OCEAN DRILLING PROGRAM

LEGS 122 AND 123 SCIENTIFIC PROSPECTUS

EXMOUTH PLATEAU AND ARGO BASIN

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INTRODUCTION

Northwestern Australia from the Exmouth Plateau to the Scott Plateau forms one of the oldest oceanic margins in the world (155 Ma), with a relatively low sediment influx and a large biogenic component (Fig. 1). It is an ideal margin for comprehensive and integrated sedimentologic, biostratigraphic, paleobathymetric, and subsidence studies. Two Ocean Drilling Program (ODP) legs are planned in this area: Leg 122, to drill a transect of three or four sites across the Exmouth Plateau, and Leg 123, to drill one site on the northern Exmouth Plateau and one site on the Argo Abyssal Plain (Fig. 2).

The Exmouth Plateau off northwestern Australia is about 600 km long and 300-400 km wide with water depths ranging from 800 to 4000 m (Fig. 1). The plateau consists of rifted and deeply subsided continental crust covered by a Phanerozoic sedimentary sequence about 10 km thick. It is separated from the Northwest Shelf by the Kangaroo Syncline, and is bound to the north, west and south by Jurassic oceanic crust of the Argo, Gascoyne and Cuvier abyssal plains. The Canning and Carnarvon Basin sediments extend over the plateau from the east and abut the Pilbara Precambrian block (Exon and Willcox, 1978, 1980; Exon et al., 1982; Exon and Williamson, 1986).

The Argo Abyssal Plain is an extremely flat, about 5.7 km deep, abyssal plain located north of the Exmouth and Wombat plateaus and west of the Rowley Shoals and Scott Plateau (Fig. 1). It is underlain by the oldest (Late Jurassic M-26) oceanic crust known in the Indian Ocean, crust that is slowly being consumed by the convergence of Australia and the Sunda arc.

The Exmouth Plateau-Argo Abyssal Plain transect will be the first Mesozoic, sediment-starved passive margin to be studied since 1985 when JOIDES Resolution drilled the Galicia margin (Leg 103; Boillot, Winterer, et al., 1986). Australian margins are characterized by large marginal plateaus with broad continent/ocean transitions and a different paleogeographic, tectonic and climatic setting.

Drilling the Exmouth Plateau-Argo Abyssal Plain transect on Legs 122 and 123 will allow (1) comparison of tectonic and seismic sequences with Atlantic passive margins, (2) improvement of the accuracy of the Mesozoic geological time scale, and (3) characterization of old ocean crust prior to subduction under the Sunda arc.

Exmouth Plateau can serve as an ideal model for an old (120-150 Ma), sediment-starved (less than 1-2 km of post-breakup sediments) passive continental margin with a broad ocean/continent transition. The margin, because of its relatively thin sediment cover, is well suited to study the early-rift, breakup, juvenile and mature ocean paleoenvironmental and geodynamic evolution. The unusually wide marginal plateau between the shelf and the oldest Indian Ocean crust allows study of the structural development of the ocean/continent transition and testing of various tectonic models by geophysical methods and core analysis. The continental margin has drifted about 10° northward since Jurassic time (Johnson et al., 1980) and is associated with a continent which has shed very little terrigenous material. This and the paleo-waterdepths (10-4000 m) make it a prime target for detailed studies of biostratigraphy, sediment facies, paleoenvironment and stratigraphic evolution owing to subsidence and sea level fluctuations during the entire period from the Late Triassic through the Quaternary.

This prospectus was compiled using the drilling proposals by von Rad, Exon, Symonds and Willcox (1984, ODP proposal 121/B); Arthur (SOHP deep stratigraphic test proposal, 1985, ODP proposal 211/B); von Rad, Exon, Williamson and Boyd (1986, ODP proposal 121/B revised); Gradstein (1986, ODP proposal 240/B); and Mutter and Larson (1987 ODP proposal 288/B); and Langmuir and Natland (ODP proposal 267/F, 1986). We also relied heavily on the pre-site survey information in the cruise reports of R/V Sonne cruise SO-8 (von Stackelberg et al., 1980) and Rig Seismic cruises 55 and 56 (Falvey and Williamson, 1986; Exon and Williamson, 1986).

BACKGROUND

Tectonic and stratigraphic background

The geological development of the Exmouth Plateau has been discussed by Falvey and Veevers (1974), Veevers and Johnstone (1974), Veevers and Cotterill (1979), Powell (1976), Willcox and Exon (1976), Larson (1977), Exon and Willcox (1978, 1980), Wright and Wheatley (1979), Larson et al. (1979), von Stackelberg et al. (1980), Falvey and Mutter (1981), Willcox (1982), von Rad and Exon (1983), Erskine (in press), and Mutter et al. (in press). The three Exmouth margins abutting oceanic crust (a sheared or transform margin to the south; a rifted and thinned 125-Ma-old margin to the west; and a 150-160-Ma-old, mixed rifted and sheared margin to the north) were compared and contrasted by Exon et al. (1982). The structure and evolution of the Argo Abyssal Plain have been discussed by Hinz et al. (1978), Heirtzler et al. (1978), Cook et al. (1978), Veevers et al. (1985a), Veevers et al. (1985b), and Audley-Charles (in press).

The present structural configuration of the Exmouth Plateau region was initiated in Triassic to Middle Jurassic time by rifting between northwest Australia, India and possibly South Tibet. The western margin has a normal rifted structure. The southern margin has a transform dominated structure. The complex northern rifted and sheared margin contains at least one crustal block of post-breakup igneous origin.

The northern margin of the plateau formed in Callovian to Oxfordian time (160-150 Ma), when seafloor spreading commenced in the Argo Abyssal Plain (at or slightly before anomaly M-25 time). The northeast-trending seafloor spreading anomaly pattern was initially described by Falvey (1972), basin age was established by DSDP drilling (Veevers, Heirtzler, et al., 1974), and magnetic lineations were mapped by Larson (1975), Heirtzler et al. (1978), and Veevers et al. (1985a, 1985b). Triassic-Jurassic intermediate and acid volcanics (213-192 Ma) on the northern margin, which probably overlie a thick Triassic paralic sequence (von Stackelberg et al., 1980; von Rad and Exon, 1983), are most likely related to initiation of rifting.

Steady subsidence along the incipient northern margin, north of an east-west hinge line, allowed several thousand meters of Lower and Middle Jurassic carbonates and coal measures to accumulate before breakup (Exon et al., 1982). Breakup occurred along a series of rifted and sheared margin segments, the tectonic setting being further complicated by northeast-trending Callovian horsts and grabens. The horsts were reduced in Late Jurassic and Early Cretaceous time, and the whole northern margin was covered by a few hundred meters of Upper Cretaceous and Cenozoic pelagic carbonates, as it subsided to its present depth of 2000-5000 m (Figs. 3 and 4).

Throughout the Jurassic, pre-breakup rift tectonics affected the entire northeast-trending western margin of the Exmouth Plateau (Falvey and Mutter, 1981). Breakup occurred in the Neocomian, approximately 110 Ma, as "Greater India" moved to the northwest and seafloor spreading anomalies started to form in the Gascoyne Abyssal Plain (Exon et al., 1982). Normal faults parallel this margin. A thick Triassic paralic sequence is unconformably overlain by a thin, Upper Jurassic marine sequence indicating that the area was elevated in the Early and Middle Jurassic. Thin Upper Cretaceous and Cenozoic pelagic carbonates cover the western margin, which now lies more than 2000 m below sea level (mbsl) (Figs. 3 and 4).

The northwest-trending southern margin of Exmouth Plateau formed along an incipient transform in the Neocomian, about the same time as the western margin (Exon et al., 1982). It is cut by northeast-trending normal faults, which formed in the Late Triassic and mid-Jurassic (Callovian), and is paralleled by Early Cretaceous (Neocomian) and later normal faults. A thick Triassic paralic sequence on this margin is unconformably overlain by a thick Neocomian delta (Barrow Delta). This suggests that the area was high in the Early and Middle Jurassic, but received sediments before and afterward. There was thermal uplift of more than 1000 m during the Neocomian. Later normal faulting lowered the outermost margin, and turned the uplift into a northwest-trending marginal anticline. The anticline sank beneath the sea in the Late Cretaceous, and thereafter this margin was covered by a thin sequence of pelagic carbonates, which now lie at 1500 mbsl (Fig. 3).

Available data

Von Stackelberg et al. (1980) reported the results of 30 dredge hauls from the outer slopes of the Exmouth Plateau, mostly from the northern margin (R/V Sonne cruise SO-8). More than half contain Jurassic and Triassic pre-breakup shallow-water sediments. Four dredges also contain acid volcanic rocks dated at about the time of rift onset (Triassic/Liassic boundary). This suggests limited continental crustal anatexis at the site of the later continent/ocean boundary.

In 1986 the Australian Bureau of Mineral Resources (BMR) conducted research surveys in the Exmouth Plateau area (Falvey and Williamson, 1986; Exon and Williamson, 1986) to prepare for ODP Legs 122/123 drilling. These included:

a. a two-ship multichannel seismic cruise on the central and southern plateau margin using R/V Rig Seismic and R/V Conrad with expanded-spread and wide-angle CDP seismic profiling techniques. These methods provided reflection and refraction data valuable in interpreting deep crustal

structural data;
b. regional multichannel seismic reflection data collected on the northern and western plateau margins, as well as detailed site surveys for proposed sites EP2A, EP9F, EP10A, EP11B, and AAP1B;
c. a heatflow survey of the central plateau; and
d. dredging and coring on the northern plateau margin. Representative samples of all Mesozoic and younger sequences shown in Figure 4 were recovered and can be tied into the seismic stratigraphy of Exon et al. (1982) and correlated with the facies of the Sonne SO-8 dredge results. The dredges included uppermost Triassic volcanics and shelf carbonates, Lower and Middle Jurassic shelf carbonates and coal measure lithologies, Lower and middle Cretaceous shallow-marine sandstones and marine radiolarian mudstones, Upper Cretaceous and Cenozoic chalks, marls and pelagic oozes (von Rad et al., in press).

Exploration wells have been drilled on the Exmouth Plateau by Phillips, ESSO and BHP (Fig. 2; Barber, 1982). They resulted in several non-commercial gas finds. The lack of oil finds has resulted in the cessation of industry drilling exploration on the plateau. Well logs and sidewall cores collected from these industrial wells were used in site selection and are available to aid in the correlation between seismic lines and ODP drill sites. Of special importance for proposed site EP7V is the information from Vinck-1, and for proposed site EP12P information from Eendracht-1 (Table 1).

Three DSDP sites were drilled during Leg 27 in the vicinity of Exmouth Plateau (Veevers, Heirtzler, et al., 1974; Veevers and Heirtzler, 1974; Veevers and Johnstone, 1974; Table 1):
a. Site 261 in the Argo Abyssal Plain (580 m total penetration [TP]), bottoming in Oxfordian nannofossil claystone overlying oceanic crust;
b. Site 260 in the Gascoyne Abyssal Plain (323 m TP), bottoming in Albian radiolarian claystone and nannofossil ooze overlying oceanic crust; and
c. Site 263 in the Cuvier Abyssal Plain (746 m TP), bottoming in Albian-Hauterivian shallow-water quartz-rich silty claystone.

All these sites were spot-cored, recovering only 18-22% of the total section.

Exmouth Plateau has been extensively studied by both geological (commercial wells, dredges, some cores) and geophysical methods. Today the plateau has one of the densest seismic grids on any passive continental margin. Seismic control consists of 12,000 km of data from the 1972 BMR continental margin survey, 9300 km of additional industry seismic data collected in 1976 and 1977 (Wright and Wheatley, 1979) and 30,000 km of subsequent petroleum industry seismic data.

A great number of qualitative and semi-quantitative evolutionary models for passive continental margins have been proposed (Falvey, 1974; Mauffret and Montadert, 1987; Lemoine and Trumpy, 1987). The mechanism of continental margin formation has been described in terms of models which relate cycles of uplift and subsidence to the thermal evolution of continental and oceanic lithosphere (Falvey, 1974). Recently, Mutter et al. (in press) discussed results of a two-ship seismic reflection and refraction experiment on Exmouth Plateau by Lamont-Doherty Geological Observatory and BMR. They identify large rotated blocks, bounded by deeply penetrating normal faults under the outer plateau, and a set of prominent, subhorizontal, mid-crustal detachment faults under the central plateau. They infer that the deformation at the outer plateau (near proposed site EP12P) by lithospheric thinning and "pure shear" (high-angle normal faults, McKenzie-type stretching) postdates the "thin skinned" deformation with "simple-shear" detachment systems (Wernicke-type deformation) under the central plateau (area of proposed site EP7V).

Paleogeographic evolution

The stratigraphy of Exmouth Plateau and Argo Abyssal Plain, as it is currently known, is outlined in Figure 4; the paleogeographic and plate tectonic evolution are sketched in Figures 5 and 6, respectively. Stratigraphic studies have been carried out by Apthorpe (1979), Crostella and Barter (1980), von Stackelberg et al. (1980), Colwell and von Stackelberg (1981), Sarnthein et al. (1982), and von Rad and Exon (1983). Paleontologic and biostratigraphic studies include those by Quilty (1980a, 1980b, 1981), Zobel (1984), and von Rad et al. (in press).

The sediments beneath Exmouth Plateau have been deposited in an extension of the Carnarvon Basin, which formed a north-facing Tethyan embayment in Gondwana and received detrital sediments from the south until Early Cretaceous time (Figs. 5 and 6). In the central plateau region, at least 3000 m of mainly paralic and shallow-marine detrital sediments were deposited from Permian to Middle Jurassic times. After the Late Triassic rifting, about 1000 m of shallow-marine and deltaic detrital sediments, derived from the south and east, covered the Late Jurassic and Early Cretaceous block-faulted surface. About 200 m of hemipelagic shallow-marine sediment was deposited in the middle Cretaceous, followed by 500-1000 m of Late Cretaceous to Cenozoic eupelagic carbonate sediment. The Exmouth Plateau Arch and Kangaroo Syncline probably warped to their present form during the Miocene (Exon and Willcox, 1978, 1980), by which time the central plateau had subsided to bathyal depths (Barber, 1982).

The northern Exmouth Plateau experienced a similar post-Cretaceous to Cenozoic evolution to that of the central plateau (Fig. 4). However, 1-3 km thick Lower Jurassic shelf carbonate and middle Jurassic coal measure sequences were deposited north of the "North Exmouth hingeline" during a time when the central Exmouth Plateau area was being eroded. The breakup at about 150 Ma (Callovian-Oxfordian) on the northern margin was about 40 m.y. earlier than at the central plateau.

A break-up triple junction, postulated between greater India, south Tibet-Burma and northwestern Australia, including Timor, led to a young oceanic graben that had subsided to abyssal (ca. 2.5 km) depth in (?)Callovian and Oxfordian time, when oceanic spreading started (Fig. 6). Until the middle Cretaceous, over 500 m of calcareous claystone accumulated, presumably derived from the southeast during continued oceanic subsidence. Since then, over 400 m of zeolitic clay, siliceous clay and calcareous ooze turbidites have been deposited on the sediment-starved abyssal plain. Convergence of "Sundaland" and Australia led to collision in the late Neogene and to consumption of the Argo ocean floor under the Sunda arc.

DRILLING OBJECTIVES OF LEGS 122 AND 123

The plan to drill a complete Exmouth-Argo transect during Legs 122 and 123 is a major, integrated scientific venture, where extensive interaction between both scientific parties is critical to the success of the cruises. During Legs 122 and 123, we intend to drill a depth transect of five to seven holes (EP2A, EP7V, EP9E or EP9F, EP10A or EP11A, EP12P, AAP1B, and AAP2) from the central Exmouth Plateau (water depth 1354 m) to the Argo Abyssal Plain (water depth 5740 m) (Fig. 2). The following is a list of the major objectives to be addressed at these sites:

1. To understand the Late Triassic-Jurassic pre- and syn-rift history and the rift-drift transition in a starved passive continental margin setting (EP7V, EP10A, EP9E, EP12P, EP2A).
2. To determine the geochemical and physical characteristics of the oldest Jurassic Indian Ocean crust (AAP1B) and the bulk geochemical composition as a reference section for understanding global geochemical fluxes at subduction zones (Fig. 7).
3. To study the Late Jurassic-Early Cretaceous to Cenozoic post-breakup development of sedimentation and paleoenvironment from a juvenile to a mature ocean (EP7V, EP12P, EP2A, EP9E, AAP1B).
4. To study the temporal and spatial distribution of Jurassic, Cretaceous and Tertiary sequence stratigraphies in order to evaluate the effects of basin subsidence, sediment input, and sea level changes in an almost complete, undisturbed, classic passive margin section (EP7V, EP10A, EP12P, EP9E).
5. To refine the Mesozoic geological time scale (magneto-bio-chemo-stratigraphy) (EP7V, EP12P, EP10A, AAP1B, AAP2).
6. To investigate Middle Jurassic and middle Cretaceous anoxic sedimentation in terrigenous, shallow-water marine and deep-marine environments (EP7V, EP12P, EP2A, EP9E, EP10A, AAP1B, AAP2).
7. To document Cretaceous/Tertiary boundary stratigraphy (EP7V, EP12P, EP9E).
8. To completely log AAP1B, including standard Schlumberger logs and hydrofracture, VSP, BHTV, and magnetic susceptibility experiments.

Late Triassic/Jurassic pre- and syn-rift history and the rift-drift transition

Starved passive margins are ideally suited for investigating the early stages of passive margin evolution before, during and shortly after the initial breakup of Gondwanaland. An excellent area to study the early-rift, late-rift and rift-drift transition phases by moderately deep drill holes is the uplifted horsts at the northern Exmouth Plateau margin, e.g., the Wombat Plateau (proposed site EP10A). We expect that the paleogeography, paleoclimate and paleoceanography of the Late Triassic to Late Jurassic rift-stage can be reconstructed in great detail from coring and logging at this site. These data will complement existing seismic and dredge data that have have shown the following:

a. During Late Triassic time terrigenous (fluviodeltaic) sedimentation alternated with shallow-marine (Carnian to Rhaetian) incursions from the Paleotethys or Panthalassa Ocean located to the north (Yeates et al., 1986).
b. Early rifting started around Late Triassic/Early Liassic time with major

block-tectonic movements owing to lithospheric thinning.

c. At the same time (213-192 Ma), 300 m of early-rift volcanics (alkali rhyolite and trachyte) were extruded along the northern Wombat Plateau margin.
d. A transgressive Liassic shallow-water carbonate sequence (lagoonal to mid-shelf and subtidal bank facies) followed.
e. The Middle Jurassic is characterized by a regressive "coal measure sequence" with paralic, carbonaceous, silty claystone, thin coal stringers, siltstone, sandstone, and a "ferruginous association" (clayey and sandy ironstones, ferruginous concretions and ironstone breccia), documenting an emergence of the coal measures and weathering during desert conditions.

Oldest Indian Ocean crust at proposed sites AAP1B (Callovian-Oxfordian?) and EP2A (Neocomian?)

AAP1B is located on the oldest oceanic basement in the Indian Ocean (>M-25 anomaly time). Volcanic rock drilled at this site, in addition to that drilled on DSDP Leg 27, will be used to evaluate the geochemistry of the Indian Ocean basement relative to that formed at presently active ridges in the Indian Ocean. Normal oceanic crust in the Indian Ocean is distinct in geochemical composition from that of the Pacific and Atlantic oceans (Ito et al., 1987). Drilling at this site will allow us to determine whether these differences are preserved in the oldest Indian Ocean crust.

The transition from rifted passive margin volcanism to ocean-ridge volcanism is poorly understood. Ancient analogues indicate changes from picritic volcanics to low-Mg tholeiites in comparable tectonic environments (e.g., Francis et al., 1984). The presence of hotter mantle associated with the initiation of oceanic volcanism should be reflected in thicker and geochemically characteristic oceanic crust. Site EP2A at the foot of the Exmouth Plateau and Site AAP1B offer a unique possibility for evaluating volcanism at this important tectonic transition.

Late Jurassic/Early Cretaceous to Cenozoic post-breakup development of sedimentation and paleoenvironment from a juvenile to mature ocean stage

Exmouth Plateau is characterized by a <1-2 km thick, sediment starved sequence of post-breakup sediments which will be penetrated at most of our drill sites. The hemipelagic sequence of the "juvenile ocean stage" (radiolarian mudstones, glauconitic shales, siltstone and marls) of Late Jurassic to Albian/Cenomanian age, are overlain by post-Cenomanian "mature ocean stage" pelagic carbonates (marls and chalks). The paleoenvironment and paleobathymetry of this sequence can be reconstructed from detailed litho- and biostratigraphic studies of these strata and will, we hope, allow us to infer the paleobathymetric evolution, the burial history and the tectonic and loading subsidence.

The accuracy of the determination of subsidence history depends on the quality of biostratigraphic control, its correlation with an absolute time scale and on the accuracy of paleodepth indicators. On the central Exmouth Plateau (EP7V, EP12P) we expect favorable conditions for biostratigraphic dating and paleodepth control, and few hiatuses, at least for the post-Aptian to Cenozoic history. We plan to compare the differential subsidence and paleobathymetric development in a complete depth transect across this continental margin, from Sites EP7V (upper plateau), to EP12P and EP10A (outer plateau) to EP2A (foot of western plateau) and to AAP1B (abyssal plain).

Mesozoic-Cenozoic sequence stratigraphy and its relation to basin tectonics, sediment input and global sea level changes

On the central Exmouth Plateau (Sites EP7V and EP12P) we expect few hiatuses and the opportunity to study the Cretaceous and Cenozoic eustatic sea-level curve (Vail et al., 1977; Haq et al., 1987) in an almost complete, undisturbed continental margin section. We should be able to correlate sequence boundaries in great detail between Sites EP7V, EP12P, and the nearby commercial wells (Vinck-1 and Eendracht-1, respectively) to tie them to the well-established seismic stratigraphy, documented by the dense commercial MCS grid existing in this area and to separate "global" from regional events. This correlation should make it possible to separate stress-induced tectonic (subsidence or uplift) and deposition-related (e.g., delta progradation) influences from a eustatic sea-level signal (Erskine, in press) at different positions across the passive margin. This exercise is aided by the completeness of an open-marine Cretaceous-Tertiary sequence with good stratigraphic control, moderate sedimentation rates (especially in the Lower Cretaceous), a simple subsidence and regional tectonic history, and relatively uniform pelagic deposition. It is important to study the Mesozoic-Cenozoic stratigraphy in an area outside the circum-Atlantic realm, a setting which so far has dominated our thinking on mechanisms underlying Vail's third-order cycles.

