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Scott Plateau - structure, isopach, and potential field maps

by

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<u>PLATES</u>

SUMMARY

Structure, isopach, and potential field maps for the Scott Plateau and adjacent Argo Abyssal Plain presented here are based on 6100 km of geophysical profiling by the Bureau of Mineral Resources (BMR) and 6800 km of profiling by petroleum exploration companies and German and American institutions. Four prominent seismic reflectors have been mapped over the whole area. Ties to company wells on the Northwest Shelf and the Ashmore Terrace, and regional geological considerations indicate that these reflectors are early Late Jurassic (and earlier), intra-Upper Cretaceous, base Tertiary, and Oligocene ages. Time and depth horizon structure maps are presented for each of the four horizons, together with isopach maps of each interval and isopach maps of combinations of intervals (Tertiary, Jurassic-Cretaceous, post-main unconformity, and carbonate sequences). Magnetic, free-air gravity, and Bouguer gravity anomaly maps have been machine contoured from digital data held on magnetic tapes by BMR.

Interval velocities for the time-to-depth conversion have been computed from detailed analyses of wide-angle sonobuoy reflection records, from seismic processing velocities obtained from move-out scans, and from well velocity data (including DSDP Site 261). The BMR marine group's automated seismic mapping system was modified to allow variable velocity functions to be applied in the production of the maps. Constant interval velocities were used on the Argo Abyssal Plain, on the Scott Plateau, and on the upper slope and Ashmore Terrace. Linear ramping of velocities was applied between these zones.

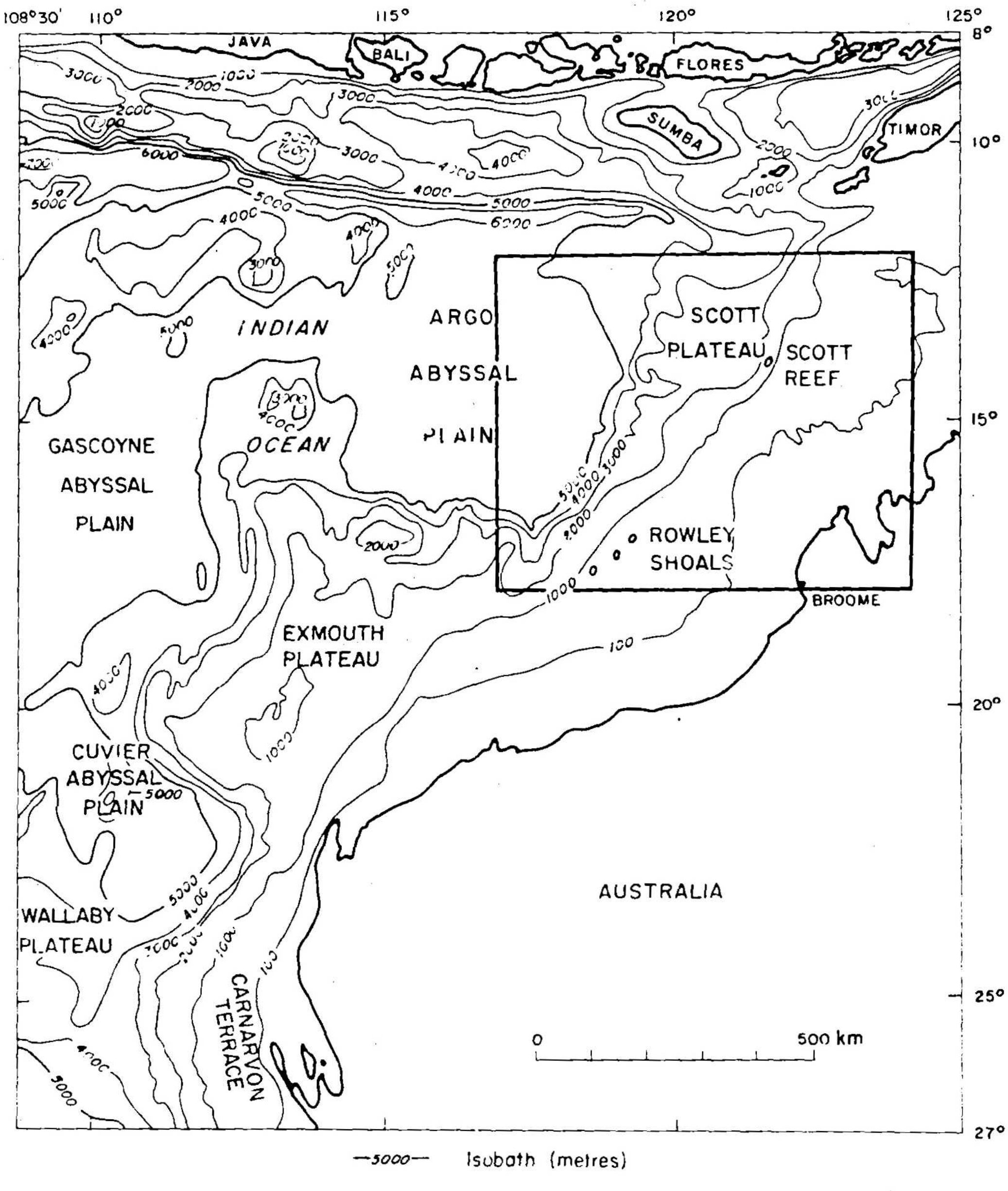

Fig. 1 Regional setting
(after Heirtzler 1974)

INTRODUCTION

During 1971-73, the Bureau of Mineral Resources (BMR) surveyed the continental margin around Australia, on which approximately 186 000 km of reconnaissance geophysical data were recorded along lines with an average separation of 30 km. Initial interpretation of these data was presented in a series of end-of-survey reports which were produced as BMR Records. Follow-up interpretation is being presented in short BMR Records, the primary purpose of which is to release structure-contour and isopach maps for sedimentary horizons and intervals based on both the BMR data and data from surveys in deep water conducted by companies and institutions. The western margin of the Australian continent has received the most systematic attention - maps have been released for the Exmouth Plateau (Willcox & Exon, 1976b) and are soon to be released for the Carnarvon Terrace and Wallaby Plateau (Cameron & Symonds, in prep.). This Record contains contour maps of horizon structure, isopach, and potential field data which substantially complete BMR mapping of the western margin.

The area mapped extends from 12°S to 18°S and from 117°E to 124°E (Fig. 1), overlapping in the southwest with the northeast part of the Exmouth Plateau project area (Willcox & Exon, 1976b). The principal physiographic feature in the area is the Scott Plateau, a mid-continental slope plateau of some 80 000 km^2 area, lying mostly between the 2000 and 3000 metre isobaths. Other major features in the project area are the Rowley Terrace (new name) to the south of the Scott Plateau, and the Argo Abyssal Plain to the west. The Java Trench and Roti Basin (new name) lie just north of the area, and the Timor Trough lies to the northeast. The broad Northwest Shelf, where water depths are less than 600 m, has been extensively covered by company geophysical surveys, and will not be considered here other than as an aid in the dating of seismic horizons.

Although several surveys have been conducted in deep water over Australia's northwest margin, little detailed interpretation has been published on an area-by-area basis. The results of individual surveys by the Lamont-Doherty Geological Observatory, the Gulf and Shell oil exploration companies, and others have been interpreted, but until now little attempt has been made to integrate all the better-quality data in any region except over the Exmouth Plateau. The maps in this Record have been compiled from seismic and navigation data held by BMR for several surveys in the Scott Plateau region. Although the contour maps must be fairly generalised because of the large line separation of the surveys included, the contouring is thought to be broadly correct. Data maps showing values of the interpreted seismic times and depths and sediment thickness in their correct locations are available from BMR.

Previous literature has generally treated the Scott Plateau and environs only briefly. Falvey & Veevers (1974) describe the topography of the northwest margin in some detail, although their bathymetric contours over the Scott Plateau are based on only sparse data. Other papers discuss the origin and nature of the Scott Plateau, but only insofar as the discussion relates to the tectonic interpretation of nearby features of interest, or of the region as a whole. The papers by Veevers & others (1974) and Powell (1976) contain the most comprehensive discussion of the Scott Plateau.

DATA

Sources of seismic reflection data

The seismic reflection data used in the production of the depth and thickness maps accompanying this Record come from the following sources:

(1) BMR Continental Margin Survey (CGG, 1975); Surveys 17 and 18.

(2) Gulf Research and Development Co. and Australian Gulf Oil Co. regional geophysical reconnaissance off the northwest coast of Western Australia, conducted with the M/S Gulfrex from 28 May to 6 July 1972 (Gulf, 1973).

(3) Shell Development (Australia) survey conducted with M/V Petrel from 7 June to 25 August 1971 (Shell, 1972).

(4) Woods Hole Oceanographic Institution, Cruise 93, leg 14 of R/V Atlantis II in the northeast Indian Ocean, from October to November 1976 (Woods Hole, 1977).

(5) Bundesanstalt für Geowissenschaften und Rohstoffe (BGR) - Cruise 16, leg 1(a) of the R/V Valdivia off northwest Australia from 9 February to 25 February 1977 (Hinz & others, 1978).

A total of 12 900 km of seismic profiling from these surveys lies within the study area. Table 1 shows the individual contributions from the six surveys, and Table 2 describes the seismic energy sources and recording and display methods used in each survey.

Navigation in all the above surveys combined satellite fixing for absolute positioning with sonar Doppler or ship's log for dead-reckoned track between fixes. Post-survey processing of the BMR navigation data has probably resulted in positioning accuracy of better than 0.2 km (Garnett, 1975) for most of the data. The other surveys are estimated to have positioning accuracies of 2 km or better in most cases; bathymetric misties suggest there could be occasional errors considerably in excess of 2 km.

Water depth map

The contoured bathymetric data presented in Plate 2 have been compiled from values digitised from the seismic sections during production of horizon maps. BMR presently holds magnetic tapes from the Continental Margin Survey containing one-minute bathymetric data which, following post-survey processing, are probably accurate to better than 20 metres (Stagg, in prep.). Unfortunately, BMR does not possess a complete set of bathymetric data of similar accuracy for the other surveys in the Scott Plateau region. Thus digitisation of water depths from seismic sections was held to be the only way of obtaining a complete and internally consistent data set.

Since the seismically-derived water depths have not been corrected for receiver offset or source and receiver depth, they will necessarily have systematic errors. A plot of the difference in depth versus true depth from the BMR seismic system (Fig. 2) shows that these errors are large only in shallow water.

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Table 1. Distance travelled in each survey on the Scott Plateau and adjacent Argo Abyssal Plain.

Survey	Kilometres
BMR Survey 17	2700
BMR Survey 18	3400
Gulf	1800
Shell	1900
Woods Hole	1600
BGR	1500
Total	12900

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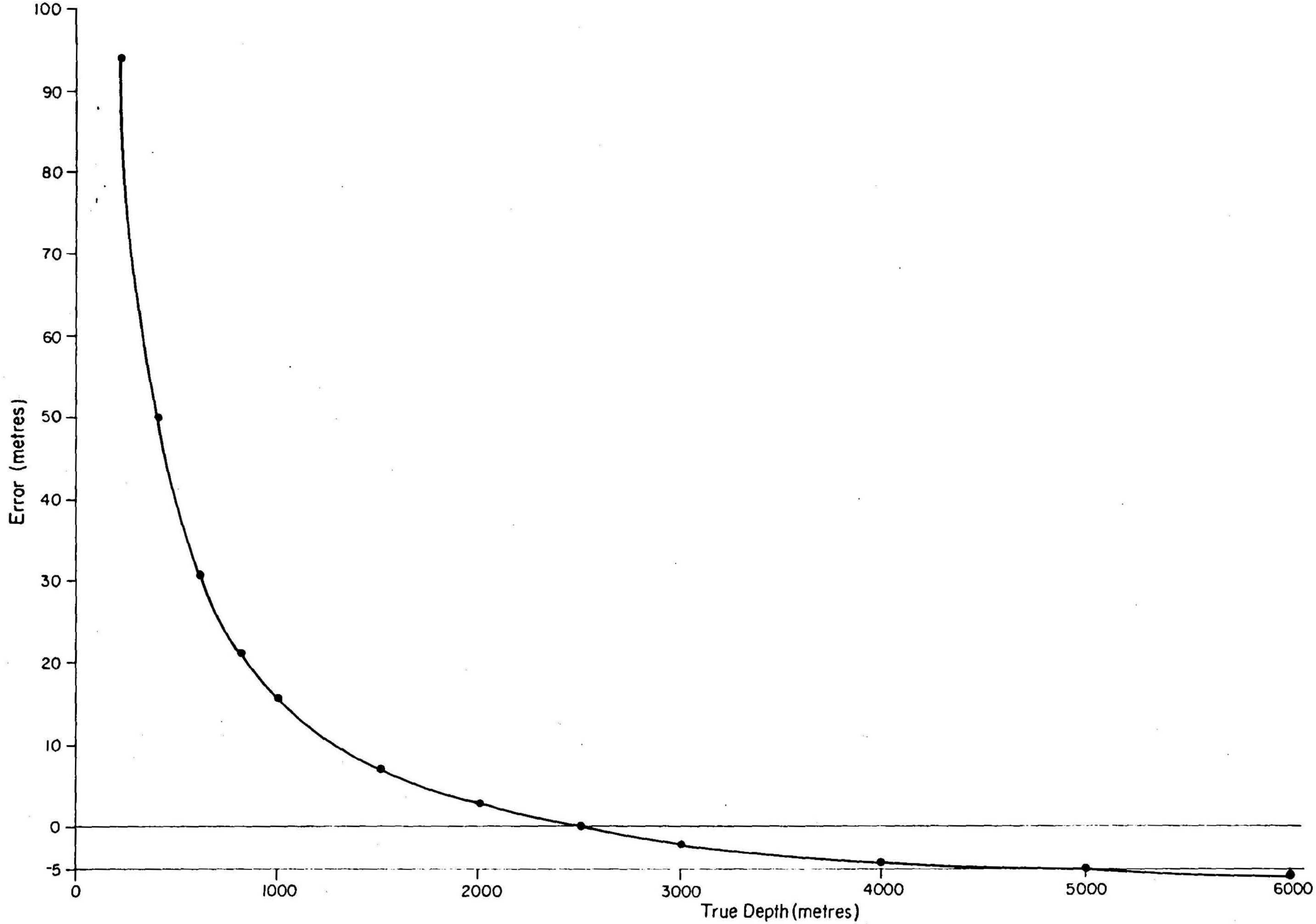
Fig. 2 Difference between depth from BMR seismic system and true depth



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Finally, contours have been extracted from the bathymetric map compiled by Falvey & Veevers (1974) where our density of ships tracks is too low for accurate contouring. Contours in water depths less than 600 metres have also been extracted from this map to minimise the errors outlined above.

