proterozoic sediments and acid volcanic sequence.

Igneous activity—Basal acid and basic volcanics; later acid volcanics and intrusives.

Metamorphism—Very low-grade to low-grade regional.

Deformation—Moderately to strongly deformed.

Economic geology—Small deposits of gold in quartz reefs.

Reference—Blake, D. H., Hodgson, I. M., & Muhling, P. C., 1979—Geology of The Granites-Tanami region, Northern Territory and Western Australia. *Bureau of Mineral Resources, Australia, Bulletin* 197.

ARUNTA BLOCK

Age—Early to Late Proterozoic.

Size—220 000 km^2.

Margins—Proterozoic The Granites-Tanami Block and Birrindudu Basin and Phanerozoic Canning Basin to west; Proterozoic-Palaeozoic Amadeus Basin to south; Proterozoic-Palaeozoic Georgina Basin and Mesozoic Eromanga Basin to east; Proterozoic Davenport Geosyncline and Palaeozoic Wiso Basin to north.

Physiography—Sand plains in north; ranges with rounded summits; strike ridges; intervening alluvial plains with salt lakes, sand plains, and dune fields.

Elements—Complex of metamorphic, sedimentary, and acid to basic igneous rocks; some ultrabasic rocks.

Stratigraphy—Sequence of sediments and volcanics now variously metamorphosed to schist, gneiss, amphibolite, marble, and granulite.

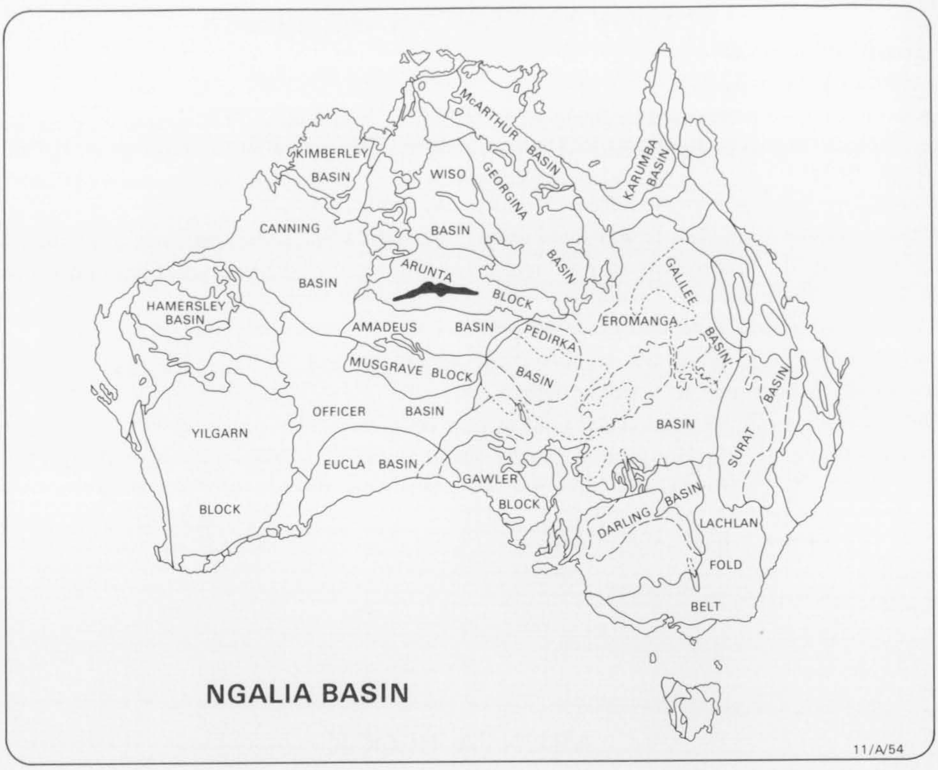
Igneous activity—Acid to basic volcanic sequence at base; major acid to basic intrusives with pegmatite; minor ultrabasic intrusives.

Metamorphism—Low to very high-grade.

Deformation—Strongly deformed in several periods during Proterozoic and Late Palaeozoic; strongly faulted with overthrust sheets.

Economic geology—Small zinc-lead-copper stratabound deposits in pelitic sediments, or highly metamorphosed sediments and volcanics; small deposits of copper, lead, tin, tungsten, uranium, and beryllium in association with granites; tungsten also in associated metasomatic replacements; hydrothermal quartz-sulphide-gold bodies in several horizons; small copper sulphide deposits as lenses in metamorphosed basic rocks; small deposits of mica, beryl, and ruby also occur.

Reference—Plumb, K. A., Derrick, G. M., Needham, R. S., & Shaw, R. D., 1981—The Proterozoic of Northern Australia. *In* Hunter, D. R. (Editor)—DEVELOPMENTS IN PRECAMBRIAN GEOLOGY. 2. Precambrian of the Southern Hemisphere. *Elsevier Scientific Publishing Company, Amsterdam.*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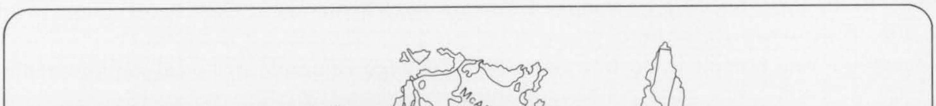
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LACHLAN
FOLD
BELT
AMADEUS BASIN
11/A/55

NGALIA BASIN

Age—Late Proterozoic to Carboniferous.

Size—16 000 km^2.

Margins—Surrounded by Proterozoic Arunta Block.

Physiography—Sharp ridges and cuestas at margin; central and plain.

Elements—Marine and continental sediments; maximum thickness about 5000 m.

Stratigraphy—Basal Late Proterozoic marine sequence overlain by continental fluvioglacial sequence; unconformably overlain by Cambrian and Ordovician shelf sediments including carbonates; unconformably overlain by Devonian to Carboniferous fluvial sediments.

Igneous activity—None.

Metamorphism—None.

Deformation—Moderately folded and faulted; major thrust faults along northern margin.

Economic geology—Uranium disseminated through Devonian to Carboniferous carbonaceous sandstones; minor metalliferous minerals include copper and lead in dolomite and siltstone.

Reference—Wells, A. T., & Moss, F. J., 1983—The Ngalia Basin, Northern Territory: stratigraphy and structure. *Bureau and Mineral Resources, Australia, Bulletin* 212.

AMADEUS BASIN

Age—Late Proterozoic to Carboniferous.

Size—170 000 km^2.

Margins—Phanerozoic Canning Basin to west; Proterozoic Musgrave Block to south; Palaeozoic Pedirka Basin to east; Proterozoic Arunta Block to north.

Physiography—East-west ridges in north; sand plains, dune fields, salt lakes, and stony lowlands in south.

Elements—Marine and continental sediments; minor volcanics; maximum thickness about 10 000 m.

Stratigraphy—Basal late Proterozoic succession of shelf, lagoonal, and continental sediments with minor interbedded volcanics; unconformably overlain by Cambrian continental and shallow-marine sediments including carbonates and evaporites; overlain by Late Cambrian-Ordovician marine sediments and unconformably by continental Devonian-Carboniferous sediments.

Igneous activity—Minor basic volcanics in basal sequence.

Metamorphism—Low-grade along northern margin.

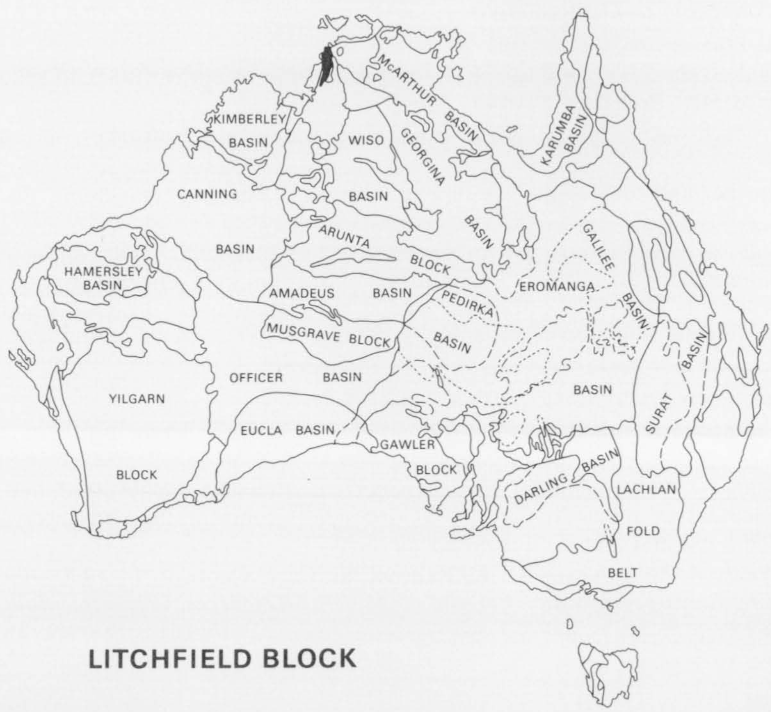
Deformation—Extensive broad folding; thrusting with nappes along northern and southern margins.

Economic geology—Minor metallic mineral occurrences include copper, lead, and zinc in sediments and volcanics as disseminations or as secondary concentrations in shear zones; gas in Palm Valley field; gas and minor oil in Mereenie field.

Reference—Wells, A. T., Forman, D. J., Ranford, L. C., & Cook, P. J., 1970—Geology of the Amadeus Basin, Central Australia. *Bureau of Mineral Resources, Australia, Bulletin* 100.

MUSGRAVE BLOCK

11/A/56



LITCHFIELD BLOCK

11/A/57

MUSGRAVE BLOCK

Age—Early to Middle Proterozoic.

Size—135 000 km^2.

Margins—Proterozoic-Phanerozoic Officer Basin to west and south; Mesozoic Eromanga Basin to east; Proterozoic-Palaeozoic Amadeus Basin to north.

Physiography—Dissected rounded hills; ranges; tablelands; intervening sand plains.

Elements—Sediments; metamorphics; acid and basic intrusives; acid volcanics.

Stratigraphy—Basal metamorphic complex; unconformably overlain by sedimentary and volcanic succession.

Igneous activity—Metamorphic complex intruded by acid, basic, and ultrabasic bodies; acid volcanics within and overlying the sedimentary sequence.

Metamorphism—Basal complex, high to very high-grade regional metamorphism; overlying sediments low-grade.

Deformation—Complex multistage deformation; major thrusting.

Economic geology—Nickel and vanadium in titaniferous magnetite segregation in layered basic intrusions; minor metals include: copper and lead disseminations in granodiorite; copper in fractures cutting basalt and conglomerate and disseminated through a variety of other sedimentary rocks; uranium in pegmatites.

Reference—Thomson, B. P., 1975b—Musgrave Block. *In* Knight, C. L. (Editor)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 1. Metals. *The Australasian Institute of Mining and Metallurgy, Monograph Series* No. 5.

LITCHFIELD BLOCK

Age—Early Proterozoic.

Size—2000 km^2.

Margins—Phanerozoic Bonaparte Basin to west; Proterozoic Victoria River Basin to south and east; Proterozoic Pine Creek Geosyncline to east; extends offshore.

Physiography—Low stony plains; some low mesas.

Elements—Sedimentary, metamorphic, and intrusive acid and basic rocks.

Stratigraphy—Schist, metasediments.

Igneous activity—Sedimentary sequence intruded by basic, ultrabasic, and acid bodies.

Metamorphism—Low to medium-grade.

Deformation—Little-known; probably strongly developed in metamorphics; less intense in overlying sediments.

Economic geology—No known mineralisation.

Reference—Berkmann, D. A., 1980—The geology of the Litchfield Province, N.T. *In* Ferguson, J., & Goleby, A. B. (Editors)—URANIUM IN THE PINE CREEK GEOSYNCLINE. *International Atomic Energy Agency, Vienna.*

VICTORIA RIVER BASIN

11/A/58

MONEY SHOAL BASIN

11/A/59

VICTORIA RIVER BASIN

Age—Middle Proterozoic.

Size—65 000 km^2.

Margins—Proterozoic Kimberley Basin and Halls Creek Province and Palaeozoic Ord Basin to west; Proterozoic Birrindudu Basin and Palaeozoic Wiso Basin to south; Wiso Basin and Palaeozoic Daly River Basin to east; Phanerozoic Bonaparte Basin to northwest; Proterozoic Litchfield Block to north.

Physiography—Dissected plateaus and ridges; some alluvial plains.

Elements—Marine and continental sediments; maximum thickness about 3500 m.

Stratigraphy—Shallow-marine to littoral sediments including carbonates separated by two erosion periods; unconformably overlain by continental and shallow-water glacial sediments.

Igneous activity—None.

Metamorphism—None.

Deformation—Minor tilting to broad open folding; minor faulting; more prominent in northwest.

Economic geology—Minor metal occurrences include lead, copper, and manganese.

Reference—Sweet, I. P., 1977—The Precambrian geology of the Victoria River region, Northern Territory. *Bureau of Mineral Resources, Australia, Bulletin* 168.

MONEY SHOAL BASIN

Age—Cretaceous.

Size—1000 km^2.

Margins—Proterozoic Pine Creek Geosyncline and McArthur Basin to south; extends offshore.

Physiography—Dissected plateaus; sandy plains; littoral plains; coastal dunes.

Elements—Continental and marine sediments; maximum thickness about 6000 m.

Stratigraphy—Late Cretaceous fluvial and deltaic sediments.

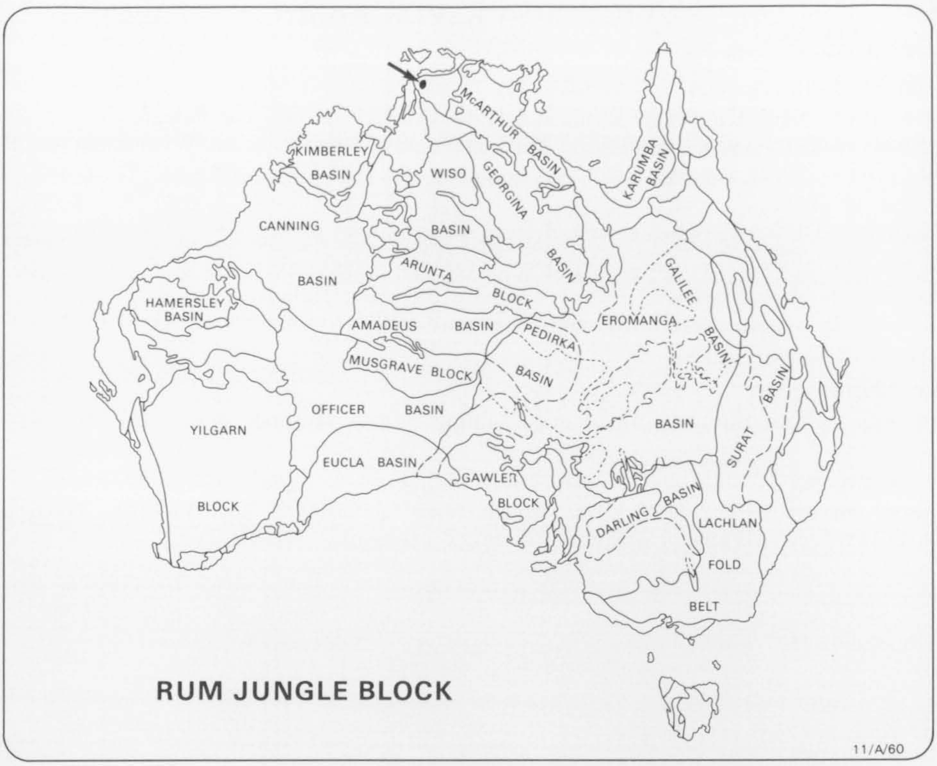
Igneous activity—None.

Metamorphism—None.

Deformation—Mild folding; block faulting.

Economic geology—No known mineral deposits.

Reference—Hughes, R. J., 1978—The geology and mineral occurrences of Bathurst Island, Melville Island, and Cobourg Peninsula, Northern Territory. *Bureau of Mineral Resources, Australia, Bulletin* 177.



KIMBERLEY BASIN
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ARUNTA BLOCK
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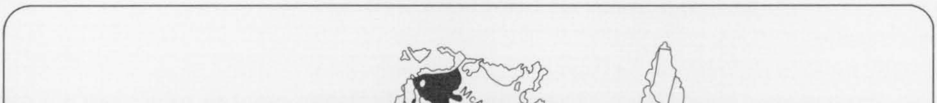
HAMERSLEY BASIN
AMADEUS BASIN
PEDIRKA BASIN
EROMANGA BASIN
MUSGRAVE BLOCK
SURAT BASIN
OFFICER BASIN
YILGARN BLOCK
EUCLA BASIN
GAWLER BLOCK
DARLING BASIN
LACHLAN FOLD BELT
RUM JUNGLE BLOCK
11/A/60



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OFFICER BASIN
YILGARN BLOCK
EUCLA BASIN
GAWLER BLOCK
DARLING BASIN
LACHLAN FOLD BELT
PINE CREEK GEOSYNCLINE
11/A/61

RUM JUNGLE BLOCK

Age—Archaean.

Size—500 km^2.

Margins—Surrounded by the Proterozoic Pine Creek Geosyncline.

Physiography—Low, rounded hills; narrow alluvial plains.

Elements—Metamorphics; acid intrusives.

Stratigraphy—Metamorphic and migmatite complex.

Igneous activity—Acid plutons intrusive into complex.

Metamorphism—High to very high-grade regional metamorphism.

Deformation—Complex multiple deformation.

Economic geology—No known mineralisation.

Reference—Fraser, W. J., 1980—Geology and exploration of the Rum Jungle uranium field. *In* Ferguson, J., & Goleby, A. B. (Editors)—URANIUM IN THE PINE CREEK GEOSYNCLINE. *International Atomic Energy Agency, Vienna.*

PINE CREEK GEOSYNCLINE

Age—Early Proterozoic.

Size—66 000 km^2.

Margins—Proterozoic Litchfield Block and Victoria River Basin to west; Palaeozoic Daly River Basin to south; Proterozoic McArthur Basin to east and southeast; Palaeozoic Arafura Basin and Mesozoic Money Shoal Basin to north.

Physiography—Rounded ridges and plateaus; dissected lowlands; extensive alluvial and estuarine plains.

Elements—Continental and marine sediments; volcanics.

Stratigraphy—Thick sequence of alternating fluvial, intertidal, and shallow-marine sediments including carbonates; bands of acid to basic volcanics.

Igneous activity—Sedimentary sequence intruded by basic sills and dykes and extensive acid to intermediate plutons.

Metamorphism—Low-grade in west and centre; medium to high-grade in east; zones of contact metamorphism around plutons.

Deformation—Tightly folded; major faults trending northwest and northeast.

Economic geology—Major uranium deposits in carbonaceous pelitic rocks adjacent to Archaean inliers; deposits of silver, gold, lead, zinc, and copper in similar sediments and associated with mixed carbonates, pelites, and volcanics higher in sequence; iron in several sedimentary sequences; gold, tin, and minor copper and tungsten associated with post-orogenic granites.

Reference—Needham, R. S., Crick, I. H., & Stuart-Smith, P. G., 1980—Regional geology of the Pine Creek geosyncline. *In* Ferguson, J., & Goleby, A. B. (Editors)—URANIUM IN THE PINE CREEK GEOSYNCLINE. *International Atomic Energy Agency, Vienna.*

DALY RIVER BASIN

11/A/62

WISO BASIN

11/A/63

DALY RIVER BASIN

Age—Cambrian to Ordovician.

Size—40 000 km^2.

Margins—Proterozoic Litchfield Block and Victoria River Basin to west; Palaeozoic Wiso Basin and Proterozoic-Palaeozoic Georgina Basin to south; Proterozoic McArthur Basin and Pine Creek Geosyncline to north.

Physiography—Undulating lowlands; alluvial plains; minor low plateaus.

Elements—Marine sediments; basic volcanics; maximum thickness about 1000 m.

Stratigraphy—Basal Early Cambrian basic volcanics and tuff; unconformably overlain by Middle Cambrian-Early Ordovician shelf sediments with carbonates.

Igneous activity—Basal basic volcanics.

Metamorphism—None.

Deformation—Some faulting.

Economic geology—Minor minerals include lead, barium, and secondary iron ore.

Reference—Lau, J. E., 1976—Daly River Basin. *In* Leslie, R. B., Evans, H. J., & Knight, C. L. (Editors)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 3. Petroleum. *The Australasian Institute of Mining and Metallurgy, Monograph Series* No. 7.

WISO BASIN

Age—Middle Cambrian to Devonian.

Size—165 000 km^2.