Mesozoic geologic time scale (magneto-biostratigraphy) and cyclic sedimentation pattern

At present, magnetic reversals linked with Tethyan ammonite zones sampled in condensed land sections (Ogg and Steiner, 1985) form the basis underlying bio-magnetochronology of the Late Jurassic/Early Cretaceous time scale (Kent and Gradstein, 1985). There is a lack of standardization within the biostratigraphy and a lack of correlation between biostratigraphic and magnetic reversals in time, as observed in open-marine sedimentary sections.

We expect the Argo and Exmouth sites to furnish important new stratigraphic data that relate the magnetic reversal sequence to standard radiolarian, nannofossil, foraminifer and dinoflagellate zonations for mid-latitudes. For example, better ties are needed for M-24/M-25 in the Oxfordian-Kimmeridgian (Gradstein, 1983), M-16, and M-10. This will assist in the recalibration of the marine M-series to chronostratigraphy.

An important aspect of sequence stratigraphy is the question of rhythmic sedimentation. Rhythmic couplets often characterize the early phase of post-rift sedimentation in Mesozoic Atlantic basins. The laminations result from a variety of sedimentary phenomena, and may be due to combined changes in surface productivity, influx of organic matter and intensity of bottom circulation, all affecting episodic oxygen depletion at the sediment/water interface. Some studies (e.g., Ogg et al., 1987) suggest a global significance of the rhythmicity, possibly driven by climate with a periodicity reminiscent of Milankovitch-type cycles and hence a potential correlation with global eustatic cycles. Preliminary data from DSDP Site 261 indicate carbonate banding of the Cretaceous brown claystones, which may reflect rhythmic sedimentation. Sediments recovered during Legs 122 and 123 will allow us to see if such a pattern can be correlated from the Argo Abyssal Plain (AAP1B) to the Wombat Plateau (EP9E, EP10A) and the Exmouth Plateau proper (EP7V, EP12P), thus reflecting a supra-regional (global) mechanism.

Testing the eustatic model

The new sea-level curve (Haq et al., 1987), as was pointed out during the COSOD Meeting (COSOD II Report, 1987, p. 39), is largely based on stratigraphic evidence from Europe and North America. To test the curve (i.e., to separate the tectonic from eustatic signal) requires documentation from passive margins away from these areas. Especially needed are data from margins that have different tectonic/subsidence histories to eliminate any coincidence of events from tectonics. COSOD recomended drilling transects off Australasian continental margins.

Exmouth Plateau drilling provides a near-ideal opportunity to carry out such a test off a margin with known tectonic/subsidence history, an excellent stratigraphic record and an extensive grid of seismic and well-log data which will ensure the separation of local and regional/global signals. Proposed sites EP7V, to be drilled near industry well Vinck-1, and EP12P, near well Eendracht-1, as well as the more "oceanward" sites of EP10A and EP9E or EP9F, represent a transect of sites ranging from the edge of the Lower Cretaceous "Barrow" Delta to more basinward locations whose Mesozoic-Cenozoic record can be compared with the "oceanic" record of proposed sites AAP1B and AAP2.

The existing high-density grid of industry data in the area will also ensure a multidisciplinary approach to test the eustatic model, by access to seismic, well-log and biostratigraphic data that can be combined with the magnetic-, isotopic-, and detailed biochronostratigraphic data from the proposed sites, leading to accurate subsidence modeling and sequence mapping on a regional extent.

Determining the bulk geochemical composition of the oldest Indian Ocean crust as a reference section for understanding geochemical fluxes at subduction zones

The extent to which sediment and altered oceanic crust are recycled during the subduction process is a fundamental problem to the understanding of arc magma petrogenesis. There may be substantial amounts of sediment and oceanic crust involved in their genesis, of varying compositions (Fig. 7) (e.g., Hole et al., 1984; Tera et al., 1986).

There are few data on the composition of old altered oceanic basement, its interaction with the overlying sediments and the bulk geochemical composition of the sediments near subduction zones. One of the objectives of proposed site AAP1B will be to obtain a complete geochemical reference section of the sedimentary sequence and about 300 m of basement, in order to determine the bulk composition of oceanic crust being subducted in the

Java trench, and as a global reference site for "crust/mantle interaction at compressive plate margins," as described by Working Group 2 of COSOD II (1987).

Logging program

Leg 122. Our understanding of the early sedimentation, subsidence history, testing of the global sea-level curve, and the cyclicity of sedimentation at proposed Exmouth Plateau sites will be greatly improved by collecting Schlumberger log data. Measurement of continuous downhole porosity and mineralogy for backstripping studies and for estimation of paleodepth will require running the lithoporosity and geochemical combination tools. Investigating sedimentation history, in particular the development of the breakup unconformity in the young Tethys Ocean, will require an accurate seismic-stratigraphic correlation, necessitating use of the seismic stratigraphic log combination. High vertical resolution microresitivity tools in this combination will also yield finer resolution of Milankovitch cycles in the sedimentary sequence.

Leg 123. The major focus of logging as well as drilling on Leg 123, will be at proposed site AAP1B on the Argo Abyssal Plain. Most of the objectives at this site can be addressed by logging with five tool combinations, plus a vertical seismic profile. For subsidence studies and the sedimentation history of the deep basin, the lithoporosity and geochemical combinations will allow porosity and mineralogy information to be extracted. The petrology of the crust will also be addressed with these tools. A televiewer/magnetometer log would measure the fracture network and magnetic reversal history of old oceanic crust. Hydrofracture experiments will allow us to determine stress directions in this complex area. The influence of structure in the crust (and indurated sediments) on local hydrothermal cells could be studied with respect to the temperature gradient in the well, measured during one of the Schlumberger standard logging runs. Finally, as a primary objective of the site is stratigraphy, data collected from the seismic stratigraphy combination tool will be applied directly to the correlation of sedimentary sequences and seismic profiles.

At proposed site EP9E on the Wombat Plateau, also scheduled for drilling on Leg 123, the three standard Schlumberger tool combinations will be run.

Site objectives

EP2A is located at the foot of the western escarpment of the Exmouth Plateau and is underlain by either oldest Gascoyne Abyssal Plain oceanic crust or by "transitional" crust, i.e., continental crust alternating with volcanic flows and sills extruded or intruded during breakup, when magmatic underplating and upwelling of the asthenosphere occurred owing to the extreme thinning of the continental crust to 20 km (Mutter et al., in press). At EP2A we should be able to learn more about "transitional" type basement and to test stretching and subsidence models for rifting and the subsequent evolution leading to marginal plateau formation. We can also study the nature of the pre-breakup facies (sediments and/or volcanics), the paleobathymetric evolution and the transition of the rift stage into a juvenile ocean stage in a setting close to the ocean/continent boundary.

At proposed site EP2A (and at proposed sites EP10A and AAP1B; see below), coring and logging will allow us to address the following questions:

a. How and when did rifting start and what was the paleoenvironment before and after this important geodynamic event (climate, paleogeography, water depth)?
b. What are the age, nature and geodynamic implications of the important early-rift volcanic episodes?
c. What were the subsidence rates after this rifting event and when did Tethys-type shallow-water sediments and faunas first appear?
d. What were the paleoenvironmental and depositional conditions during Middle Jurassic time and were restricted organic-rich black shales deposited in the rift grabens at the same time that coal swamps covered the coastal plains?
e. How distinctly can the transition from a Middle Jurassic rift facies to an Upper Jurassic early post-breakup facies be dated, and what was the paleoenvironment (paleo-waterdepth, climate, etc.) before, at and after this event?
f. How can the breakup unconformity be explained (uplift and erosion or eustatic sea-level fluctuations) and how can this unconformity and the overlying facies be correlated with the formation of oldest oceanic crust and sediments in the nearby Argo Abyssal Plain site (AAP1B) after continental breakup, onset of seafloor spreading and accretion of oldest Indian Ocean crust?
g. How fast was the subsidence during the first 30-40 m.y. of the "juvenile ocean stage" (Oxfordian to Neocomian)?
h. Can the tectonic development of Exmouth Plateau between the breakup in the north (Callovian) and the breakup at the central plateau (Aptian) be correlated?
i. Can the Jurassic to Lower Cretaceous stratigraphic evolution be explained by tectonics and/or eustatic sea-level fluctuation and can both factors be separated?
j. Can we correlate a Tethys-type shallow-water marine Jurassic carbonate facies from proposed sites EP7V and EP10A down to the equivalent deep-water oceanic carbonates at proposed site AAP1B?

EP7V is the primary site on top of Exmouth Plateau (Figs. 2 and 3). It will provide an almost complete, condensed (Lower Cretaceous to Neogene) section and a test of the Cretaceous global sea level curve in the classic type section of the Barrow Delta (Erskine, in press). The overlying middle to Upper Cretaceous strata are important for understanding the differential subsidence history between the plateau and the outer margin (depth transect). Tectonically, the deeper structure of this site is characterized by "thin-skinned" extension during very slow subsidence (Mutter et al., in press). At proposed sites EP7V and EP12P on the central Exmouth Plateau, we have the opportunity to study the thick, northward prograding Barrow Delta (latest Jurassic to Valanginian)--a typical "Wealden-type" facies--and the overlying, condensed, marginal- marine Hauterivian to early Aptian sequence. "Breakup" (i.e., onset of seafloor spreading in the nearby Gascoyne and Curvier abyssal plains) in the area is probably not indicated by an unconformity, but by a distinct facies change toward more pelagic sedimentation, the "juvenile ocean stage."

EP9E is located on the top of the Wombat Plateau, a sub-plateau of the northern Exmouth Plateau that already experienced breakup in Callovian time and block faulting in Late Cretaceous time (Fig. 3). It serves as a companion site to EP10A which will sample the older section of the plateau. At EP9E we expect to core Lower Cretaceous through Cenozoic sediments which show excellent onlap sequence and megasequence boundaries. Together with EP10A, this site will detail the dynamic stratigraphic evolution of this margin as a function of classic passive margin extensional factors and assist in explaining sequence stratigraphy and time scale studies.

EP10A is located on the top of the Wombat Plateau (Figs. 2 and 3). It provides the best opportunity to sample Upper Triassic to Jurassic (to lowermost Cretaceous) pre- and syn-rift sediments, as well as to study the early post-breakup history. The upper part of this section (Lower Cretaceous to Neogene) will be recovered at companion site EP9E). Dredge data from the nearby escarpment indicate that much of the sequence is shallow marine and will provide an excellent record of rift-stage sedimentation, Tethyan faunas, and eustatic sea level fluctuations of the Late Triassic to Jurassic (von Stackelberg et al., 1980; von Rad et al., in press). Proposed sites EP10A and EP9E are also important for the determination of the tectonic evolution, subsidence history, and paleoenvironmental development during the early stages of margin deformation and for the correlation of these properties with Leg 123 proposed site AAP1B in the Argo Abyssal Plain.

EP11B is located on a spur between the deeply incised Swan and Cygnet submarine canyons, about 200 km east of Site EP10A (Fig. 2). It is an alternate to Site EP10A with a similar stratigraphic section and identical objectives.

EP12P is located on the outer part of the central plateau north of Site EP7V and close to industry well Eendracht-1 (Figs. 2 and 3). The main objectives are (1) correlation of Cretaceous-Tertiary global chronostratigraphy and sea-level curve with Site EP7V, (2) evolution from a Lower Cretaceous syn-rift to an Upper Cretaceous to Tertiary post-breakup facies, and (3) timing, duration and amount of subsidence and deformation of the outer plateau margin in a region where the whole crust was deformed by brittle failure (Mutter et al., in press).

AAP1B is in the oldest (southeastern) part of the Argo Abyssal Plain at a water depth of 5740 m (Figs. 2 and 3). The site will core 400 m of Cenozoic and Upper Cretaceous abyssal sediment before penetrating 500 m of Lower Cretaceous to Upper Jurassic calcareous claystone, marlstone, and limestone, and about 300 m of old ocean crust. The objectives for this site are (1) Mesozoic magneto-biostratigraphy and the standard geologic time scale, (2) Mesozoic deep-water paleoecology and paleocirculation, (3) rhythmic sedimentation in pelagic environments, and (4) subsidence history of the ocean basin relative to the adjacent passive margin. It will serve also as a global geochemical reference hole in oceanic crust for investigating magmatic processes at plate margins.

AAP2, also in the southwestern part of the Argo Abyssal Plain, is located slightly northwest of proposed site AAP1B. Its objectives are similar to those of Site AAP1B and it will provide an overlapping section for high-resolution stratigraphy and dating of M-24/M-25.

OPERATIONS PLAN

Leg 122

Leg 122 will drill proposed site EP10A' first (Table 3). There are two scenarios for drilling this site: (1) drill the primary EP10A' site to 1300 m (Triassic) using a free-fall cone; (2) if the Triassic objectives are not reached at that hole, JOIDES Resolution, after logging, will move downslope along seismic line 56/013 and continue drilling. The new site will be located to intersect slightly above the oldest interval recovered at the previous hole. Additional sites will be drilled in this manner until the complete section is recovered. If no gas is recovered at the EP10A sites, a seismic survey of EP9E will then be made and faxed to ODP Headquarters for evaluation of potential safety hazards by the JOIDES Safety Panel (PPSP).

EP2A will be drilled next. A total penetration of 800 m (including 50 m of basement) is planned using the APC and the rotary core barrel (RCB), followed by standard Schlumberger logging. After drilling EP2A, the decision of which site to drill next (EP12P or EP7V) will be made at sea.

EP12P, in response to PPSP concerns, is located approximately 3 km downdip from Eendracht-1, a dry industry well, at shotpoint 2500 on seismic line 79B-1425. Logs, operations information, cuttings and sidewall cores from this well will be available on the ship. After JOIDES Resolution makes a crossing seismic line over the site, we will APC the upper 200 m. After a round-trip of the pipe, the upper part of the hole, already cored, will be washed. The remainder of the hole will be RCB-cored to 940 mbsf (about 50 m above the Dingo Claystone). Standard Schlumberger logging (three runs) will follow.

The preliminary location of Site EP7V is at shotpoint 3508 on seismic line X78-272. EP7V, also in response to Safety Panel concerns, is located 1 km east of Vinck-1, another dry industry well. EP7V is currently located on a structural high. However, well logs from Vinck-1 show that the high-porosity target horizons contained water rather than gas. For safety purposes, the Leg 122 Co-Chief Scientists and Operations Superintendent are to identify a local low using the seismic system aboard JOIDES Resolution, thus assuring that the site drilled is located low relative to the Windalia Radiolarite. This will be done by having the ship pass over the Vinck well. As an additional safety measure, to assure that EP7V is structurally equivalent to the Vinck-1 well and therefore that the Windalia Radiolarite is a wet reservoir, we will APC/XCB (extended core barrel) the hole to between 550 and 600 mbsf. At this depth, the seismic-stratigraphy tool (gamma ray and velocity) will be run. If the shipboard Petroleum Geologist thinks that the stratigraphic datums vary 10 m or less between the two holes, drilling will proceed to 1125 mbsf about 160 m above the Dingo Claystone. If a larger variation should occur, the remainder of the Schlumberger logging suite will be run and the hole terminated.

Leg 123

Leg 123 will first drill proposed site EP9E (if it was surveyed during Leg 122; EP9F will be drilled if EP9E was not surveyed), using the APC in the upper 200 m, and the RCB to a total depth of 1000 m. Standard Schlumberger logs will be run.

The remainder of the leg will be spent at proposed site AAP1B. The upper section will be cored with the APC. A reentry cone will then be set and the RCB will be used to reach 1200 m, which includes 300 m of basement. At the conclusion of drilling an expanded downhole measurements program will be run, including logging, the borehole televiewer (BHTV), hydrofracture and magnetic susceptibility measurements, and a vertical seismic profile (VSP). Proposed site AAP2 is an alternate to AAP1B.

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Site	Approx Lat. S	Approx Long. E.	WD (m)	TD (m)	Cenozoic	Late to mid-Cretac. (inc. Albian Gearle Siltst.)	E. Cretaceous	Jurassic-Triassic
DSDP 260 (Gascoyne Ab. Pl)	16°8.7'	110°17.9'	5702	323	140 m Quat.-? Olig. zeol. (nanno) clay	ca. 80 m Con.-Maastr. nanno ooze, nanno rad ooze	ca. 100 m Albian rad. clay, nanno ooze	10 m + oceanic crust (?Apt./Albian)
DSDP 261 (Argo Ab. Plain)	12°56.8'	117°53.6'	5667	580	ca. 160 m Quat.-U. Mioc. rad clay, nanno ooze	200 m Upper-M. Cretac. brn/gn clayst.	170 m Haut.-Oxford. nanno clayst.	50 m+ oceanic crust (Oxford.?)
DSDP 263 (Cuvier Ab. Pl.)	23°19.4'	110°58.8'	5048	746	ca. 130 m Quat.-Tertiary nanno clay	—	610 m Aptian-Neocom.? black qtzose clayst. (shallow-water)	
VINCK-1 (near EP 7V)	20°35.1'	112°11.6'	1373	4600	ca. 400 m ?marl	—	950 m mainly Barrow delta (Berr.-Val.)	15 m Lt. Jur. Dingo Claystone 45 m Rhaetian marl 1933 m 1873 m + Lt. Triassic Mungarro Fm (sandst.)
ZUIDWOLF-1	21°06.5'	113°37.2'	1194	3500	590 m marl/clayst.	244 m Late Cretac. marl/clayst. 133 m Albian	615 m mainly Barrow delta (sandstone & mudstone)	5 m Rhaetian carbonate 409 m + Lt. Triassic Mungaroo Fm. 504 m (clayst./siltst./sandst.)
EENDRACHT-1 (near EP 12P)	19°54.5'	112°14.6	1353	3410	540 m ?marl	280 m Siltstone, marl (Late-mid-Cretac.)	160 m Muderong Shale and Barrow Group (shale & siltstone)	28 m E.-Lt. Jurassic clayst. 47 m Lt. Triassic marl 1066 m 991 m Lt. Triassic Mungaroo Fm. (sandst.)
INVESTIGATOR 1	20°21.1'	112°58'	841	3746	159 m ?marl	392 m ?marls & siltstone (Late-mid-Cretac.)	1828 m mainly Barrow delta (inc. 100 m Muderong shale) (siltst./sandst./clayst.)	59 m E.-Lt. Jur. marl & calcar.clayst. 65 m Rhaetian marl 382 m Lt.Triassic Mungaroo FM 506 m

Table 1. Data from previous DSDP sites and industry wells near proposed ODP sites.

May 6, 1988

TABLE 2. Legs 122 and 123,
Exmouth Plateau and Argo Abyssal Plain drilling program

SITE	LATITUDE S	LONGITUDE E	WATER DEPTH (m)	DRILLING DEPTH (m)	DRILLING TIME (days)	LOGGING TIME (days)	TOTAL TIME (days)
LEG 122							
EP2A	19°56'	110°27'	4050	800*	10.3	1.4	11.7
EP7V	20°35'	112°13'	1373	1125	9.7	2.1**	11.8
EP10A+	16°56' 16°57'	115°33' 115°33'	2050	1300	12.8	3.0	15.8
EP12P	19°51'	112°15'	1354	940	9.4	1.5	10.9
Alternate EP11B	16°49'	117°29'	3360	1200	10.1	1.8	11.9
LEG 123							
EP9E	16°46'	115°31'	2000	1000	9.3	1.7	11.0
or EP9F	16°34'	115°28'	2700	800	9.3	1.7	11.0
AAP1B	15°58'	117°34'	5740	1200++	32.9	7.5	40.4
Alternate AAP2#	15°42'	117°20'	5700	1000	16.0	4.8	20.8

*Includes 50 m of basalt.

**One logging run when drilling reaches about 600 m and the standard three runs at the completion of drilling.

+There are two possible scenarios for drilling this site:
a) Drill one hole to 1300 m on top of plateau, or
b) Recover same section by drilling a series of holes down the side of the plateau.

++Includes 300 m of basalt.

#Time calculation based on washing the upper 200 m.

TABLE 3
LEG 122, EXMOUTH PLATEAU AND ARGO ABYSSAL PLAIN DRILLING PROGRAM

	Date	Time on Station (Days)#	Transit Time (Days)
LV Singapore	3 July		
Transit Singapore - EP10A			5.6*
AR EP10A	9 July		
		15.8	
LV EP10A	24 July		
EP9E Site Survey			0.5
Transit EP10A - EP2P			1.6
AR EP2A	26 July		
		11.7	
LV EP2A	7 August		
Shipboard decision			
Transit EP2A-EP12P or EP7V			0.5
EP12P			
		10.9	
Transit EP12P - EP7V			0.5
EP7V			
		11.8	
LV EP7V or EP12V	22 August		
Transit EP7V or EP12P - Singapore			6.0
AR Singapore	28 August		
		41.3(time available)	14.7
		=	56

#Time on station includes time to APC upper section, trip pipe and RCB to total depth, and make 3 logging runs. At Site EP7V, it also allows time to make an additional logging run at 600 mbsf.
*Assume transit time of 11 kt.
**There are 2 options for drilling EP10A:
a) drill one hole on top of the Plateau to 1300 m using a reentry cone, or
b) drill two or three sites down the edge of the escarpment, recovering the 1300 m section, without using a reentry cone.

TABLE 4
LEG 123, ARGO ABYSSAL PLAIN AND EXMOUTH PLATEAU
PROPOSED SITE OCCUPATION SCHEDULE

	Date	Time on Station (Days)	Transit Time* (Days)
LV Singapore	2 Sept.		
Transit Singapore - EP9E			5.6
AR EP 9E	8 Sept.		
		11.0 (Includes 40.8 hr for logging)	
LV EP 9E	19 Sept.		
Transit EP9E - AAP1B			0.2
AR AAP1B	19 Sept.		
		40.4 (Includes reentry logging, BHTV, magnetic susceptibility, VSP, hydrofracture and porosity)	
LV AAP1B	28-29 Oct.		
Transit EP9E - AAP1B			2.8
AR Darwin	1 Nov.		
		51.4	8.6 =
			60 days total

*Transit assumes average speed of 11 kt.

FIGURE CAPTIONS

Figure 1: Regional and tectonic setting of the Scott, Exmouth, and Wallaby Plateaus off northwest Australia. Bathymetry from Falvey and Veevers (1974) and Veevers and Cotterill (1979); magnetic lineations after Heirtzler et al. (1978) and Larson et al. (1979). From von Rad and Exon (1983).

Figure 2: Bathymetric map of Exmouth Plateau and vicinity with location of planned ODP sites (bold stars) and commercial wells (open circles, modified from Exon, BMR unpublished data). Bathymetry in meters.

Figure 3: Schematic east-west and north-south cross sections of Exmouth Plateau with proposed ODP Legs 122 and 123 sites (Exon and von Rad, unpublished).

Figure 4: Simplified stratigraphy of Argo Abyssal Plain, northern Exmouth Plateau and Exmouth Plateau proper, based on seismic and geological evidence. Seismic reflector nomenclature is also shown. Modified from Exon et al. (1982, Fig. 2).