Gravity and magnetic maps

Contour maps of free-air gravity, Bouguer gravity, and magnetic anomalies (Plates 4-6) have been prepared by machine contouring the surface of minimum curvature (Briggs, 1974). For each map the bulk of the data was derived from the BMR Continental Margin Survey; supplementary data from Gulf and Woods Hole cruises were used where available. The formulae used in the computation of the different anomalies are included in the Appendix.

Free-air and Bouguer gravity data were sampled every minute (of time), and the magnetic data were sampled every 5 minutes. For contouring, the data were pushed on to a grid of dimension 2.5' x 2.5', (approximately 4.6 x 4.6 km) and the maximum distance of contour extrapolation was set at 40 minutes of arc.

Production of seismic maps

The Marine Geophysics Group is developing a seismic digitising and contouring package (Tilbury & Whitworth, in prep.) which will be used in future projects of this type. Because of development problems only the latter half of the package was used in producing maps for this Record.

The following procedure was adopted (Fig. 3);

(1) Seismic horizons were hand-digitised at structural discontinuities and inflection points, or at hourly intervals where the structure was featureless. The accuracy of digitising is about 20 ms of two-way time. Altogether, 2532 stations were digitised and transferred to punched cards.

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(2) The punched cards were input to program INFILE, which produced one card-image permanent file for each survey (BMR Survey 17, BMR Survey 18, Woods Hole, BGR, Gulf, and Shell). These files were in turn run through program SEISCHK, which checked for the following -

(a) horizon times decreasing with increasing horizon number for a particular station (fatal error);

(b) horizon numbers not consecutive from 1 to 5 (fatal error);

(c) a portion of a horizon flagged as being outcropped by a horizon below does not overlie a horizon flagged as being eroded against a horizon above (fatal error);

(d) times to a horizon at consecutive stations differ by more than 900 ms (warning message);

(e) that the correct columns contain blanks or decimal points (fatal error).

The error and warning listings were then checked against the seismic sections. Errors were rectified using the editing program NFILE.

(3) The corrected files were then input to programs DEPTH and ISOPACH together with velocity data to obtain full listings of all the data converted to true depth and thickness. These lists served as an aid in contouring when data printed on the maps were unclear or overwritten.

(4) The card-image data files were input to program SEGEDIT to convert the data into BMR marine group survey-format buffered files, compatible with standard marine group navigation files.

(5) The survey-formatted seismic files and the navigation files were merged by program MERGPOS to give files of seismic data with position co-ordinates.

(6) These merged files together with velocity data were input to program SEISMAP to produce plot tapes containing horizon time and depth, and isopach data in map format. An important modification made to SEISMAP was to include a facility in the time-depth conversion that would allow the variation of a particular interval velocity over the survey area. The need for this facility is explained in detail in "Seismic Interval Velocities".

(7) The plot tapes were run on the CALCOMP drum plotter at BMR to produce data maps showing values in their correct locations.

(8) Data maps were then contoured by hand.

All seismic maps have been prepared at 1:2.5 million scale using a simple conic projection with standard parallels at 18°S and 36°S.

SEISMIC HORIZONS AND INTERVALS

Stratigraphic control of the Scott Plateau and Rowley Terrace is based partly on tentative seismic ties to company wells on the Northwest Shelf, and partly on a regional comparison of the stratigraphy with that of the Exmouth Plateau to the southwest. Stratigraphic nomenclature is complicated by the existence of two large sedimentary basins in the project area - the Canning Basin (Rowley Sub-basin) in the south, and the outer margin of the Browse Basin in the north. Although the line of demarcation between these two basins is rather vague, being usually taken as the northwesterly extension of the Leveque Platform, there are marked dissimilarities in reflector characteristics between the two basins. Despite these dissimilarities, we have been fairly confident in tracing the major unconformities from basin to basin, and our confidence is reinforced by tentative ties to Bedout No. 1 (outside the project area), Scott Reef No. 1, Lynher No. 1, and Ashmore Reef No. 1 wells.

In this Record, units will generally be referred to by their assumed ages; this is necessary since no rock units have been defined in the wholly offshore Browse Basin (Playford & others, 1975), and few units have been defined in the offshore part of the Canning Basin. The characteristics and proposed ages of seismic horizons are shown in Table 3.

Horizon E is the most prominent unconformity over most of the plateau. Only on the Northwest Shelf is it possible to assign a definite age to this unconformity; here it is generally of late Middle to early Late Jurassic age, although it has been recognised as being as old as Late Triassic in North Hibernia No. 1 to the northeast of the project area. This Triassic to Late Jurassic dating is probably applicable to the inner part of the Scott Plateau and the Rowley Terrace. On the outer margin of the Scott Plateau the hiatus is probably of much greater duration; the pre-horizon E sequence is thought by Powell (1976) and Stagg (1978) to be no younger than Permian, and on the structurally high areas the hiatus probably extends to the Tertiary. Thus horizon E represents a

Table 2. Seismic energy sources, recording, and display parameters.

Organisation/Ship	Energy Source	Recording	Display
BMR/Lady Christine	120 Kilojoule sparker	6-channel analogue	Single-channel monitor sections produced on-line using E.P.C. electrostatic recorders. About half the lines have been digitally processed by Geophysical Services Inc. for various clients.
Gulf/Gulfrex	Aquapulse	24-channel digital	24-fold CDP stack with deconvolution and time variant filtering after stack; variable-area display.
Shell/Petrel	Airguns (6.4 litres)	24-channel digital	2-fold CDP stack with no moveout corrections, produced on-line using an optical method. The inshore ends of each line have been processed in the same way as the Gulf data.
Woods Hole/Atlantis II	Airguns (2.0 litres)	single-channel analogue	Hewlett-Packard electrostatic recorders.
BGR/Valdivia	Airguns (18.0 litres)	24-channel digital, also single-channel analogue	Single-channel on-line recordings from analogue streamer, recorded on 2 EDO-Western electrostatic recorders.

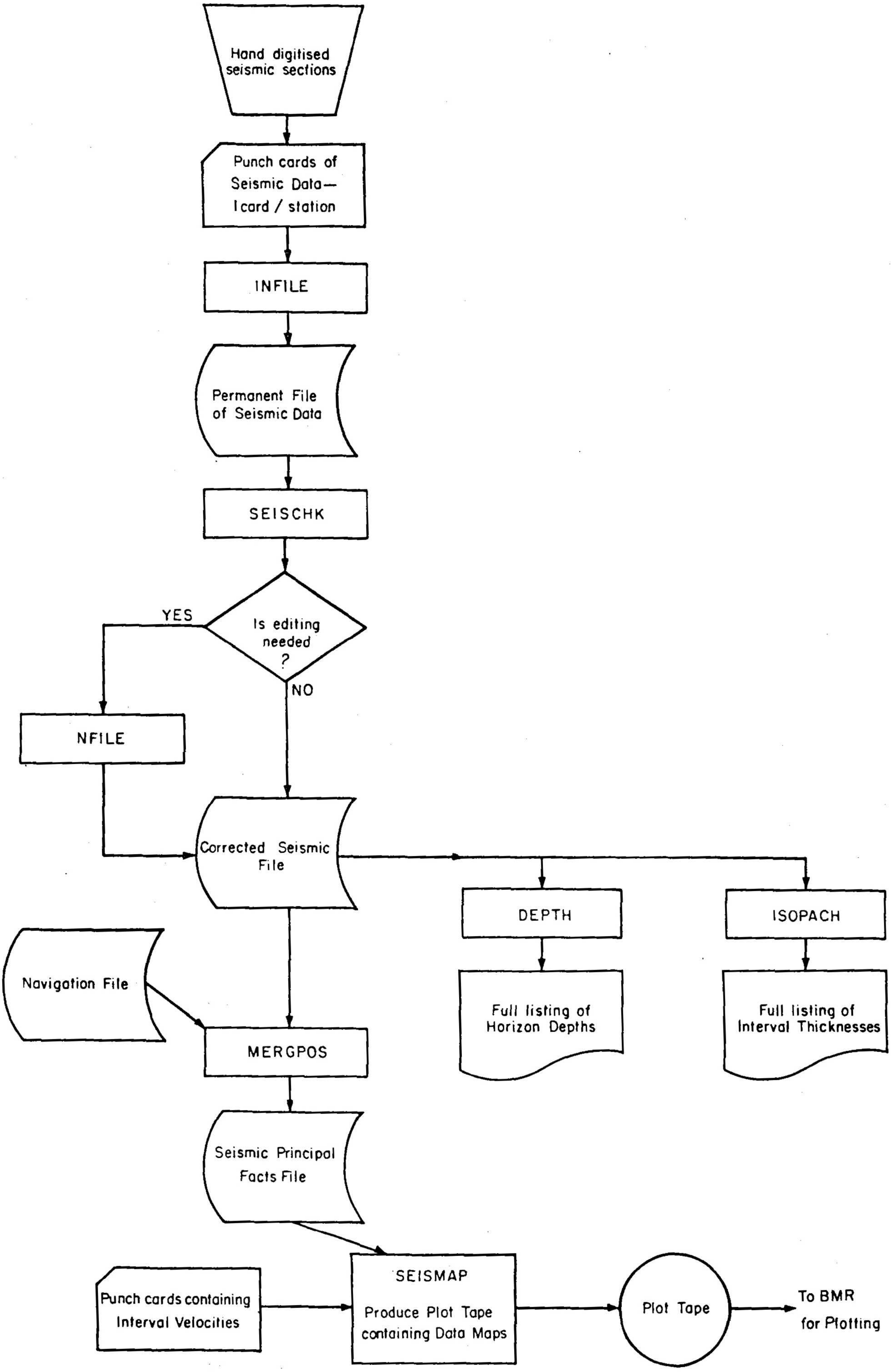

Fig.3 Procedure used in producing structure and isopach maps

TABLE 3. Characteristics and proposed ages of seismic horizons

HORIZON	PROBABLE AGE	SCOTT PLATEAU DOME	SCOTT PLATEAU SADDLE - SCOTT REEF TREND	ROWLEY TERRACE	ARGO ABYSSAL PLAIN
A	Oligocene	Strong event at or near top of well-stratified zone and below a surface transparent zone. Mild angular unconformity.	Event within stratified sequence. Strong unconformity. Overlies slumped beds in Scott Plateau Saddle. Underlies prograded beds on Scott Reef Trend.	Within or near top of stratified zone with slightly more transparent beds above. Underlies major zone of prograding with more prograded beds beneath.	Strong conformable event near top of stratified zone. Underlies a possible semi-transparent zone.
B	Near base Tertiary - probably early Paleocene	Strong event at base of stratified zone, overlying zone with extensive small-scale slumping.	As for Scott Plateau Dome, with some slumped beds above.	As for Scott Plateau Dome.	Not identified.
C	Late Cretaceous - probably Cenomanian - Turonian	Strong continuous event below slumped beds, overlying poorly stratified zone.	As for Scott Plateau Dome.	Strong continuous event at base of contorted beds, overlying an almost transparent zone.	Fairly strong event at base of stratified zone, overlying semi-transparent beds.
Main Unconformity (E)	As shown	Strong angular unconformity - generally the upper limit of faulting. Underlying sediments are probably Triassic to pre-Permian.	Strong angular unconformity. Top of faulted blocks (Scott Plateau Saddle). Uppermost strongly faulted horizon (Scott Reef Trend). Probably Mid-Jurassic.	Slightly unconformable, overlies weakly stratified subhorizontal sequence with minor faulting. Probably Mid-Jurassic	Top of oceanic layer 2 (basalt). Strong reflector defining an irregular surface with no deeper reflectors.

depositional hiatus with an age range corresponding to part of the Late Jurassic only, over the Northwest Shelf and extending from pre-Permian to Tertiary on the outer margin of the Scott Plateau. The map of horizon E also includes contours of the reflector marking the top of oceanic layer-2 in the Argo Abyssal Plain.

The seismic characteristics of horizon E and the underlying sequence vary from area to area. On the Ashmore Terrace, and especially from Gulf lines Au-28 to Au-32, horizon E is seen to be only a slight unconformity, disturbed by minor faulting, at the top of a well stratified sequence. On the inner part of the Scott Plateau, horizon E is a stronger unconformity dislocated by extensive block faulting of the underlying sequence. The outer margin of the Scott Plateau apparently remained emergent for much longer, and here horizon E is a strong erosional surface broken by numerous faults and fractures. The underlying sequence shows little stratification; it is probably much older here than to the east. To the south in the Rowley Sub-basin, the character of horizon E is similar to that on the Ashmore Terrace. The horizon is only a slight unconformity with minor faulting except at the outer margin, where the faulting is extensive. The underlying sequence is well stratified down to the limit of seismic penetration.