Margins—Proterozoic The Granites-Tanami Block, Birrindudu Basin, and Victoria River Basin and Palaeozoic Ord Basin to west; Proterozoic Arunta Block to south; Proterozoic Tennant Creek Block and Davenport Geosyncline and Proterozoic-Palaeozoic Georgina Basin to east; Palaeozoic Daly River Basin to north.

Physiography—Sand plains and minor dune fields; stony rises and marginal floodplains.

Elements—Marine and continental sediments; maximum thickness about 2000 m.

Stratigraphy—Middle Cambrian-Ordovician shallow-marine to intertidal sediments with carbonates; unconformably overlain by Devonian continental sequence.

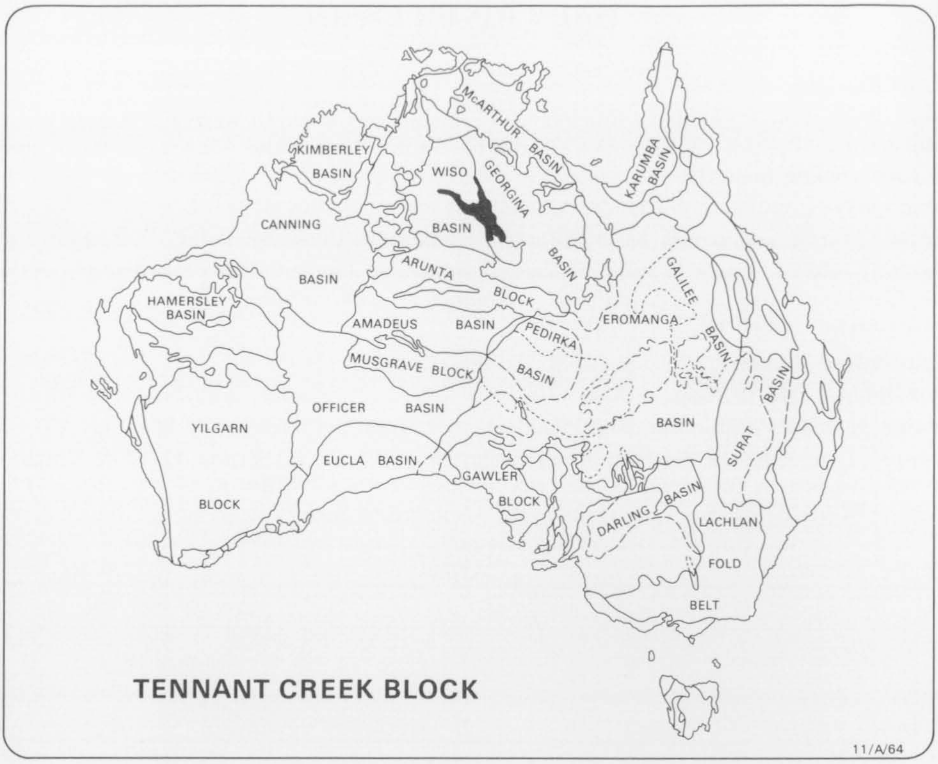
Igneous activity—None.

Metamorphism—None.

Deformation—Some faulting.

Economic geology—Traces of phosphate and copper.

Reference—Kennewell, P. J., & Huleatt, M. B., 1980—Geology of the Wiso Basin, Northern Territory. *Bureau of Mineral Resources, Australia, Bulletin* 205.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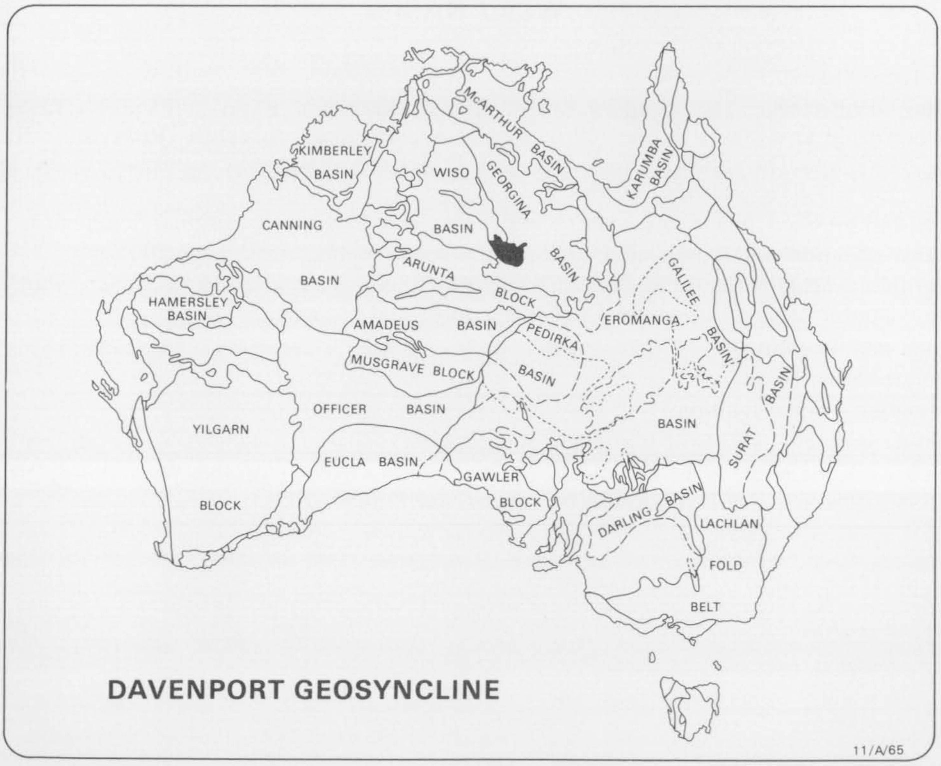
TENNANT CREEK BLOCK
11/A/64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LACHLAN
FOLD
BELT
DAVENPORT GEOSYNCLINE
11/A/65

TENNANT CREEK BLOCK

Age—Early to Middle Proterozoic.

Size—38 000 km^2.

Margins—Palaeozoic Wiso Basin to north and west; Proterozoic-Palaeozoic Georgina Basin to south and east; Proterozoic Davenport Geosyncline to southeast.

Physiography—Ridges; low hills; plains.

Elements—Marine sediments; volcanics; intrusives.

Stratigraphy—Basal sequence of trough sediments and acid volcanics; unconformably overlain by Middle Proterozoic shallow-water sediments including carbonates and acid and basic volcanics.

Igneous activity—Early Proterozoic acid volcanics and intrusives; Middle Proterozoic acid and basic volcanics and intrusives.

Metamorphism—Low to very low-grade regional metamorphism.

Deformation—Early Proterozoic sequence moderately to strongly folded; Middle Proterozoic sequence moderately folded.

Economic geology—Gold and copper in quartz-hematite and quartz-magnetite bodies; gold, tungsten, copper, and bismuth in quartz veins; uranium in sheared volcanics.

Reference—Blake, D. H., & Wyche, S., 1983—Geology of the Hatches Creek region, Northern Territory. *Bureau of Mineral Resources, Australia, Record* 1983/18.

DAVENPORT GEOSYNCLINE

Age—Early Proterozoic.

Size—12 000 km^2.

Margins—Proterozoic Tennant Creek Block to northwest; Palaeozoic Wiso Basin to west; Proterozoic-Palaeozoic Georgina Basin to south, east, and northeast.

Physiography—Sandstone ridges with narrow lowlands; some rounded hills and plains.

Elements—Shallow-marine sandstone succession; some interbedded conglomerate, siltstone, shale, volcanics, and rare carbonates.

Stratigraphy—Basal sandstone and minor shale succession with interbedded acid to basic volcanics and derived sediments and conglomerate at top; overlain conformably by a further sandstone succession with minor shale, carbonate, and acid to basic volcanics; these overlain conformably by more sandstone and siltstone.

Igneous activity—Interbedded acid and basic volcanics in lower two sequences; intruded by comagmatic granite and basic dykes and sills; minor younger granite.

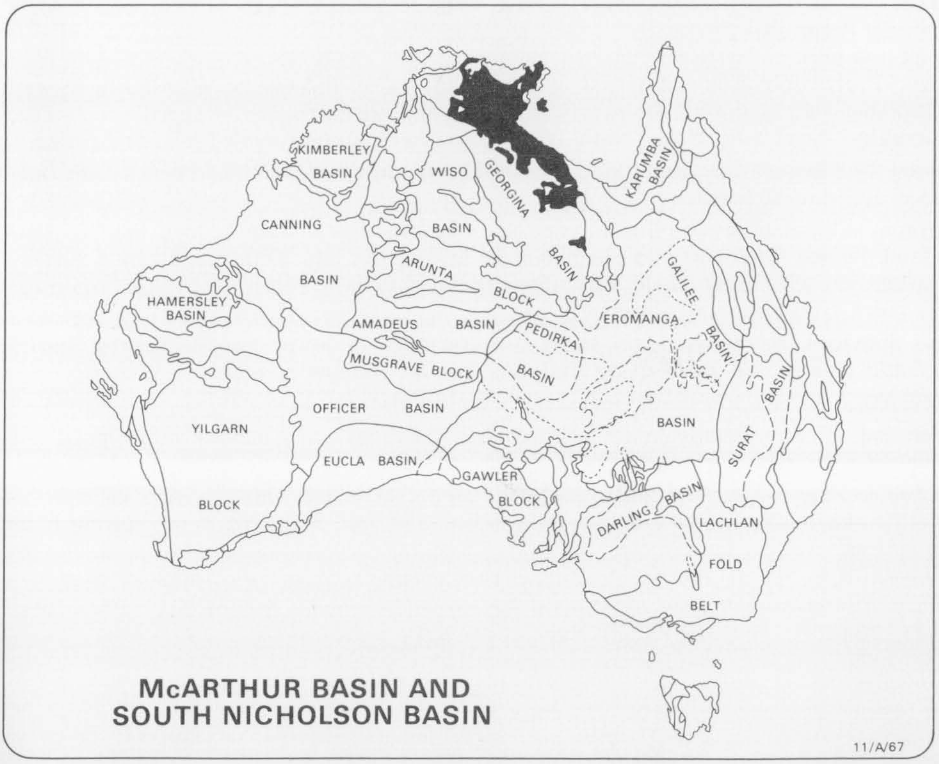
Metamorphism—Very low-grade regional metamorphism.

Deformation—Predominantly northwest-trending anticlines and synclines; minor northeast folds; some doming; moderately faulted.

Economic geology—Tungsten and associated copper in quartz veins cutting volcanics; copper and lead in amygdales in basic lavas; gold, silver, and lead in quartz veins cutting basic lavas and intrusives.

Reference—Blake, D. H., 1982—Davenport Geosyncline project. *In* Geological Branch Annual Summary of Activities. *Bureau of Mineral Resources, Australia, Report* 239 (*BMR Microform* MF182), 70-81.

ARAFURA BASIN



McARTHUR BASIN AND SOUTH NICHOLSON BASIN

ARAFURA BASIN

Age—Cambrian.

Size—7000 km^2.

Margins—Proterozoic McArthur Basin and Pine Creek Geosyncline to south; extends offshore.

Physiography—Dissected plateaus and plateau margins; coastal and littoral plains.

Elements—Shallow-marine sediments; maximum thickness about 1500 m.

Stratigraphy—Early to Middle Cambrian marine sediments.

Igneous activity—None.

Metamorphism—None.

Deformation—Undeformed.

Economic geology—Minor bauxite developed on overlying thin Mesozoic sediments.

Reference—Plumb, K. A., & Derrick, G. M., 1975—Geology of the Proterozoic rocks of northern Australia. *In* Knight, C. L. (Editor)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 1. Metals. *The Australasian Institute of Mining and Metallurgy, Monograph Series* No. 5.

McARTHUR BASIN AND SOUTH NICHOLSON BASIN

Age—Middle Proterozoic.

Size—210 000 km^2.

Margins—Proterozoic Pine Creek Geosyncline to west; Proterozoic-Palaeozoic Georgina Basin and Palaeozoic Daly River Basin to south; Proterozoic Mount Isa Block to southeast; Palaeozoic Arafura Basin to north; extends offshore.

Physiography—Tablelands; dissected plateau margins; coastal plains.

Elements—Shallow-marine and continental sediments; basic volcanics and intrusives; maximum thickness about 12 000 m.

Stratigraphy—Basal shallow-marine to fluvial sediment and basic volcanic succession; overlain by shallow-water to intertidal succession of carbonates and evaporites; unconformably overlain by unstable-shelf sandstone-shale succession.

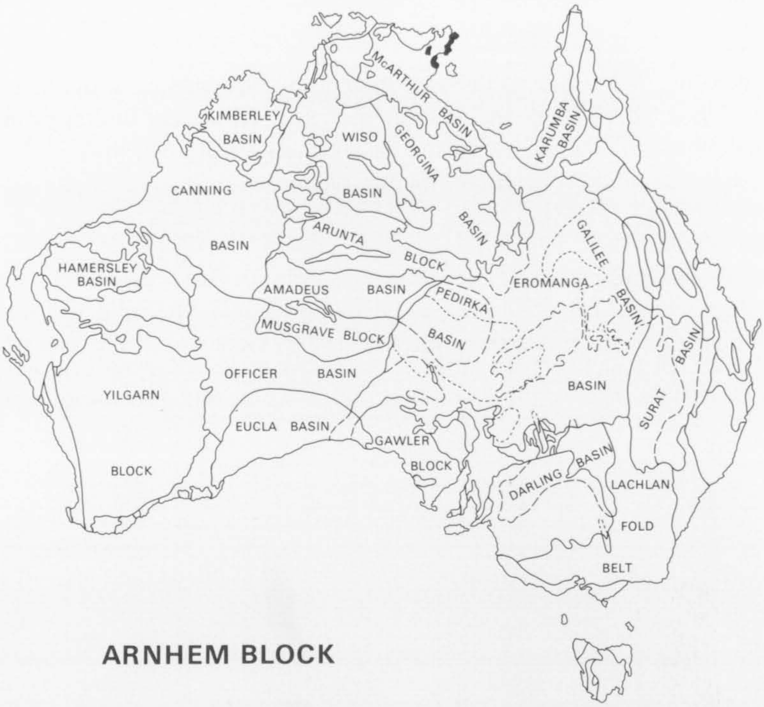
Igneous activity—Basic volcanics in basal succession; youngest sediments cut by basic intrusives.

Metamorphism—None.

Deformation—Strongly developed faulting and associated moderate folding in meridional area; mild deformation elsewhere.

Economic geology—Large stratabound silver-lead-zinc body in carbonaceous shale; lead and zinc also associated with carbonates; copper in carbonates, siltstone, and volcanic breccia; uranium in altered basic dykes; manganese on Groote Eylandt occurs in thin Cretaceous sediments overlying McArthur Basin sequence.

Reference—Plumb, K. A., Derrick, G. M., & Wilson, I. H., 1980—Precambrian geology of the McArthur River-Mount Isa region northern Australia. *In* Henderson, R. A., & Stephenson, P. J. (Editors)—THE GEOLOGY AND GEOPHYSICS OF NORTHEASTERN AUSTRALIA. *Geological Society of Australia, Queensland Division, Brisbane.*



ARNHEM BLOCK

11/A/68

GEORGINA BASIN

11/A/69

ARNHEM BLOCK

Age—Early Proterozoic.

Size—5000 km^2.

Margins—Proterozoic McArthur Basin to west; extends offshore.

Physiography—Dissected plateaus, narrow coastal plains; some coastal dunes and swamps.

Elements—Metamorphics; acid plutons.

Stratigraphy—Metamorphic complex.

Igneous activity—Acid plutons intrusive into metamorphic complex.

Metamorphism—High to very high-grade regional metamorphism.

Deformation—Complex multiple deformation.

Economic geology—No known metal deposits; extensive bauxite deposits on Cretaceous sediments which overlie the Proterozoic rocks.

Reference—Plumb, K. A., Derrick, G. M., & Wilson, I. H., 1980—Precambrian geology of the McArthur River-Mount Isa region northern Australia. *In* Henderson, R. A., & Stephenson, P. J. (Editors)—THE GEOLOGY AND GEOPHYSICS OF NORTHEASTERN AUSTRALIA. *Geological Society of Australia, Queensland Division, Brisbane.*

GEORGINA BASIN

Age—Late Proterozoic to Devonian.

Size—340 000 km^2.

Margins—Proterozoic Davenport Geosyncline and Tennant Creek and Arunta Blocks and Palaeozoic Wiso Basin to west; Arunta Block to south; Proterozoic Mount Isa Block to east; Proterozoic McArthur and South Nicholson Basins and Palaeozoic Daly River Basin to north.

Physiography—Black clay plains; sand plains; dissected stony plains; uplands.

Elements—Marine and continental sediments; volcanics; maximum thickness about 9000 m.

Stratigraphy—Basal Late Proterozoic continental glacial sediments overlain by marine sediments with carbonates; unconformably overlain by Cambrian to Early Ordovician marine carbonates; these overlain conformably by Ordovician clastic sediments and unconformably by Devonian sediments.

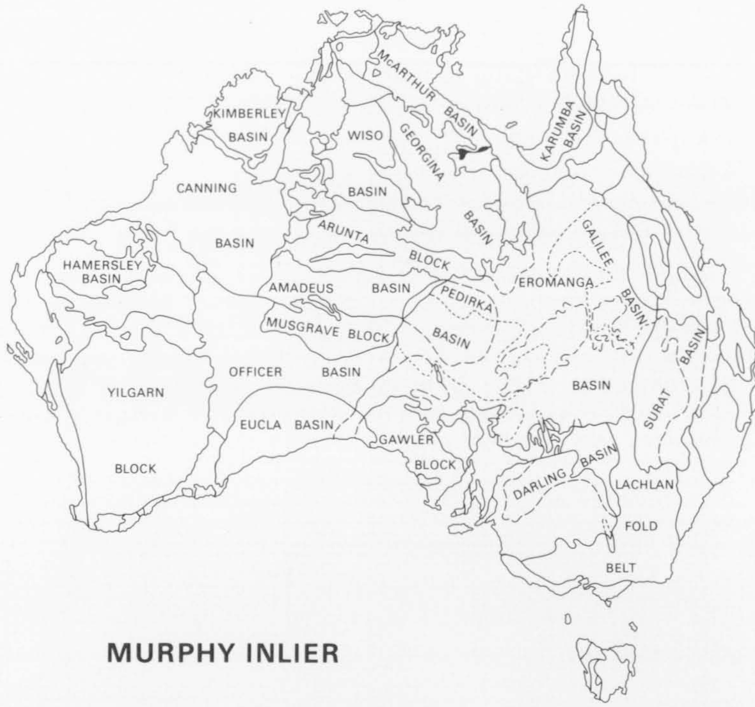
Igneous activity—Minor Cambrian basic volcanics in west.

Metamorphism—None.

Deformation—Minor to moderate folding and faulting, especially in east and south; localised marginal intense faulting and thrusting.

Economic geology—Large quantities of phosphate rock; minor metals include lead and manganese; traces of hydrocarbons.

Reference—Shergold, J. H., & Druce, E. C., 1980—Upper Proterozoic and Lower Palaeozoic rocks of the Georgina Basin. *In* Henderson, R. A., & Stephenson, P. J. (Editors)—THE GEOLOGY AND GEOPHYSICS OF NORTHEASTERN AUSTRALIA. *Geological Society of Australia, Queensland Division, Brisbane.*



MURPHY INLIER

11/A/70

MOUNT ISA BLOCK

11/A/71

MURPHY INLIER

Age—Early Proterozoic.

Size—6000 km^2.

Margins—Surrounded by Proterozoic McArthur Basin.

Physiography—Low rounded ranges.

Elements—Metamorphics; acid intrusives; acid volcanics.

Stratigraphy—Early Proterozoic metamorphics; unconformably overlain by acid volcanics.

Igneous activity—Acid plutons intrusive into metamorphics; acid volcanics.

Metamorphism—Low to medium-grade regional metamorphism.

Deformation—Complex multistage deformation; volcanics mildly deformed.

Economy geology—Small deposits of copper, tin, and tungsten associated with granites; uranium in shears in acid volcanics.

Reference—Plumb, K. A., Derrick, G. M., & Wilson, I. H., 1980—Precambrian geology of the McArthur River-Mount Isa region northern Australia. *In* Henderson, R. A., & Stephenson. P. J. (Editors)—THE GEOLOGY AND GEOPHYSICS OF NORTHEASTERN AUSTRALIA. *Geological Society of Australia, Queensland Division, Brisbane.*

MOUNT ISA BLOCK

Age—Early to Late Proterozoic.

Size—45 000 km^2.