Figure 5: Paleogeographic sketches of the Exmouth Plateau and surrounding areas, related to present-day bathymetry. Based on seismic evidence, well control and dredge samples from *Sonne* SO-8 and *Rig Seismic* 56 cruises (from Exon et al., 1982, Fig. 9).

Figure 6: Plate-tectonic reconstruction and paleogeography of the southeastern Tethys Ocean during Late Jurassic time. After Audley-Charles (in press).

Figure 7: $^{143}Nd/^{144}Nd$ vs. $^{87}Sr/^{86}Sr$ for Quaternary lavas from the Sunda and Banda arcs of Indonesia. Also plotted are fields of lavas from other island arcs and the active continental margin of South America, the mantle array defined by oceanic basalts, and an estimate of the average upper oceanic crust. The lavas of the Banda arc appear to lie on a mixing line between the mantle array and the upper crust. (After Whitford et al., 1979.)

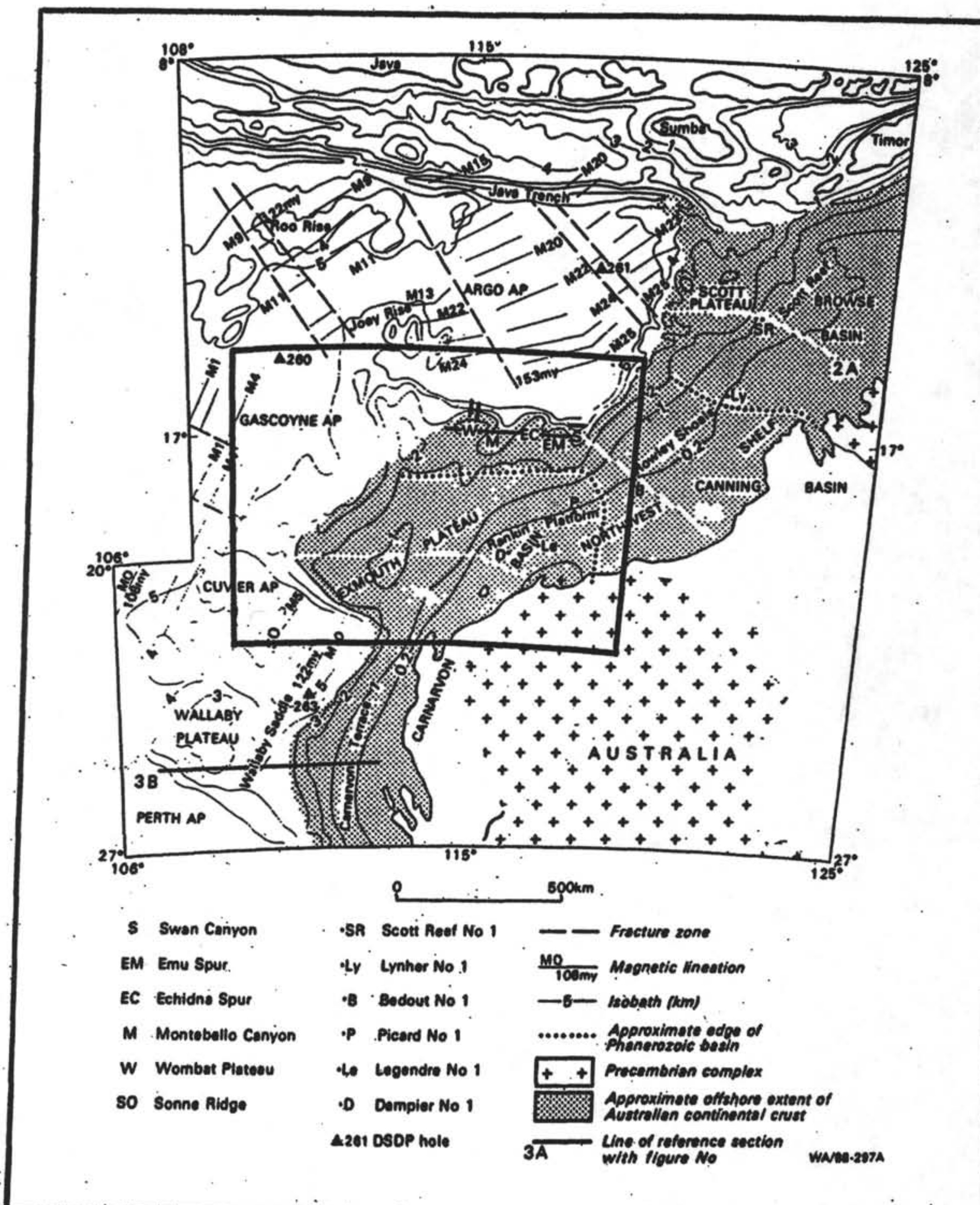


Figure 1. Regional and tectonic setting of the Scott, Exmouth, and Wallaby Plateaus off northwest Australia. Bathymetry from Falvey and Veevers (1974) and Veevers and Cotterill (1979); magnetic lineations after Heirtzler et al. (1978) and Larson et al. (1979). From von Rad and Exon (1983).

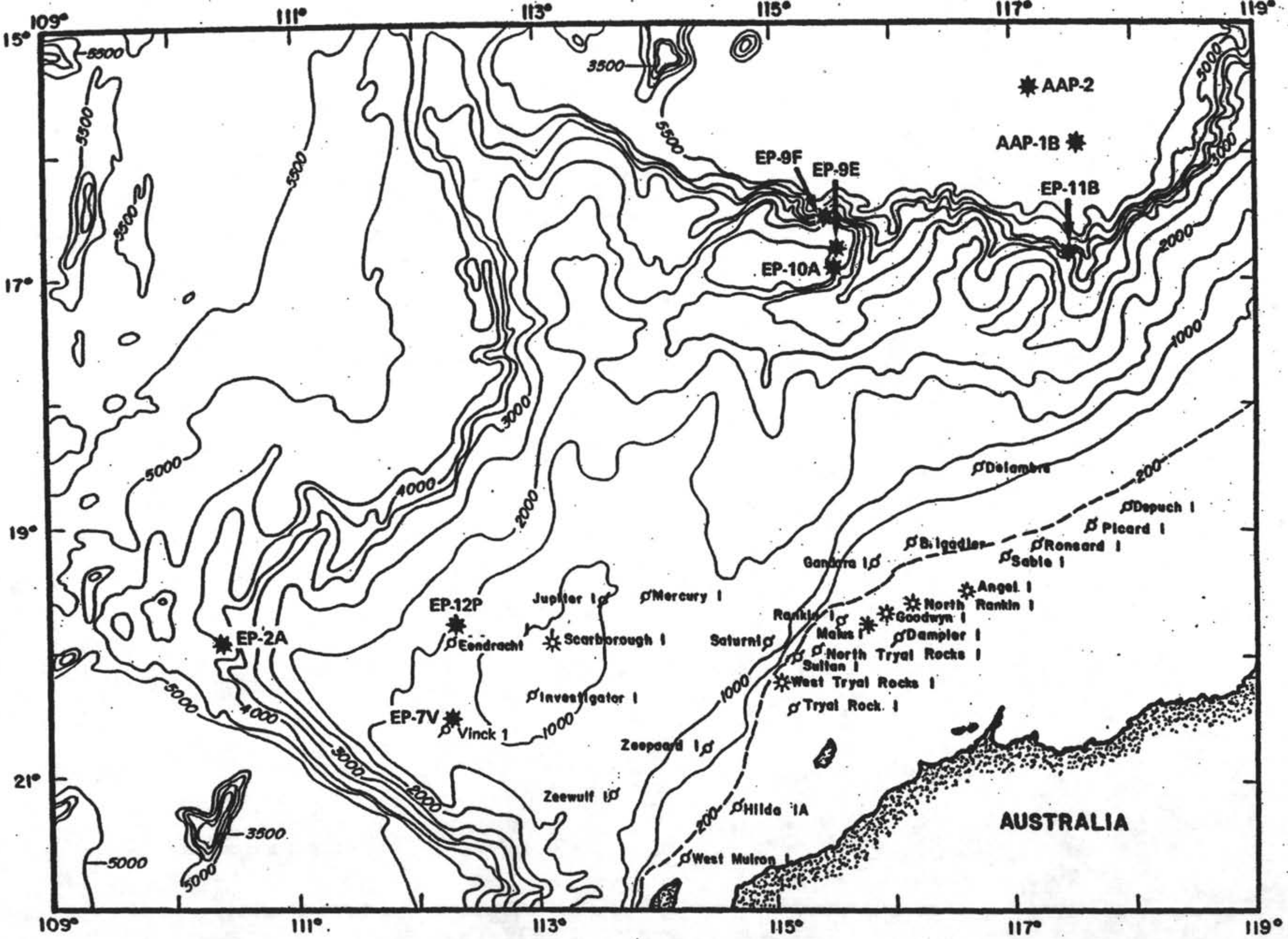


Figure 2. Bathymetric map of Exmouth Plateau and vicinity with location of planned ODP sites (bold stars) and commercial wells (open circles, modified from Exon, BMR unpub. data). Bathymetry in meters.

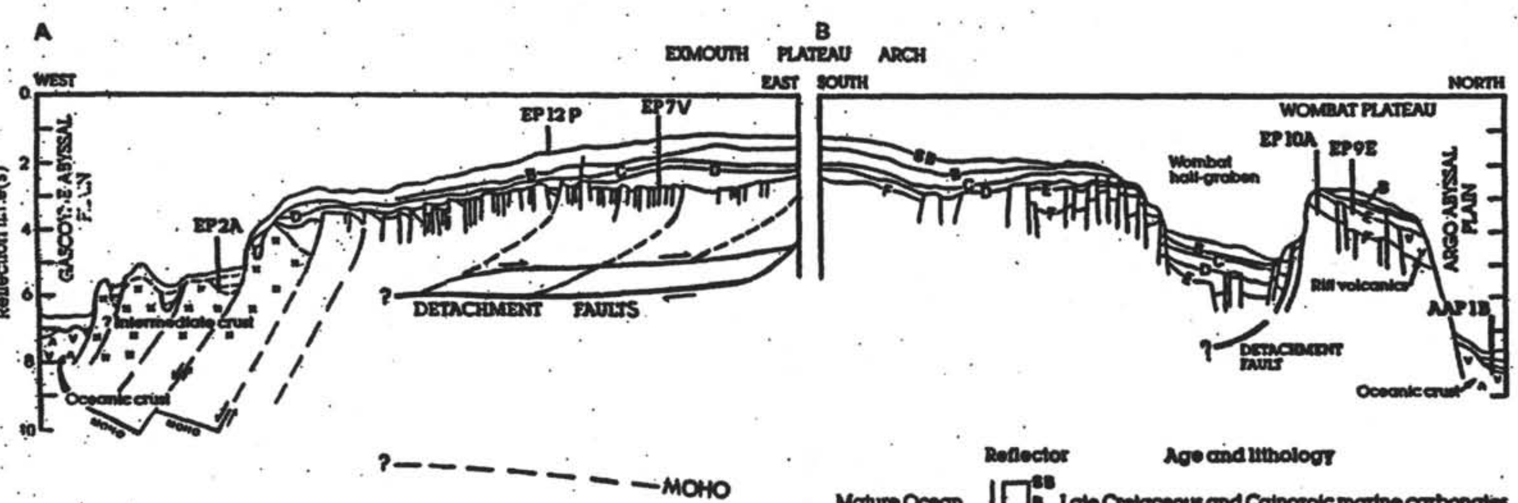


Figure 3. Schematic east-west and north-south cross sections of Exmouth Plateau with proposed ODP Legs 122 and 123 sites (Exon and von Rad, unpublished).

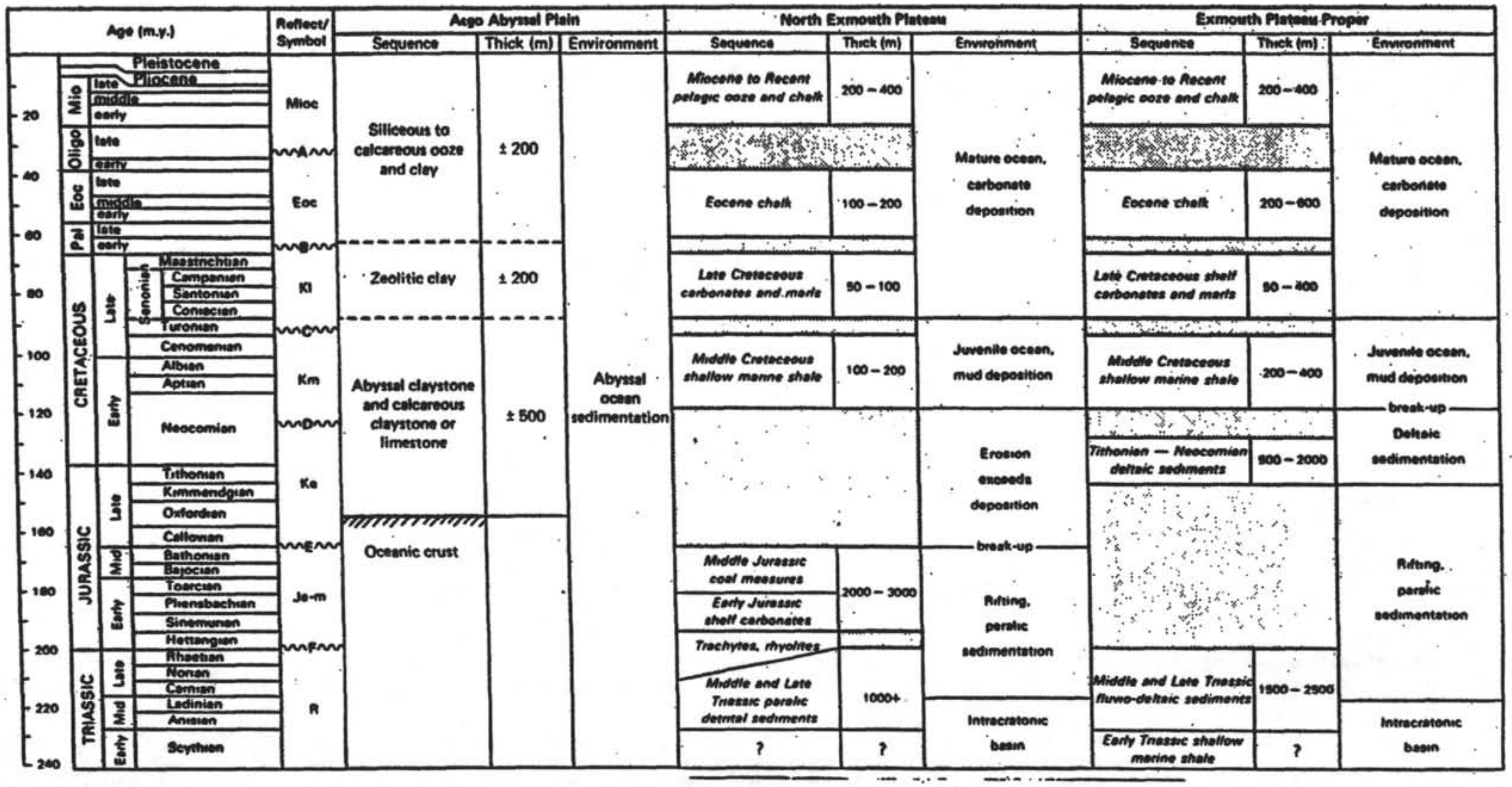


Fig. 4. Simplified stratigraphy of Argo Abyssal Plain, Exmouth Plateau proper, and northern Exmouth Plateau, based on seismic and geological evidence. Seismic reflector nomenclature shown.

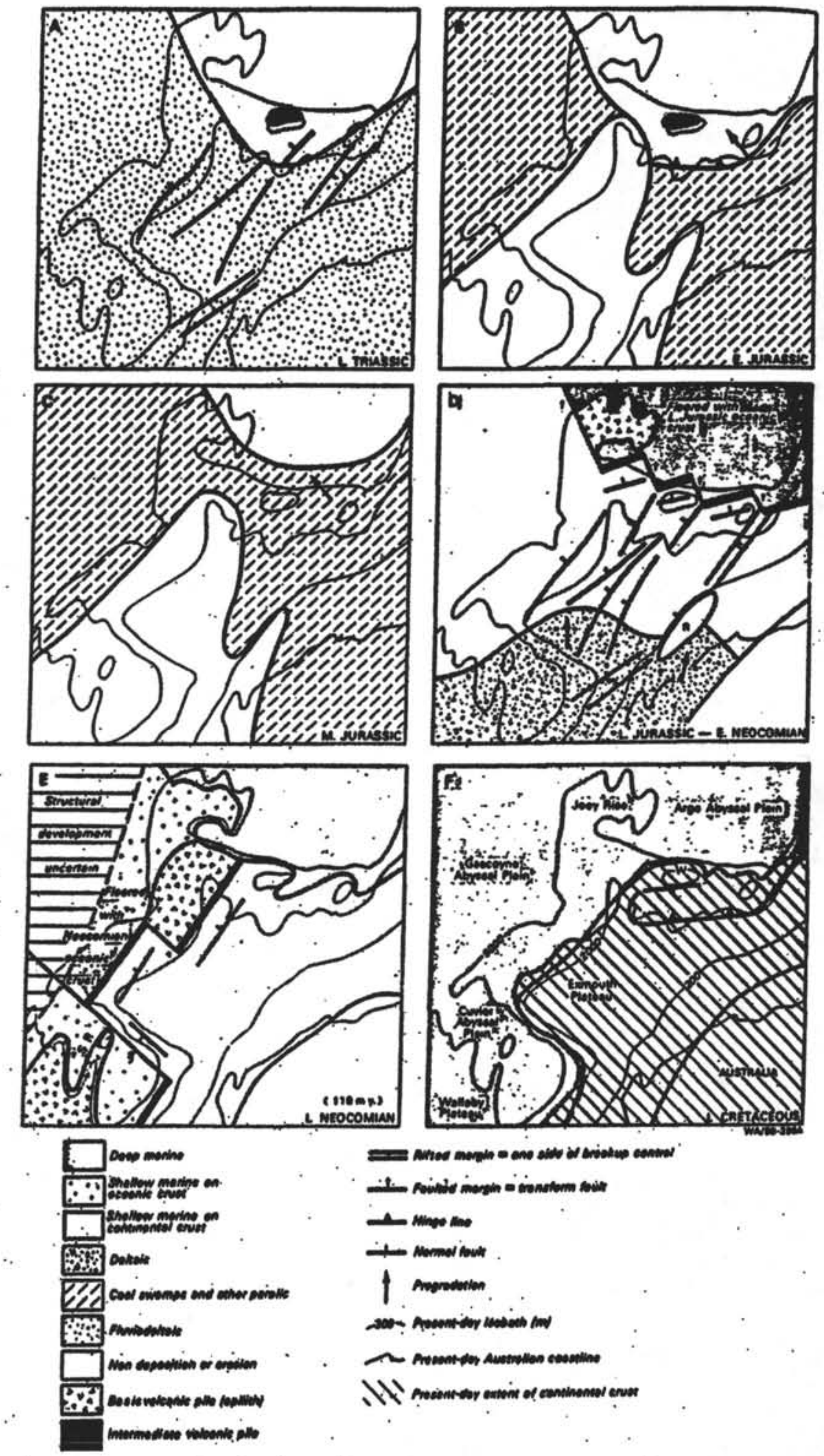


Figure 5: Paleogeographic sketches of the Exmouth Plateau and surrounding areas, related to present-day bathymetry. Based on seismic evidence, well control and dredge samples from <u>Sonne</u> SO-8 and <u>Rig Seismic</u> 56 cruises (from Exon et al., 1982, Fig. 9).

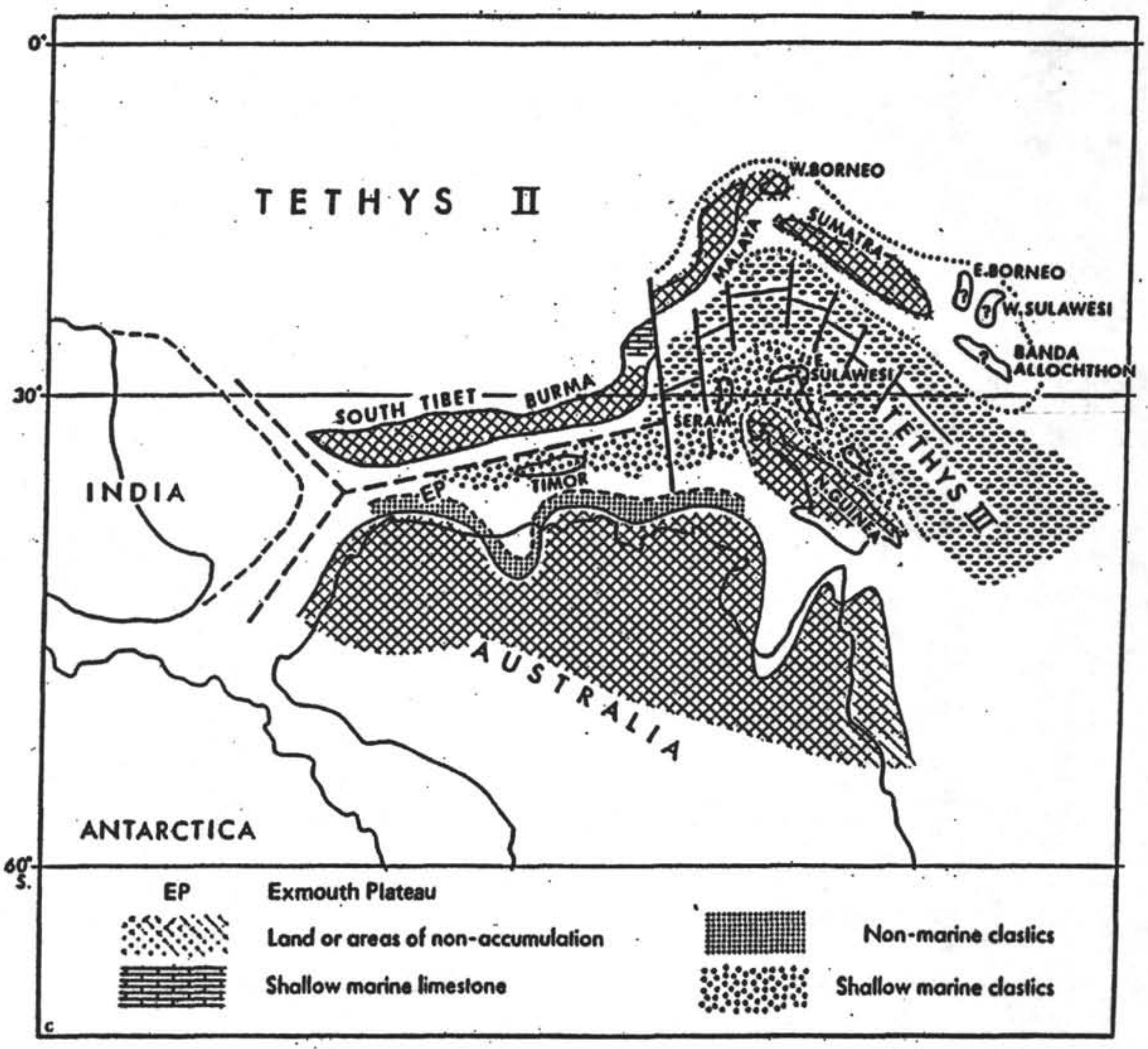


Figure 6. Plate-tectonic reconstruction and paleogeography of the southeastern Tethys Ocean during Late Jurassic time. After Audley-Charles (in press).