Mention should also be made here of a prominent deeper reflector observed principally in the Rowley Sub-basin. Displaced extensively by faulting, it is unfortunately not sufficiently continuous to be mapped. Willcox & Exon (1976a) assign a Late Triassic age to this, their horizon F. Little is known of the age or composition of these sequences which are as yet unsampled by drilling.

Horizon C is the most distinctive and consistent reflector throughout the area. Where clearest, it appears as a strong, highly continuous event at the base of a thin, well-stratified zone, overlying a semi-transparent sequence which varies greatly in thickness. Ties to wells, and comparison with a similar reflector over much of the western margin, identify this reflector as being of Turonian to Coniacian age and lying at the base of the Toolonga Calcilutite, the basal unit of the Cretaceous-Tertiary carbonate sequence. Only where this sequence thins significantly (for example, on the outer margin of the Scott Plateau) does it lose its characteristic semi-transparent appearance.

Several unconformities have been recognised within the Tertiary and younger section, but of these, only horizons B and A have been mapped over the whole area. Horizon B in particular has a distinctive character, usually being observed at the base of a well-stratified layer overlying a thin zone of extensive small-scale slumping. Tentative well ties and ties to B.O.C. of Australia Ltd seismic lines indicate that horizon B is probably at the base of the Tertiary (probable Paleocene age).

Horizon A is a prominent unconformity lying approximately in the middle of the Tertiary section: it has been correlated with a widespread Oligocene hiatus but is generally too shallow at well sites for a definite tie. On the outer Scott Plateau and Argo Abyssal Plain it lies at or near the top of a well-stratified sequence, underlying a partially transparent sequence. On the inner margin of the Scott Plateau it is farther down within the stratified sequence. On the inner part of the Scott Plateau the underlying sequence shows fairly extensive slumping. On the Ashmore and Rowley Terraces, horizon A lies at the base of a prograded sequence. On the southern part of the Rowley Terrace it is difficult to trace but is interpreted as lying between a major prograded sequence and an underlying, smaller prograded sequence.

Several post-Oligocene unconformities can be recognised on the seismic sections but as yet they have not been mapped since they generally show little continuity.

SEISMIC INTERVAL VELOCITIES FOR TIME-DEPTH CONVERSION

In deciding on a set of interval velocities for use in time-to-depth conversion, several problems came to light. Briefly, the major problems were -

(1) The variation in sediment type in proceeding from a neritic environment (Northwest Shelf) to an abyssal environment (Argo Abyssal Plain) is probably associated with lateral velocity changes within seismic intervals.

(2) The large variation in thickness of particular sedimentary intervals (2000 to 100 m in the case of the post-Oligocene) would be expected to produce lateral velocity variations as a result of differing degrees of compaction.

TABLE 4. Seismic interval velocities in metres per second

HORIZON	ASHMORE TERRACE	SCOTT PLATEAU	ARGO ABYSSAL PLAIN
SURFACE			
	1500	1500	1500
SEA BED			
	2600	1850	1850
A			
	3000	2250	2200
B			
	3000	2500	2200
C			
	3000	2700	2200
E			
SOURCE	Exploration wells, processing velocities	Sonobuoy wide-angle reflections, processing velocities	Sonobuoy wide-angle reflections, DSDP Site 261

(3) Very few sonobuoys deployed in the area have given good-quality data. On the Scott Plateau, nine were deployed by BMR; although several refractors have been identified, it is difficult to tie them to a particular geological horizon. One Atlantis II sonobuoy on the Argo Abyssal Plain gave an excellent oceanic 3rd layer refraction, but nothing shallower. Analysis of wide-angle reflections from sonobuoys was of considerable use in determining velocities.

(4) The only exploration wells in the area have been drilled on the Northwest Shelf in shallow water, and almost invariably on structural highs where the sedimentary intervals are usually thinner and have lower velocity than in adjacent areas. The interval velocity determinations made from these wells are therefore not representative of velocities over the region as a whole.

Given the large variation of some interval velocities (in particular the seabed-horizon A velocity) it was felt to be unjustifiable to use one set of interval velocities over the whole region as was done in the case of the Exmouth Plateau (Willcox & Exon, 1976b).

The only abundant velocity information were the R.M.S. processing velocities obtained from the BMR seismic lines processed by Geophysical Service International (G.S.I.). Although interval velocities obtained from these velocities probably do not represent true interval velocities, it was felt that comparison of processing velocities with known true velocities in a particular area might enable a general correlation to be made between processing and true velocity. It was found that the average of interval velocities from seismic processing was close to that obtained from wells and wide-angle sonobuoy reflections. Approximately 70 sets of processing velocity analyses in varying water depths were reduced to interval velocities using the method of Dix (1955). The results of these analyses indicated a strong dependence of velocity on water depth, and a consistency of velocities obtained from similar ranges of water depths (e.g. on the Scott Plateau or on the Ashmore Terrace).

By combining the various data, a table of velocities was derived (Table 4).

Modifications were made to program SEISMAP, which computes depths and produces plot tapes containing data maps, to allow for the introduction of varying interval velocities. Velocities are specified at particular survey times and then interpolated linearly between these times. The distribution of velocities is shown in Plate 7. The variation in velocity between the Scott Plateau and Argo Abyssal Plain was assumed to occur over the basement outcrop on the outer margin of the plateau; the variation between the shelf and the Scott Plateau was found to coincide with the steepest part of the upper slope, approximately the seaward limit of the prograding.

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Appendix

COMPUTATION OF FREE-AIR, BOUGUER, AND MAGNETIC ANOMALIES

Free-air The free-air gravity anomaly is computed by applying latitude and Eötvös corrections (Glicken, 1962) to the observed gravity:

$$G_{FAA} = G_{OBS} - 978.049 \; (1 + 0.0052884 \sin^2 \phi - 0.000005 \sin^2 2\phi) + 7.5 \, V_e$$

where G_{FAA} = free-air gravity anoamly (gal)

G_{OBS} = observed gravity (gal)

ϕ = latitude

V_e = eastward component of velocity (knots)

Bouguer In the Bouguer gravity anomaly a further correction has been applied to eliminate the effect on gravity observations caused by variations in water depth. The water layer density of 1.03 $t.m^{-3}$ has been rounded to 1.0 $t.m^{-3}$ and replaced with a layer of density 2.20 $t.m^{-3}$.

$$G_{BA} = G_{FAA} + 2\pi G \, \Delta \partial \, d$$

where G_{BA} = Bouguer anomaly

G = Universal Gravitational Constant

$\Delta \partial$ = difference in density between sea water and sediment[s]
- assumed to be 1.20 $t.m^{-3}$

d = water depth in metres

Magnetic Ordinarily, magnetic anomalies are computed as the difference between the measured total magnetic field, corrected for diurnal variation, and the International Geomagnetic Reference Field (I.G.R.F.). However, in recent studies at BMR, Petkovic & Whitworth (1975) have shown the time terms of the I.G.R.F. to be considerably in error in the Australian region and they further derived a more closely fitting regional field. This is termed the Australian Geomagnetic Reference Field (A.G.R.F.) and it has been used for the computation of magnetic anomalies in this Record:

(Magnetic Anomaly) = (observed total magnetic field) - (diurnal) - (A.G.R.F.)

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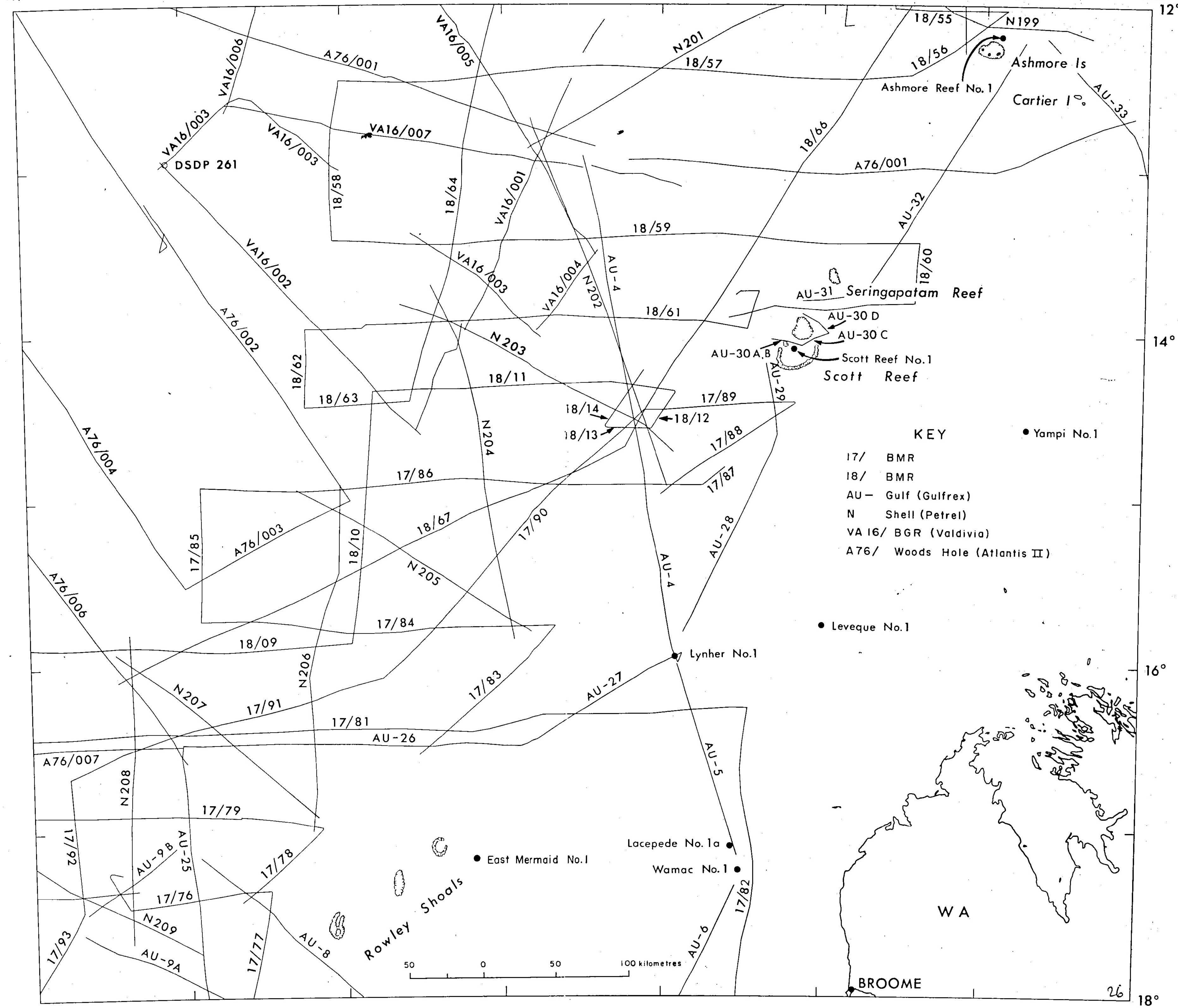
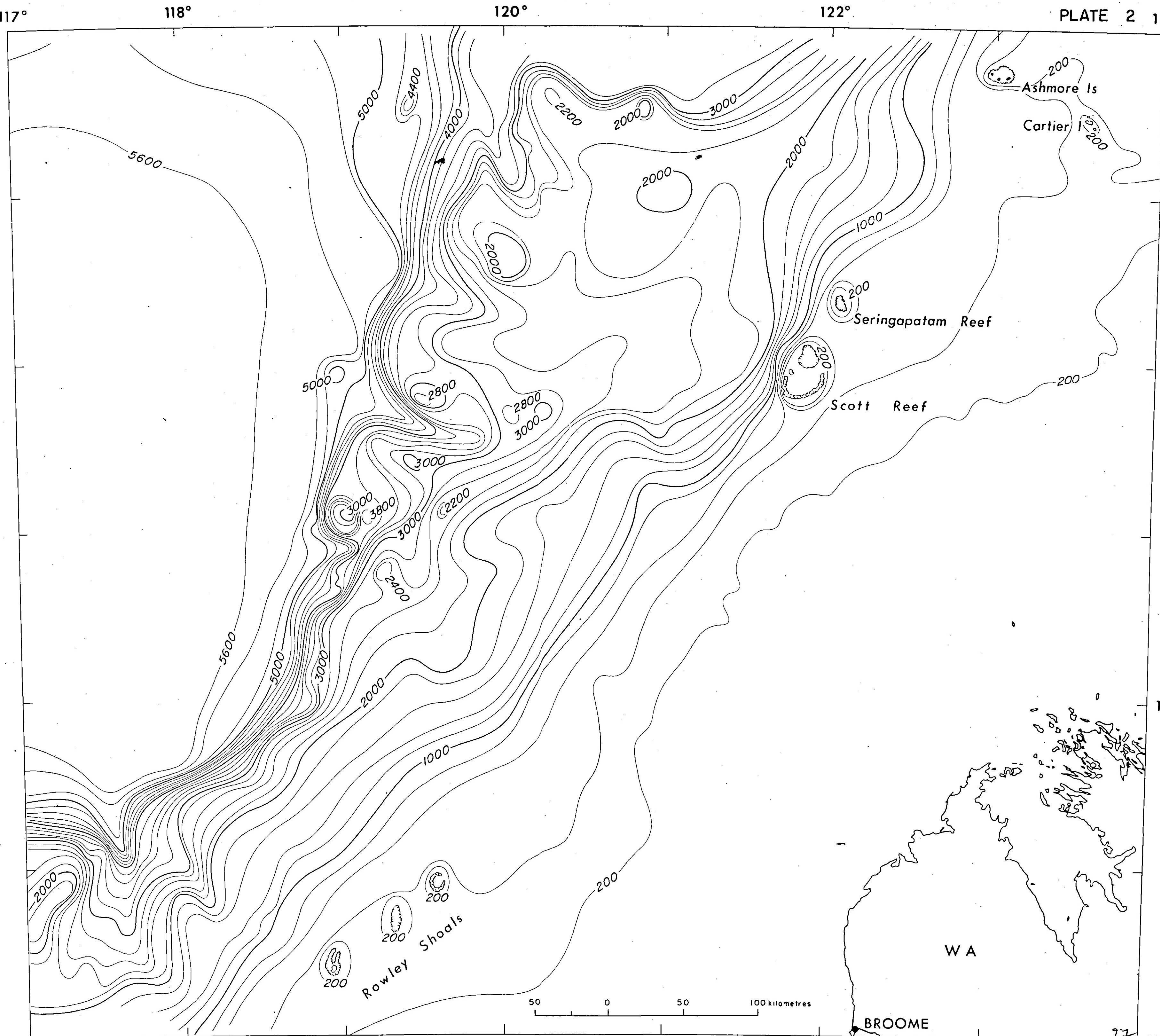
PLATE 1