Margins—Proterozoic-Palaeozoic Georgina Basin to west; Georgina Basin and Mesozoic Eromanga Basin to south; Eromanga Basin and Mesozoic Carpentaria Basin to east; Carpentaria Basin to north.

Physiography—Prominent parallel ridges surrounded by lowlands.

Elements—Thick sequence of mainly marine sediments, acid and basic volcanics, and intrusives.

Stratigraphy—Basal metamorphics and acid volcanics; unconformably overlain by sediments and basic and acid volcanics; unconformably overlain in turn by shallow-marine sediments with carbonates.

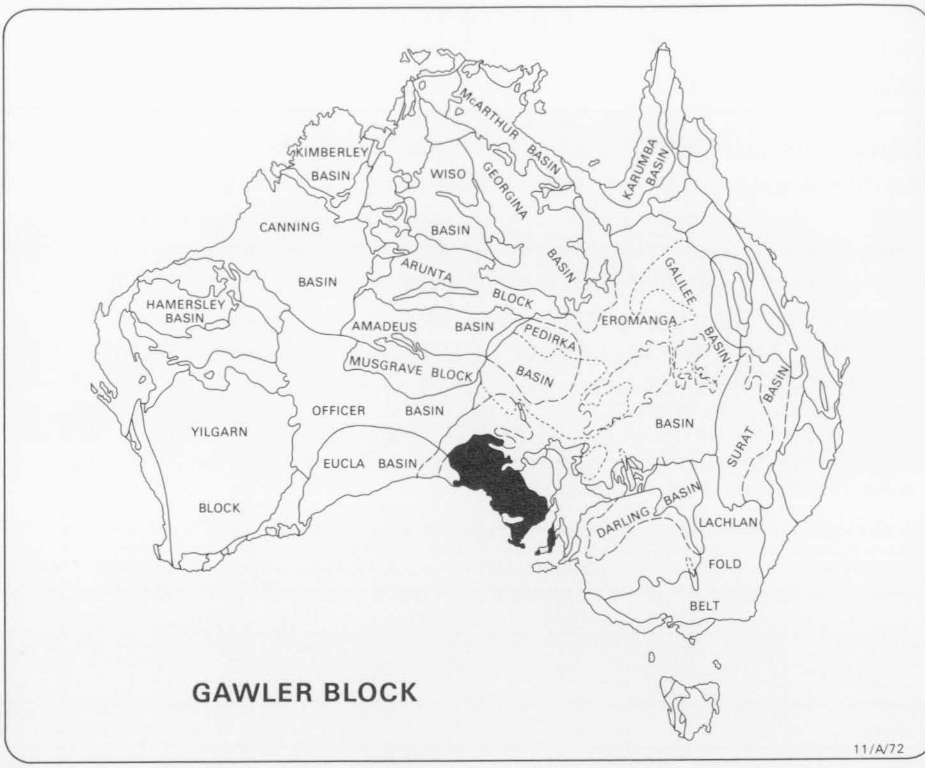
Igneous activity—Several phases of acid and basic intrusion; thick sequences of acid and basic volcanics.

Metamorphism—Low to medium-grade regional metamorphism.

Deformation—Complex multistage deformation; extensive faulting.

Economic geology—Large deposits of silver-lead-zinc within black shale at Mount Isa; scattered stratabound copper-gold and silver-lead-zinc deposits elsewhere; uranium in sheared sediments and in metasomatic skarns associated with granite intrusions; iron as siderite or hematite pisolites in or on shallow-marine sediments; minor metals include cobalt and manganese.

Reference—Plumb, K. A., Derrick, G. M., & Wilson, I. H., 1980—Precambrian geology of the McArthur River-Mount Isa region northern Australia. *In* Henderson, R. A., & Stephenson, P. J. (Editors)—THE GEOLOGY AND GEOPHYSICS OF NORTHEASTERN AUSTRALIA. *Geological Society of Australia, Queensland Division, Brisbane.*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EROMANGA BASIN
GALILEE BASIN
MUSGRAVE BLOCK
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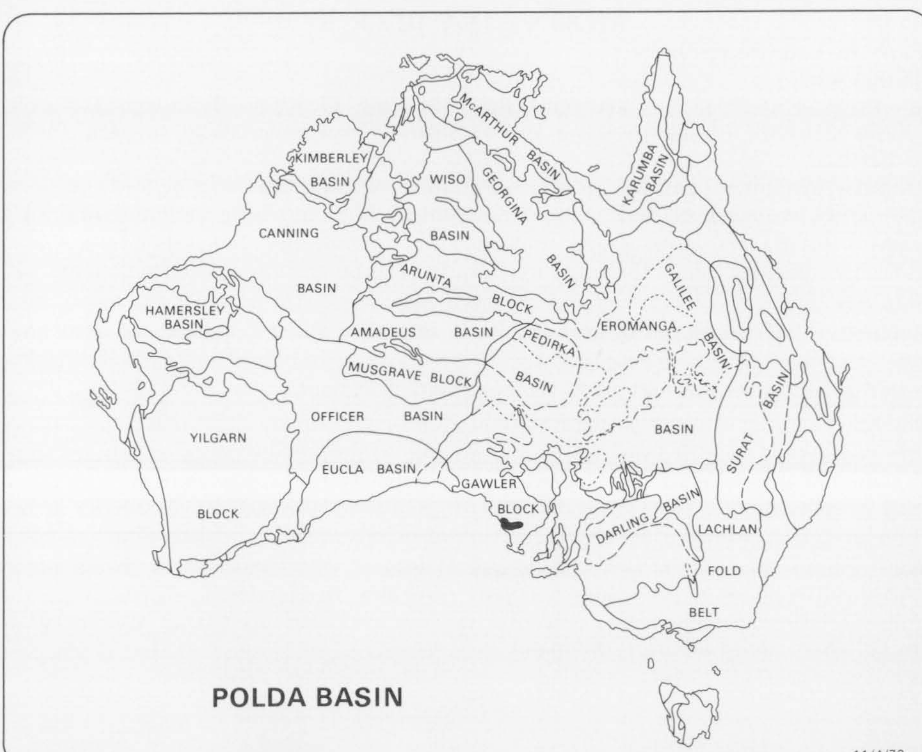
EUCLA BASIN
SURAT BASIN
DARLING BASIN
LACHLAN FOLD BELT
GAWLER BLOCK
11/A/72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EUCLA BASIN
GAWLER BLOCK
SURAT BASIN
DARLING BASIN
LACHLAN FOLD BELT
POLDA BASIN
11/A/73

GAWLER BLOCK

Age—Archaean to Middle Proterozoic.

Size—130 000 km^2.

Margins—Mesozoic-Cainozoic Eucla Basin to west; Proterozoic Stuart Shelf to east; Mesozoic Eromanga Basin to north; extends offshore.

Physiography—Low rounded hills and ranges; alluvial plains with salt lakes; calcareous dunes along coast.

Elements—Marine and continental sediments and metasediments; acid to basic volcanics and intrusives.

Stratigraphy—Basal Archaean to Early Proterozoic high-grade metamorphic complex with banded iron formation; unconformably overlain by low-grade metamorphosed sediments including carbonates and banded iron formation; further unconformably overlain by continental and shallow-marine sediments and finally by a thick sequence of acid volcanics.

Igneous activity—Several phases of acid to basic intrusives; major acid volcanic phase at top of sequence.

Metamorphism—Older units metamorphosed to high-grade; younger units to low to moderate-grade.

Deformation—Moderate to intense; older units multiply deformed.

Economic geology—Large deposits of iron in banded iron formation in east; gold and copper in tabular quartz veins; lead-silver-zinc-copper mineralisation associated with dolomite or pegmatite; minor metals include molybdenum, tungsten, tin, and uranium.

Reference—Rutland, R. W. R., Parker, A. J., Pitt, G. M., Preiss, W. V., & Murrell, B., 1981—The Precambrian of South Australia. *In* Hunter, D. R. (Editor)—DEVELOPMENTS IN PRECAMBRIAN GEOLOGY. 2. Precambrian of the Southern Hemisphere. *Elsevier Scientific Publishing Company, Amsterdam.*

POLDA BASIN

Age—Jurassic to Tertiary.

Size—6000 km^2.

Margins—Archaean-Proterozoic Gawler Block to north, east, and south; extends offshore.

Physiography—Dunefields.

Elements—Continental and marine sediments; maximum thickness about 3000 m.

Stratigraphy—Late Jurassic continental sediments unconformably overlain by continental and marine Tertiary sediments.

Igneous activity—None.

Metamorphism—None.

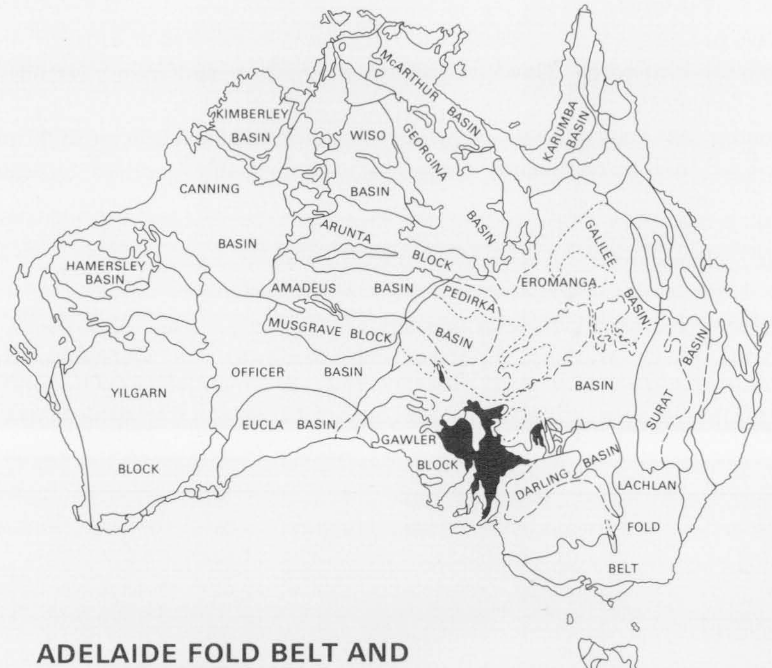
Deformation—None.

Economic geology—No known mineral deposits.

Reference—Pattinson, R., Watkins, G., & van den Abeele, D., 1976—Great Australian Bight Basin, South Australia. *In* Leslie, R. B., Evans, H. J., & Knight, C. L. (Editors)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 3. Petroleum. *The Australasian Institute of Mining and Metallurgy, Monograph Series* No. 7.

ARROWIE BASIN

11/A/74



ADELAIDE FOLD BELT AND STUART SHELF

11/A/75

ARROWIE BASIN

Age—Cambrian.

Size—7000 km^2.

Margins—Western body: Proterozoic-Palaeozoic Stuart Shelf to south; Cainozoic Torrens Basin to east; Mesozoic Eromanga Basin to north. Eastern body: Proterozoic Adelaide Fold Belt to west; Mesozoic Eromanga Basin to east, north, and south.

Physiography—Dune fields; salt lakes.

Elements—Marine and continental sediments; maximum thickness about 6000 m.

Stratigraphy—Clastic shelf sediments with carbonates; overlain by fluvial sediments.

Igneous activity—None.

Metamorphism—None.

Deformation—Moderately to strongly folded and faulted in areas adjoining Proterozoic sediments.

Economic geology—Traces of hydrocarbons in limestone.

Reference—Townsend, I. J., 1976a—Arrowie Basin. *In* Leslie, R. B., Evans, H. J., & Knight, C. L., (Editors)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 3. Petroleum. *The Australasian Institute of Mining and Metallurgy, Monograph Series* No. 7.

ADELAIDE FOLD BELT AND STUART SHELF

Age—Late Proterozoic to Cambrian.

Size—95 000 km^2.

Margins—Proterozoic-Palaeozoic Warburton Basin, Palaeozoic Arckaringa and Arrowie Basins, and Mesozoic Eromanga Basin to north; Archaean-Proterozoic Gawler Block to west; Palaeozoic Kanmantoo Fold Belt to south; Proterozoic Broken Hill Block, Palaeozoic Darling Basin, and Cainozoic Murray Basin to east; extends offshore.

Physiography—Complex belt of fold ridges; alluvial and sand plains; salt lakes.

Elements—Shelf, trough, deltaic, and glacial sediments; basic volcanics; thickness unknown.

Stratigraphy—Basal clastic sediments and carbonates overlain by a similar sequence containing evaporites; overlain in places disconformably by two glacial sequences separated by marine clastics and carbonates; further overlain by marine clastics and disconformably by Cambrian carbonates; sequence thinner and less continuous on Stuart Shelf in west.

Igneous activity—Widespread basal basic volcanics and younger granite.

Metamorphism—Widespread low-grade regional metamorphism in southeast.

Deformation—Irregularly branching pattern of folds and marginal faults; sequence relatively undeformed and flat-lying on Stuart Shelf.

Economic geology—Copper as scattered deposits over wide area in sediments associated with basement highs or the intrusion of younger granite; lead and zinc mineralisation associated with Cambrian carbonates as disseminations and veins; minor gold.

Reference—Rutland, R. W. R., Parker, A. J., Pitt, G. M., Preiss, W. V., & Murrell, B., 1981—The Precambrian of South Australia. *In* Hunter, D. R. (Editor)—DEVELOPMENTS IN PRECAMBRIAN GEOLOGY. 2. Precambrian of the Southern Hemisphere. *Elsevier Scientific Publishing Company, Amsterdam.*

TORRENS BASIN

11/A/76

STANSBURY BASIN

11/A/77

TORRENS BASIN

Age—Tertiary.

Size—6000 km^2.

Margins—Proterozoic-Palaeozoic Stuart Shelf and Palaeozoic Arrowie Basin to west; Proterozoic Adelaide Fold Belt to east and north.

Physiography—Salt Lake.

Elements—Continental sediments; maximum thickness about 800 m.

Stratigraphy—Trough of Tertiary clastic continental sediments.

Igneous activity—None.

Metamorphism—None.

Deformation—Some block faulting along margins.

Economic geology—No known mineral deposits.

Reference—Townsend, I. J., 1976b—Pirie-Torrens Basin. *In* Leslie, R. B., Evans, H. J., & Knight, C. L. (Editors)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 3. Petroleum. *The Australasian Institute of Mining and Metallurgy, Monograph Series* No. 7.

STANSBURY BASIN

Age—Permian.

Size—4000 km^2.

Margins—Surrounded by the Archaean-Proterozoic Gawler Block; extends offshore.

Physiography—Undulating lowlands with a cover of calcareous dunes.

Elements—Continental sediments; maximum thickness about 5000 m.

Stratigraphy—Sequence of Early Permian continental glacial sediments.

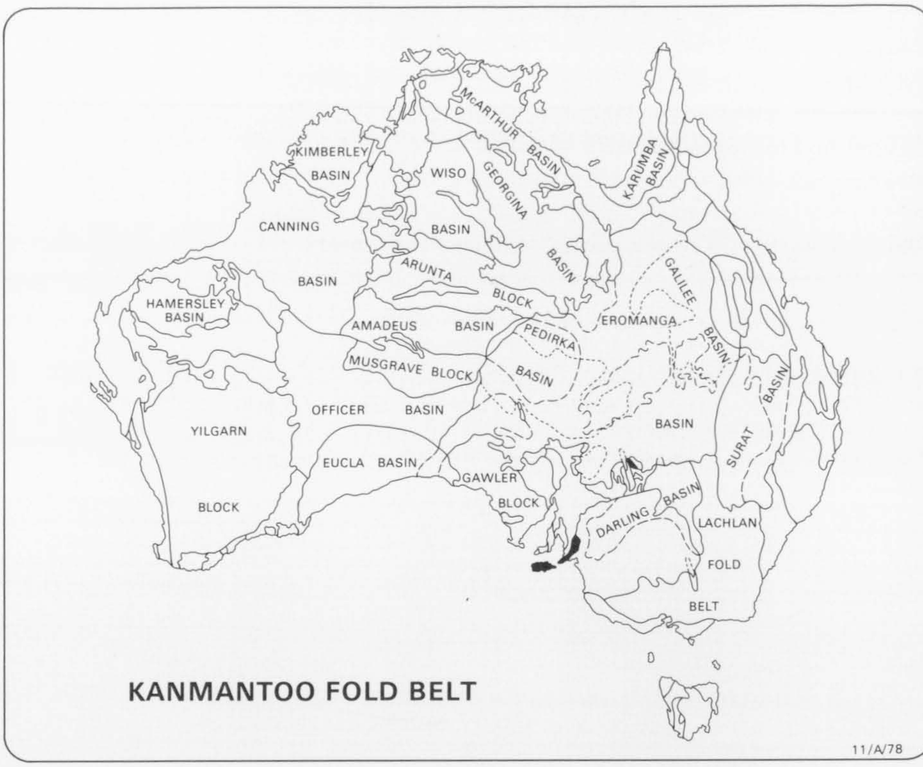
Igneous activity—None.

Metamorphism—None.

Deformation—Little known.

Economic geology—No known mineralisation.

Reference—Stuart, W. J., & von Sanden, A. T.,1976—Gulf of St. Vincent region. *In* Leslie, R. B., Evans, H. J., & Knight, C. L. (Editors)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 3. Petroleum. *The Australasian Institute of Mining and Metallurgy, Monograph Series* No. 7.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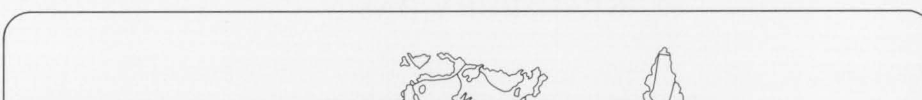
KANMANTOO FOLD BELT
11/A/78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EUCLA BASIN
GAWLER BLOCK
DARLING BASIN
LACHLAN FOLD BELT
ST VINCENT BASIN
11/A/79

KANMANTOO FOLD BELT

Age—Cambrian.

Size—15 000 km^2.

Margins—Western body: Proterozoic Adelaide Fold Belt to north and west; Cainozoic Murray Basin to east. Eastern body: Proterozoic Broken Hill Block and Adelaide Fold Belt to west; Cainozoic Murray Basin to south; Palaeozoic Darling Basin to east; Mesozoic Eromanga Basin to north; extends offshore.

Physiography—Undulating fold ridges; alluvial valleys.

Elements—Marine sediments; acid intrusives.

Stratigraphy—Early to Middle Cambrian trough and shelf sediments.

Igneous activity—Sequence intruded and metamorphosed by Ordovician acid plutons.

Metamorphism—High-grade contact metamorphism around plutons.

Deformation—Little to strongly folded; moderately faulted.

Economic geology—Copper, gold, lead, and zinc as disseminations or veinlets in carbonaceous shale, phyllite, schist, and carbonates.

Reference—Thomson, B. P., 1975a—Kanmantoo Trough. *In* Knight, C. L. (Editor)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 1. Metals. *The Australasian Institute of Mining and Metallurgy, Monograph Series* No. 5.

ST VINCENT BASIN

Age—Tertiary.

Size—7000 km^2.

Margins—Proterozoic Adelaide Fold Belt to east and north; extends offshore.

Physiography—Alluvial and littoral plains.

Elements—Marine and continental sediments; maximum thickness about 1500 m.

Stratigraphy—Basal Eocene deltaic sediments overlain by Miocene-Pleistocene marine sediments.

Igneous activity—None.

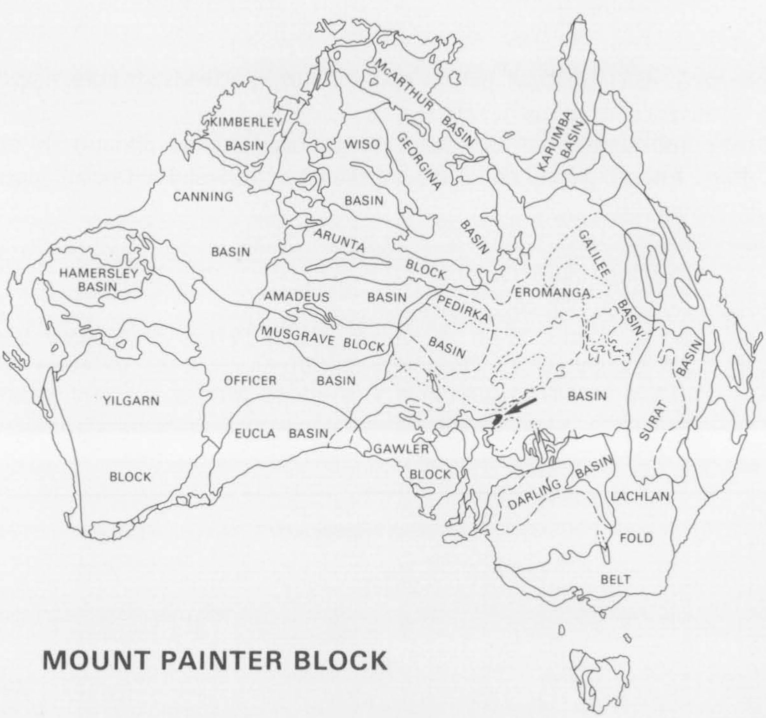
Metamorphism—None.