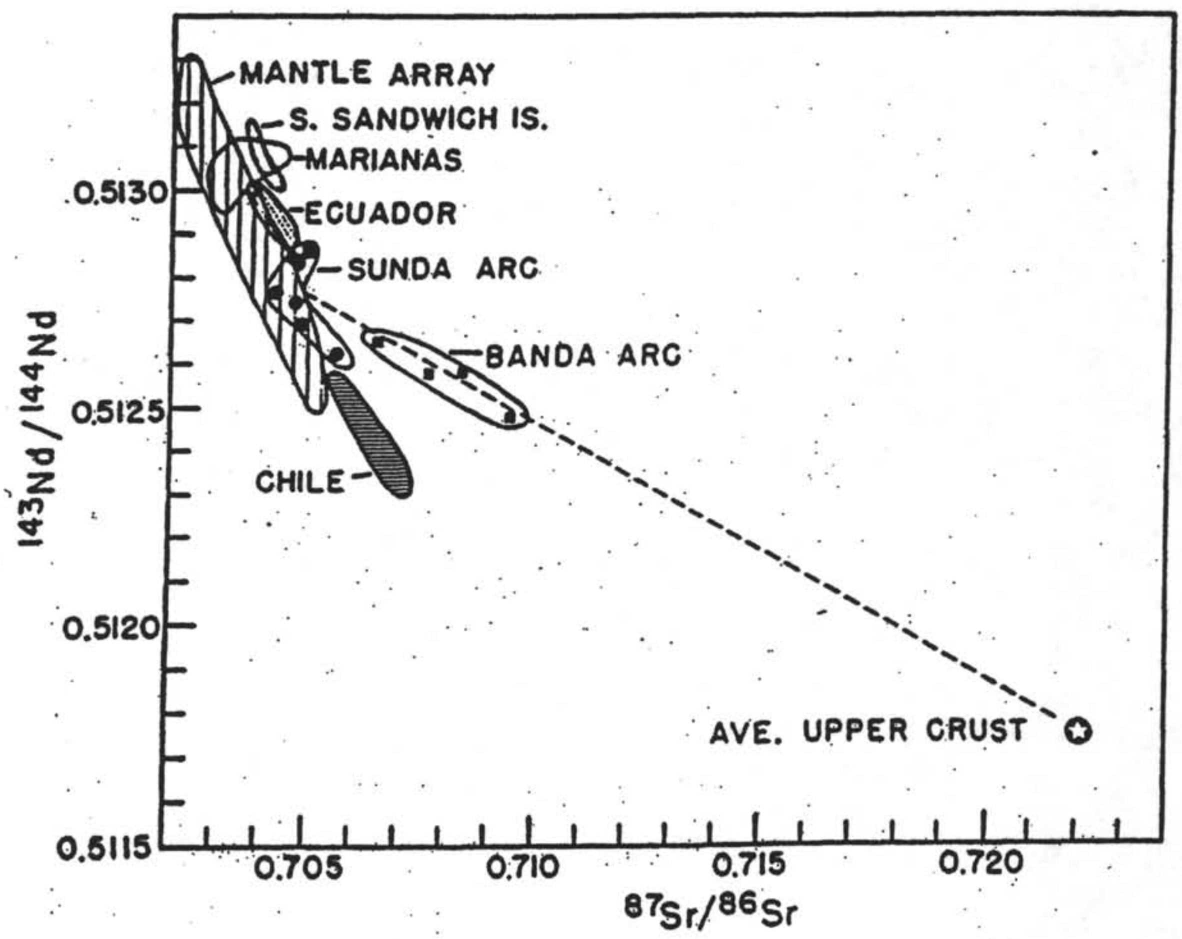


Figure 7. $^{143}Nd/^{144}Nd$ vs. $^{87}Sr/^{86}Sr$ for Quaternary lavas from the Sunda and Banda arcs of Indonesia. Also plotted are fields of lavas from other island arcs and the active continental margin of South America, the mantle array defined by oceanic basalts, and an estimate of the average upper oceanic crust. The lavas of the Banda arc appear to lie on a mixing line between the mantle array and the upper crust. (After Whitford et al., 1979.)

SITE NUMBER: EP2A

POSITION: 19°56'S, 110°27'E

JURISDICTION: Australia

SEDIMENT THICKNESS: 750 m

PRIORITY: 1

WATER DEPTH: 4050 m

PROPOSED DRILLING PROGRAM: APC upper 200 m; RCB to 800 m, including 50 m of basalt.

SEISMIC RECORD: Crossing of BMR/*Rig Seismic* lines 55/002 and 55/003E, near 55/003B.

LOGGING: Standard

OBJECTIVES: 1. Pre-breakup margin subsidence of lower plateau slope (nonmarine Triassic/marine Jurassic +/or volcanics) 2. Rift-phase sedimentation with prograssive upward marine influence. 3. Post-breakup marine sedimentation, transition shallow-deeper marine sedimentation (Upper Cretaceous-Paleogene) 4. Nature and age of basement: continental or transitional?

SEDIMENT TYPE: (Approximate lithologies)

0-100 m	Paleogene/Upper Cretaceous (Cenozoic?) pelagic carbonates
100-400 m	Lower Cretaceous marginal-marine sediments (or Cenozoic-Upper Cretaceous pelagic sediments?)
400-630 m	Jurassic marginal-marine claystone (or middle Cretaceous Winning Group equivalent)
630-750 m	Triassic nonmarine or Jurassic marine sediments
750-800 m	Continental/transitional basement (?volcanics)

SITE FIGURES (following pages):

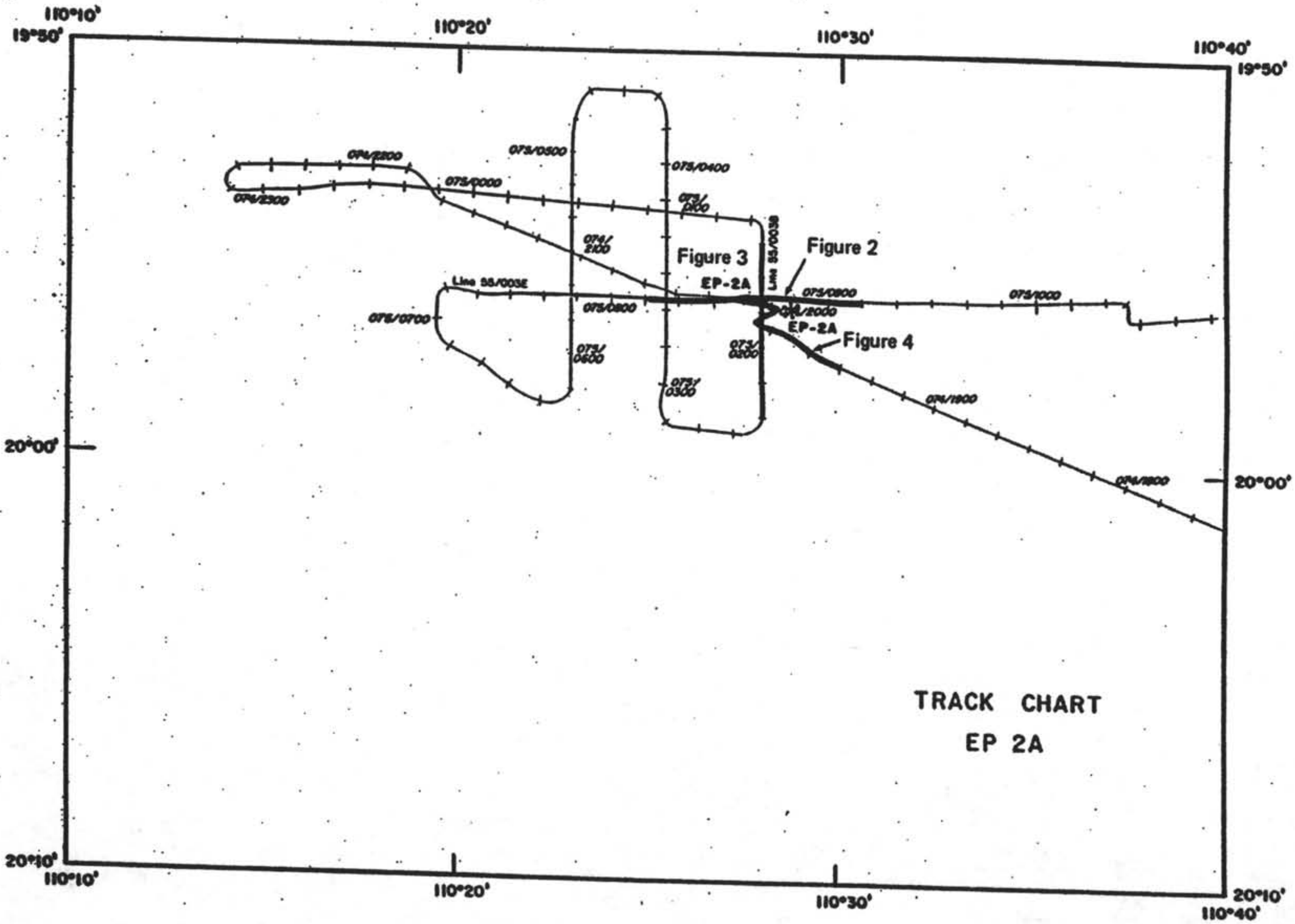
Figure 1. Location map for EP2A on BMR site survey line 56/002 and 56/003.

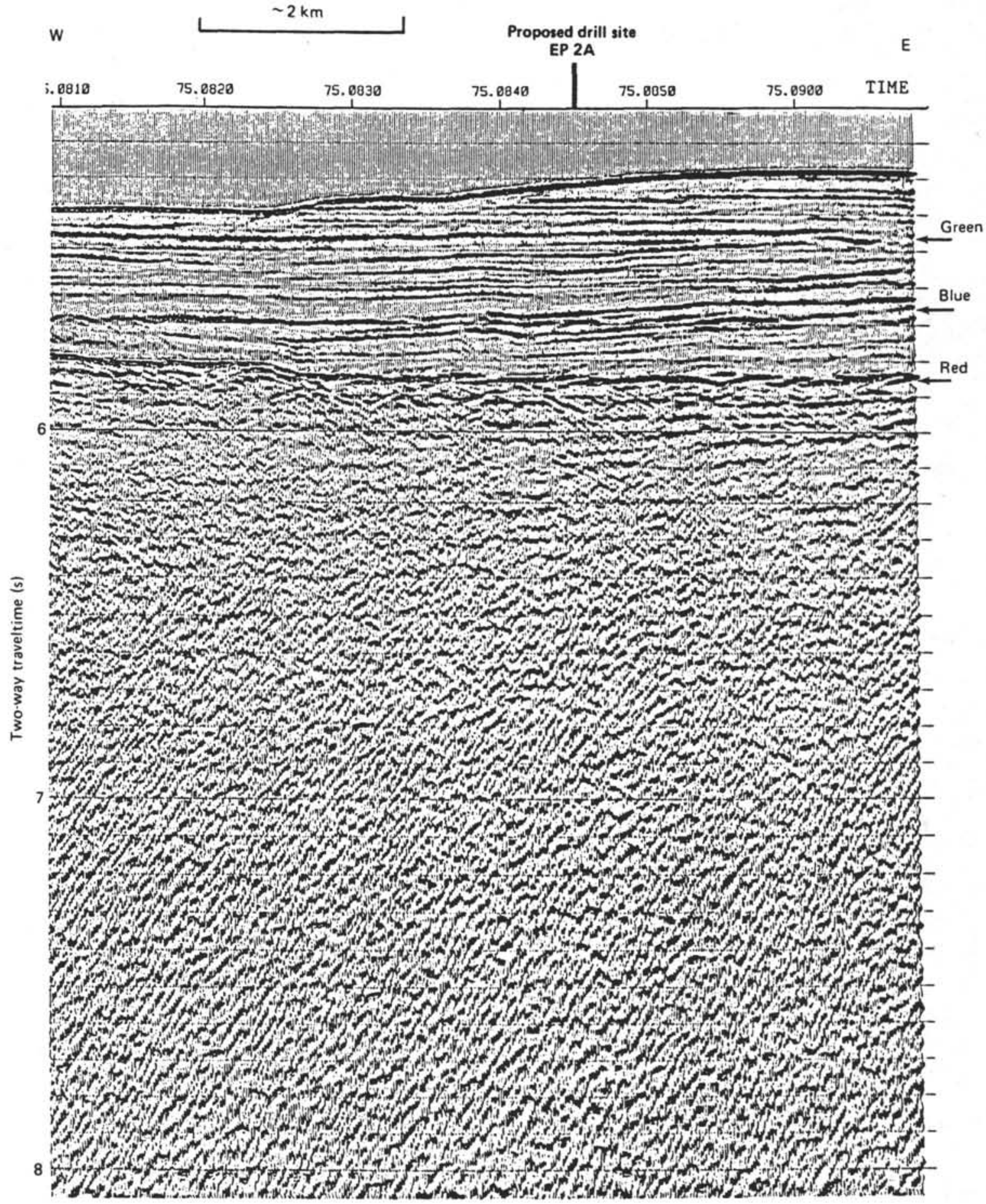
Figure 2. Projected location of EP2A on seismic line BMR 56/003E.

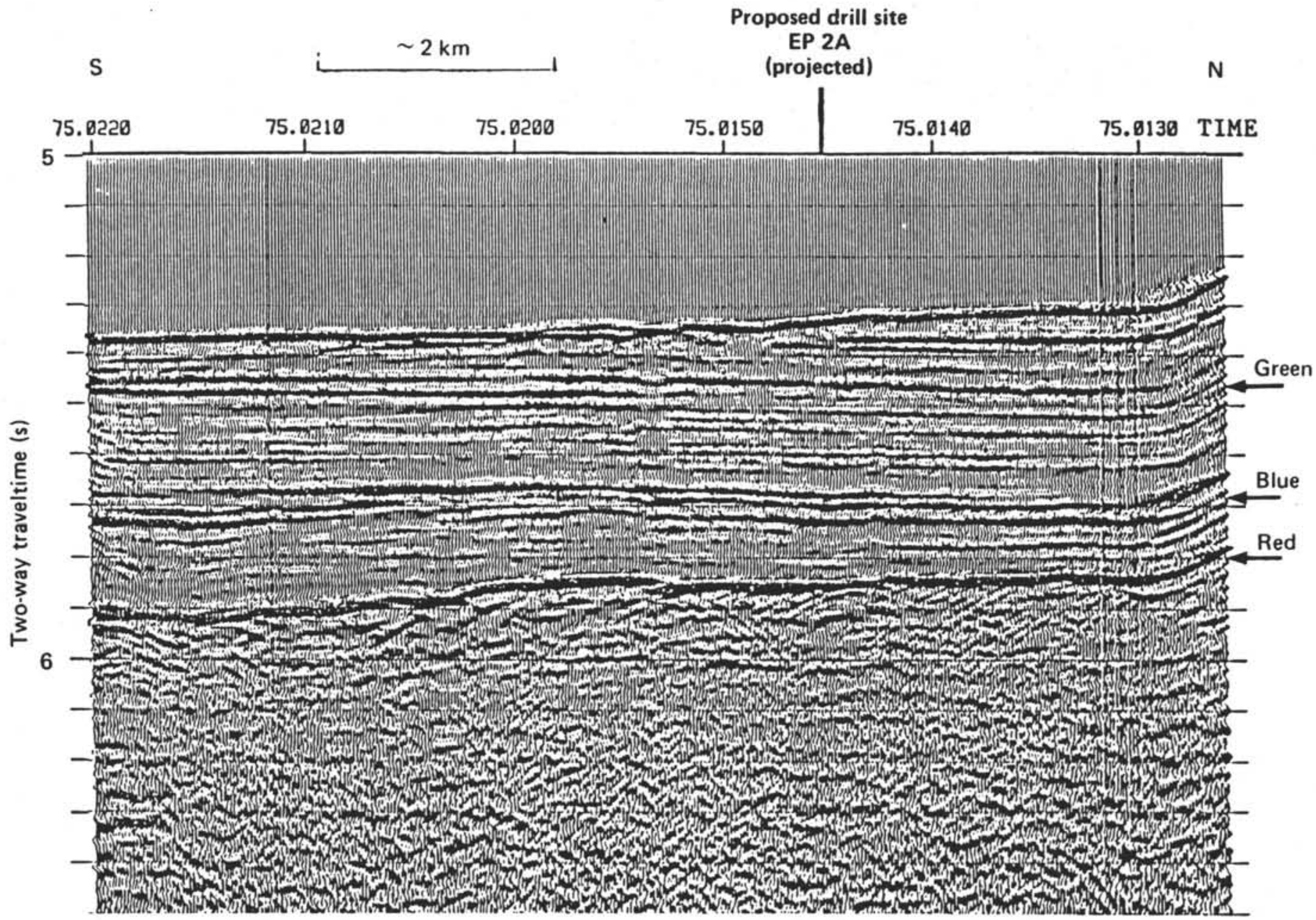
Figure 3. Seismic line BMR 55/003B with location of EP2A projected 0.9 km from the west.

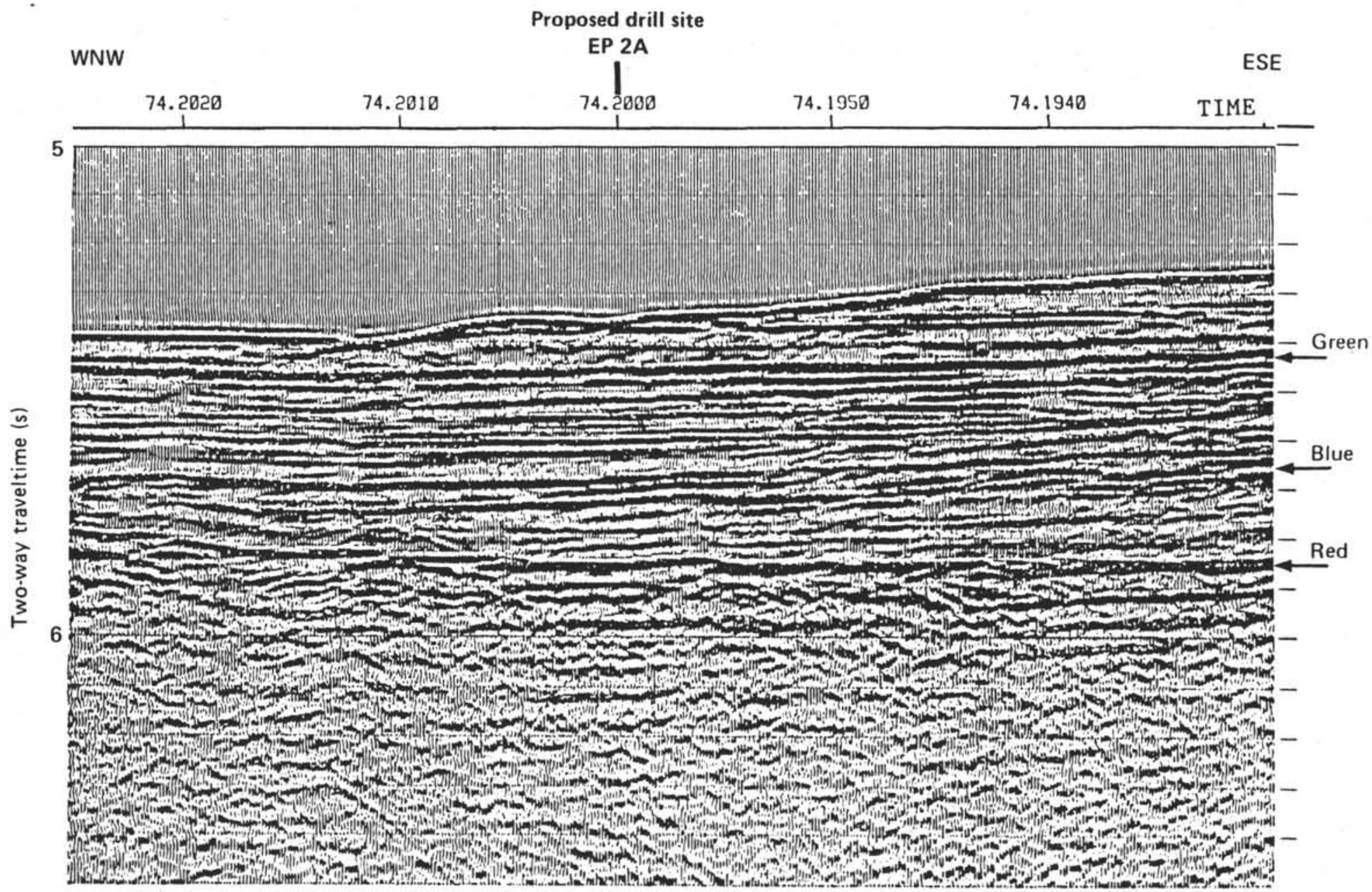
Figure 4. BMR seismic line 55/002 showing location of EP2A.