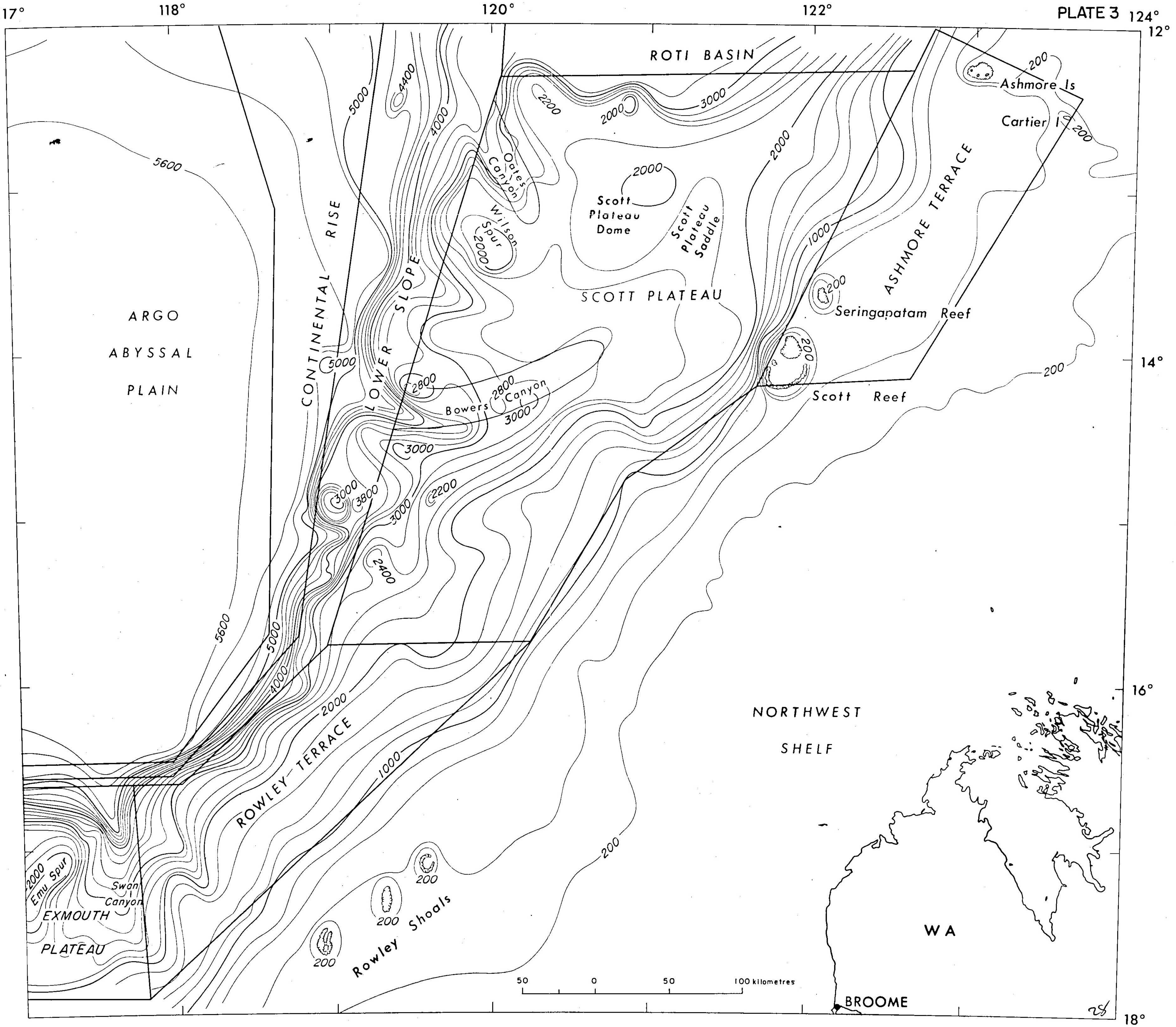
Ships tracks

PLATE 2



Bathymetry

PLATE 3



Bathymetric features

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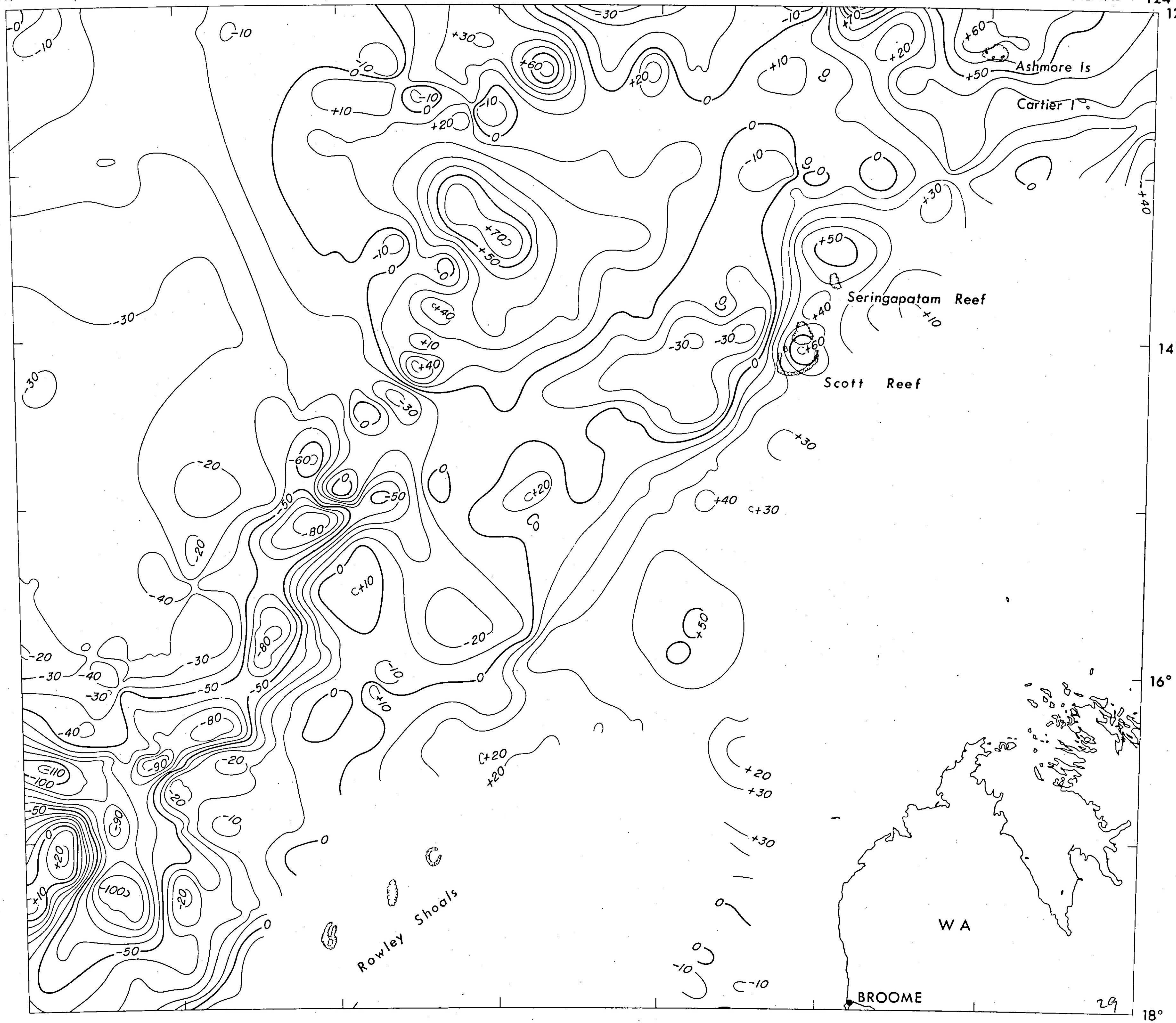
PLATE 4



Free-air gravity

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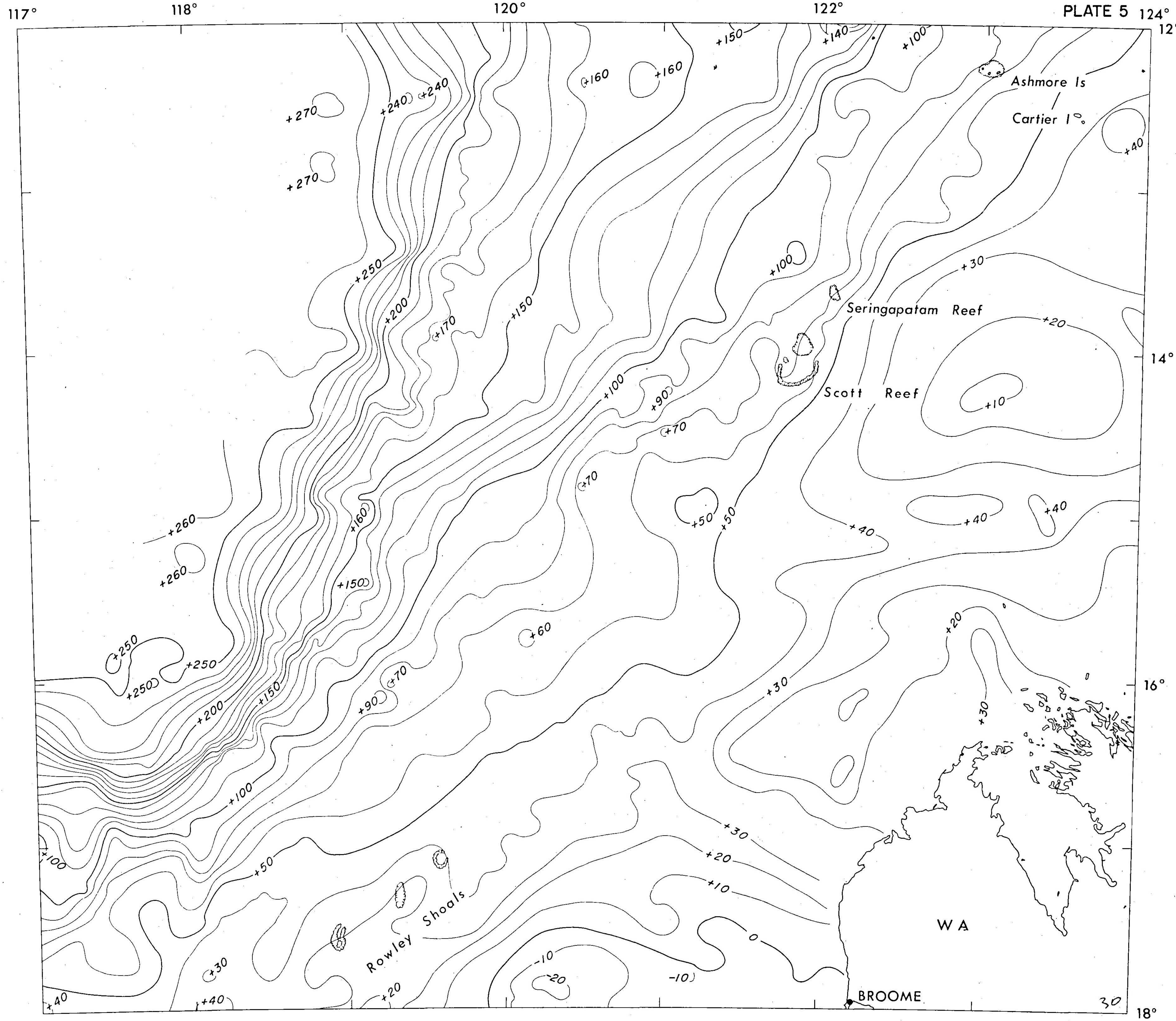
WA/B8-214