Deformation—Mild folding; block faulting.

Economic geology—Small brown coal deposits.

Reference—Leslie, R. B., Evans, H. J., & Knight, C. L., 1976a—St. Vincent Basin. *In* Leslie, R. B., Evans, H. J., & Knight, C. L. (Editors)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 3. Petroleum. *The Australasian Institute of Mining and Metallurgy, Monograph Series* No. 7.

BROKEN HILL BLOCK AND WONOMINTA BLOCK



MOUNT PAINTER BLOCK

BROKEN HILL BLOCK AND WONOMINTA BLOCK

Age—Early to Middle Proterozoic.

Size—8000 km^2.

Margins—Proterozoic Adelaide Fold Belt to west; Cainozoic Murray Basin to south; Palaeozoic Kanmantoo Fold Belt and Darling Basin to east; Mesozoic Eromanga Basin to north.

Physiography—Low ranges and stony rises; lowlands.

Elements—Metamorphics; acid intrusives.

Stratigraphy—Metasedimentary and metavolcanic complex.

Igneous activity—Highly metamorphosed acid intrusives and volcanics.

Metamorphism—High to very high-grade regional metamorphism.

Deformation—Complex multistage deformation.

Economic geology—Silver-lead-zinc in granulites of diverse composition (some contain copper); tin and uranium in pegmatite; nickel and platinum in ultrabasic bodies; uranium, copper, and gold in hydrothermal veins or disseminated in stratabound bodies.

Reference—Glen, R. A., Laing, W. P., Parker, A. J., & Rutland, R. W. R., 1977—Tectonic relationships between the Proterozoic Gawler and Willyama orogenic domains, Australia. *Journal of the Geological Society of Australia*, 24(3), 125-150.

MOUNT PAINTER BLOCK

Age—Early to Middle Proterozoic.

Size—1000 km^2.

Margins—Proterozoic Adelaide Fold Belt to west and south; Mesozoic Eromanga Basin to north and east.

Physiography—Ranges and stony rises.

Elements—Metamorphic complex; acid intrusives.

Stratigraphy—Complex of metasediments and metavolcanics.

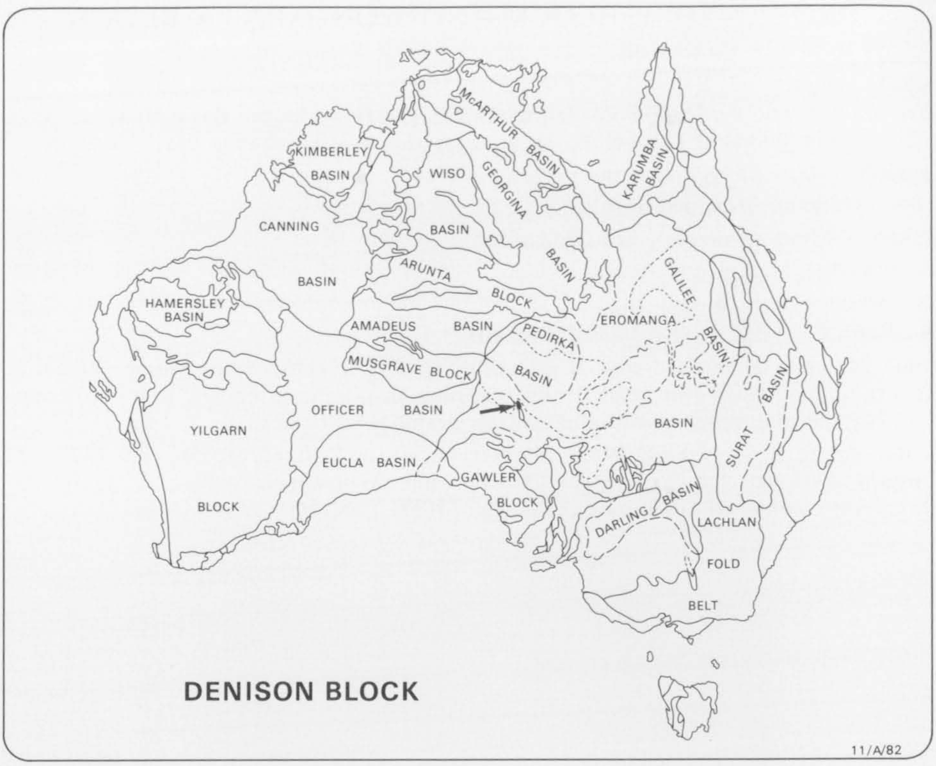
Igneous activity—Acid volcanics; intrusive granite suite.

Metamorphism—Low to medium-grade.

Deformation—Strongly deformed.

Economic geology—Uranium and minor copper mineralisation.

Reference—Parkin, L. W. (Editor), 1969—HANDBOOK OF SOUTH AUSTRALIA GEOLOGY. *The Geological Survey of South Australia, Adelaide.*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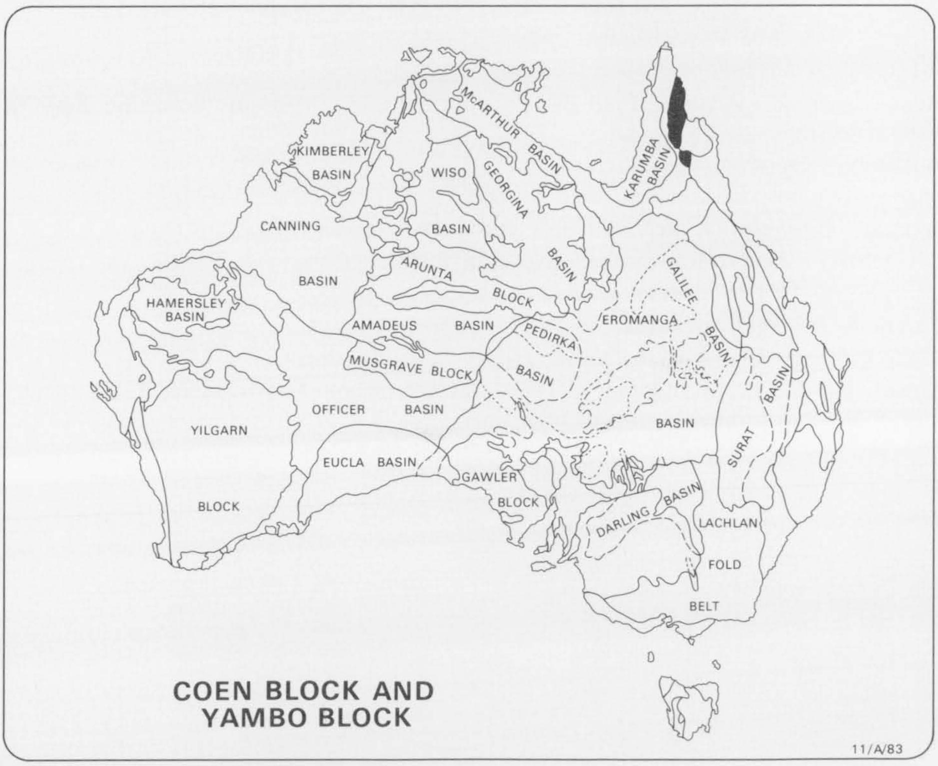
LACHLAN FOLD BELT
DENISON BLOCK
11/A/82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OFFICER BASIN
YILGARN BLOCK
EUCLA BASIN
GAWLER BLOCK
DARLING BASIN
LACHLAN FOLD BELT
COEN BLOCK AND YAMBO BLOCK
11/A/83

DENISON BLOCK

Age—Early to Middle Proterozoic.

Size—1000 km^2.

Margins—Mesozoic Eromanga Basin to north, east, and west; Proterozoic Adelaide Fold Belt to south.

Physiography—Low dissected ridges.

Elements—Metamorphic complex.

Stratigraphy—Complex of metasediments and metavolcanics; possible metagranitic rocks.

Igneous activity—Possible metagranites.

Metamorphism—Low to high-grade.

Deformation—Intensely deformed.

Economic geology—Small copper-bearing bodies.

Reference—Parkin, L. W. (Editor), 1969—HANDBOOK OF SOUTH AUSTRALIAN GEOLOGY. *The Geological Survey of South Australia, Adelaide.*

COEN BLOCK AND YAMBO BLOCK

Age—Late Proterozoic to Palaeozoic.

Size—25 000 km^2.

Margins—Mesozoic Carpentaria Basin to west and south; Palaeozoic Hodgkinson Fold Belt and Mesozoic Laura Basin to east; extends offshore.

Physiography—Tablelands; rounded hills; low sandy plateaus; alluvial and sandy plains.

Elements—Metamorphics; acid intrusives and volcanics.

Stratigraphy—Basal metasedimentary sequence; unconformably overlain by late Palaeozoic acid volcanics.

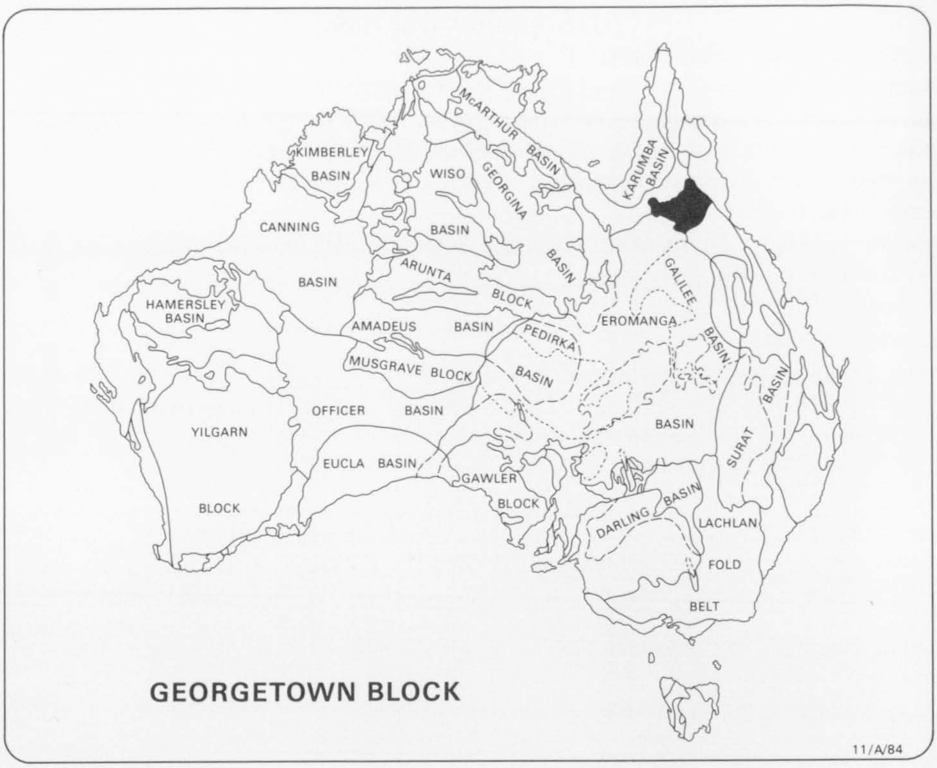
Igneous activity—Basal metasediments intruded by Devonian and Permian acid plutons; overlain by acid volcanics.

Metamorphism—Low to medium-grade regional metamorphism.

Deformation—Moderate north-south trending folds; major transcurrent faults on east.

Economic geology—Gold in quartz reefs and shear zones associated with granite intrusion and in deep leads beneath Mesozoic cover rocks; iron and manganese in lenses of magnetite-quartz and hematite-quartz schist; minor metals include tin in alluvial deposits associated with granite; tungsten in quartz reefs associated with mica schist.

Reference—Willmott, W. F., Whitaker, W. G., Palfreyman, W. D., & Trail, D. S., 1973—Igneous and metamorphic rocks of Cape York Peninsula and Torres Strait. *Bureau of Mineral Resources, Australia, Bulletin* 135.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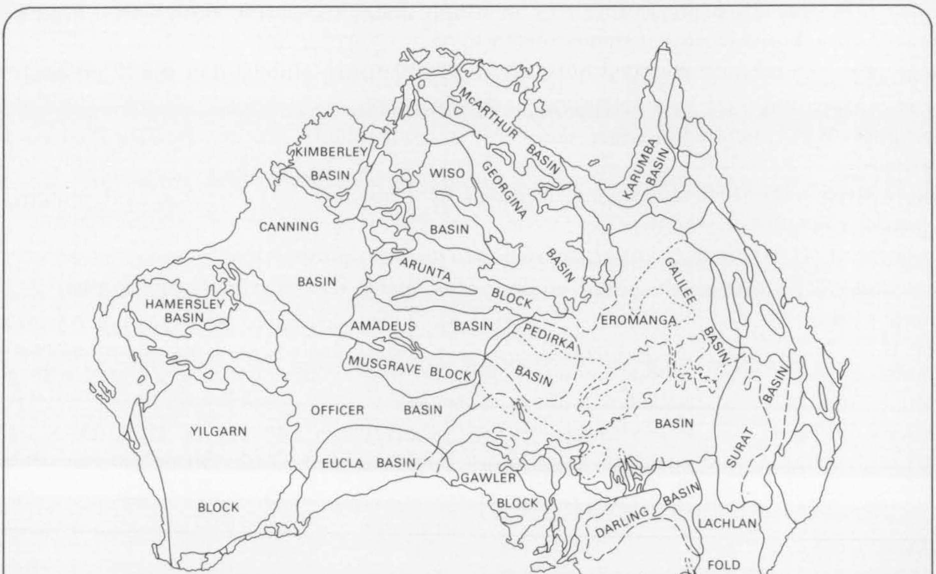
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BELT
ROCKY CAPE BLOCK AND TYENNA BLOCK
11/A/85

GEORGETOWN BLOCK

Age—Early Proterozoic to Palaeozoic.

Size—50 000 km^2.

Margins—Mesozoic Carpentaria Basin to north and west; Mesozoic Eromanga Basin to south; Palaeozoic Lachlan Fold Belt to southeast; Palaeozoic Hodgkinson Fold Belt to northeast.

Physiography—Rugged hills; lower rounded hills; alluvial and sandy plains.

Elements—Metamorphics; acid intrusives and volcanics; minor basic intrusives and volcanics.

Stratigraphy—Early and Middle Proterozoic metasedimentary sequence; unconformably overlain by Middle Proterozoic acid volcanics and by minor Late Proterozoic sediments; unconformably overlain by Late Palaeozoic acid volcanics.

Igneous activity—Early Proterozoic basic dykes, sills, and flows; Middle Proterozoic and Palaeozoic acid plutons; overlain by acid volcanics.

Metamorphism—Low to high-grade regional metamorphism.

Deformation—Complex multistage deformation in metasediments; block faulting in overlying volcanics.

Economic geology—Gold in quartz fissures cutting granite, metamorphics, and acid volcanics; copper in schist associated with amphibolite or basic intrusions; lead and zinc in schist, clastics, and granite contacts in several places; uranium associated with overlying younger Palaeozoic sediments; minor metals include tin and tungsten associated with granite intrusions.

Reference—Withnall, I. W., Bain, J. H. C., & Rubenach, M. J., 1980—The Precambrian Geology of northern Queensland. *In* Henderson, R. A., & Stephenson, P. J. (Editors)—THE GEOLOGY AND GEOPHYSICS OF NORTHEASTERN AUSTRALIA. *Geological Society of Australia, Queensland Branch, Brisbane.*

ROCKY CAPE BLOCK AND TYENNA BLOCK

Age—Late Proterozoic.

Size—10 000 km^2.

Margins—Palaeozoic Dundas Trough and Palaeozoic-Mesozoic Tasmania Basin to east; extends offshore.

Physiography—Fold ridges; narrow alluvial plains; low coastal plateaus.

Elements—Metamorphics; marine sediments; acid and basic intrusives.

Stratigraphy—Basal metamorphic complex; unconformably overlain by trough sequence; further overlain by shelf sequence with carbonates.

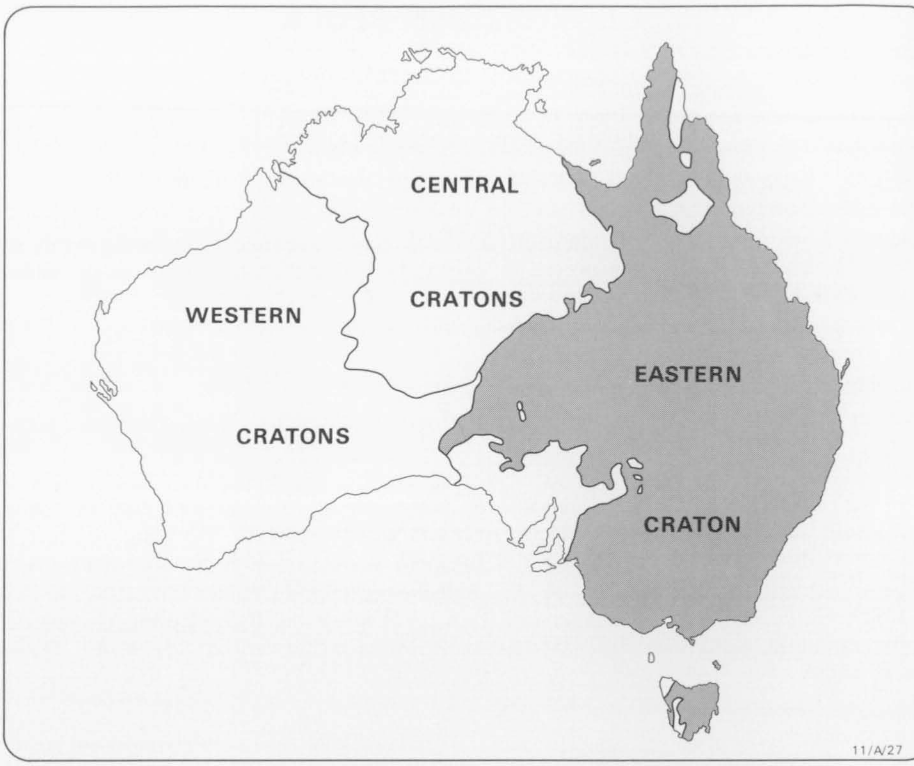
Igneous activity—Acid and basic intrusives.

Metamorphism—Basal sequence moderate to high-grade regional metamorphics.

Deformation—Complex multistage deformation.

Economic geology—Minor metals include tin, tungsten, and copper in lodes in high-grade metamorphic rocks.

Reference—Williams, E., Solomon, M., & Green, G. R., 1975—The geological setting of metalliferous ore deposits in Tasmania. *In* Knight, C. L. (Editor)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 1. Metals. *The Australasian Institute of Mining and Metallurgy, Monograph Series* No. 5.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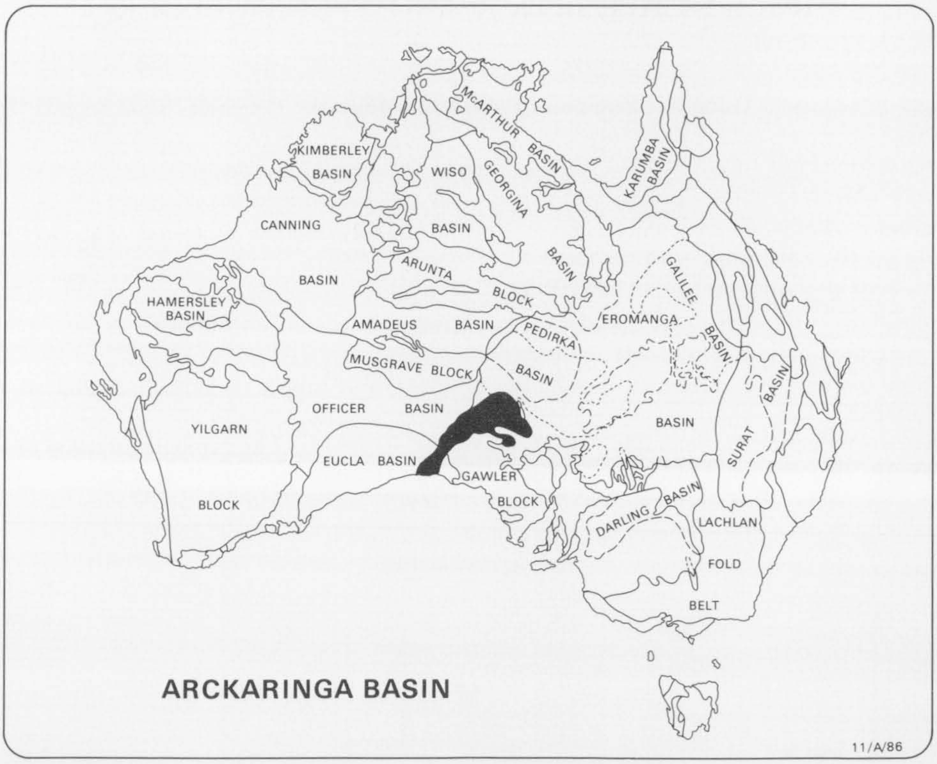
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GAWLER
BLOCK
DARLING BASIN
LACHLAN
FOLD
BELT
ARCKARINGA BASIN
11/A/86

EASTERN CRATON

The Eastern Craton consists of the Palaeozoic and early Mesozoic Tasman Fold Belt and the overlying Palaeozoic, Mesozoic, and Cainozoic sedimentary basin sequences. Scattered inliers of Proterozoic rocks (mainly in Tasmania and northeastern Queensland) have been assigned to to the Central Cratons. The Eastern Craton is bounded and partly underlain on the west by Proterozoic and Palaeozoic rocks of the Central and Western Cratons, and it extends offshore, to the north, east, and south.