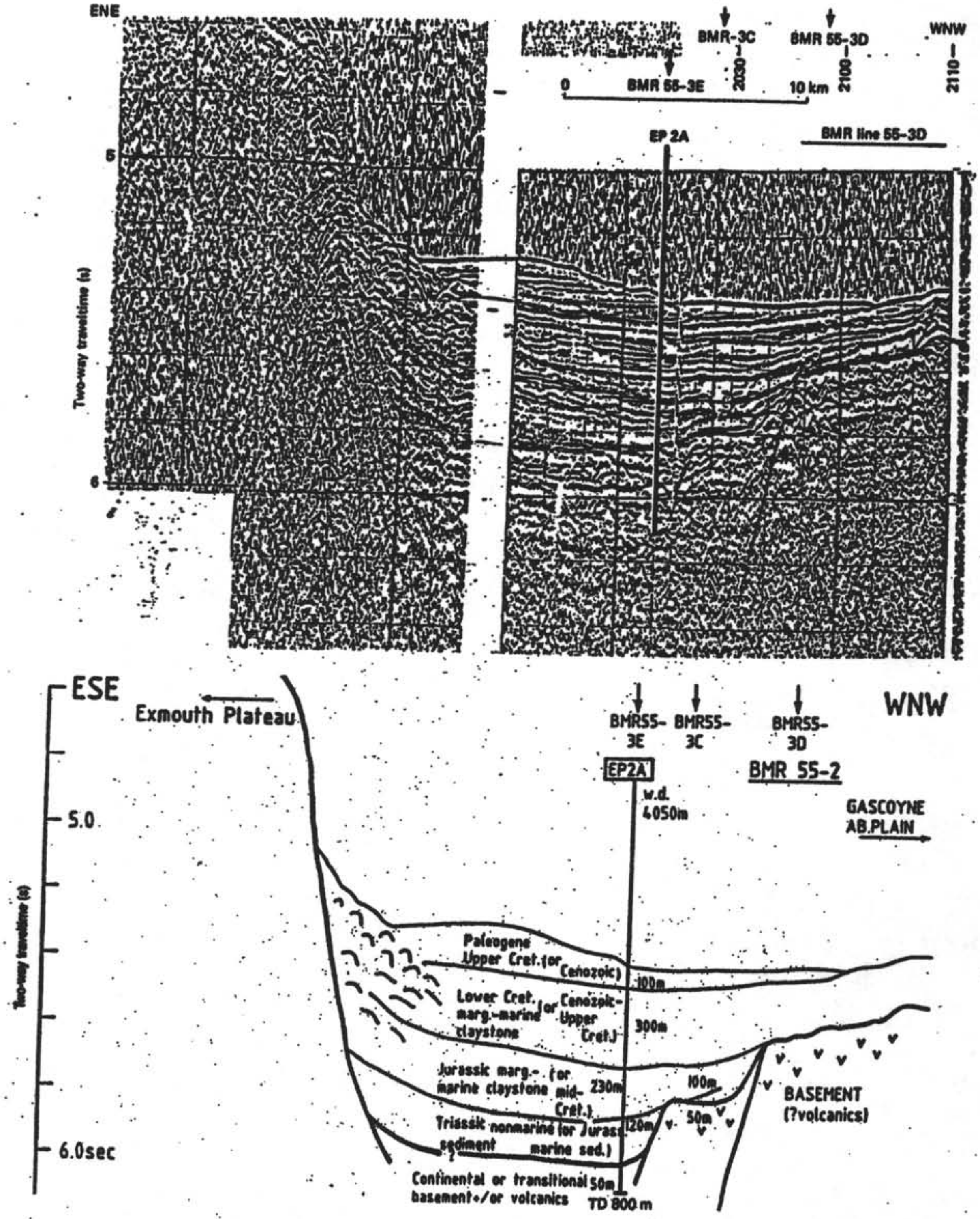
Figure 5. BMR line 55/002 and interpretation.


110°10'
19°50'
110°20'
110°30'
110°40'
19°50'
075/0500
075/0400
074/2200
075/0000
074/2300
074/2100
Figure 3
Line 55/0038
Figure 2
EP-2A
Line 55/003E
075/0800
075/1000
075/0700
075/0600
EP-2A
Figure 4
075/0600
075/0300
075/0200
074/1900
074/1800
20°00'
20°00'
TRACK CHART
EP 2A
20°10'
110°10'
110°20'
110°30'
20°10'
110°40'


~2 km
W
Proposed drill site
EP 2A
E
75.0820
75.0830
75.0840
75.0050
75.0900
TIME
Green
Blue
Red
6
7
8
Two-way traveltime (s)


Proposed drill site
EP 2A
(projected)
~ 2 km
S
N
75.0220
75.0210
75.0200
75.0150
75.0140
75.0130
TIME
5
6
Two-way traveltime (s)
Green
Blue
Red


Proposed drill site
EP 2A
WNW
ESE
74.2020
74.2010
74.2000
74.1950
74.1940
TIME
5
6
Two-way traveltime (s)
Green
Blue
Red


ENE
BMR-3C
BMR 55-3D
WNW
BMR 55-3E
2030
2100
2110
0
10 km
EP 2A
BMR line 55-3D
Two-way traveltime (s)
5
6
ESE
Exmouth Plateau
BMR55-3E
BMR55-3C
BMR55-3D
WNW
EP2A
BMR 55-2
w.d. 4050m
GASCOYNE AB.PLAIN
5.0
6.0sec
Two-way traveltime (s)
Paleogene
Upper Cret.(or Cenozoic)
100m
Lower Cret. marg.-marine claystone
(or Cenozoic-Upper Cret.)
300m
Jurassic marg.-marine claystone
(or mid-Cret.)
230m
100m
50m
Triassic nonmarine sediment
(or Jurassic marine sed.)
120m
Continental or transitional basement+/or volcanics
50m
TD 800 m
BASEMENT (?volcanics)

SITE NUMBER: EP7V

POSITION: 20°35'S, 112°13'E **JURISDICTION:** Australia

SEDIMENT THICKNESS: approx. 10 km **PRIORITY:** 1

WATER DEPTH: 1373 m

PROPOSED DRILLING PROGRAM: Choose site location, drop beacon, pass over site and Vinck well, APC upper 200 m, XCB to 550-600 m, log; pull pipe, RCB to 1125 m.

SEISMIC RECORD: Line 78-A-272, near shot point 3508

LOGGING: 1 logging run at 550-600 mbsf, standard logs at total depth - 1125 mbsf.

OBJECTIVES: 1. Control of relative sea level by global eustasy, tectonics, and sediment supply. Test of validity of Vail model. 2. Establish model for marginal plateau development from pre-rift to mature ocean stage, concentrating on subsidence history and the paleoenvironmental relationship between style of sedimentation and biostratigraphy. Compare outer plateau margin (EP2A) and northern plateau sites with subsided plateau and adjacent shelf commercial wells). 3. Depositional history of the classic Barrow Delta sequence through combination of seismic stratigraphy and continuous coring.

SEDIMENT TYPE: (Approximate lithologies)

0-370 m	Neogene and Paleogene pelagic carbonates
370-550 m	Upper Cretaceous pelagic carbonates (Toolonga etc.)
550-670 m	Middle Cretaceous siltstone (Gearle-equivalent)
670-720 m	Upper Neocomian marine shale (Muderong-equivalent)
720-860 m	Upper part of lower Barrow Delta
860-1125 m	Lower part of lower Barrow Delta

SITE FIGURES (following pages):

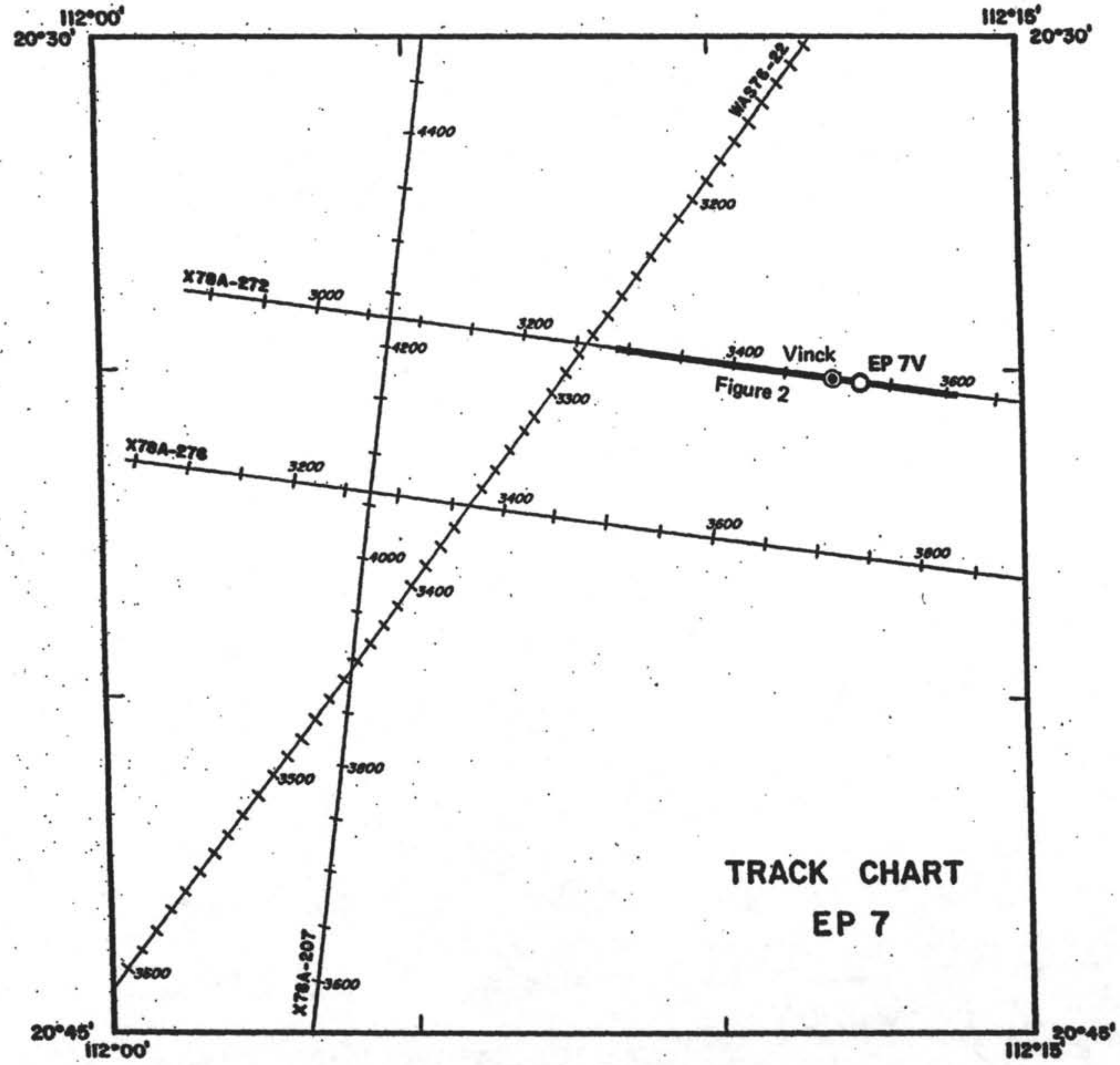
Figure 1. Location map for EP7V.

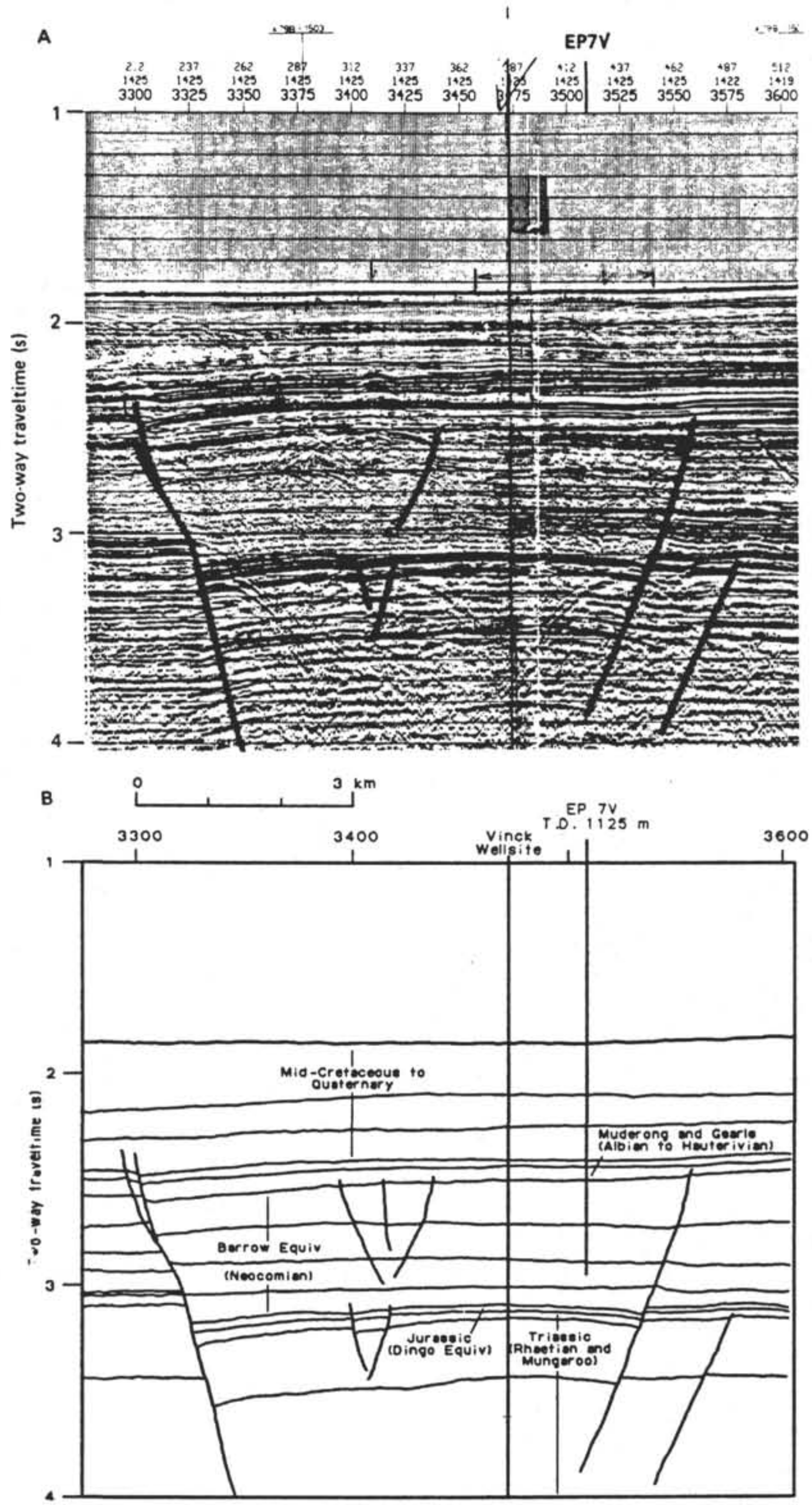
Figure 2. A. Seismic line X78-272 showing location of EP7V.
B. Interpretation of seismic line shown in A.

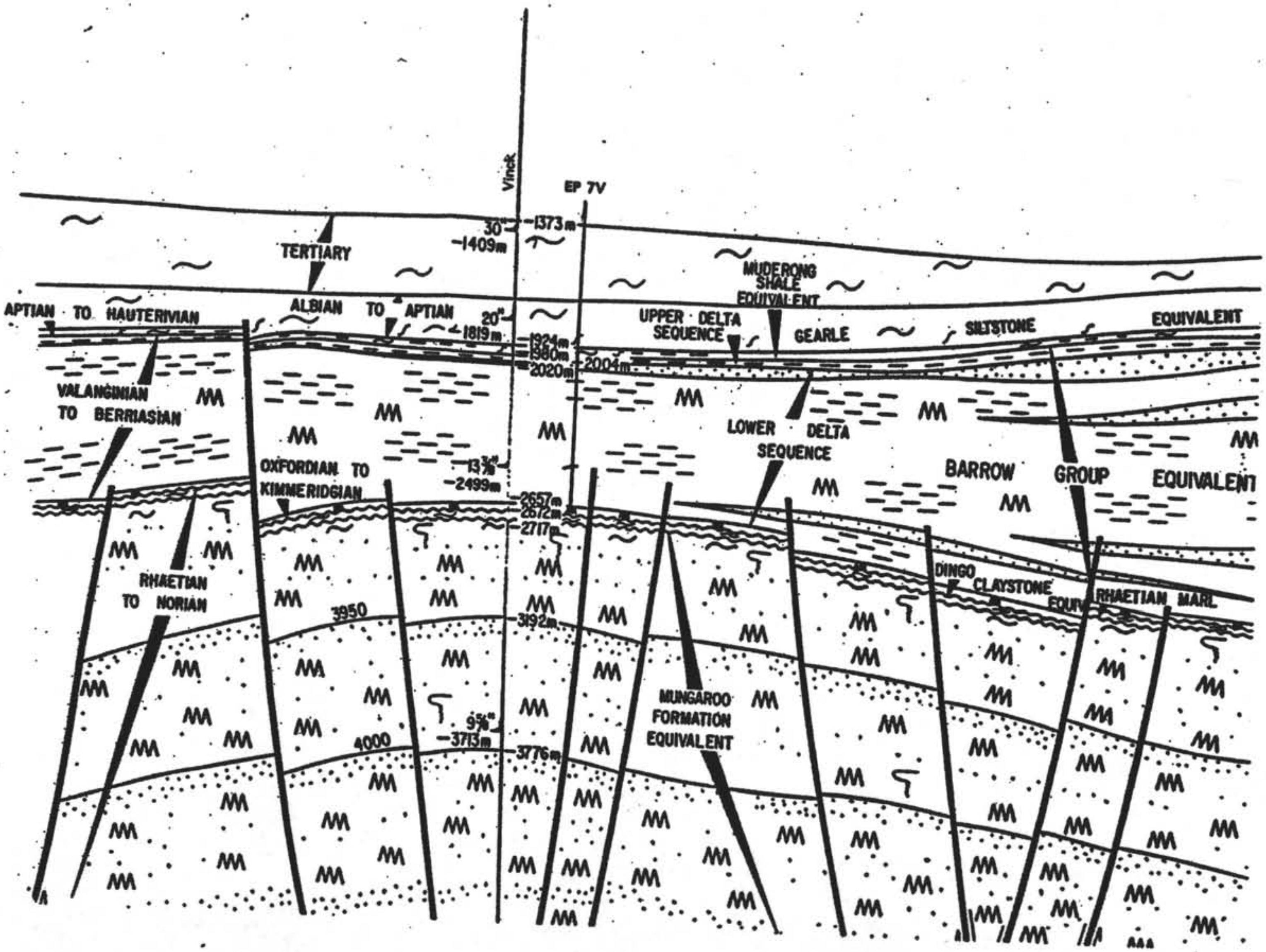
Figure 3. Schematic depth cross section showing geological interpretation near EP7V.

Figure 4. Interpretation of seismic line WAS 76-22 showing projected locations of Vinck 1 wellsite and EP7V.

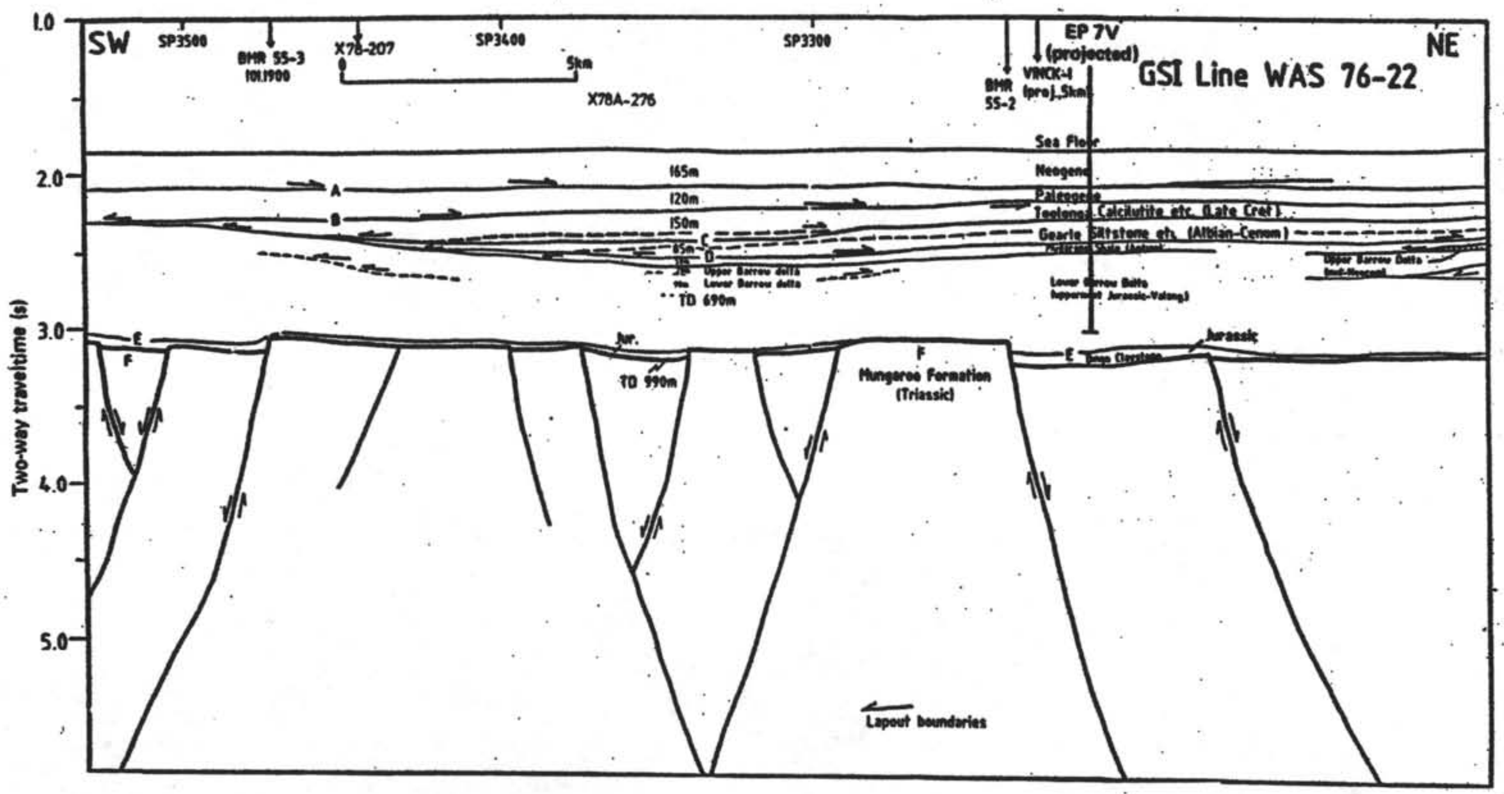
Figure 5. Structure map showing depth in time to top of Lower Barrow Delta and location of EP7V and Vinck 1 well.