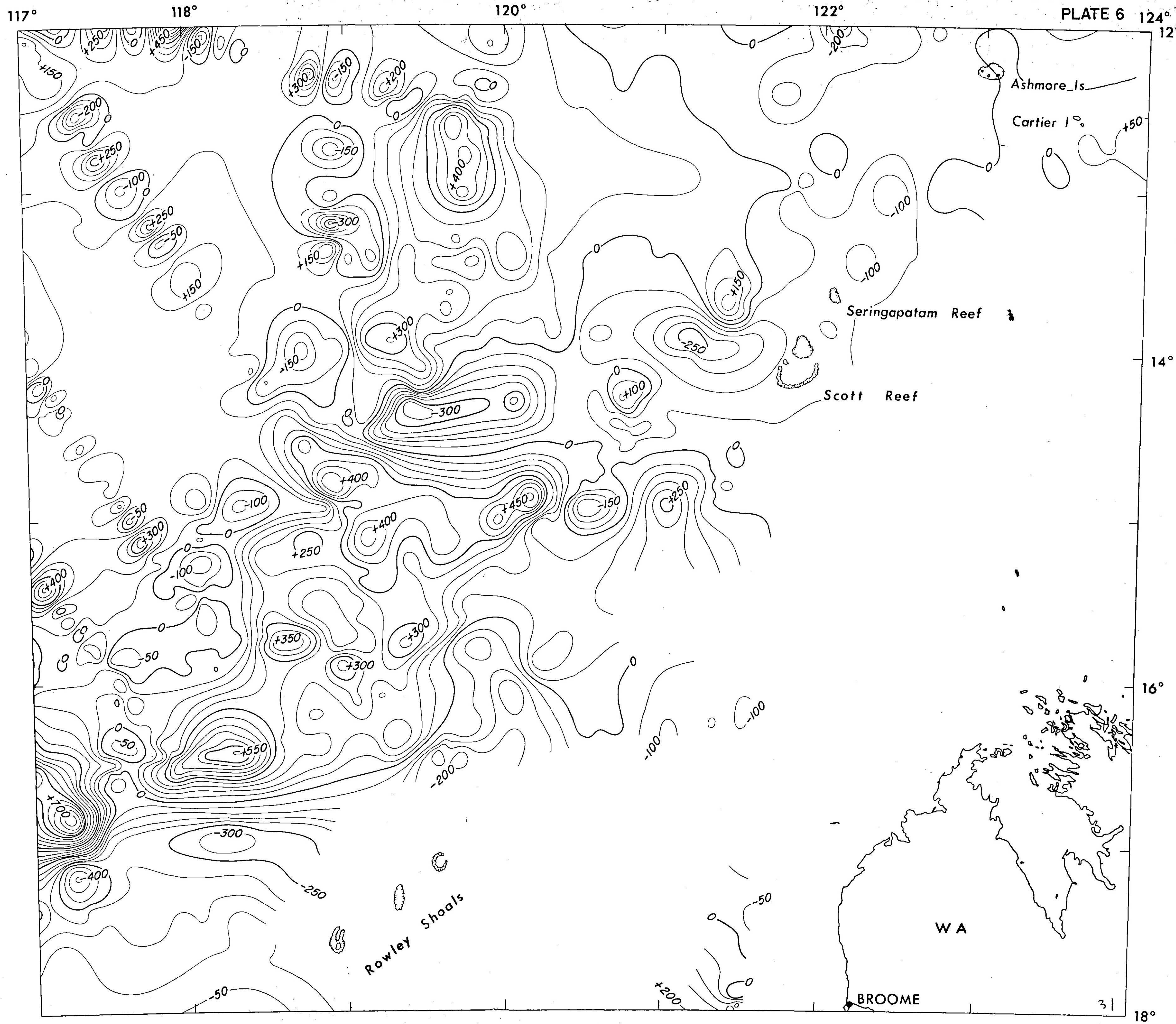
PLATE 5



Record 1977/43

Bouguer gravity

WA/B8-215

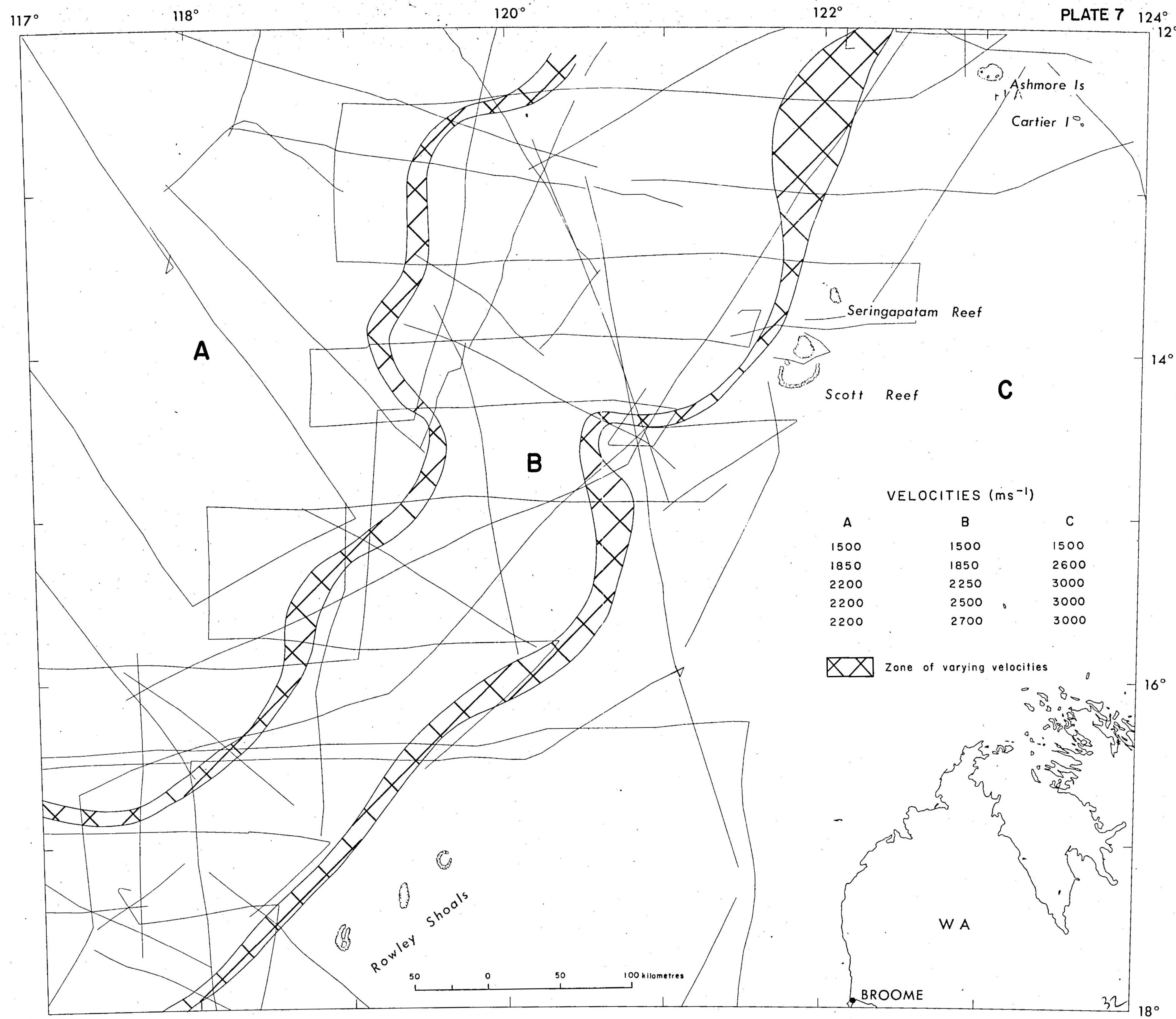


Magnetic anomaly

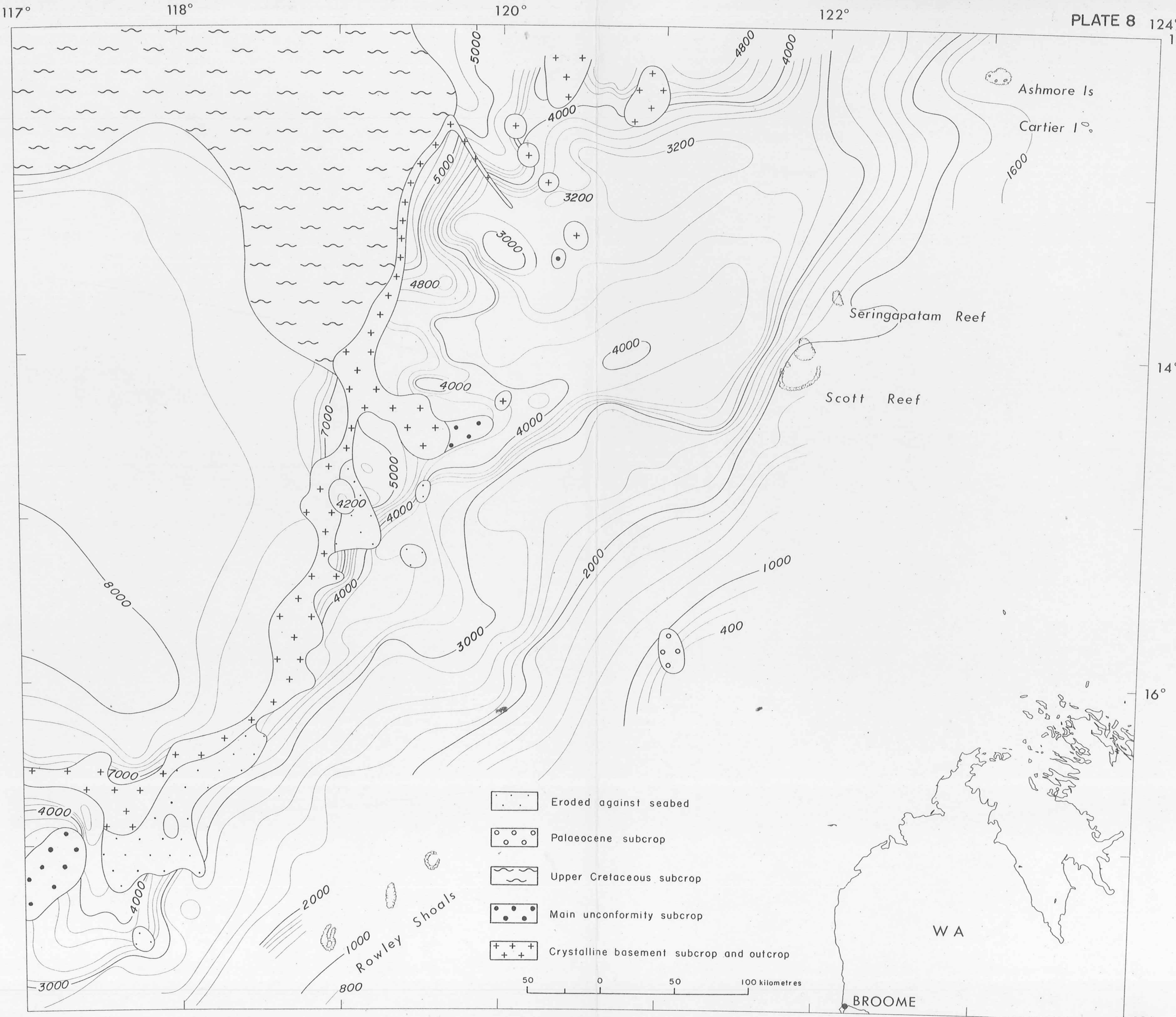
Record 1977/43

WA/B8-216

PLATE 7



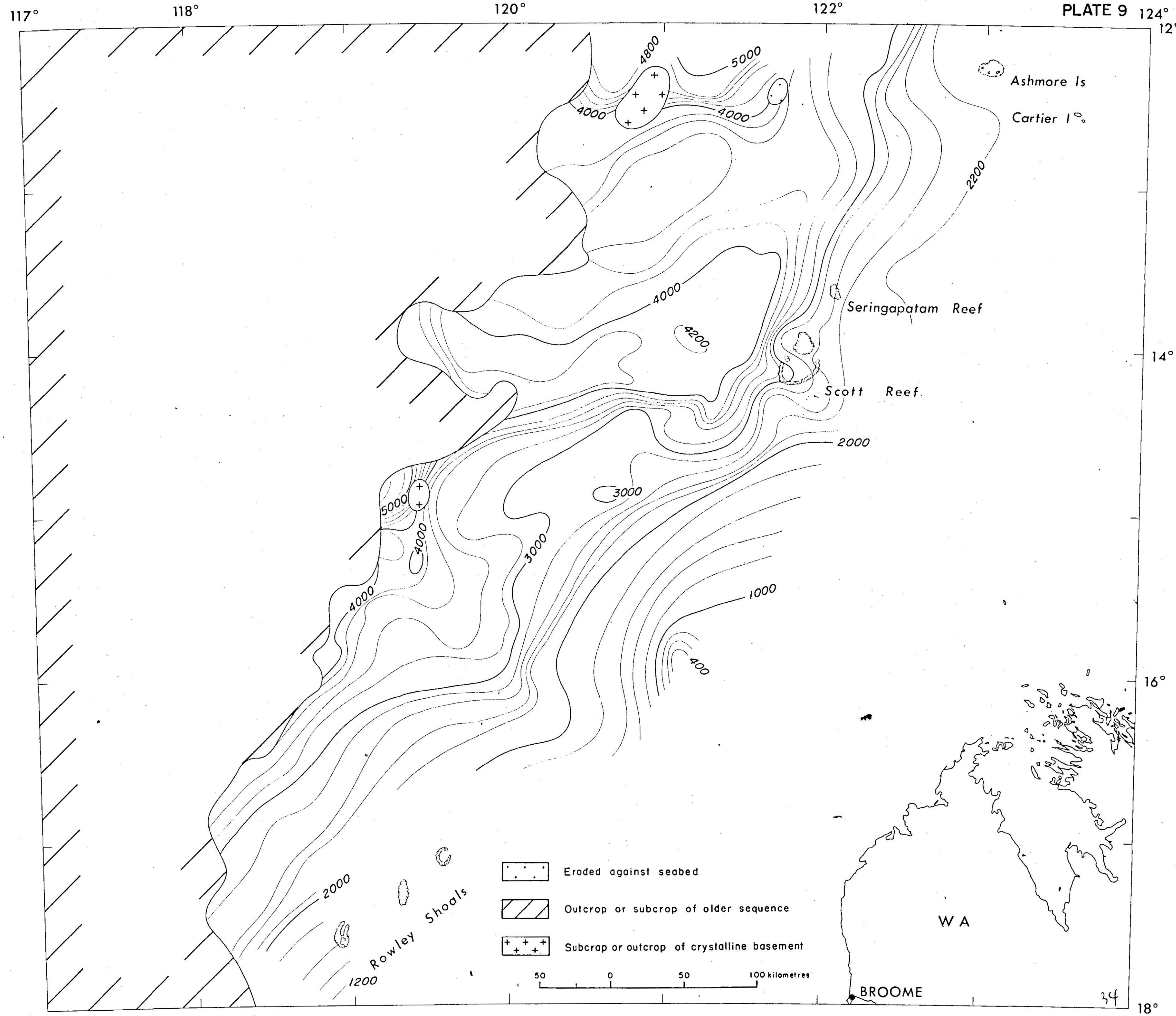
Velocity distribution



Record 1977/43

Oligocene structure map - time to Horizon A (milliseconds)