The Tasman Fold Belt can be subdivided into three major components: the Lachlan Fold Belt in the south, west, and north; the New England Fold Belt in the east; and the Hodgkinson Fold Belt in the north (Scheibner, 1974). The Kanmantoo Fold Belt, which is usually assigned to the Tasman Fold Belt, has been included with the Central Cratons as its development predates the main development of the Tasman Fold Belt. The Tasman Fold Belt has undergone a number of deformational events, culminating in the Late Ordovician, Middle Devonian, Late Carboniferous, and mid-Permian.

The Phanerozoic sedimentary basin sequences which partly overlie the Tasman Fold Belt and onlap the Central and Western Cratons in the west can be divided into an older group, which shows some geological and tectonic continuity with their basement (transitional basins; Doutch & Nicholas, 1978) and a younger group, which shows no such continuity (platform cover).

The older group comprises the Adavale, Darling, and Drummond Basins. The Adavale and Darling Basins commenced development in the Early Devonian, and the basal sequences have been modified by the major Middle Devonian orogeny which also affected the adjoining Lachlan Fold Belt. In contrast, the Drummond Basin sedimentation commenced late in the Devonian, and early sequences were affected by the major Late Carboniferous orogeny which had its main influence to the east in the New England Belt.

The younger group, comprising little-deformed platform cover of Late Carboniferous and younger age, can be divided into four groups (modified from Doutch & Nicholas, 1978). The first group, comprising the Pedirka, Arckaringa, Cooper, Galilee, Bowen, Sydney, Oaklands, and Tasmania Basins, is of Late Carboniferous or Early Permian to Triassic age; the second group, comprising the Eromanga, Surat, Clarence-Moreton, Maryborough, Carpentaria, and Laura Basins, is of Late Triassic or Early Jurassic to Cretaceous age; the third group, comprising the Otway and Gippsland Basins, is of Late Jurassic to Tertiary age; and the fourth group, comprising the Murray, Duaringa, and Karumba Basins, is of Tertiary to Quaternary age.

ARCKARINGA BASIN

Age—Late Carboniferous to Early Permian.

Size—65 000 km^2.

Margins—Overlain by the Mesozoic Eromanga Basin and Mesozoic-Tertiary Eucla Basin.

Physiography—Not exposed.

Elements—Continental sediments; minor marine sediments.

Stratigraphy—Basal continental glacial and fluvioglacial sediments; overlain by a thin shallow-marine sequence followed by fluvial and lacustrine sediments with coal.

Igneous activity—None.

Metamorphism—None.

Economic geology—Major coal deposits.

Reference—Milton, B. E., 1976—Arckaringa Basin. *In* Leslie, R. B., Evans, H. J., & Knight, C. L. (Editors)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 3. Petroleum. *The Australasian Institute of Mining and Metallurgy, Monograph Series* No. 7.


KIMBERLEY BASIN
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KARUMBA BASIN
WISO BASIN
GEORGINA BASIN
CANNING BASIN
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GALILEE BASIN
HAMERSLEY BASIN
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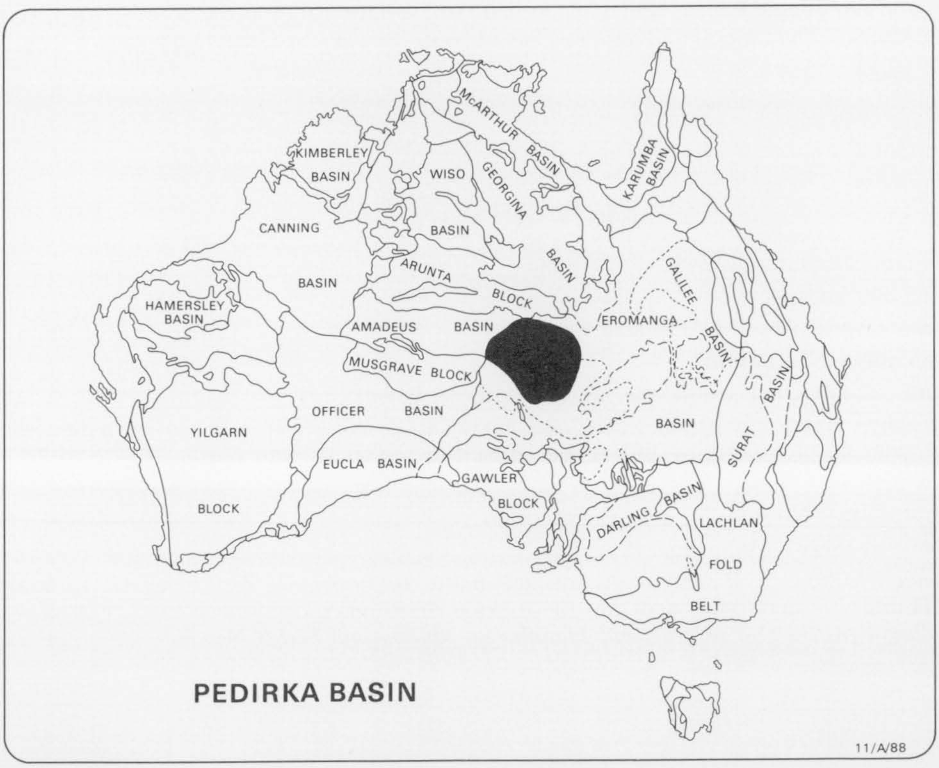
LACHLAN FOLD BELT
WARBURTON BASIN
11/A/87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LACHLAN FOLD BELT
PEDIRKA BASIN
11/A/88

WARBURTON BASIN

Age—Late Proterozoic to Devonian(?)

Size—250 000 km^2.

Margins—Underlies the Mesozoic Eromanga Basin and Palaeozoic Pedirka Basin.

Physiography—Not exposed.

Elements—Marine and continental sediments; volcanics.

Stratigraphy—Basal Adelaidean to Cambrian volcanics; conformably overlain by Cambrian marine sediments; unconformably overlain by Ordovician marine sediments and Silurian(?)-Devonian(?) continental or marginal marine sediments.

Igneous activity—Basal volcanic sequence.

Metamorphism—None.

Deformation—Moderately folded and faulted.

Economic geology—No known deposits.

Reference—Wopfner, H., 1969—Depositional history and tectonics of South Australian sedimentary basins. *ECAFE Symposium on the development of petroleum resources in Asia and the Far East.*

PEDIRKA BASIN

Age—Late Carboniferous to Permian.

Size—185 000 km^2.

Margins—Proterozoic-Palaeozoic Amadeus Basin to west; underlies the Mesozoic Eromanga Basin.

Physiography—Dune fields; some low ridges.

Elements—Continental sediments.

Stratigraphy—Basal sequence of continental glacial and fluvioglacial sediments overlain by continental fluvial sediments.

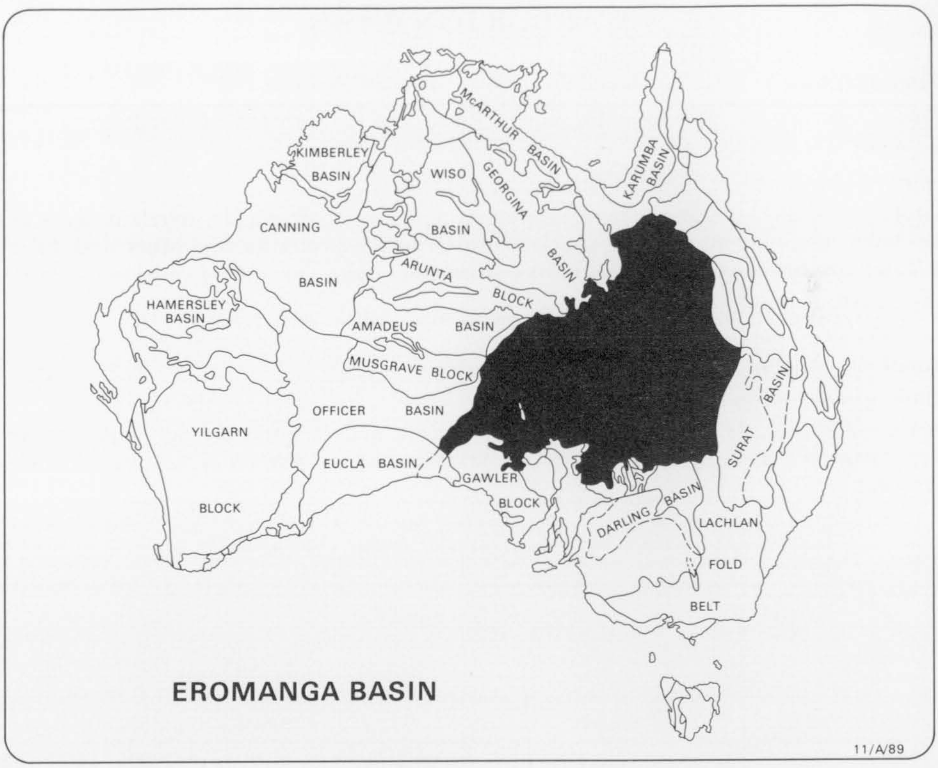
Igneous activity—None.

Metamorphism—None.

Deformation—Moderately folded.

Economic geology—Some coal seams near top of sequence.

Reference—Youngs, B. C., 1976—Pedirka Basin. *In* Leslie, R. B., Evans, H. J., & Knight, C. L. (Editors)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 3. Petroleum. *The Australasian Institute of Mining and Metallurgy, Monograph Series* No. 7.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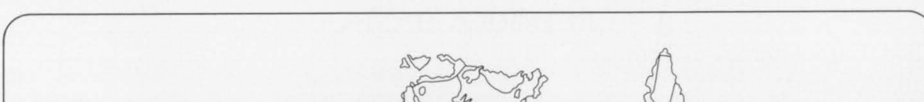
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DARLING BASIN
LACHLAN FOLD BELT
COOPER BASIN
11/A/90

EROMANGA BASIN

Age—Jurassic to Cretaceous.

Size—1 200 000 km^2.

Margins—Proterozoic Arunta and Musgrave Blocks, Proterozoic-Palaeozoic Amadeus and Officer Basins and Palaeozoic Pedirka Basin to west; Archaean-Proterozoic Gawler Block, Proterozoic Broken Hill Block and Adelaide Fold Belt, Proterozoic-Palaeozoic Stuart Shelf, Palaeozoic Arrowie and Darling Basins, and Palaeozoic Kanmantoo and Lachlan Fold Belts to south; Lachlan Fold Belt, Palaeozoic-Mesozoic Galilee Basin, and Mesozoic Surat Basin to east; Proterozoic Mount Isa Block, Proterozoic-Palaeozoic Georgetown Block, and Mesozoic Carpentaria Basin to north.

Physiography—Undulating clay plains; sand plains with low mesas; flood plains; dune fields; some stony plains; salt lakes in west.

Elements—Continental and marine sediments; maximum thickness about 3500 m.

Stratigraphy—Jurassic fluvial, lacustrine, and deltaic sediments including coal; conformably overlain by Cretaceous fluvial, marginal, and shallow-marine sediments.

Igneous activity—None.

Metamorphism—None.

Deformation—Gentle warping; some faulting.

Economic geology—Thin coal seams; large oil shale deposits; important opal deposits.

Reference—Senior, B. R., Mond, A., & Harrison, P. L., 1978—Geology of the Eromanga Basin. *Bureau of Mineral Resources, Australia, Bulletin* 167.

COOPER BASIN

Age—Early Permian to Early Triassic.

Size—125 000 km^2.

Margins—Underlies Mesozoic Eromanga Basin.

Physiography—Not exposed.

Elements—Continental and possible marginal-marine sediments.

Stratigraphy—Early Permian continental glacial and fluviolglacial sediments overlain by Early and Late Permian fluvial sequence with coal seams; unconformably overlain by Early Triassic fluvial and lacustrine sediments.

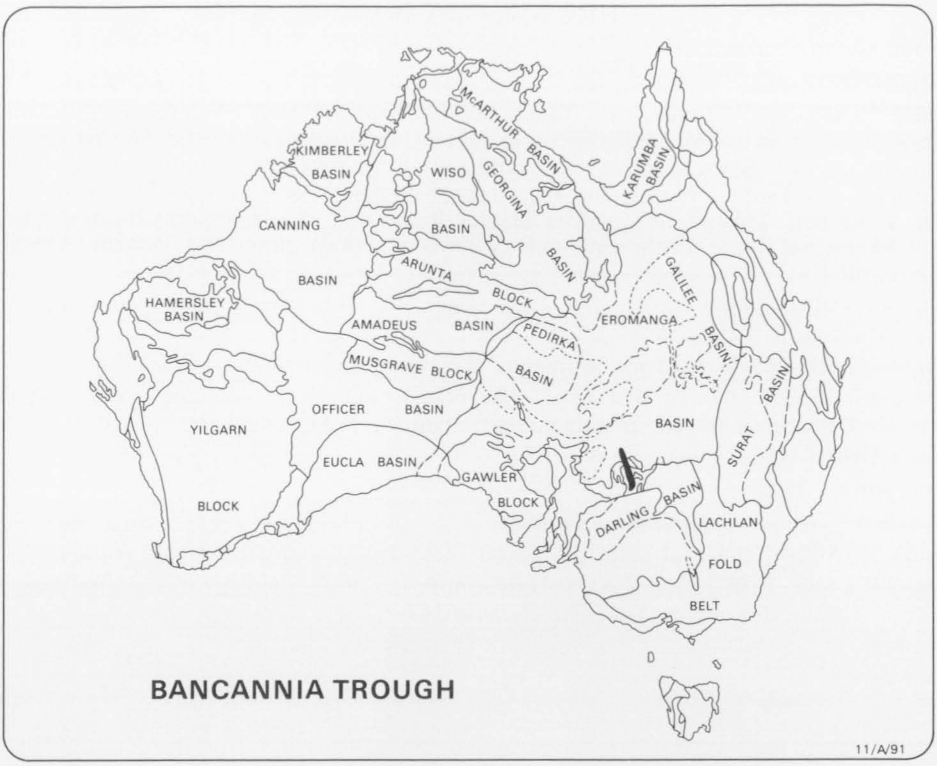
Igneous activity—None.

Metamorphism—None.

Deformation—Moderately folded; some faulting.

Economic geology—Major gas fields; subordinate oil; large, deeply buried coal deposits.

Reference—Battersby, D. G., 1976—Cooper Basin gas and oil fields. *In* Leslie, R. B., Evans, H. J., & Knight, C. L. (Editors). ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 3. Petroleum. *The Australasian Institute of Mining and Metallurgy, Monograph Series* No. 7.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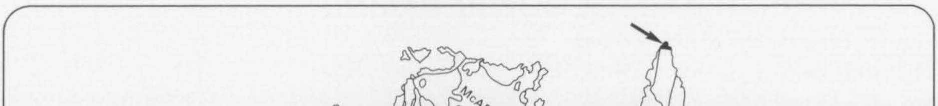
BANCANNIA TROUGH
11/A/91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LACHLAN FOLD BELT
CAPE YORK-ORIOMO INLIER
11/A/92

BANCANNIA TROUGH

Age—Cambrian to Devonian.

Size—10 000 km^2.

Margins—Palaeozoic Kanmantoo Fold Belt to east, west, and south; Mesozoic Eromanga Basin to north.

Physiography—Sand and alluvial plains.

Elements—Marine and continental sediments.

Stratigraphy—Basal marine Cambrian sediments unconformably overlain by marine Ordovician sediments; these unconformably overlain by continental Devonian sediments.

Igneous activity—None.

Metamorphism—None.

Deformation—Broad folding; some faulting.

Economic geology—No known deposits.

Reference—Bembrick, C. S., 1976a—Bancannia Trough. *In* Leslie, R. B., Evans, H. J., & Knight, C. L. (Editors)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 3. Petroleum. *The Australasian Institute of Mining and Metallurgy, Monograph Series* No. 7.

CAPE YORK-ORIOMO INLIER

Age—Carboniferous.

Size—5000 km^2.

Margins—Mesozoic Carpentaria Basin to south; extends offshore.

Physiography—High rocky islands; narrow undulating coastal plains; low dissected hills.

Elements—Acid intrusives and volcanics.

Stratigraphy—Sequence of acid ignimbrite units.

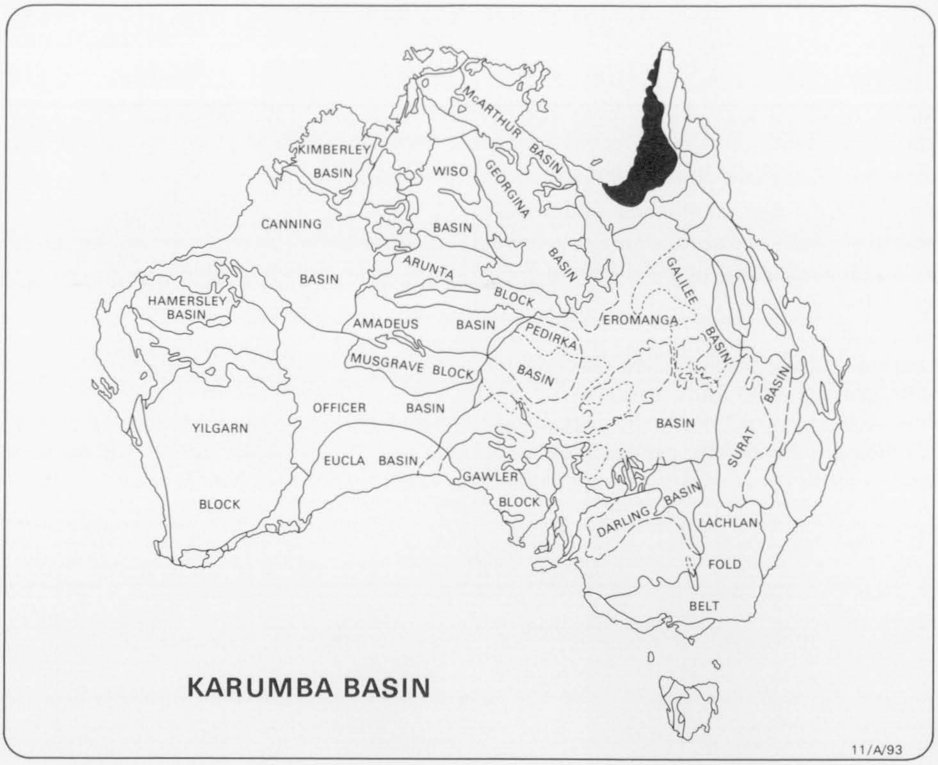
Igneous activity—Acid intrusives and volcanics.

Metamorphism—None.