112°00'
20°30'
112°15'
20°30'
X78A-272
X78A-276
WAS76-22
X78A-207
Vinck
EP 7V
Figure 2
20°45'
112°00'
20°45'
112°15'
TRACK CHART
EP 7

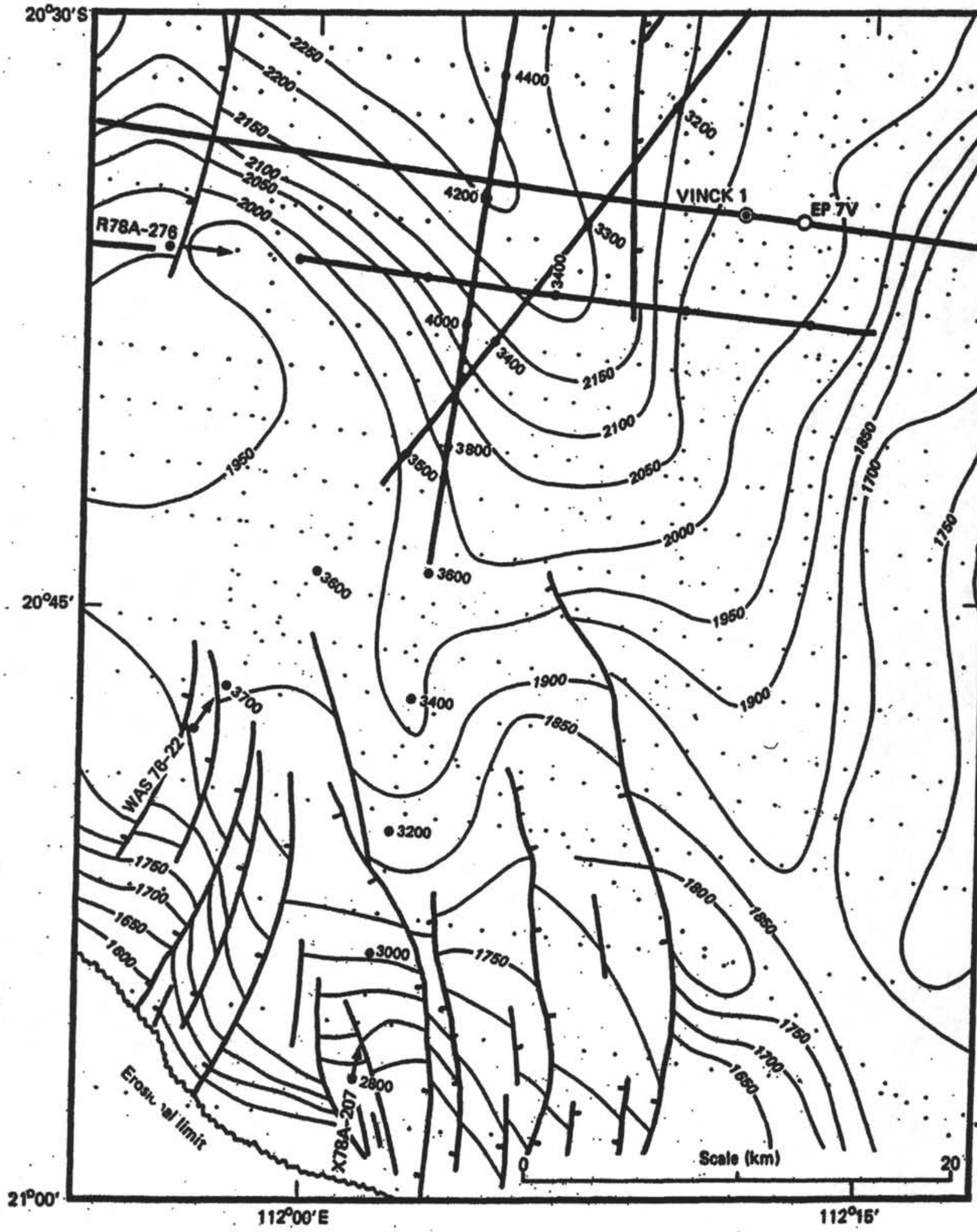

A
EP7V
3300 3325 3350 3375 3400 3425 3450 3475 3500 3525 3550 3575 3600
Two-way traveltime (s)
1
2
3
4
B
0 3 km
3300
3400
3600
Vinck Wellsite
EP 7V
T.D. 1125 m
Mid-Cretaceous to Quaternary
Muderong and Gearle (Albian to Hauterivian)
Barrow Equiv
(Neocomian)
Jurassic (Dingo Equiv)
Triassic (Rhaetian and Mungaroo)



Vinck
EP 7V
30"
-1373m
-1409m
TERTIARY
MUDERONG
SHALE
EQUIVALENT
APTIAN TO HAUTERIVIAN
ALBIAN TO APTIAN
20"
-1819m
-1924m
-1980m
-2020m
-2004m
UPPER DELTA
SEQUENCE
GEARLE
SILTSTONE
EQUIVALENT
VALANGINIAN
TO BERRIASIAN
LOWER DELTA
SEQUENCE
BARROW GROUP EQUIVALENT
OXFORDIAN TO
KIMMERIDGIAN
13⅜"
-2499m
-2657m
-2672m
-2717m
DINGO
CLAYSTONE
EQUIV
RHAETIAN MARL
RHAETIAN
TO NORIAN
3950
-3192m
MUNGAROO
FORMATION
EQUIVALENT
9⅝"
-3713m
4000
-3776m



GSI Line WAS 76-22
SW
NE
SP3500
BMR SS-3
101.1900
X78-207
0
5km
SP3400
X78A-276
SP3300
BMR
SS-2
VINCK-1
(proj. 5km)
EP 7V
(projected)
Sea Floor
Neogene
Paleogene
Toolonga Calcilutite etc. (Late Cret)
Gearle Siltstone etc. (Albian-Cenom)
Upper Barrow Delta
Lower Barrow Delta
165m
120m
150m
A
B
C
D
E
F
Upper Barrow delta
Lower Barrow delta
TD 690m
Jur.
TD 990m
Mungaroo Formation
(Triassic)
Jurassic
Lapout boundaries
1.0
2.0
3.0
4.0
5.0
Two-way traveltime (s)



20°30′S
20°45′
21°00′
112°00′E
112°15′
R78A-276
VINCK 1
EP 7V
WAS 78-22
X78A-207
Erosional limit
Scale (km)
0
20
4400
4200
4000
3800
3600
3500
3400
3300
3200
3700
3000
2800
2250
2200
2150
2100
2050
2000
1950
1900
1850
1800
1750
1700
1650
1600

SITE NUMBER: EP9E

POSITION: 16°46'S, 115°31'E

JURISDICTION: International

SEDIMENT THICKNESS: 8-10 km

PRIORITY: 1

WATER DEPTH: 2000 m

PROPOSED DRILLING PROGRAM: Seismic survey of area to make crossline, APC 200 m, RCB to 1000 m.

SEISMIC RECORD: BMR/Rig Seismic 56/013 (111:0130)

LOGGING: Standard

OBJECTIVES: 1. Triassic to middle Jurassic pre- and syn-rift sedimentation: facies, paleobathymetry, and subsidence history. 2. Upper Triassic to middle Jurassic Tethys-type shallow-water carbonates, alternating with sediments of the "coal measure sequence" (von Stackelberg et al., 1980; von Rad and Exon, 1983). 3. Late Jurassic to Early Cretaceous post-breakup development history. 4. Correlation of unconformity-bound sequences and paleodepth transect from EP7V via this site to AAP1B (marine Upper Triassic and Jurassic carbonates recovered by dredging).

SEDIMENT TYPE: (Approximate lithologies)

0-280 m	Neogene-Upper Cretaceous pelagic carbonates
280-990 m	Cretaceous to Upper Jurassic marine claystones to marginal marine deltaic sediments
990-1000 m	Triassic pre-breakup unconformity sediments

SITE FIGURES (following site page for EP9F):

Figure 1. Location map showing seismic line BMR 56/013, and proposed sites EP9E and EP9F.

Figure 2. Segment of seismic line 56/013, showing location of EP9E.

Figure 3. Segment of seismic line 56/013, showing location of EP9F.

SITE NUMBER: EP9F

POSITION: 16°34'S, 115°28'E

JURISDICTION: International

SEDIMENT THICKNESS: >5 km

PRIORITY: 1 (OR E9)

WATER DEPTH: 2700 m

PROPOSED DRILLING PROGRAM: APC upper section to 200 m, RCB to 800 m

SEISMIC RECORD: BMR/*Rig Seismic* 56/013, (111:0410), crossline to be completed during Leg 123.

LOGGING: Standard

OBJECTIVES: 1. Triassic to Middle Jurassic pre- and syn-rift sedimentation: facies, paleobathymetry, and subsidence history. 2. Upper Triassic to Middle Jurassic Tethys-type shallow-water carbonates, alternating with sediments of the "coal measure sequence" (von Stackelberg et al., 1980; von Rad and Exon, 1983. 3. Late Jurassic to Early Cretaceous post-breakup development history. 4. Correlation of unconformity-bound sequences and paleodepth transect from EP7V via this site to AAP1B (marine Upper Triassic and Jurassic carbonates recovered by dredging).

SEDIMENT TYPE: (Approximate lithologies)

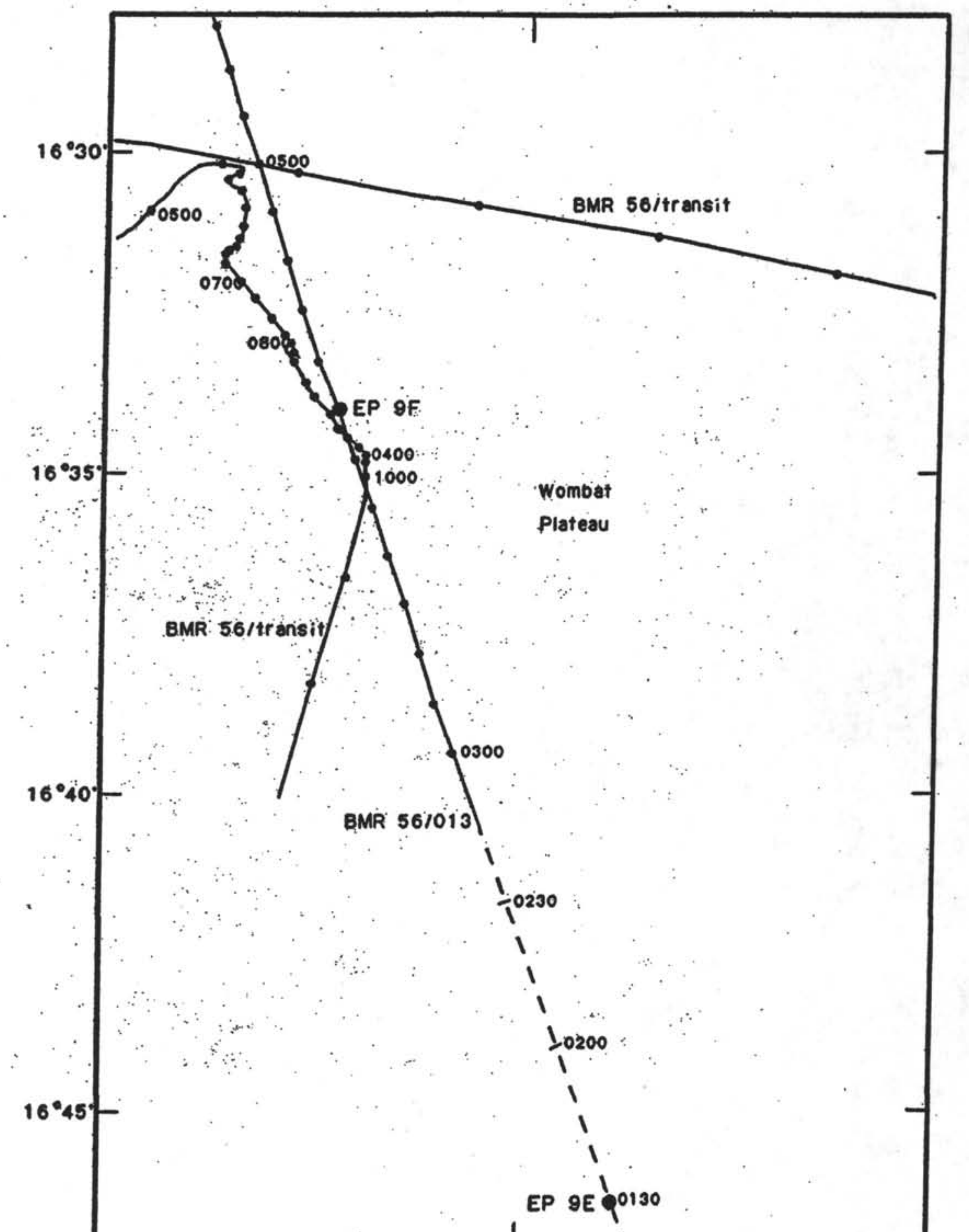
0-280 m	Neogene - Upper Cretaceous pelagic carbonates
280-990 m	Cretaceous marine claystones to marginal marine deltaic sediments
990-1000 m	Triassic pre-breakup unconformity sediments

SITE FIGURES (following pages):

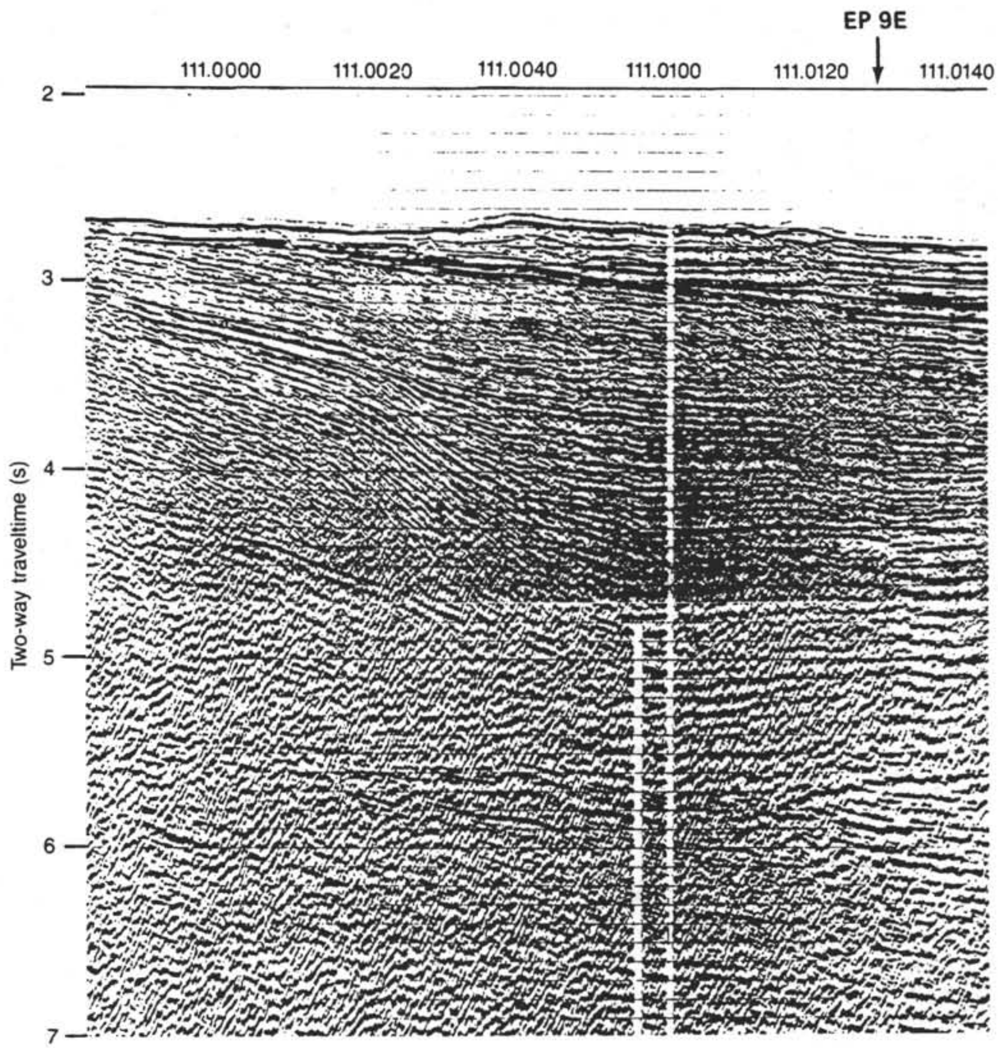
Figure 1. Location map showing seismic line BMR 56/013, and proposed sites EP9E and EP9F.

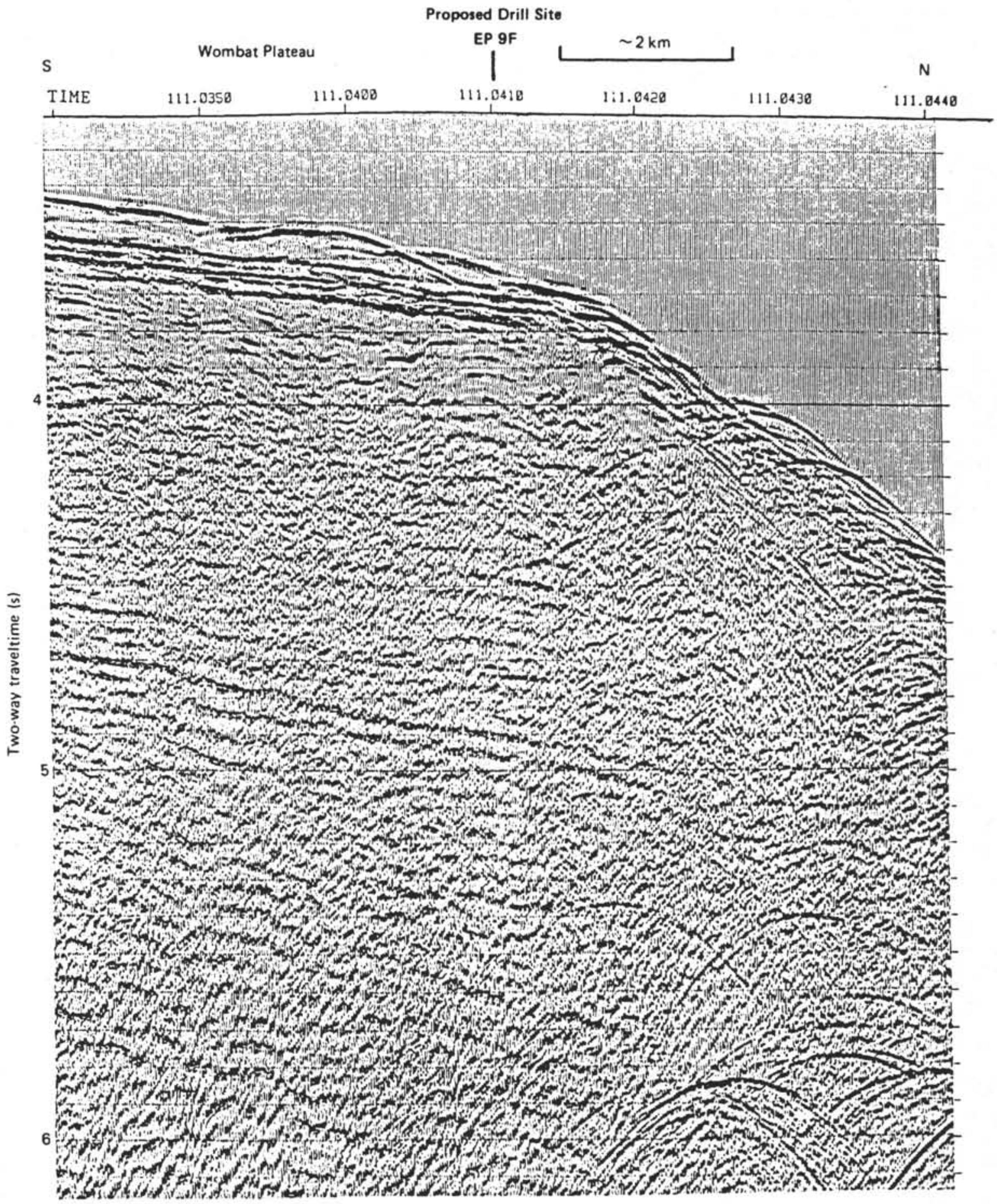
Figure 2. Segment of seismic line 56/013, showing location of EP9E.

Figure 3. Segment of seismic line 56/013, showing location of EP9F.



16°30'
16°35'
16°40'
16°45'
115°25'
115°30'
115°35'
0500
0500
0700
0800
EP 9F
0400
1000
BMR 56/transit
BMR 56/transit
Wombat
Plateau
0300
BMR 56/013
0230
0200
EP 9E
0130


EP 9E
111.0000
111.0020
111.0040
111.0100
111.0120
111.0140
Two-way traveltime (s)
2
3
4
5
6
7


Proposed Drill Site
EP 9F
~2 km
S
Wombat Plateau
N
TIME
111.0350
111.0400
111.0410
111.0420
111.0430
111.0440
Two-way traveltime (s)
4
5
6

SITE NUMBER: EP10A - EP10A"

POSITION: 16°57'S, 115°33'E to 16°56'S, 115°33'E

JURISDICTION: International

SEDIMENT THICKNESS: 8-10 km

PRIORITY: 1

WATER DEPTH: 2025-2050 m

PROPOSED DRILLING PROGRAM: Penetrate 1300 m to below Triassic rift onset unconformity by either (a) drilling one hole at top of plateau, using a reentry cone; or (b) drilling several holes down the side of the plateau to recover section in different segments.

SEISMIC RECORD: BMR *Rig Seismic* 56/020A, 56/020B, and 56/013

LOGGING: Standard

OBJECTIVES: This site provides the best opportunity to sample the Upper Triassic to lowermost Cretaceous, pre- and syn-rift, as well as early post-breakup history. Much of the early sequence should be shallow marine and provide an excellent record of rift-stage sedimentation, Tethyan faunas, and eustatic sea-level fluctuations in the Late Triassic.