WA/B8-218

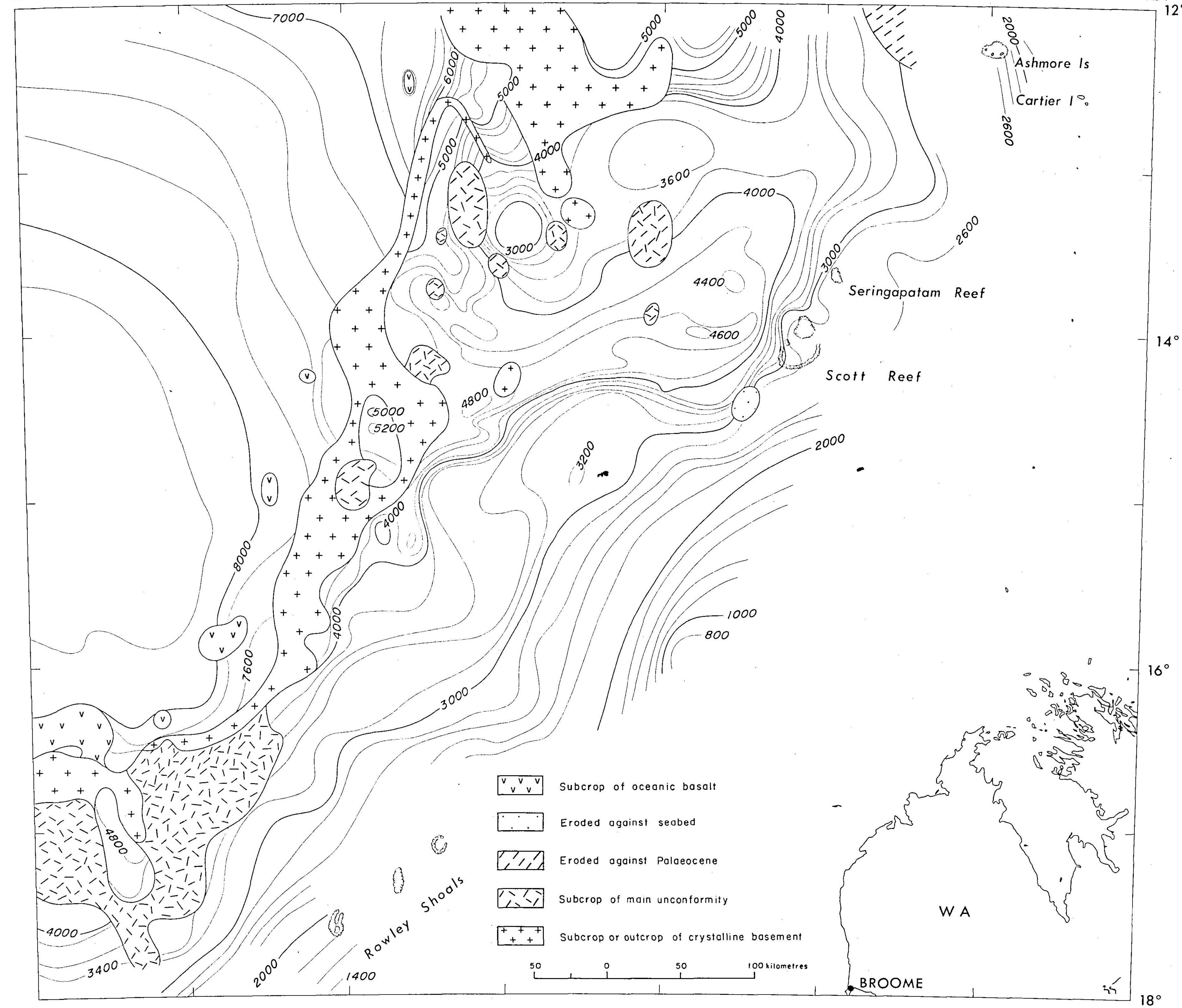


Base Tertiary structure map - time to Horizon B (milliseconds)

Record 1977/43

WA/B8-219

PLATE 10

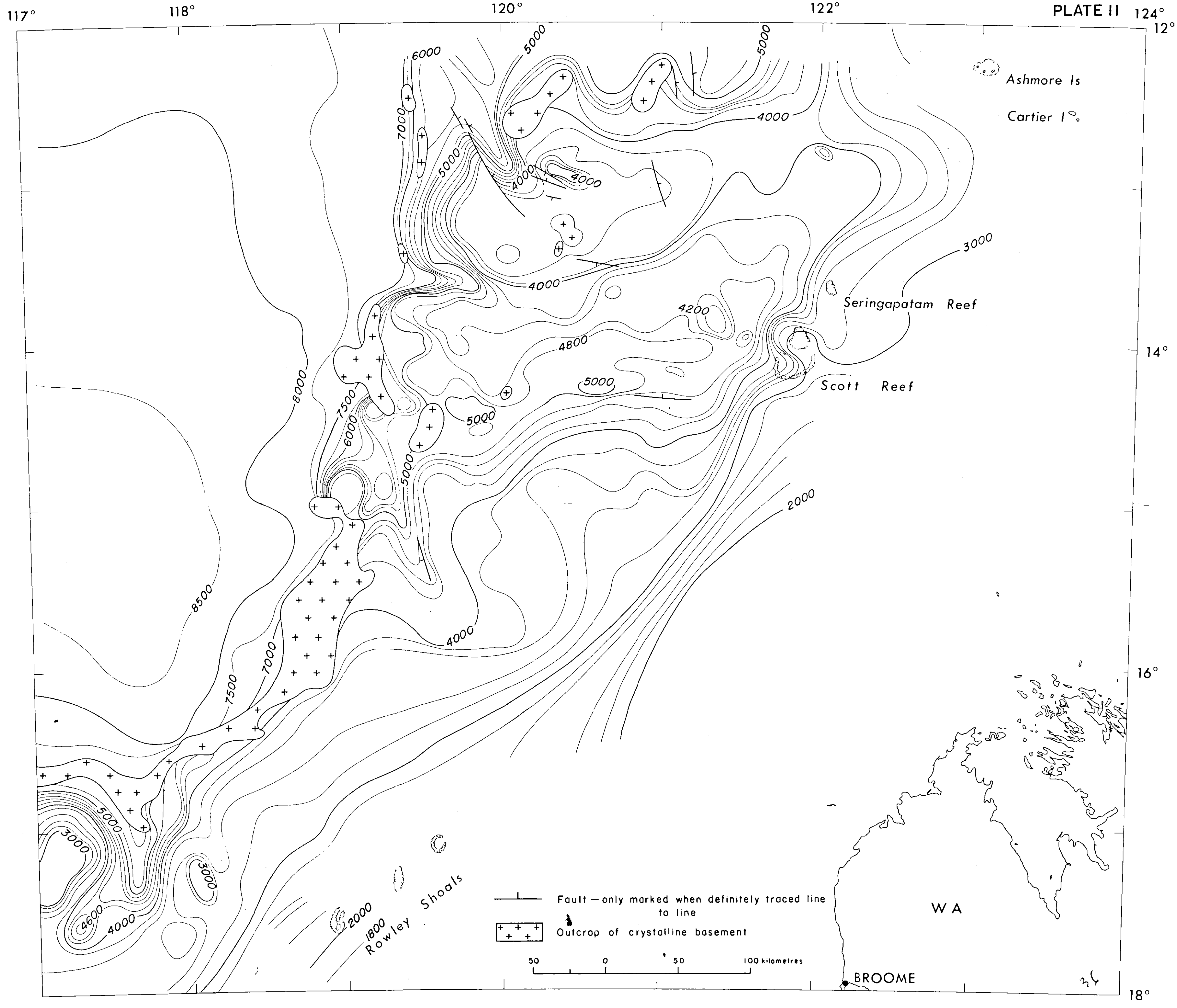


Record 1977/43

Upper Cretaceous structure map - time to Horizon C (milliseconds)

WA/B8-220

PLATE II

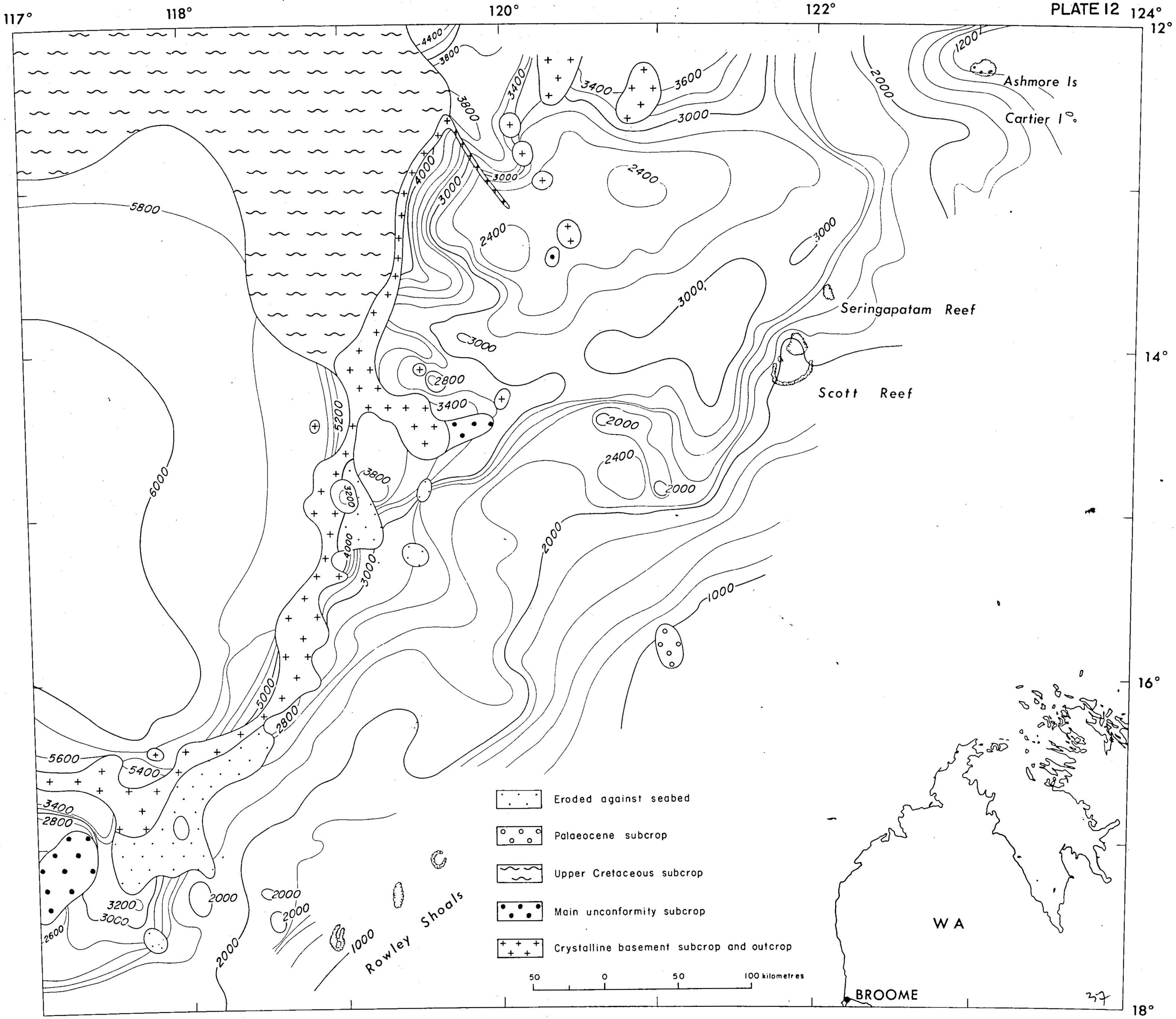


Record 1977/43

Breakup unconformity structure map (generalised) – time to Horizon E (milliseconds)