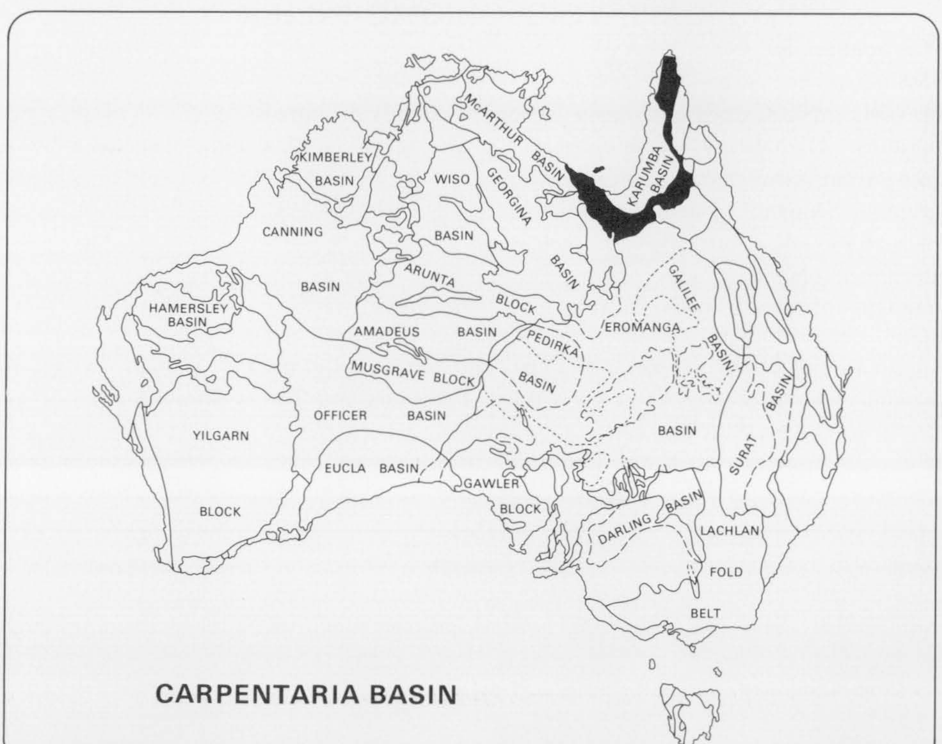
Deformation—Moderate block faulting.

Economic geology—Small deposits of tin and tungsten associated with granite.

Reference—Willmott, W. F., Whitaker, W. G., Palfreyman, W. D., & Trail, D. S., 1973—Igneous and metamorphic rocks of Cape York Peninsula and Torres Strait. *Bureau of Mineral Resources, Australia, Bulletin* 135.



KARUMBA BASIN



CARPENTARIA BASIN

KARUMBA BASIN

Age—Late Cretaceous to Holocene.

Size—100 000 km^2.

Margins—Mesozoic Carpentaria Basin to south and east; extends offshore.

Physiography—Low sandy plateaus; undulating clay plains; sandy littoral, fluvial and deltaic plains; dissected uplands and tablelands.

Elements—Continental sediments; minor marine sediments in south; maximum thickness about 300 m.

Stratigraphy—Basal Early Paleocene fluvial sediments unconformably overlain by Miocene fluvial and shallow-marine sediments; these unconformably overlain by Pliocene fluvial and lacustrine, and Pleistocene to Holocene fluvial, sediments.

Igneous activity—None.

Metamorphism—None.

Deformation—Local faulting.

Economic geology—Extensive bauxite deposits.

Reference—Doutch, H. F., 1976—The Karumba Basin, northeastern Australia and southern New Guinea. *BMR Journal of Australian Geology & Geophysics*, 1, 131-140.

CARPENTARIA BASIN

Age—Early Jurassic to Early Cretaceous.

Size—125 000 km^2.

Margins—Proterozoic McArthur Basin and Mount Isa Block to west; Mesozoic Eromanga Basin to south; Proterozoic-Palaeozoic Georgetown, Yambo, and Coen Blocks to east; Cainozoic Karumba Basin and Palaeozoic Cape York-Oriomo Inlier to north; extends offshore.

Physiography—Sandy plains; silt and clay flood plains; dissected tablelands.

Elements—Continental and marine sediments; maximum thickness about 1500 m.

Stratigraphy—Early to Late Jurassic sandy continental sediments overlain conformably by Early to mid-Cretaceous shallow-marine clayey and minor sandy and calcareous sediments.

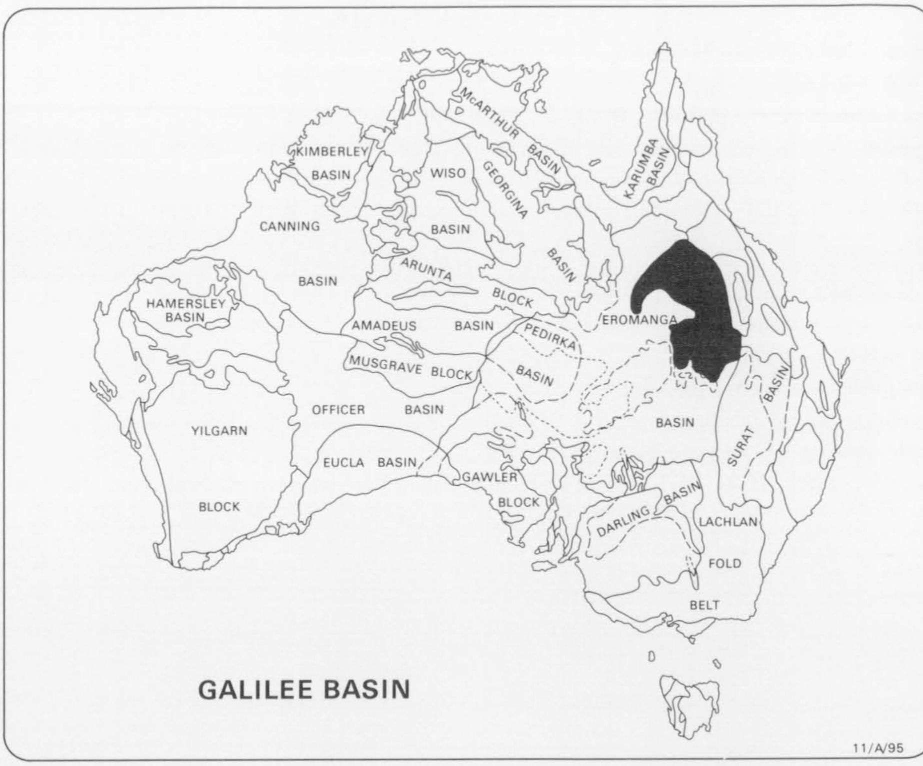
Igneous activity—None.

Metamorphism—None.

Deformation—Mild titling, sagging, and faulting.

Economic geology—Oil shale; minor coal and hydrocarbons.

Reference—Smart, J., Grimes, K. G., Doutch, H. F., & Pinchin, J., 1980—The Carpentaria and Karumba Basins, north Queensland. *Bureau of Mineral Resources, Australia, Bulletin* 202.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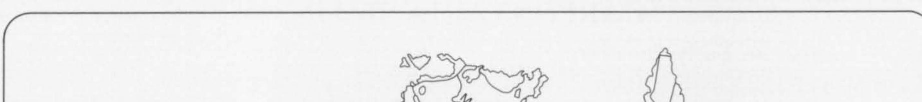
GALILEE BASIN
11/A/95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DARLING BASIN
LACHLAN FOLD BELT
ADAVALE BASIN
11/A/96

GALILEE BASIN

Age—Carboniferous to Triassic.

Size—200 000 km^2.

Margins—Mesozoic Eromanga Basin to west and south; Palaeozoic Drummond Basin to east; Palaeozoic Lachlan Fold Belt to north.

Physiography—Low dissected tablelands; alluvial plains.

Elements—Continental sediments; maximum thickness about 3000 m.

Stratigraphy—Late Carboniferous to Triassic fluvial and lacustrine sediments including coal.

Igneous activity—None.

Metamorphism—None.

Deformation—Gentle folding.

Economic geology—Thick seams of coal; minor oil and gas shows.

Reference—Evans, P. R., 1980—Geology of the Galilee Basin. *In* Henderson, R. A., & Stephenson, P. J. (Editors)—THE GEOLOGY AND GEOPHYSICS OF NORTHEASTERN AUSTRALIA. *Geological Society of Australia, Queensland Division, Brisbane.*

ADAVALE BASIN

Age—Early to Late Devonian.

Size—60 000 km^2.

Margins—Overlain by the Mesozoic Eromanga Basin.

Physiography—Not exposed.

Elements—Marine and continental sediments; volcanics.

Stratigraphy—Basal acid volcanics and minor derived sediments; conformably overlain by shallow-marine and thin continental sediments; unconformably overlain by continental, evaporitic, and shallow-marine sediments.

Igneous activity—Thick sequence of acid volcanics at base of sequence.

Metamorphism—None.

Deformation—Moderate folding; strongly block faulted.

Economic geology—Small gas field.

Reference—Auchincloss, G,. 1976—Adavale Basin. *In* Leslie, R. B., Evans, H. J., & Knight, C. L. (Editors)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 3. Petroleum. *The Australasian Institute of Mining and Metallurgy, Monograph Series* No. 7.

DARLING BASIN

11/A/97

MURRAY BASIN

11/A/98

DARLING BASIN

Age—Devonian to Carboniferous.

Size—160 000 km^2.

Margins—Palaeozoic Kanmantoo Fold Belt to west; Cainozoic Murray Basin to south; Palaeozoic Lachlan Fold Belt to east; Mesozoic Eromanga Basin to north.

Physiography—Sand plains with low ridges; some dune fields.

Elements—Marine and continental sediments; acid volcanics; maximum thickness about 8000 m.

Stratigraphy—Basal Early Devonian continental sediments and acid volcanics resting unconformably on unknown early Palaeozoic or Proterozoic basement; overlain unconformably by Early Devonian sediments ranging from continental in west to shallow-marine in east; unconformably overlain by Late Devonian to Early Carboniferous continental sediments.

Igneous activity—Basal acid volcanics.

Metamorphism—None.

Deformation—Broad open folds; well-developed fault system.

Economic geology—No known mineral deposits.

Reference—Bembrick, C. S., 1976b—Darling Depression. *In* Leslie R. B., Evans, H. J., & Knight, C. L. (Editors)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 3. Petroleum. *The Australasian Institute of Mining Metallurgy, Monograph Series* No. 7.

MURRAY BASIN

Age—Palaeocene to Pleistocene.

Size—320 000 km^2.

Margins—Proterozoic Adelaide Fold Belt and Palaeozoic Kanmantoo Fold Belt to west; Palaeozoic Lachlan Fold Belt and Mesozoic-Cainozoic Otway Basin to south; Palaeozoic Darling Basin and Lachlan Fold Belt to east; Proterozoic Broken Hill Block and Palaeozoic Kanmantoo Fold Belt and Darling Basin to north; extends offshore.

Physiography—Sand plains, dune fields, and salt lakes in west; alluvial plains in east.

Elements—Continental and marine sediments; maximum thickness about 600 m.

Stratigraphy—Cainozoic fluvial sands overlain by fluvial and marginal marine sediments with lignite; disconformably overlain by middle Cainozoic shallow-marine carbonates in west and fluvial sediments in east; disconformably overlain by late Cainozoic shallow and marginal marine sediments in west and fluvial sediments in east.

Igneous activity—None.

Metamorphism—None.

Deformation—None.

Economic geology—Minor brown coal and traces of hydrocarbons.

Reference—Thornton, R. C. N., 1976—Murray Basin and associated intrabasins. *In* Leslie, R. B., Evans, H. J., & Knight, C. L. (Editors)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 3. Petroleum. *The Australian Institute of Mining and Metallurgy, Monograph Series* No. 7.

OTWAY BASIN

11/A/99

OAKLANDS BASIN

11/A/100

OTWAY BASIN

Age—Late Jurassic to Tertiary.

Size—35 000 km^2.

Margins—Palaeozoic Lachlan Fold Belt and Cainozoic Murray Basin to north; extends offshore.

Physiography—Dissected uplands; coastal plain overlain by calcareous dunes in west.

Elements—Continental and marine sediments; basic volcanics; maximum thickness about 11 000 m.

Stratigraphy—Basal Jurassic deltaic and fluvial sediments with minor basic volcanics; unconformably overlain by similar sediments with coal of Early Cretaceous age; these unconformably overlain by fluvial, deltaic, and shallow-marine sediments of Late Miocene age.

Igneous activity—Some basal basic volcanics and intrusives.

Metamorphism—None.

Deformation—Gentle folding; extensive block faulting.

Economic geology—Minor coal and hydrocarbon deposits.

Reference—Abele, C., Kenley, P. R., Holgate, G., & Ripper, D., 1976—Otway Basin. *In* Douglas, J. G., & Ferguson, J. A. (Editors)—Geology of Victoria. *Geological Society of Australia, Special Publication* No. 5.

OAKLANDS BASIN

Age—Permian.

Size—1500 km^2.

Margins—Cainozoic Murray Basin to north; Palaeozoic Lachlan Fold Belt to west, south, and east.

Physiography—Flat-lying alluvial and sand plain.

Elements—Continental sediments.

Stratigraphy—Thin sequence of continental claystone with sandy horizons; coal seam near top of sequence.

Igneous activity—None.

Metamorphism—None.

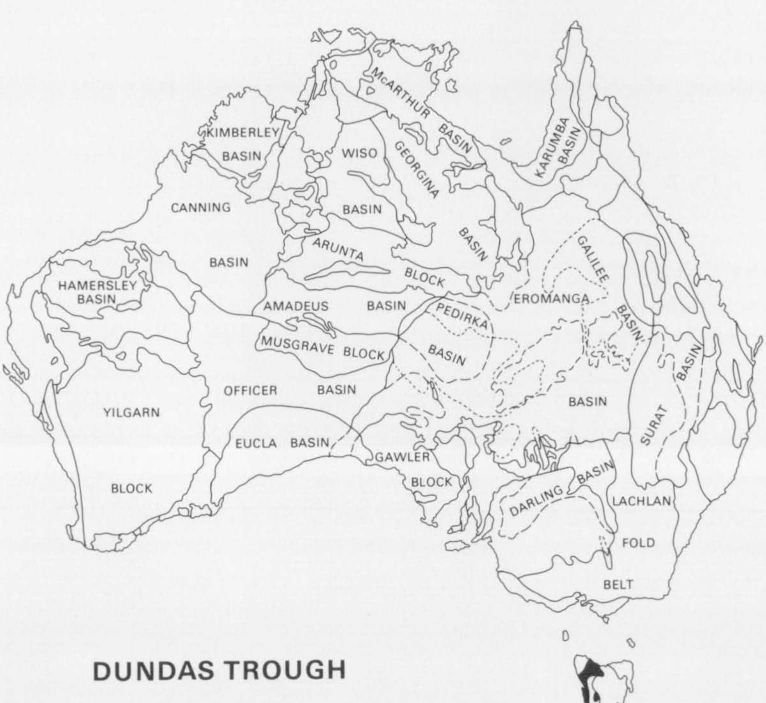
Deformation—Little deformed.

Economic geology—Moderate deposits of coal.

Reference—Driver, R. C., 1975—Oaklands-Coorabin coalfield, New South Wales. *In* Traves, D. M., & King, D. (Editors)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 2. Coal. *The Australasian Institute of Mining and Metallurgy, Monograph Series* No. 6.

GIPPSLAND BASIN

11/A/101



DUNDAS TROUGH

11/A/102

GIPPSLAND BASIN

Age—Late Jurassic to Tertiary.

Size—9000 km^2.

Margins—Palaeozoic Lachlan Fold Belt to north and south; extends offshore.

Physiography—Dissected uplands; terraced coastal plains.

Elements—Continental and marine sediments; maximum thickness about 12 000 m.

Stratigraphy—Late Jurassic to Early Cretaceous fluvial and deltaic sediments unconformably overlain by Late Cretaceous to Eocene fluvial and deltaic sediments including lignite and coal; these unconformably overlain by Oligocene to Pliocene marine sediments.

Igneous activity—Minor basic volcanics.

Metamorphism—None.

Deformation—Mild folding and block faulting.

Economic geology—Large deposits of brown coal, oil, and gas (important hydrocarbon deposits mostly offshore).

Reference—Hocking, J. B., 1976—Gippsland Basin. *In* Douglas, J. G., & Ferguson, J. A. (Editors)—Geology of Victoria. *Geological Society of Australia, Special Publication* No. 5.

DUNDAS TROUGH

Age—Cambrian to Devonian.

Size—20 000 km^2.

Margins—Proterozoic Rocky Cape Block to west; Rocky Cape Block, Proterozoic Tyenna Block, and Palaeozoic-Mesozoic Tasmania Basin to east; extends offshore.

Physiography—Ridge and valley complex.

Elements—Continental and marine sediments; ultrabasic to acid intrusives; basic and intermediate lavas.

Stratigraphy—Basal Cambrian marine sequence and associated acid volcanics; unconformably overlain by Early Ordovician continental sediments and Early Ordovician-Early Devonian marine sediments including carbonates.

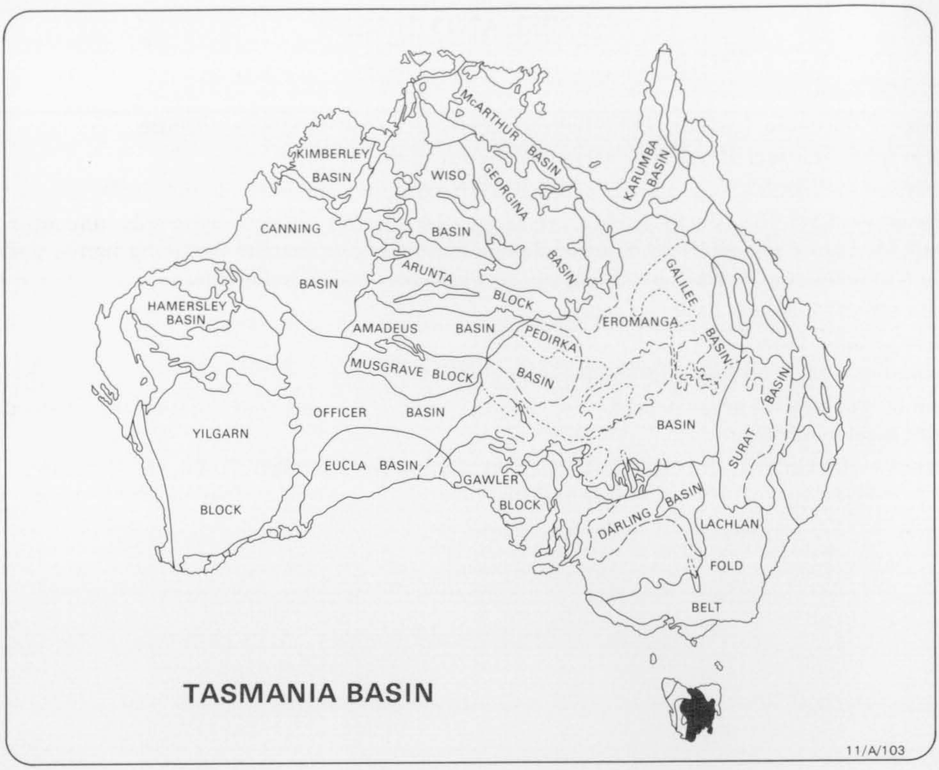
Igneous activity—Early Cambrian ultrabasic and basic intrusives; Late Cambrian acid and intermediate volcanics and intrusives.

Metamorphism—Low-grade.

Deformation—Moderate to strong folding and faulting.

Economic geology—Tin and tungsten deposits in veins or bands within granite or metasomatised country rock or as massive sulphide bodies containing tin only; silver, lead, zinc, and copper deposits as fissures or lodes in shale and tuff.

Reference—Williams, E., Solomon, M., & Green, G. R., 1975—The geological setting of metalliferous ore deposits in Tasmania. *In* Knight, C. L. (Editor)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 1. Metals. *The Australian Institute of Mining and Metallurgy, Monograph Series* No. 5.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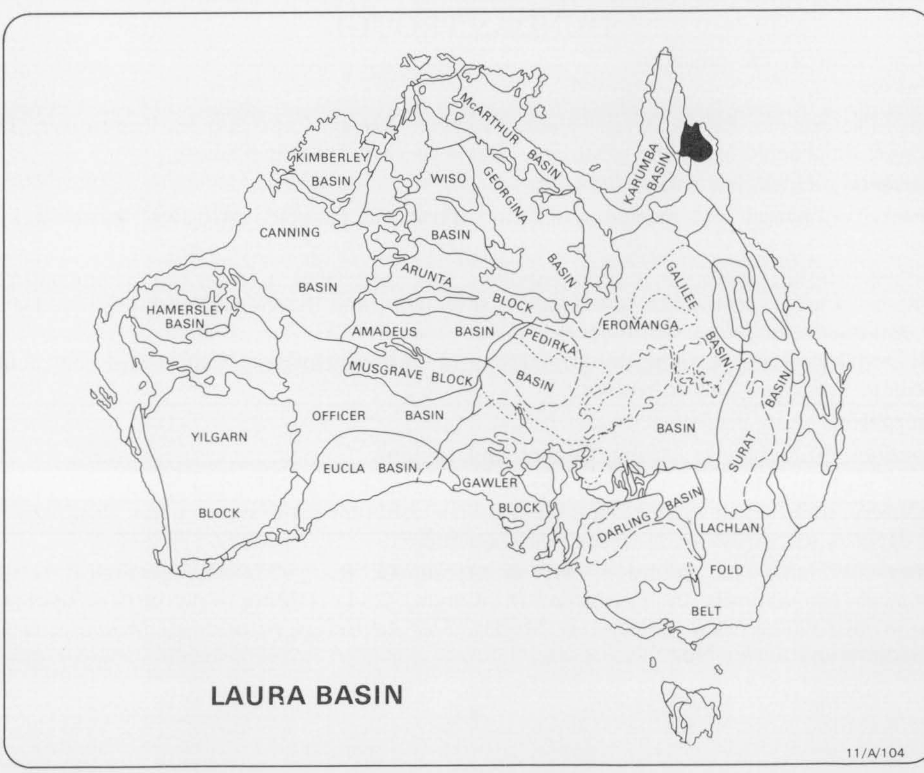
11/A/103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GAWLER BLOCK
DARLING BASIN
LACHLAN FOLD BELT
LAURA BASIN
11/A/104

TASMANIA BASIN

Age—Permian to Triassic.