SEDIMENT TYPE: (Approximate lithologies)

0-30 m	Neogene
30-190 m	Lowermost Neocomian Jurassic mudstones and calcareous claystones
approx. 190 m	Breakup unconformity
190-1200 m	Jurassic to Triassic shallow water carbonates, ferruginous claystones, silt and mudstones
~900 m	Liassic shallow-water carbonates
~1200 m	Triassic rift onset unconformity
>1200 m	Triassic rift and pre-rift sediments

SITE FIGURES (following pages):

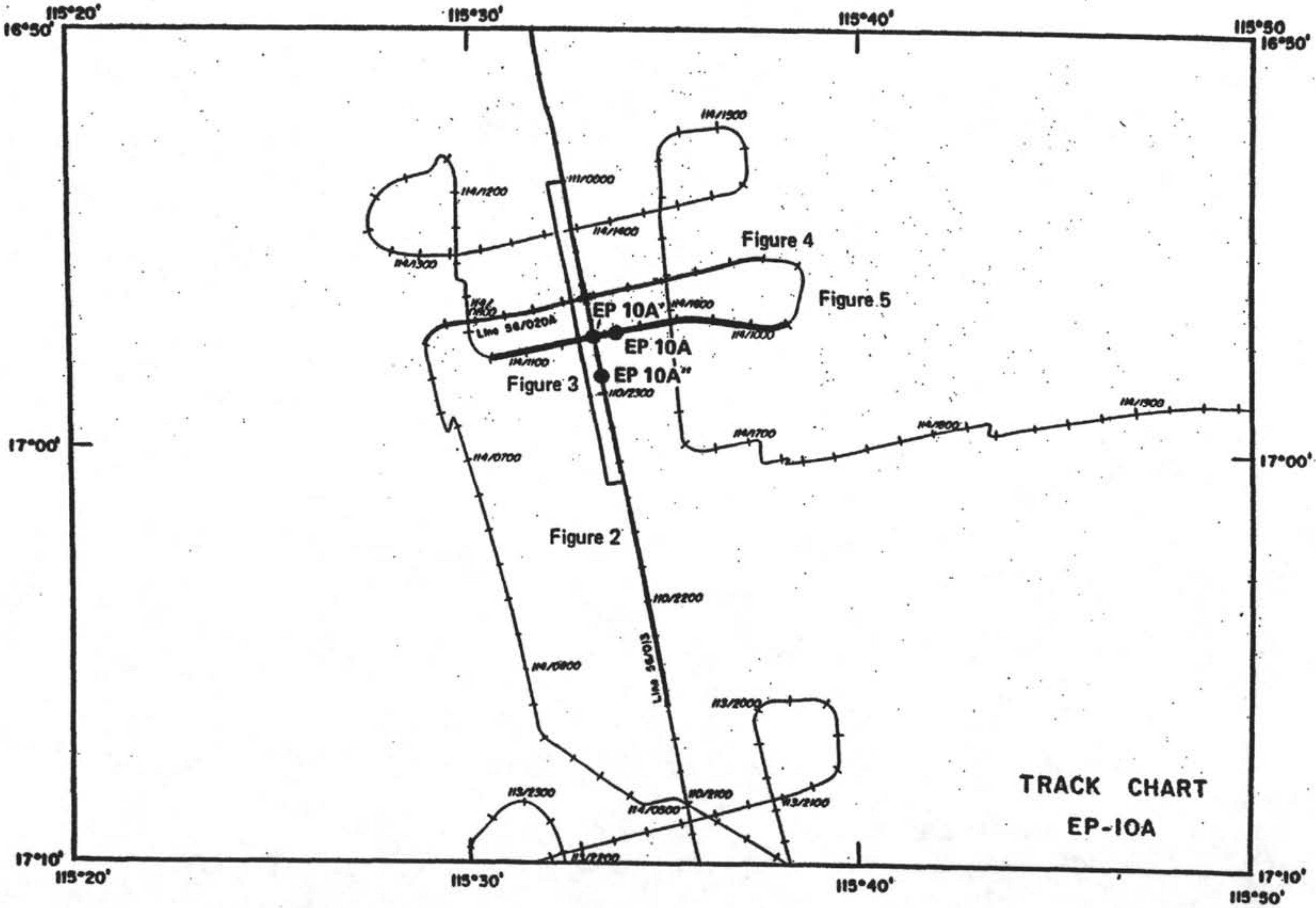
Figure 1. Location map for EP10A, EP10A', and EP10A" on crossing of lines BMR 56/020A and BMR 56/013.

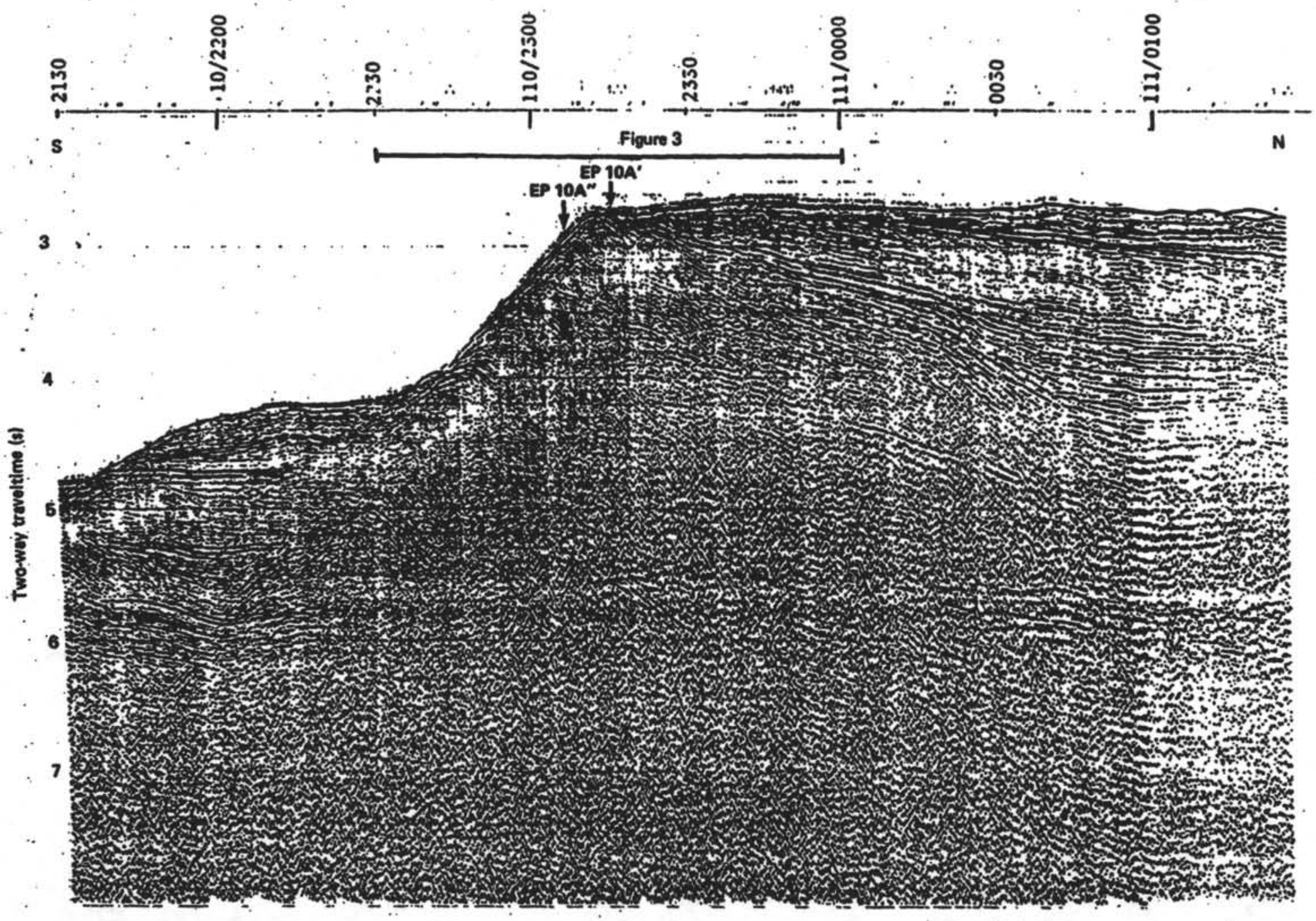
Figure 2. Seismic line 56/013 showing location of Figure 3, and EP10A' and EP10A". EP10A is located on seismic line 56/020B. Its projection onto line 56/013 coincides with the location of EP10A'.

Figure 3. A. Seismic line 56/013 showing location of EP10A, EP10A', and EP10A" and reflecting horizons E and F. EP10A is located on seismic line 56/020B. Its projection onto line 56/013 coincides with the location of EP10A'.
B. Schematic interpretation of a segment of line 56/013 shown in A.

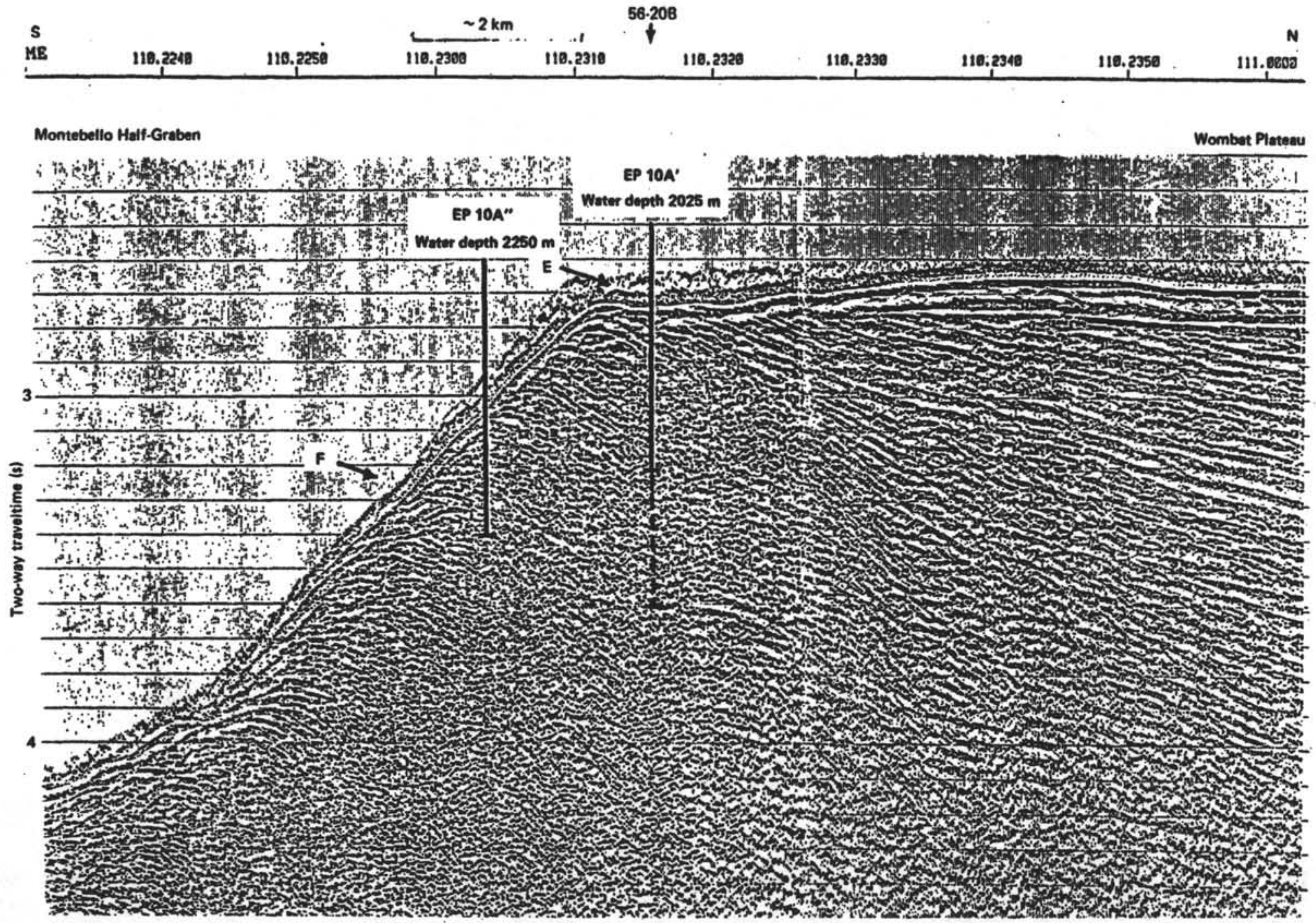
Figure 4. A. Seismic line 56/020A showing projected location of EP10A.
B. Schematic interpretation of segment of line 56/020A shown in A.

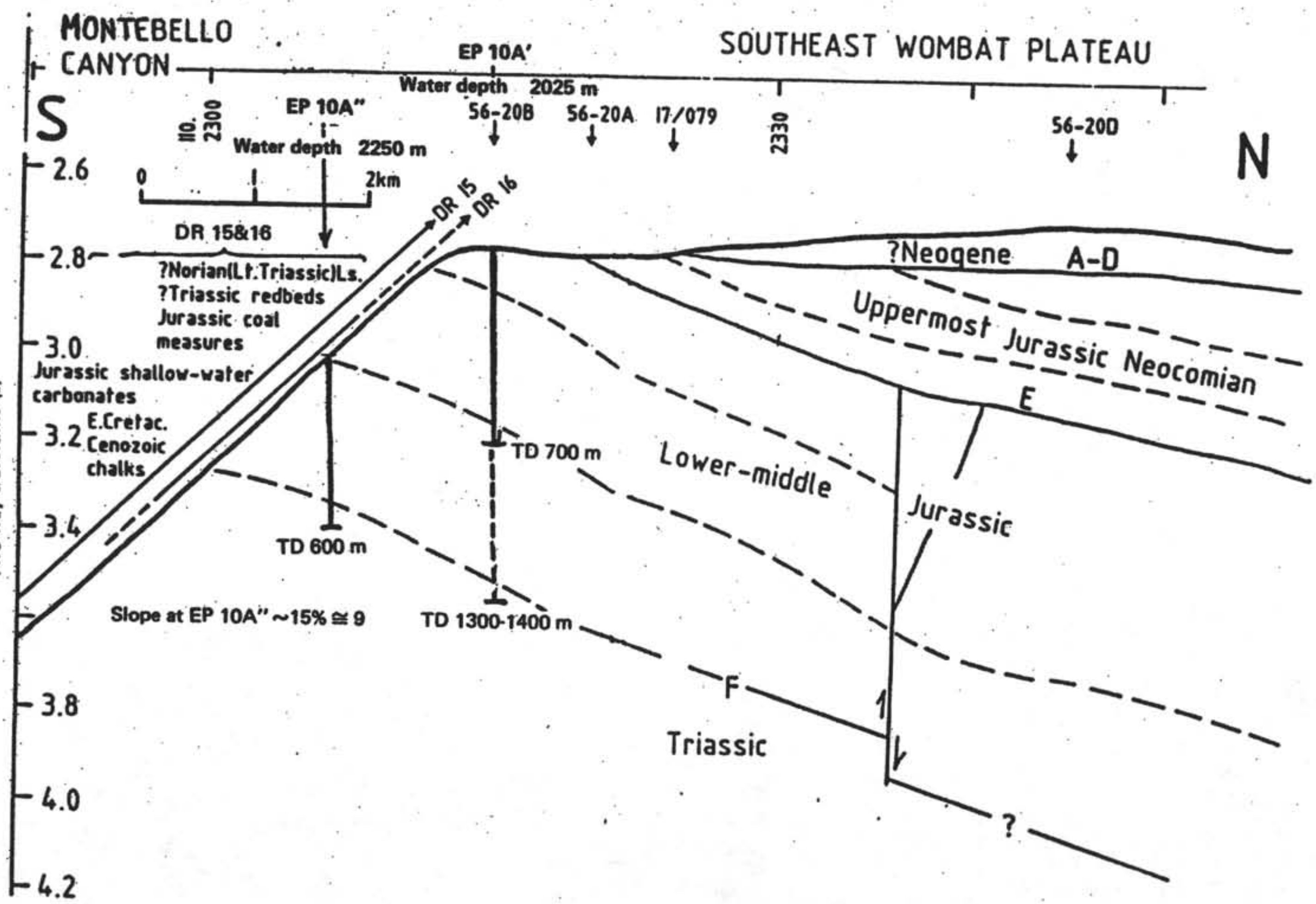
Figure 5. Seismic line 56/020B showing location of EP10A.


115°20'
115°30'
115°40'
115°50
16°50'
17°00'
17°10'
114/1500
114/1200
111/0000
114/1400
114/1300
Figure 4
Figure 5
EP 10A'
EP 10A
EP 10A"
Line 56/020A
114/1100
114/1000
Figure 3
110/2300
114/1700
114/1800
114/1900
114/0700
Figure 2
110/2200
Line 56/013
114/0800
113/2000
113/2300
114/0500
110/2100
113/2100
TRACK CHART
EP-10A

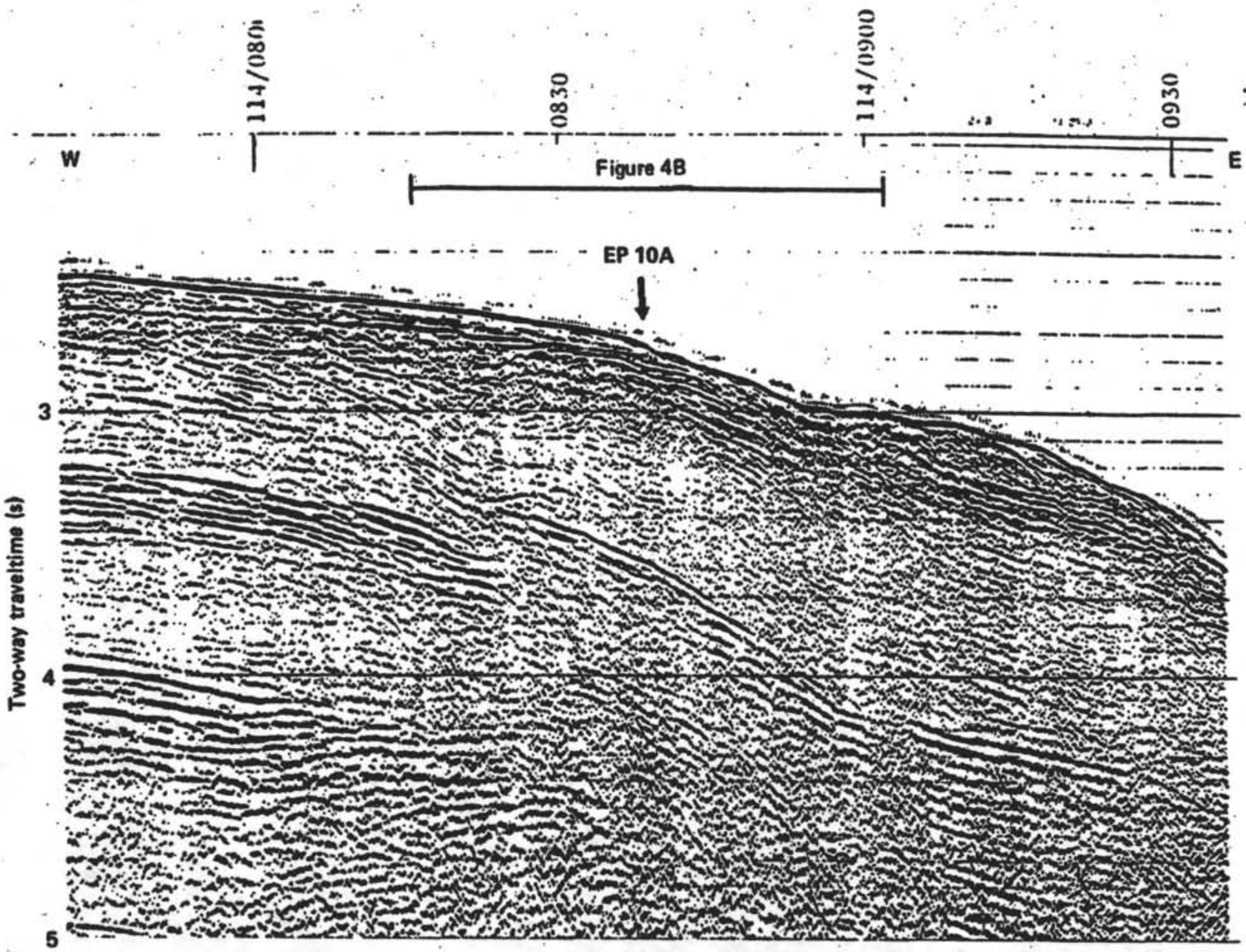

2130
10/2200
2230
110/2300
2350
111/0000
0030
111/0100
S
N
Figure 3
EP 10A'
EP 10A''
3
4
5
6
7
Two-way traveltime (s)