WA/B8-221

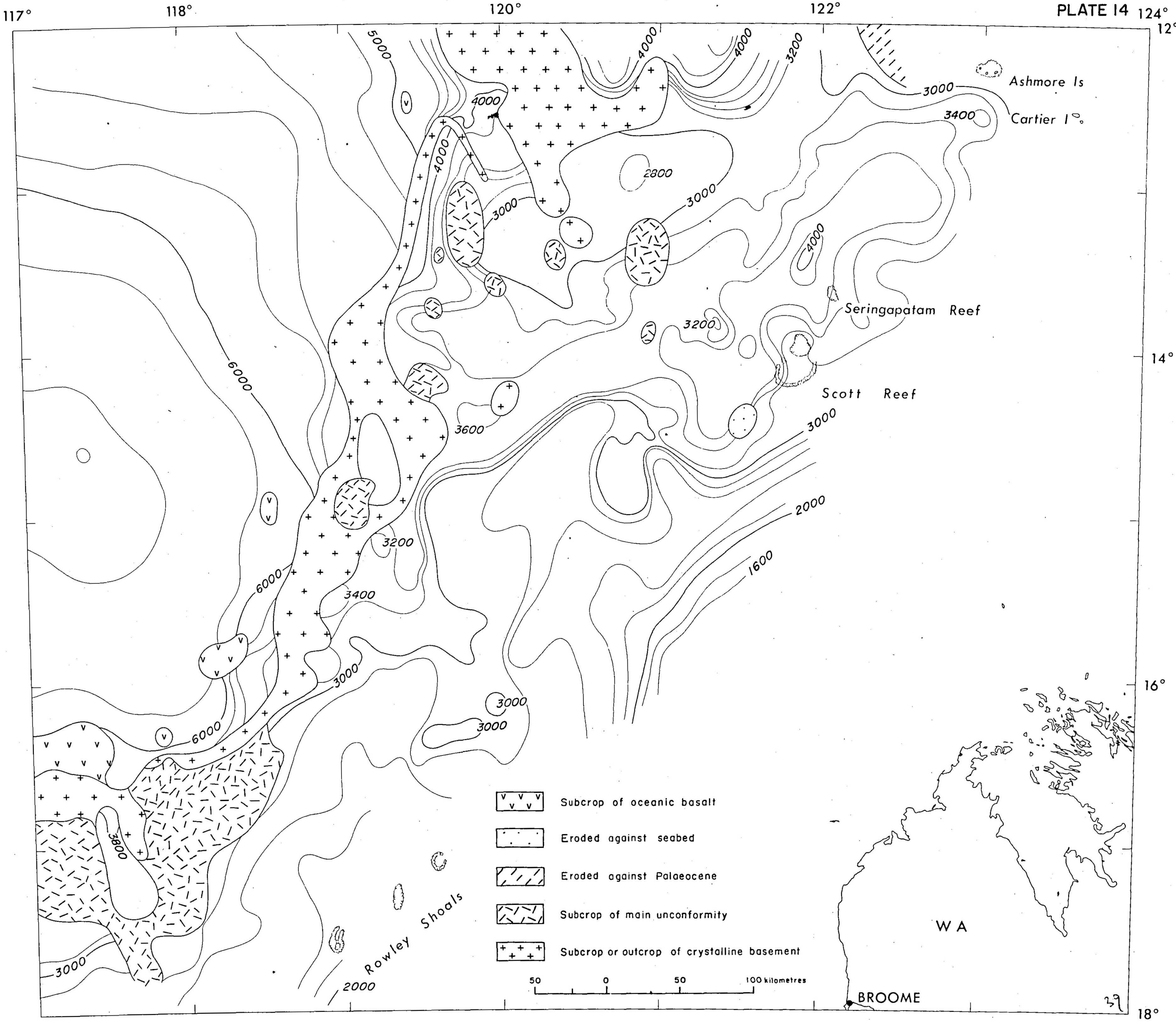
PLATE 12



Oligocene structure map - depth to Horizon A (metres)

WA/B8-222

Base Tertiary structure map – depth to Horizon B (metres)

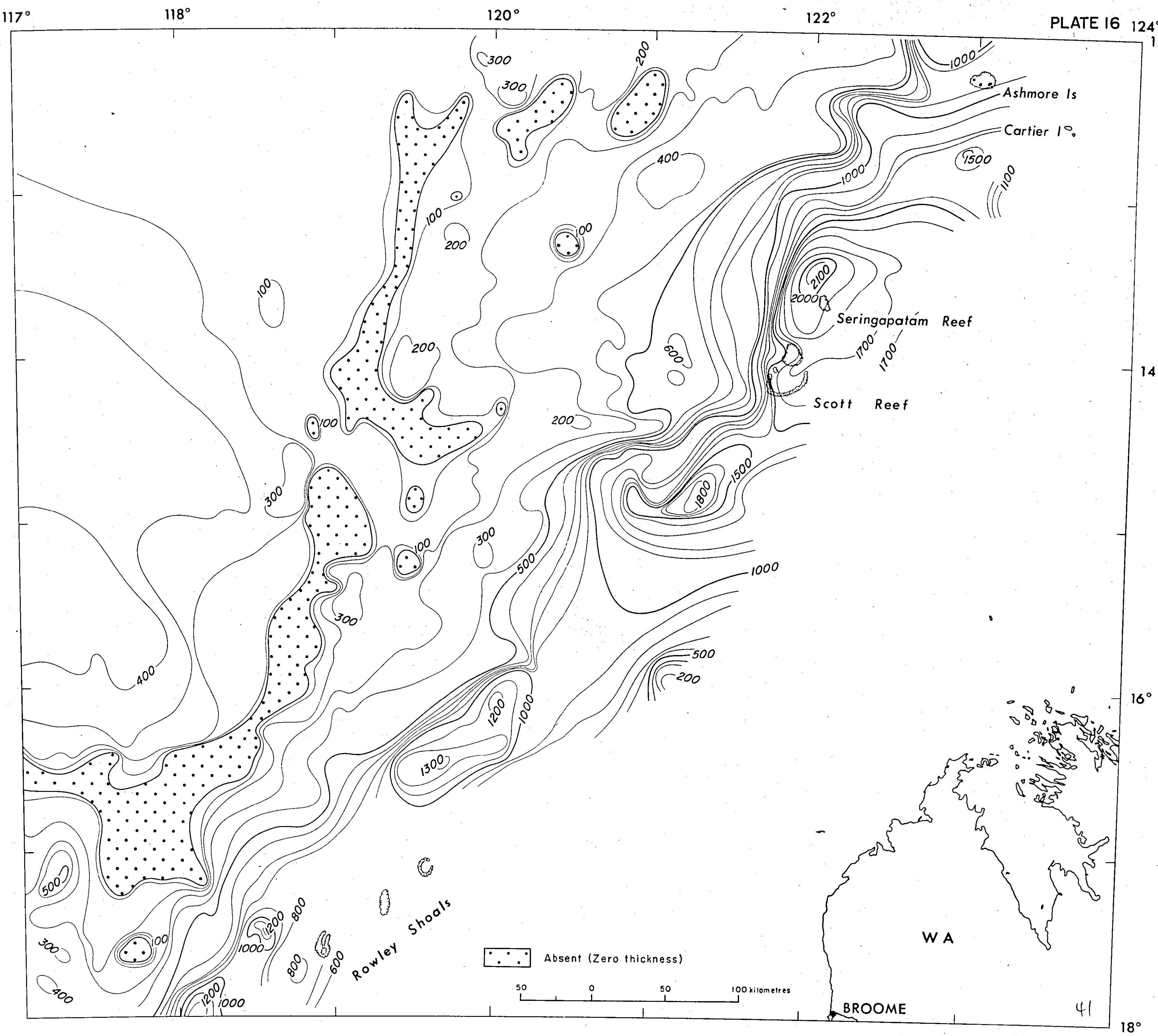


Record 1977/43

Upper Cretaceous structure map – depth to Horizon C (metres)

WA/B8-224

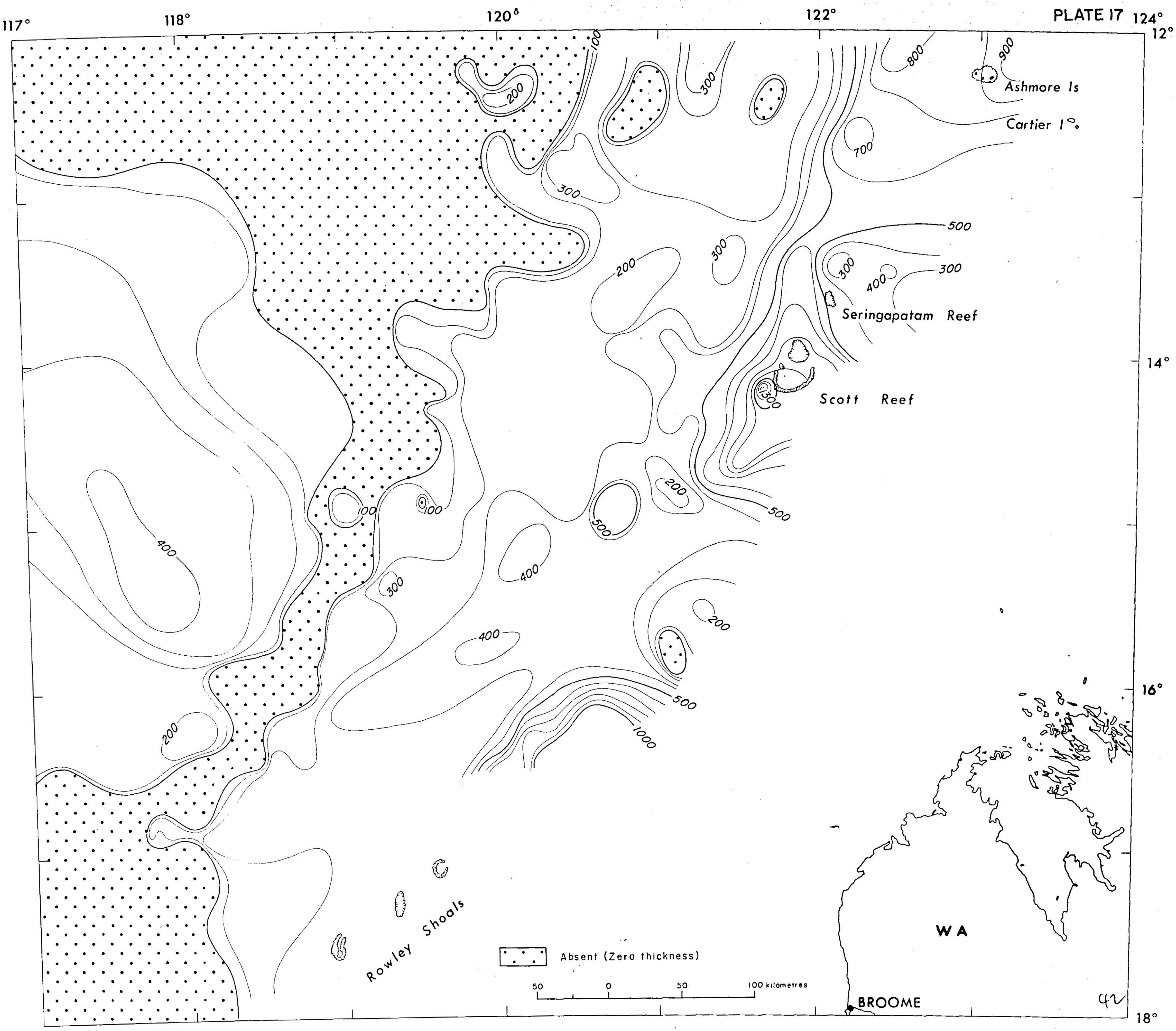
Breakup unconformity structure map (generalised) - depth to Horizon E (metres)



Post Oligocene isopach (post-A)

Record 1977/43

WA/B8-226



Generalised Eocene isopach (B-A)

Record 1977/43

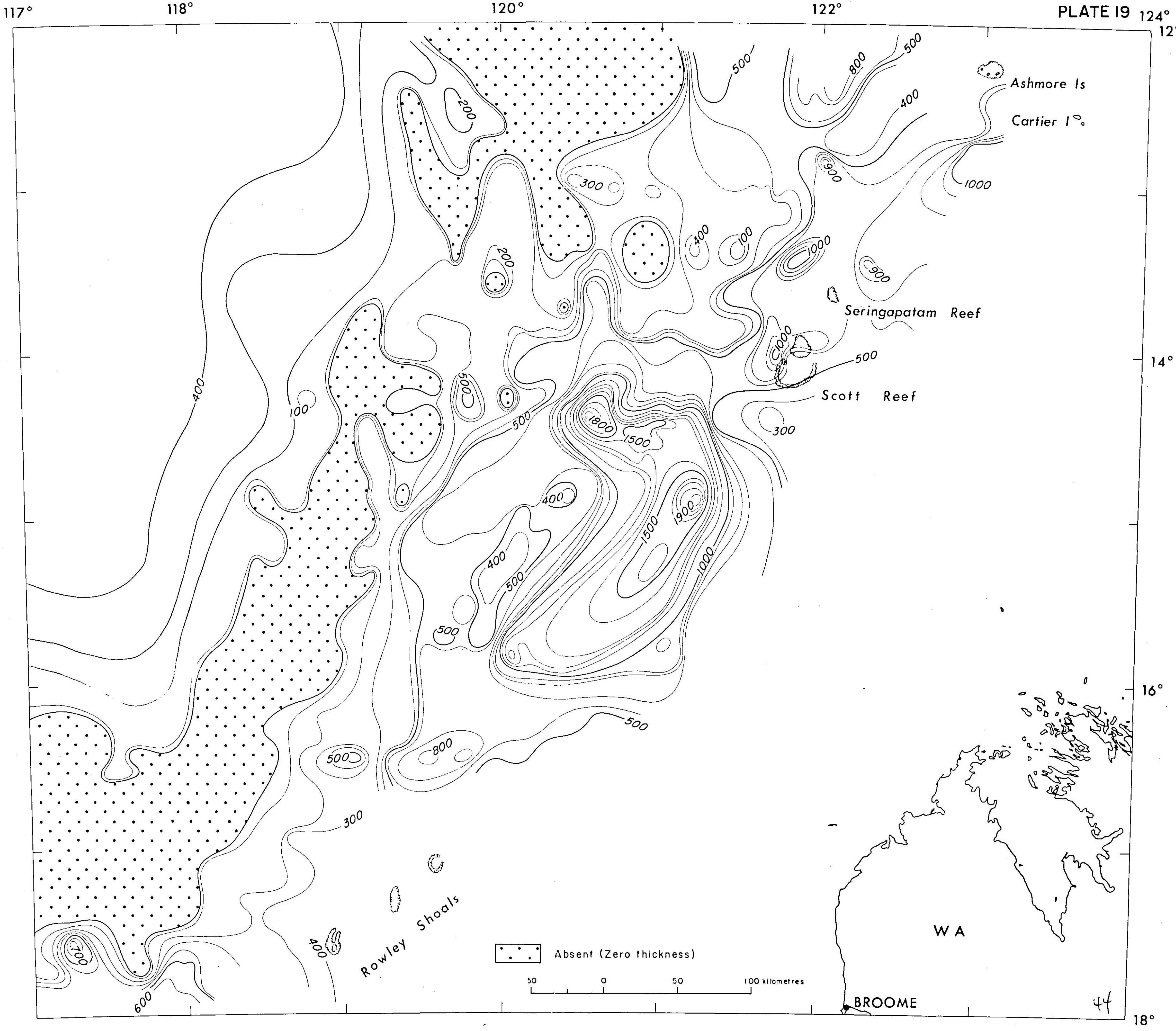
WA/B8-227

Record 1977/43

Generalised Upper Cretaceous isopach (C-B)