Size—35 000 km^2.

Margins—Proterozoic Tyenna Block and Palaeozoic Dundas Trough to west; Palaeozoic Lachlan Fold Belt to northeast; extends offshore.

Physiography—High plateaus and ranges; fault-bounded lowlands.

Elements—Continental and marine sediments; maximum thickness about 1500 m.

Stratigraphy—Basal Early Permian glacial sediments overlain unconformably by alternating shallow-marine, deltaic (with coal), and again shallow-marine sediments deposited through the Permian; followed by Triassic lacustrine and fluvial sediments.

Igneous activity—Sequence extensively intruded by Jurassic dolerite.

Metamorphism—None.

Deformation—Block faulting; minor folding.

Economic geology—Small coal deposits.

Reference—Clarke, M. J., Farmer, N., & Gulline, A. B., 1976—Tasmania Basin-Parmeener Supergroup. *In* Leslie, R. B., Evans, H. J., & Knight, C. L. (Editors)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 3. Petroleum. *The Australasian Intstitute of Mining and Metallurgy, Monograph Series* No. 7.

LAURA BASIN

Age—Jurassic to Early Cretaceous.

Size—15 000 km^2.

Margins—Proterozoic-Palaeozoic Coen Block towest; Proterozoic-Palaeozoic Yambo Block and Palaeozoic Hodgkinson Fold Belt to south; Hodgkinson Fold Belt to east; extends offshore.

Physiography—Deeply dissected plateaus; alluvial and littoral plains.

Elements—Continental and marine sediments; maximum thickness about 1500 m.

Stratigraphy—Continental Jurassic sediments with coal, overlain conformably by Early Cretaceous deltaic and shallow-marine sediments.

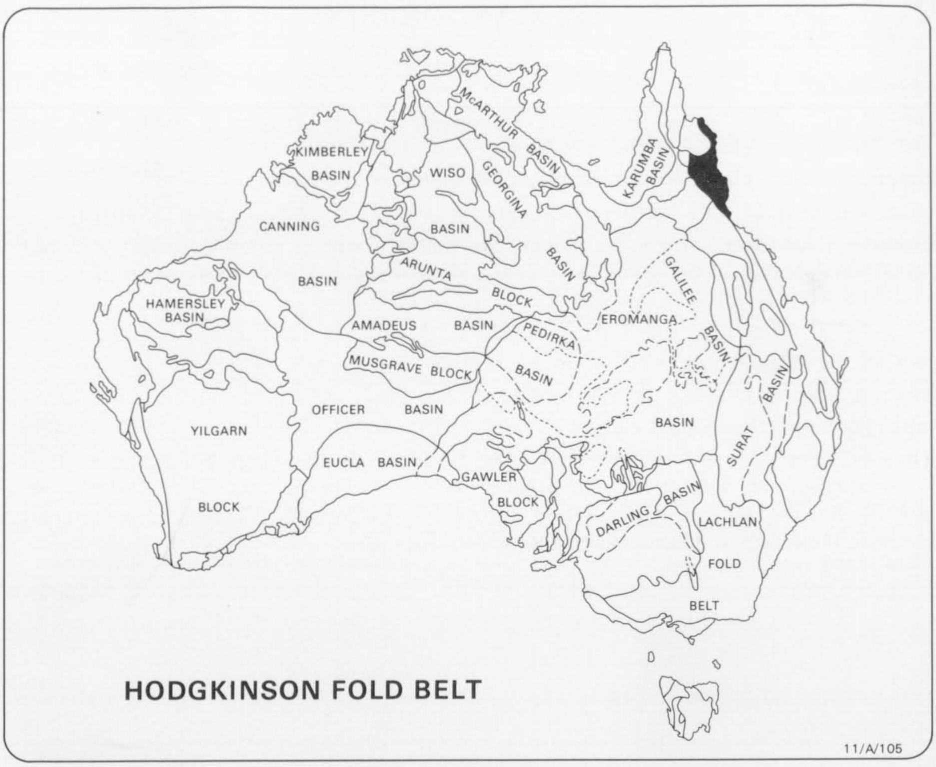
Igneous activity—None.

Metamorphism—None.

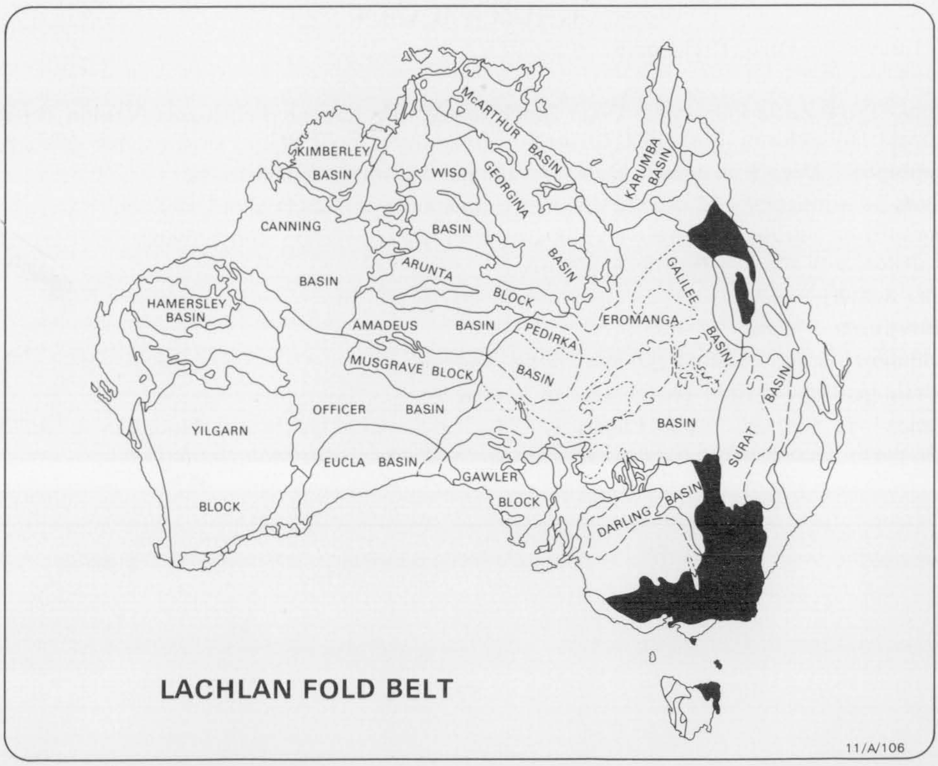
Deformation—Some faulting, mainly along margins.

Economic geology—Minor coal; traces of hydrocarbon.

Reference—de Keyser, F., & Lucas, K. G., 1968—Geology of the Hodgkinson and Laura Basins, north Queensland. *Bureau of Mineral Resources, Australia, Bulletin* 84.



HODGKINSON FOLD BELT



LACHLAN FOLD BELT

HODGKINSON FOLD BELT

Age—Late Silurian to Late Devonian.

Size—50 000 km^2.

Margins—Proterozoic-Palaeozoic Yambo and Georgetown Blocks and Mesozoic Carpentaria Basin to west; Palaeozoic Lachlan Fold Belt to south; Mesozoic Laura Basin to north; extends offshore.

Physiography—Dissected hilly uplands; plateaus; coastal ranges.

Elements—Marine sediments; minor basic volcanics.

Stratigraphy—Late Silurian to Early Devonian shelf sediments including carbonates; overlain by trough-type sediments and minor basic volcanics of Middle to Late Devonian age.

Igneous activity—Minor basic volcanics; widespread acid intrusives in Late Carboniferous and Early Permian.

Metamorphism—Low to high-grade in east; very low-grade regional metamorphism elsewhere.

Deformation—Moderate to strongly developed folding; most intense in east; major faulting in west.

Economic geology—Tin and tungsten in pegmatites in, and adjacent to, granite; gold in reefs in sheared sediments and volcanics, and basal conglomerate; copper, lead, and zinc in sheared sediments.

Reference—Arnold, G. O., & Fawckner, J. F., 1980—The Broken River and Hodgkinson provinces. *In* Henderson, R. A., & Stephenson, P. J. (Editors)—THE GEOLOGY AND GEOPHYSICS OF NORTHEASTERN AUSTRALIA. *Geological Society of Australia, Queensland Division, Brisbane.*

LACHLAN FOLD BELT

Age—Cambrian to Early Carboniferous.

Size—375 000 km^2.

Margins—Palaeozoic Darling Basin and Cainozoic Murray Basin to west; Mesozoic-Cainozoic Otway and Gippsland Basins to south; Palaeozoic-Mesozoic Sydney Basin to east; Mesozoic Eromanga Basin to north; extends offshore.

Physiography—Tablelands stepping down to west; upland plains; high upland and hill chains; dissected high plateaus.

Elements—Marine and continental sediments; acid to basic volcanics and intrusives; minor ultrabasic intrusives.

Stratigraphy—Complex of deep-marine sediments with basic volcanics; trough-type sediments and associated acid to basic volcanics; also shelf and continental sediments; sedimentation extended from Cambrian to Middle Devonian with major breaks at the close of the Ordovician and Silurian, and in the Middle Devonian.

Igneous activity—A number of phases of acid and lesser intermediate to basic intrusives of Ordovician to Carboniferous age; widespread acid to basic volcanism; minor ultrabasic intrusions.

Metamorphism—Mostly low-grade; isolated areas of moderate to high-grade.

Deformation—Moderately to strongly deformed in several periods of tectonism.

Economic geology—Gold as reefs or veins in shale, granite, or volcanics; copper, lead, and zinc deposits associated with andesite or andesitic tuff, acid volcanics or shale, chert, and limestone; tin in lodes and greisens within granite and in sediments adjacent to granite intrusions; minor metals include tungsten and molybdenum; minor gemstones.

Reference—Murray, C. G., 1975—The Tasman Geosyncline in Queensland—regional geology. *In* Knight, C. L. (Editor)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 1. Metals. *The Australasian Institute of Mining and Metallurgy, Monograph Series* No. 5.

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Spencer-Jones, D., & Vandenberg, A. H. M., 1975—The Tasman Geosyncline in Victoria—regional geology. *In* Knight, C. L. (Editor)— ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 1. Metals. *The Australasian Institute of Mining and Metallurgy, Monograph Series* No. 5.


McARTHUR BASIN
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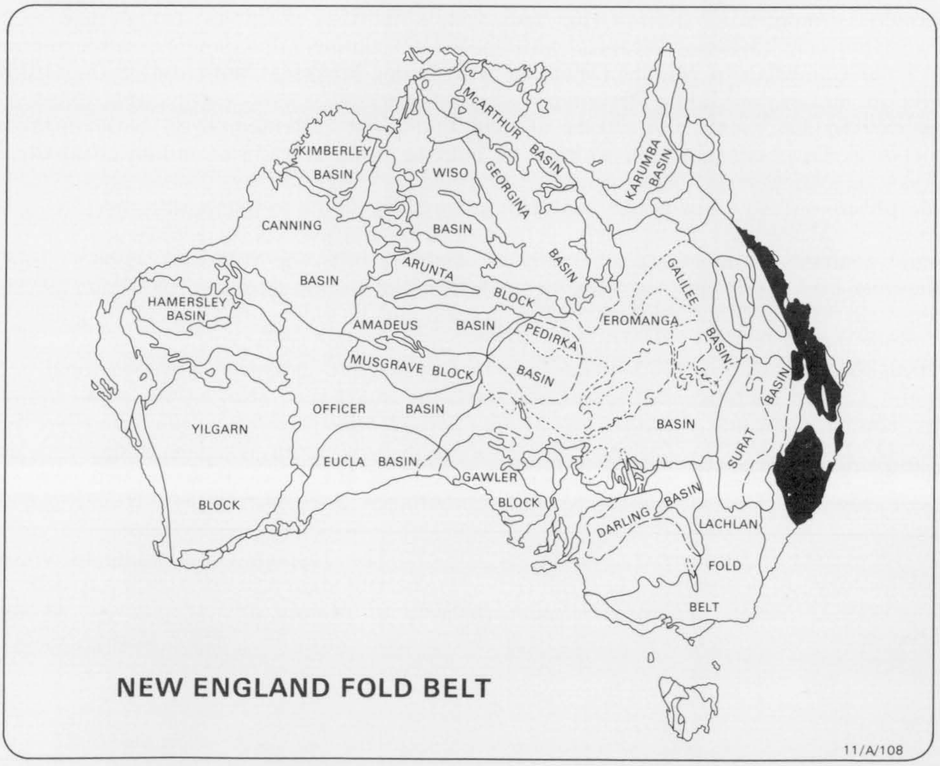
DRUMMOND BASIN
11/A/107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DARLING BASIN
LACHLAN FOLD BELT
NEW ENGLAND FOLD BELT
11/A/108

DRUMMOND BASIN

Age—Devonian to Carboniferous.

Size—50 000 km^2.

Margins—Palaeozoic-Mesozoic Galilee Basin to west and south; Palaeozoic-Mesozoic Bowen Basin to east; Palaeozoic Lachlan Fold Belt to north.

Physiography—Rugged hills; low rounded hills; dissected rocky plains.

Elements—Marine and continental sediments; minor volcanics; maximum thickness about 13 000 m.

Stratigraphy—Basal Late Devonian shallow-marine sediments including minor tuff beds; overlain unconformably by Early Carboniferous fluvial and lacustrine sediments and acid volcanics.

Igneous activity—Acid volcanics, thickest in east.

Metamorphism—None.

Deformation—Gentle folding becoming more intense adjacent to Lachlan Fold Belt inlier.

Economic geology—Gold in sheared andesite.

Reference—Olgers, F., 1972—Geology of the Drummond Basin, Queensland. *Bureau of Mineral Resources, Australia, Bulletin* 132.

NEW ENGLAND FOLD BELT

Age—Silurian to Triassic.

Size—220 000 km^2.

Margins—Palaeozoic-Mesozoic Sydney and Bowen Basins and Mesozoic Clarence-Moreton and Surat Basins to west; Sydney Basin to south; Mesozoic Maryborough Basin to east; extends offshore.

Physiography—Undulating, dissected plateaus; narrow plains.

Elements—Continental and marine sediments; acid to basic volcanics and intrusives; minor ultrabasic intrusives.

Stratigraphy—Shelf and trough sedimentation with episodes of volcanism and continental sedimentation from Late Silurian to Middle Triassic in age; major breaks in the Middle Devonian, early mid-Carboniferous, Middle to Late Permian, and Early Triassic.

Igneous activity—Widespread basic-acid volcanism and intrusions; minor ultrabasic intrusions.

Metamorphism—Very low-grade to high-garde.

Deformation—Moderate to strongly folded and faulted.

Economic geology—Gold as veins in shale or associated with volcanics or granite; copper, lead, and zinc deposits associated with intermediate or acid volcanics; tin and tungsten as veins in sediments associated with granite intrusions; porphyry copper-molybdenum deposits in granodiorite; sapphires in gravels associated with overlying Tertiary basalt.

Reference—Flood, P. G., & Runnegar, B., (Editors), 1982—NEW ENGLAND GEOLOGY. *University of New England, Armidale.* Murray, C. G., 1975—The Tasman Geosyncline in Queensland—regional geology. *In* Knight, C. L. (Editor)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 1. Metals. *The Australasian Institute of Mining and Metallurgy, Monograph Series* No. 5.

HILLSBOROUGH BASIN

11/A/109

STYX BASIN

11/A/110

HILLSBOROUGH BASIN

Age—Tertiary.

Size—250 km^2.

Margins—Palaeozoic-Mesozoic New England Fold Belt to west and south; extends offshore.

Physiography—Alluvial plain; coastal dunes.

Elements—Continental sediments; volcanics.

Stratigraphy—Sequence of continental sediments including thin oil shale.

Igneous activity—Basal volcanics and volcanic breccia.

Metamorphism—None.

Deformation—Faulting and some tilting.

Economic geology—Major oil shale deposits.

Reference—Gray, A. R. G., 1976—Hillsborough Basin. *In* Leslie, R. B., Evans, H. J., & Knight, C. L. (Editors)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 3. Petroleum. *The Australasian Institute of Mining and Metallurgy, Monograph Series* No. 7.

STYX BASIN

Age—Early Cretaceous.

Size—500 km^2.

Margins—Palaeozoic-Mesozoic New England Fold Belt to west and south; extends offshore.

Physiography—Alluvial plains; coastal swamps; some low ranges.

Elements—Continental sediments.

Stratigraphy—Thin sequence of continental sediments including coal.

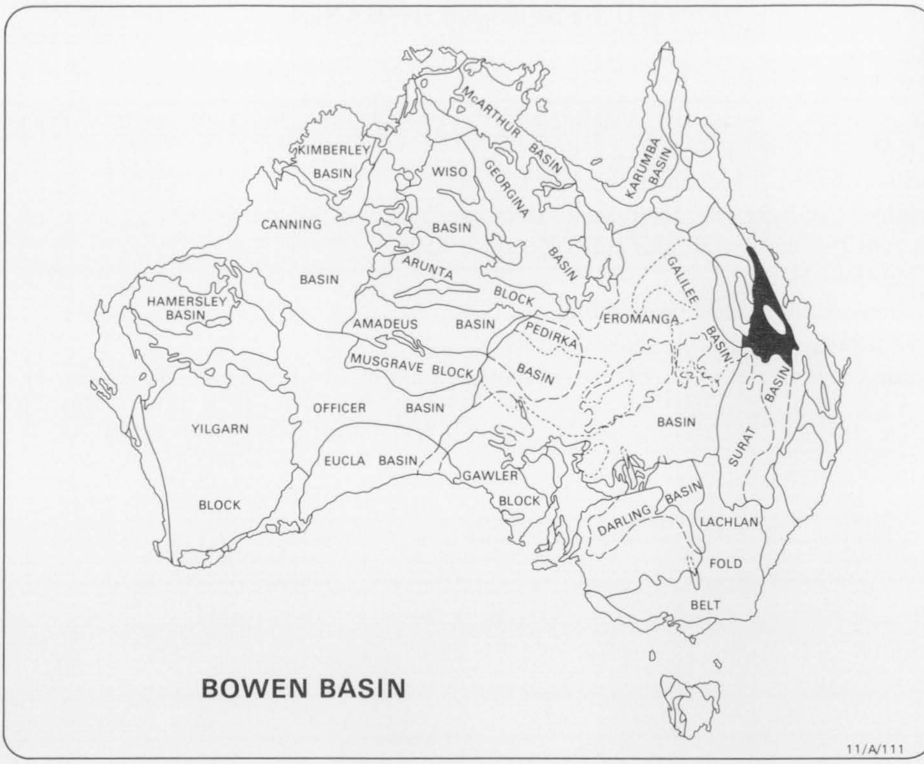
Igneous activity—None.

Metamorphism—None.

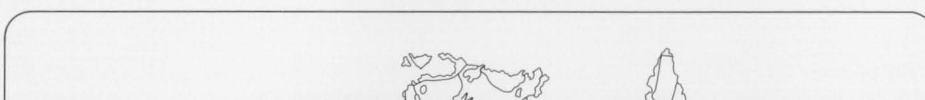
Deformation—Mildly folded and faulted.

Economic geology—Economic coal seams.

Reference—Benstead, W. L., 1976a—Styx Basin. *In* Leslie, R. B., Evans, J. H., & Knight, C. L. (Editors)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 3. Petroleum. *The Australasian Institute of Mining and Metallurgy, Monograph Series* No. 7.