WA/B8-228

PLATE 19



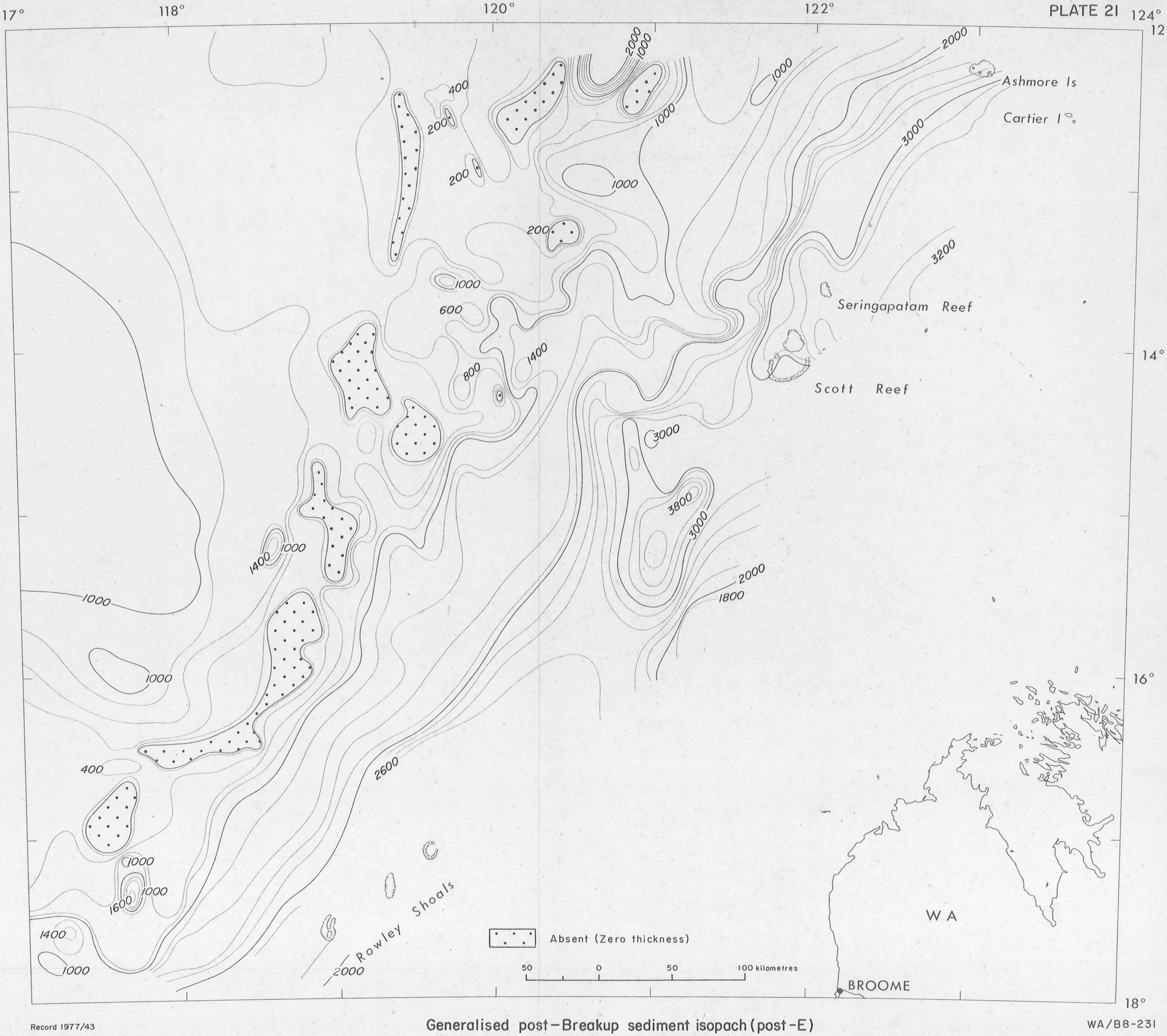
Generalised Upper Jurassic–Upper Cretaceous isopach (E–C)

Record 1977/43

WA/B8-229

Generalised Carbonate sequence isopach (post-C)

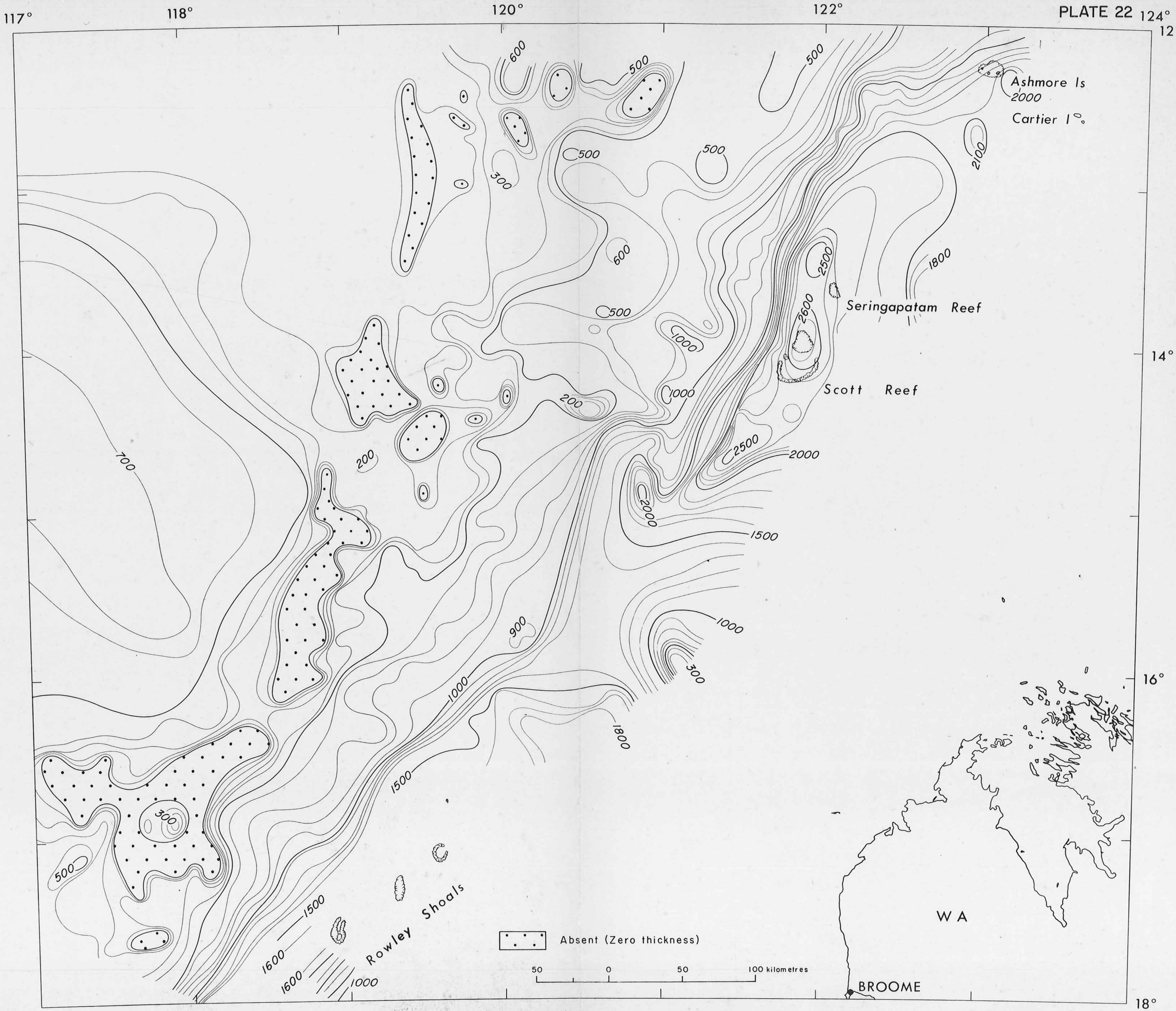
WA/B8-230



Record 1977/43

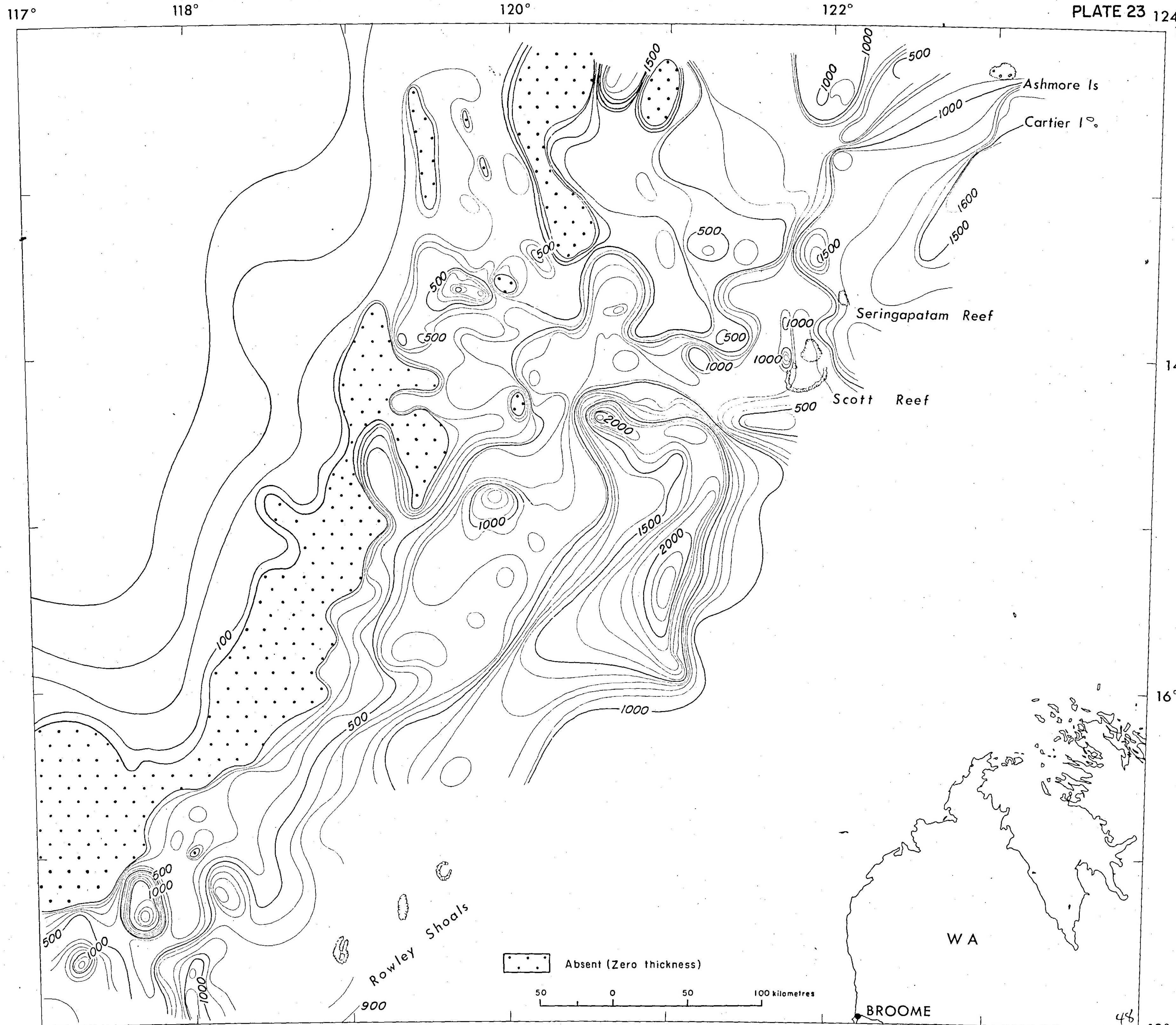
Generalised post-Breakup sediment isopach (post-E)

WA/B8-231



Tertiary isopach (post-B)

PLATE 23



Upper Jurassic – Cretaceous isopach (E–B)

Record 1977/43

WA/B8-233

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