BOWEN BASIN



DUARINGA BASIN

BOWEN BASIN

Age—Permian to Triassic.

Size—160 000 km^2.

Margins—Palaeozoic Drummond Basin to west; Mesozoic Surat Basin to south; Palaeozoic-Mesozoic New England Fold Belt to east; Palaeozoic Lachlan Fold Belt to north.

Physiography—Rugged plateaus and ridges; lowlands; flood plains.

Elements—Marine and continental sediments; volcanics; intrusives; maximum thickness about 11 500 m.

Stratigraphy—Permian deltaic and shallow-marine sediments, including coal, and basic and intermediate volcanics; overlain by Triassic continental sediments.

Igneous activity—Basal volcanics and Permian and Cretaceous ultrabasic and acid intrusives; overlain in part by Tertiary basalt.

Metamorphism—None.

Deformation—Open to tight folding; moderate faulting.

Economic geology—Large coal deposits; some natural gas.

Reference—Dickins, J. M., & Malone, E. J., 1973—Geology of the Bowen Basin, Queensland. *Bureau of Mineral Resources, Australia, Bulletin* 130.

DUARINGA BASIN

Age—Tertiary.

Size—8000 km^2.

Margins—Surrounded by Palaeozoic-Mesozoic Bowen Basin.

Physiography—Low dissected tablelands; alluvial plains.

Elements—Continental sediments; maximum thickness about 1000 m.

Stratigraphy—Sequence of continental sediments including oil shale.

Igneous activity—None.

Metamorphism—None.

Deformation—None.

Economic geology—Large oil shale deposits.

Reference—Grimes, K. G., 1980—The Tertiary geology of north Queensland. *In* Henderson, R. A., & Stephenson, P. J. (Editors)—THE GEOLOGY AND GEOPHYSICS OF NORTHEASTERN QUEENSLAND. *Geological Society of Australia, Queensland Division, Brisbane.*

SURAT BASIN

11/A/113

CLARENCE-MORETON BASIN

11/A/114

SURAT BASIN

Age—Jurassic to Cretaceous.

Size—300 000 km^2.

Margins—Palaeozoic Lachlan Fold Belt and Mesozoic Eromanga Basin to west; Lachlan Fold Belt and Palaeozoic-Mesozoic Sydney Basin to south; Palaeozoic-Mesozoic New England Fold Belt and Mesozoic Clarence-Moreton Basin to east; New England Fold Belt and Palaeozoic-Mesozoic Bowen Basin to north.

Physiography—Low tablelands; undulating clay plains; sand plains.

Elements—Continental and marine sediments; maximum thickness about 2500 m.

Stratigraphy—Basal Jurassic fluvial and lucastrine sediments overlain conformably by Cretaceous fluvial and shallow-marine sediments.

Igneous activity—None.

Metamorphism—None.

Deformation—Moderate folding and faulting.

Economic geology—Hydrocarbons occur in economic amounts throughout the basin; some coal.

Reference—Exon, N. F., 1976—Geology of the Surat Basin in Queensland. *Bureau of Mineral Resources, Australia, Bulletin* 166.

CLARENCE-MORETON BASIN

Age—Late Triassic to Early Cretaceous.

Size—40 000 km^2.

Margins—Mesozoic Surat Basin to west; Palaeozoic-Mesozoic New England Fold Belt to south, north, and east; extends offshore.

Physiography—Lowlands; littoral and alluvial plains.

Elements—Continental and deltaic sediments; basic volcanics and intrusives; maximum thickness about 3000 m.

Stratigraphy—Late Triassic fluvial sequence with coal and andesitic tuff; overlain conformably by Early Jurassic fluvial and lacustrine sediments; Middle to Late Jurassic lacustrine and paludal sediments with coal; Late Jurassic to Early Cretaceous fluvial and lacustrine sandstones.

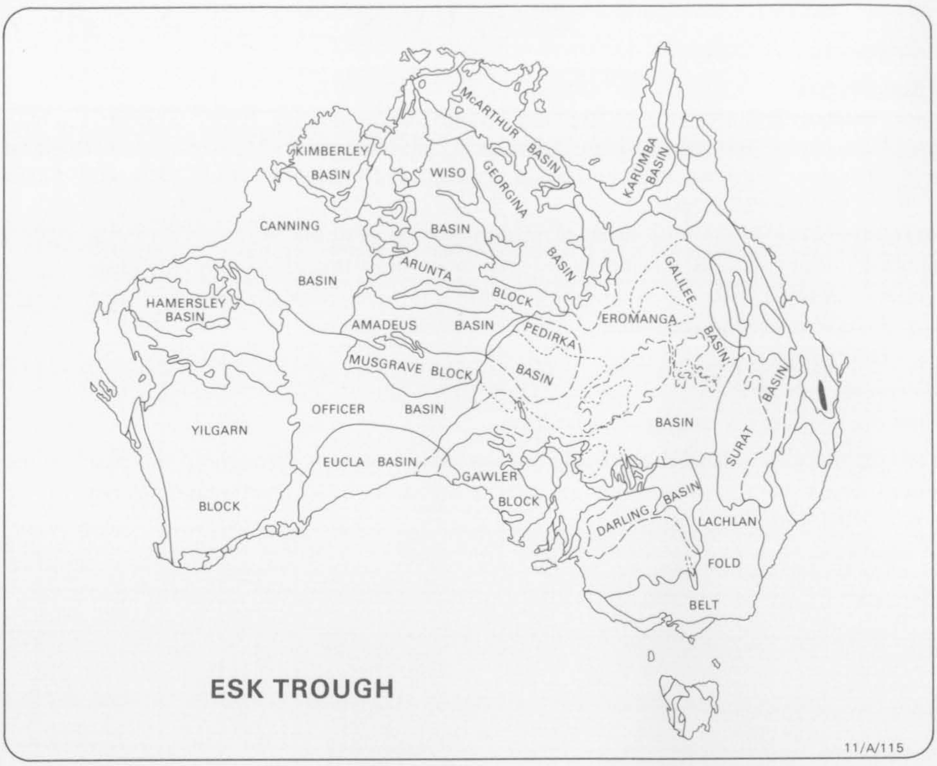
Igneous activity—Basal basalt flows and andesitic tuff beds; extensively intruded by Tertiary basic sills and dykes and overlain by Tertiary basalt.

Metamorphism—None.

Deformation—Gentle folding and doming in places; more intense folding where basement faults reactivated.

Economic geology—Important coal and minor hydrocarbon deposits.

Reference—Benstead, W. L., 1976b—Clarence-Moreton Basin. *In* Leslie, R. B., Evans, H. J., & Knight, C. L. (Editors)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 3. Petroleum. *The Australasian Institute of Mining and Metallurgy, Monograph Series* No. 7.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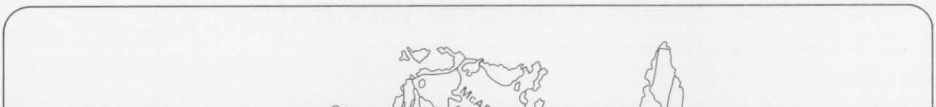
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LACHLAN FOLD BELT
MARYBOROUGH BASIN
11/A/117

ESK TROUGH

Age—Triassic.

Size—5000 km^2.

Margins—Bounded on all sides by the Palaeozoic-Mesozoic New England Fold Belt.

Physiography—Dissected plateau; strike ridges; alluvial plains.

Elements—Continental sediments; lavas.

Stratigraphy—Basal Middle Triassic continental sediments conformably overlain by lavas and derived sediments; these conformably overlain by continental sediments.

Igneous activity—Interbedded andesitic lavas; intruded by intermediate and basic dykes and plugs.

Metamorphism—None.

Deformation—Strongly folded and faulted.

Economic geology—No known deposits.

Reference—Cranfield, L. C., & Schwarzbock, H., 1976—Esk Trough. *In* Leslie, R. B., Evans, H. J., & Knight, C. L. (Editors)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 3. Petroleum. *The Australasian Institute of Mining and Metallurgy, Monograph Series* No. 7.

MARYBOROUGH BASIN

Age—Jurassic to Cretaceous.

Size—10 000 km^2.

Margins—Palaeozoic-Mesozoic New England Fold Belt to west; extends offshore.

Physiography—Lowlands, partly dune covered in east.

Elements—Continental and marine sediments; volcanics; maximum thickness about 7500 m.

Stratigraphy—Basal Late Jurassic continental sediments with coal; unconformably overlain by Early Cretaceous volcanics and tuffaceous sediments; in turn, disconformably overlain by Early Cretaceous deltaic or shallow-marine sediments with coal.

Igneous activity—Andesitic and minor rhyolite flows at base of Cretaceous sequence.

Metamorphism—None.

Deformation—Strongly folded and faulted.

Economic geology—Thin coal seams and minor natural gas.

Reference—Ellis, P. L., 1976—Maryborough Basin. *In* Leslie, R. B., Evans, H. J., & Knight, C. L. (Editors)—ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA NEW GUINEA. 3. Petroleum. *The Australasian Institute of Mining and Metallurgy, Monograph Series* No. 7.

SYDNEY BASIN

SYDNEY BASIN

Age—Late Carboniferous to Middle Triassic.

Size—65 000 km^2.

Margins—Palaeozoic-Mesozoic New England Fold Belt to northeast; Palaeozoic Lachlan Fold Belt to southwest; Mesozoic Surat Basin to northwest; extends offshore.

Physiography—Deeply dissected plateaus; undulating low hills.

Elements—Continental and marine sediments; minor intrusive and volcanics; maximum thickness about 5000 m.

Stratigraphy—Late Carboniferous continental and shallow-marine sediments; Early Permian shelf sedimentation; mid-Permian uplift of New England Fold Belt and subsidence of the Sydney Basin resulted in deposition of thick sequence of continental sedimentation which continued until the Middle Triassic.

Igneous activity—Basal basic volcanism; intermediate to acid intrusives; minor post-depositional, mainly alkali, intrusives.

Metamorphism—None.

Deformation—Broad open folds and mainly minor faulting.

Economic geology—Large coal deposits; some natural gas.

Reference—Mayne, S. J., Nicholas, E., Bigg-Wither, A. L., Rasidi, J. S., & Raine, M. J. 1974—Geology of the Sydney Basin: a review. *Bureau of Mineral Resources, Australia, Bulletin* 149.

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APPENDIX: GEOLOGICAL MAPS OF AUSTRALIA

Early attempts at compiling geological maps of Australia have been summarised by Vaughan (1921), and David (1932, 1950). Darragh (1977) has revised the earlier lists and added details of more recently published maps.

The first geological map of Australia was published in 1850 by J. B. Jukes, the naturalist from HMS *Fly*. The map was at a scale of 225 miles to an inch (1:14 256 000) and was mostly blank, owing to the very limited knowledge at that time.

In 1875, R. B. Smyth of the Victorian Department of Mines published a map at a scale of 110 miles to the inch (1:6 969 000). A reprint, incorporating amendments, was published in 1876. A new compilation at 50 miles to the inch (1:3 168 000) was subsequently undertaken by Arthur Everett and published by the Victorian Department of Mines in 1887. Versions of the latter two maps appeared in several other publications about this time (Darragh, 1977). Later, small-scale maps were published by Bartholomew in 1890 (275 miles to the inch or 1:17 424 000), Gregory in 1907 (195 miles to the inch or 1:12 355 200), Cotton in 1908 and 1913 (225 miles to the inch or 1:14 256 000 and 90 miles to the inch or 1:5 702 400 respectively), and Reed in 1921 (310 miles to the inch or 1:19 500 000).

An important map published after Everett's was that compiled at 1:2 990 000 scale by T. W. E. David and published in 1931 by the Commonwealth Council for Scientific and Industrial Research (later to become the Commonwealth Scientific and Industrial Research Organisation or CSIRO). David drew on maps and other data supplied by the State Geological Surveys, universities, and Commonwealth Government sources.

BMR has been responsible for geological maps of Australia compiled during the last thirty years, namely: the 1:6 336 000-scale map, published in 1952; the 1:6 000 000-scale map, in the Atlas of Australian Resources, published in 1958; the 1:2 534 400-scale Tectonic Map of Australia in 1960; the 1:5 000 000-scale map, part of the Geological Map of the World-Australia and Oceania, published in 1965; and the 1:6 000 000-scale map, in the Atlas of Australian Resources, Second Series, published in 1966. In 1976 a new large-scale (1:2 500 000) geological map of Australia was published (see below). This map synthesised the knowledge obtained from the nearly completed post-war national 1:250 000-scale geological mapping project undertaken jointly by the Commonwealth, States, and Territories. In 1979 two geological maps at 1:10 000 000 scale (Geology, and Solid Geology) were published as part of the BMR Earth Science Atlas of Australia, a progressively updated, looseleaf series of geoscientific maps. In 1982 a new 1:5 000 000 scale map was published by the Division of National Mapping, as part of the third series of the Atlas of Australian Resources.

COMPILATION OF THE 1976 1:2 500 000-SCALE MAP

The BMR 4-sheet 1:2 500 000-scale map, 'Geology of Australia', published in 1976, is the latest geological map at this scale.

This map project was conceived in 1971 and preliminary preparation for compilation commenced in late 1972. An outline of the project, including a tentative timetable, was presented at the annual Conference of Government Geologists in February 1973. It was decided that BMR should be responsible for the project, which was to be completed in time for the 25th International Geological Congress in Sydney in August 1976. Compilation material was requested from the State Surveys. A draft guide to the compilation of the map and an outline of the proposed reference were circulated for internal comment within BMR in November 1973, and guidelines covering all aspects of the project had been agreed to by March 1974.

Draft compilations were sent to the State Surveys during the period March to May 1975, and replies were received by July 1975. Fair drawing of three of the four sheets commenced in August 1975 and the remaining sheet was begun in October 1975. Two fair-drawn sheets were sent to the printer in December 1975 and the remaining two in February 1976; the map was printed during July 1976, and released in August, just before the Congress. The map was reprinted in 1981.

Sources of Information

Compilation material in the form of geological maps at various scales was available in BMR and from the State Geological Surveys; some additional data were acquired from CSIRO, private companies, and various publications. Where a choice of scale was possible, e.g. where both 1:250 000 and 1:500 000 or 1:1 000 000 scale maps were available, data at the larger scale were selected.

The map sources for each State are detailed below; offshore data are treated in one section.

Queensland

Geology of the Kimberley to Mount Isa Region, 1:2 500 000, BMR, 1974.

Geology of the Southern Carpentaria Basin, 1:1 000 000, BMR, Preliminary Edition, 1973.

Geological Map of Hodgkinson and Laura Basin, 1:500 000, BMR, 1966.

Igneous and Metamorphic Rocks of Cape York Peninsula and Torres Strait, 1:500 000, BMR, 1970.

Geology of the Burdekin-Townsville Region, 1:1 000 000, BMR, 1972.

Geology of the Northern Eromanga Basin, 1:1 000 000, BMR, Preliminary Edition, 1974.

Geology of the Northwestern Eromanga Basin, 1:1 000 000, BMR, Preliminary Edition, 1975.

Geological Map of the Georgina Basin, 1:500 000, BMR, 1966.

Geology of the Central Eromanga Basin, 1:1 000 000, BMR, 1974.

Geology of the Fitzroy Region, 1:1 000 000, BMR, 1966.

Geology of the Northern Part of the Surat Basin, 1:1 000 000, BMR Preliminary Edition, 1972.

Data for other areas were taken from BMR 1:250 000-scale maps, both Preliminary and First Edition, and from 1:250 000-scale Preliminary Edition maps and other unpublished material provided by the Geological Survey of Queensland.

New South Wales

Data were obtained from the Geology of New South Wales, 1:1 000 000-scale map, published by the Geological Survey of New South Wales in 1972, and updated by the Survey in 1975.

Victoria

Data were gathered from 1:250 000-scale Preliminary and First Edition maps, published by the Geological Survey of Victoria, and updated by the Survey in 1975.

Tasmania

A compilation at 1:2 500 000-scale was prepared by the Geological Survey of Tasmania in 1975.

South Australia

Data were obtained from 1:250 000-scale Preliminary and First Edition maps published by the Geological Survey of South Australia and updated by the Survey in 1975.

Western Australia

Compilation material was mostly obtained from the 1:2 500 000-scale Geological Map of Western Australia, published by the Geological Survey of Western Australia in 1973. The Kimberley region was compiled from the Geology of the Kimberley to Mount Isa Region, 1:2 500 000, BMR, 1974. The Officer Basin and part of the Canning Basin were compiled from BMR 1:250 000 Preliminary and First Edition maps, the Nabberu Basin from unpublished data supplied by CSIRO. The compilation of other parts of the State was supplemented by data from other recent publications.

Northern Territory

Compilation material was taken from the Geology of the Northern Territory, 1:2 500 000, BMR, 1976; and from the Cainozoic Geology of the Northern Territory, 1:2 500 000, BMR, 1976.

Offshore data

Data used for the compilation of the seismic and magnetic basement contours and for the well sections were obtained by the Petroleum Exploration Branch of BMR from various published and unpublished BMR and company sources.

Basis of map and use of rock-unit symbols

The BMR 1:2 500 000 Geology of Australia map shows the 'solid' geology of the continent with 153 rock units on which are superimposed five patterned screens representing superficial Cainozoic units. The Cainozoic units grouped at the top of the reference have the same symbols in each major subdivision. Geological boundaries beneath Cainozoic units represented by colour (i.e., Qe, Qc, Qb, Ts, Tc, Tb, and Tf) are shown by broken lines, and the underlying pre-Cainozoic units are shown by symbol only, as, for example, $\frac{\text{Tc}}{\text{Kw}}$.

In areas of very sketchy information, boundaries are omitted.

The well sections shown are intended to convey some idea of offshore geology. The sections are supplemented by basement contours derived from various geophysical surveys. The contours are annotated with the age of the oldest post-basement rocks where known. In most cases, to avoid interference with the contours, the well sections are placed several centimetres from the well locations, which are shown as large dots.

The topographic base was supplied by the Division of National Mapping, Commonwealth Department of National Development and Energy. The topographic symbols are those used by the Division. The offshore topographic names were supplied by marine groups within BMR, in consultation with the Hydrographer, Royal Australian Navy, and the Division of National Mapping.

Selection and grouping of units

Geological mapping delineates categories of units that are distinguished from one another on the basis of rock type (lithostratigraphic units), or of age (time-rock units of the Australian Code of Stratigraphic Nomenclature—GSA, 1973; chronostratigraphic units of the International Stratigraphic Guide—ISG, 1976). Lithostratigraphic units are usually the simplest to map in the field and are therefore often used in preliminary compilations; further work is needed to define chronostratigraphic units. Before compilation is completed, an age (more or less specific) can almost always be assigned to rock units, which then become chronostratigraphic units. With this in mind the units shown in the 1:2 500 000 map are chronostratigraphic units, i.e. they 'are the rocks considered to have been deposited (or intruded, extruded, etc.) during a defined division of the geological time scale' (Australian Code of Stratigraphic Nomenclature; GSA, 1973). 1:250 000 or similar larger-scale geological map units of similar rock type, age, and general areal distribution within each major geological region, were grouped together. The distinctiveness of each smaller-scale grouping has depended firstly on the validity of the grouping process, and secondly on the nature of the individual units. For example, a great variety of rock types, or a vagueness in age, or both, in the constituent larger-scale units has inevitably created some ill-defined, indistinct smaller-scale groupings.

The reference

The horizontal arrangement of units within each major geological region varies because of the geology. Units in the Western Cratons subdivision have been arranged largely in a single column because the development of individual cratons can be represented as a single sequence. In the Central Cratons subdivision, geological evolution has been more complex, and more geological provinces or entities are recognised; the units have been labelled by geological province and grouped broadly from west to east according to longitude. The units in the Eastern Craton are arranged in four columns—one each for sedimentary, volcanic, and granitic rocks, and the fourth containing intermediate, basic, and ultrabasic intrusive rocks and metamorphics; units that overlap the major time divisions adjoin the main columns. The arbitrary horizontal arrangement of the Cainozoic units is the same in each major subdivision and is not related to distribution.

The Phanerozoic time scale is modified from van Eysinga (1975). For the Precambrian, two time scales have been used: that adopted by the Geological Survey of Western Australia is used for the Western Cratons, and that adopted by BMR (Dunn & others, 1961) is used for the Central Cratons. Units that span more than one time division, or cross a time boundary, have their time-range indicated by arrows. Otherwise, the time-range of units is determined by (i) the standard time division, (ii) unconformities, or (iii) the position of adjoining boxes.

INDEX TO GEOLOGICAL PROVINCES OR ENTITIES