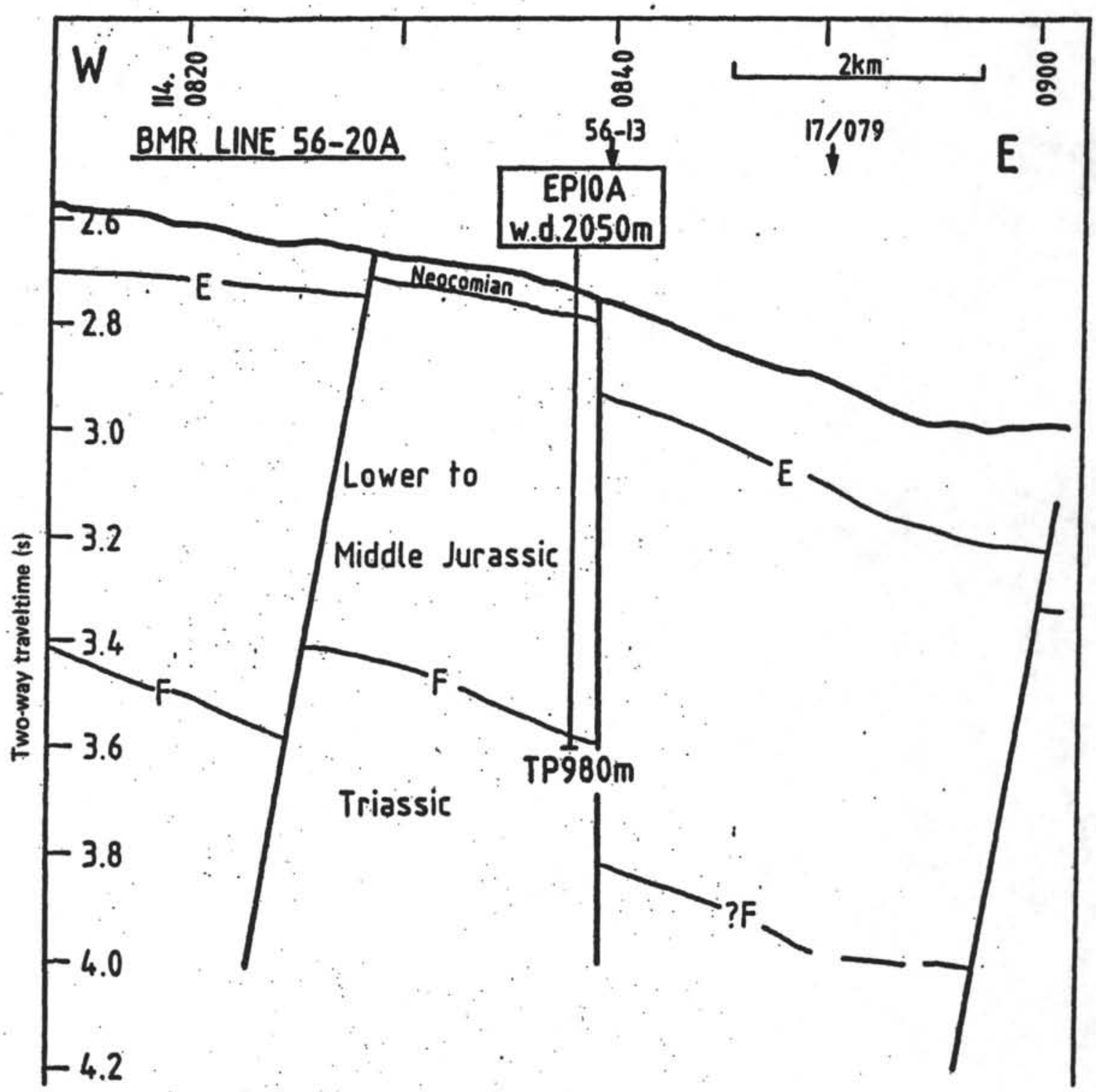
56/013

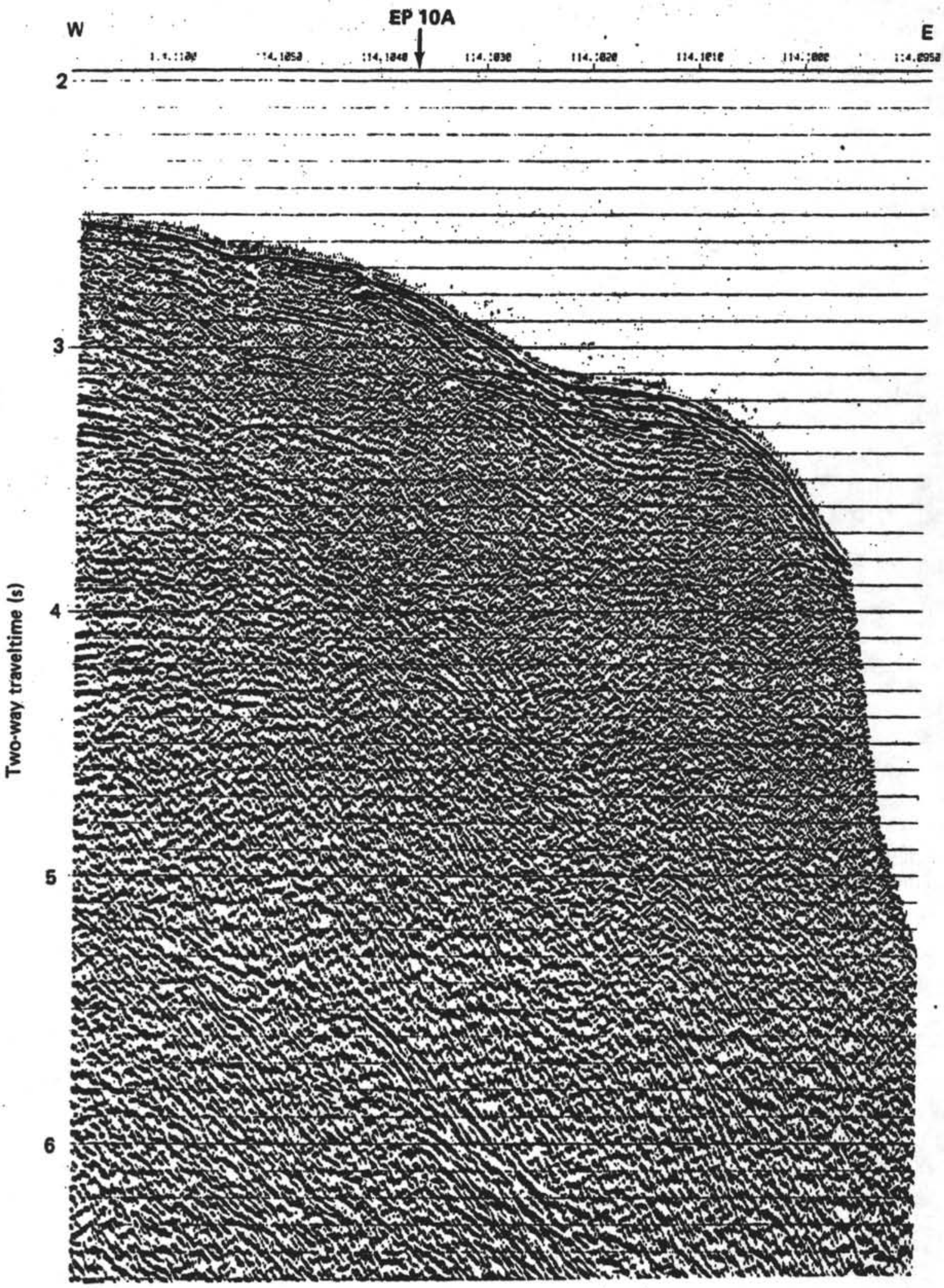

S
ME
110.2240
110.2250
~2 km
110.2300
110.2310
56-208
110.2320
110.2330
110.2340
110.2350
N
111.0000
Montebello Half-Graben
Wombat Plateau
EP 10A''
Water depth 2250 m
EP 10A'
Water depth 2025 m
E
F
3
4
Two-way traveltime (s)



MONTEBELLO CANYON
SOUTHEAST WOMBAT PLATEAU
S
N
EP 10A'
Water depth 2025 m
EP 10A"
Water depth 2250 m
110. 2300
56-20B
56-20A
17/079
2330
56-20D
0
2km
DR 15
DR 16
DR 15&16
?Norian(Lt.Triassic)Ls.
?Triassic redbeds
Jurassic coal measures
Jurassic shallow-water carbonates
E.Cretac. Cenozoic chalks
2.6
2.8
3.0
3.2
3.4
3.8
4.0
4.2
Two-way traveltime (s)
TD 600 m
TD 700 m
TD 1300-1400 m
Slope at EP 10A" ~15% ≅ 9
?Neogene
A-D
Uppermost Jurassic Neocomian
E
Lower-middle
Jurassic
F
Triassic
?


114/080
0830
114/0900
0930
W
E
Figure 4B
EP 10A
3
4
5
Two-way traveltime (s)


W
114.
0820
0840
0900
2km
BMR LINE 56-20A
56-13
17/079
E
EP10A
w.d.2050m
2.6
2.8
3.0
3.2
3.4
3.6
3.8
4.0
4.2
Two-way traveltime (s)
E
Neocomian
Lower to
Middle Jurassic
F
TP980m
Triassic
?F


W
EP 10A
E
2
3
4
5
6
Two-way traveltime (s)

SITE NUMBER: EP11B

POSITION: $16^{o}49'S$, $117^{o}29'E$ **JURISDICTION:** Australia

SEDIMENT THICKNESS: >8 km **PRIORITY:** 1

WATER DEPTH: 3360 m

PROPOSED DRILLING PROGRAM: APC upper 200 m, RCB to 1200 m

SEISMIC RECORD: BMR/*Rig Seismic* 56/024 and 56/025E

LOGGING: Standard

OBJECTIVES: 1. Triassic to Middle Jurassic pre- and syn-rift sedimentation: facies, paleobathymetry, and subsidence history. 2. Upper Triassic to Middle Jurassic Tethys-type shallow-water carbonates, alternating with clastic rocks of the "coal measure sequence" (von Stackelberg et al., 1980). 3. Late Jurassic to Early Cretaceous post-breakup development history. 4. Correlation of unconformity-bound sequences with coeval events at EP7V, EP2A and AAP1B. 5. Paleodepth transect across passive continental margin.

SEDIMENT TYPE: (Approximate lithologies)

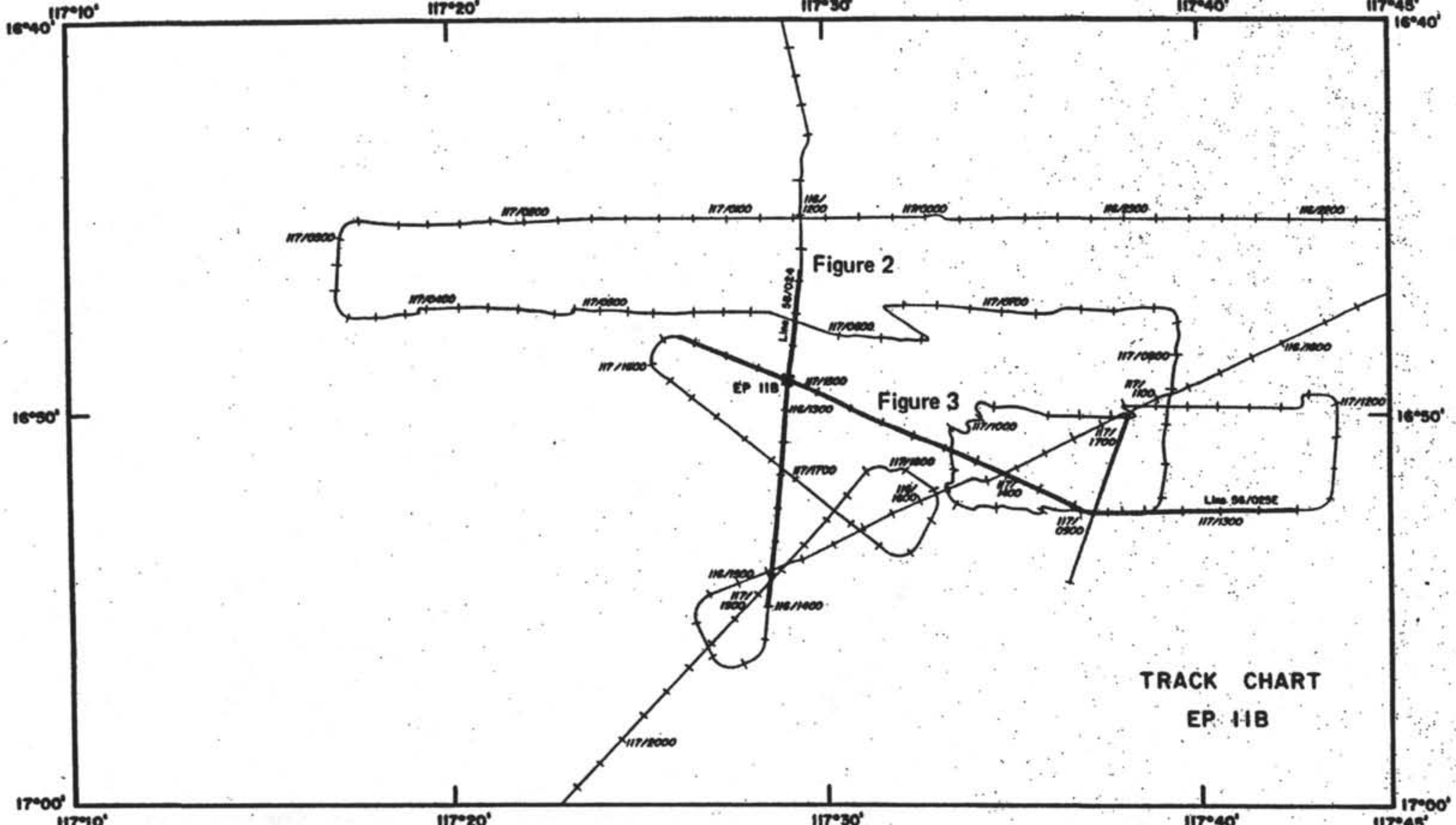
approx. 200 m	Uppermost Jurassic-Lower Cretaceous calcareous claystones, silt/sandstone
790 m	Uppermost Triassic to Middle Jurassic shallow-water carbonates, ferruginous clay and sandstone, clastic sediments of "coal measure sequence"

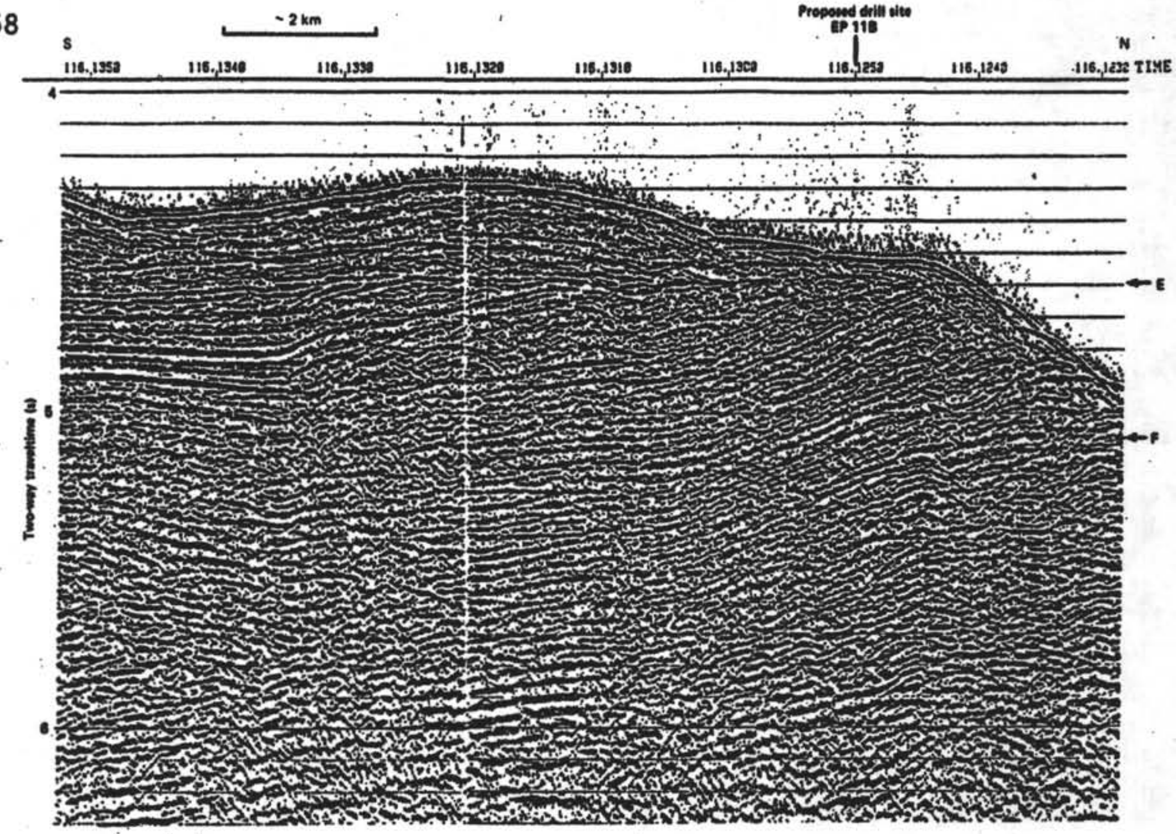
SITE FIGURES (following pages):

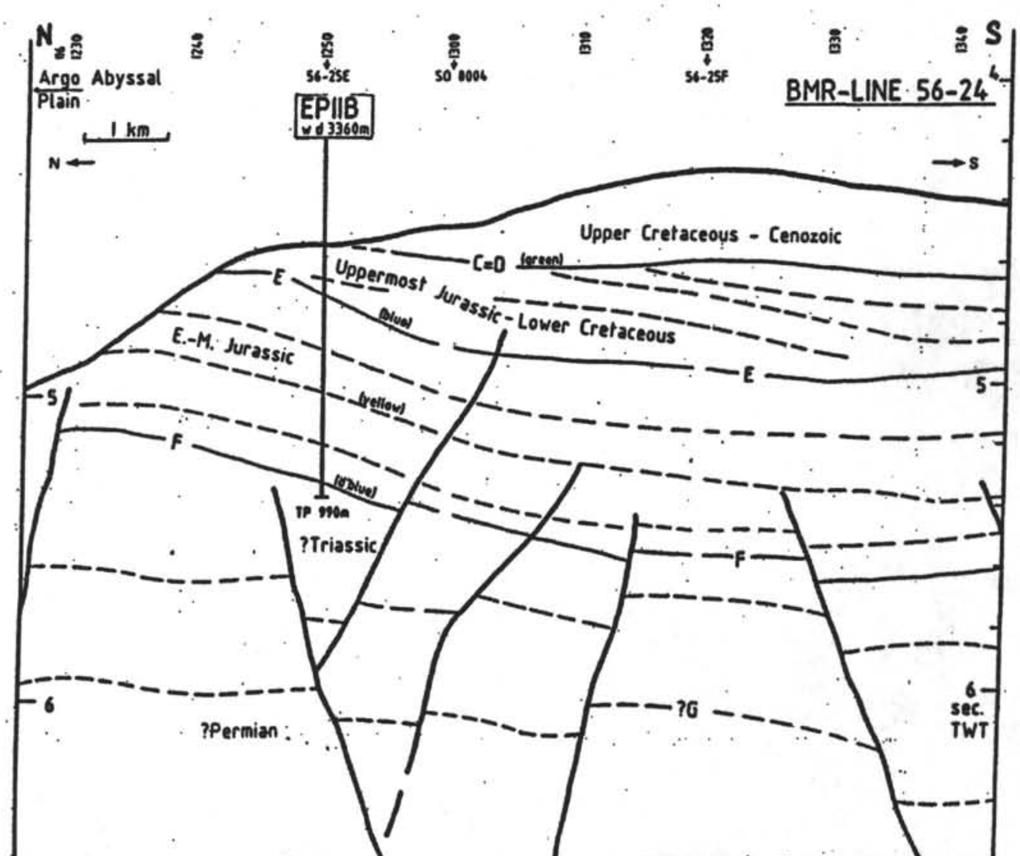
Figure 1. Track chart showing location of seismic lines and EP11B.

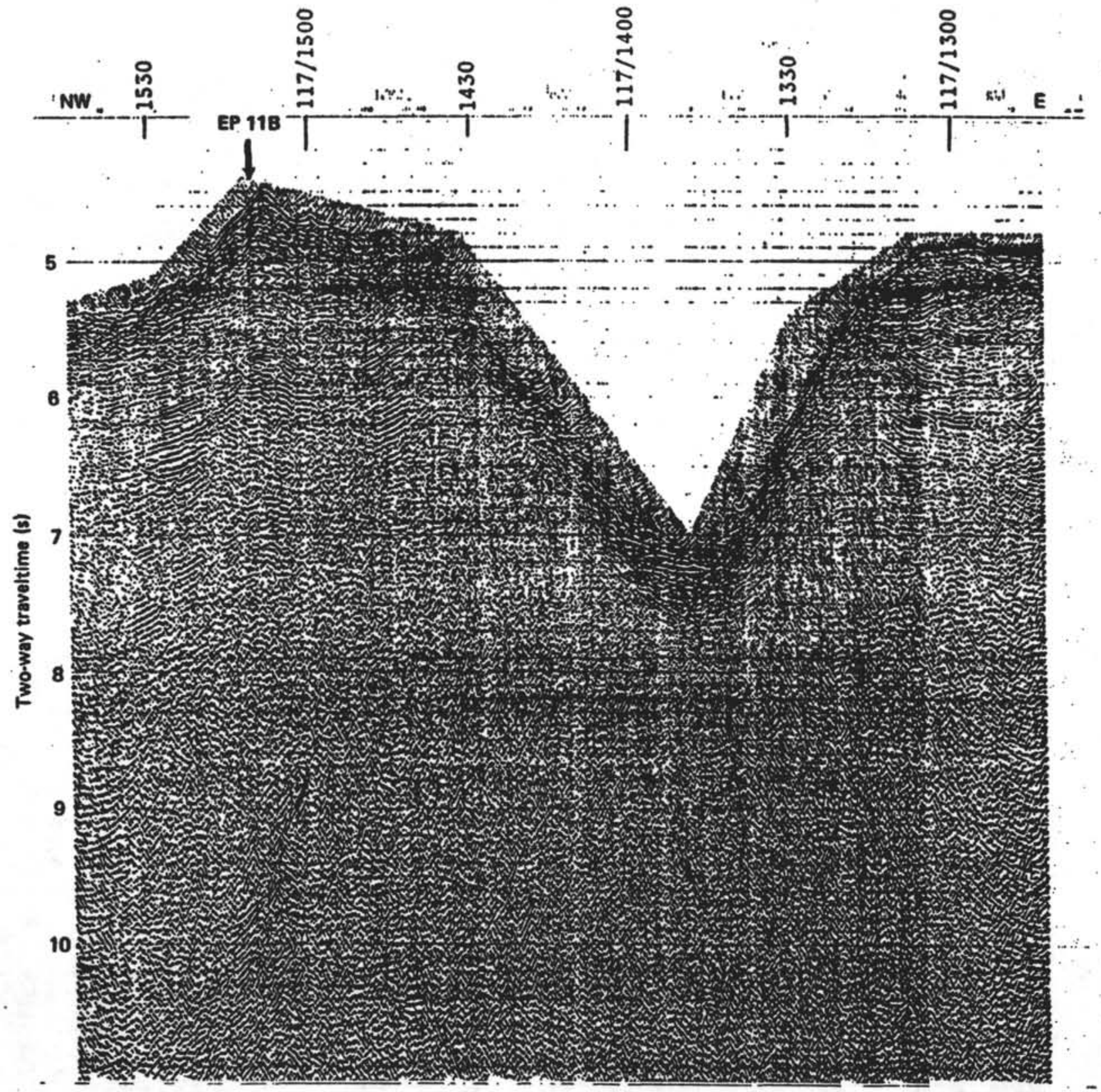
Figure 2. A. Seismic line 56/024 with location of EP11B.
B. Schematic interpretation of portion of seismic line shown in A.

Figure 3. Seismic line 56/025E with location of EP11B.


117°10'
117°20'
117°30'
117°40'
117°45'
16°40'
16°50'
17°00'
Figure 2
Figure 3
EP 11B
117/0500
117/0400
117/0600
117/0800
117/0900
117/0700
117/1000
117/1100
117/1200
117/1300
117/1600
117/1700
117/1800
117/1900
117/2000
116/1300
116/1400
116/1500
116/1600
116/1800
TRACK CHART
EP 11B


~2 km
Proposed drill site
EP 11B
S
N
TIME
4
5
6
Two-way traveltime (s)
E
F


N
S
1230
1240
1250
1300
1310
1320
1330
1340
56-25E
SO 8004
56-25F
Argo Abyssal Plain
BMR-LINE 56-24
EP11B
w d 3360m
1 km
Upper Cretaceous - Cenozoic
C=D (green)
E
Uppermost Jurassic - Lower Cretaceous
(blue)
E.-M. Jurassic
(yellow)
F
(d'blue)
TP 990m
?Triassic
5
6
?Permian
?G
6 sec. TWT


NW
1530
EP 11B
117/1500
1430
117/1400
1330
117/1300
E
Two-way traveltime (s)
5
6
7
8
9
10

SITE NUMBER: EP12P

POSITION: 19°51'S, 112°15'E

JURISDICTION: Australia

SEDIMENT THICKNESS: 8-10 km

PRIORITY: 1

WATER DEPTH: 1354 m

PROPOSED DRILLING PROGRAM: Make crossing seismic line; APC upper 200 m, RCB to 940 m (50 or above Dingo Claystone)

SEISMIC RECORD: North of Line 78A-234 (at shot point 2500 on line 79B-1425)

LOGGING: Standard

OBJECTIVES: Timing, duration and amount of subsidence of the block-faulted outer Exmouth Plateau margin and a comparison with similar parameters on the central Exmouth Plateau dominated by thin-skinned detachment.

SEDIMENT TYPE: 400 m of pelagic carbonates overlying 600 m of shallow water, terrigenous, syn-rift facies.

SITE FIGURES (following pages):

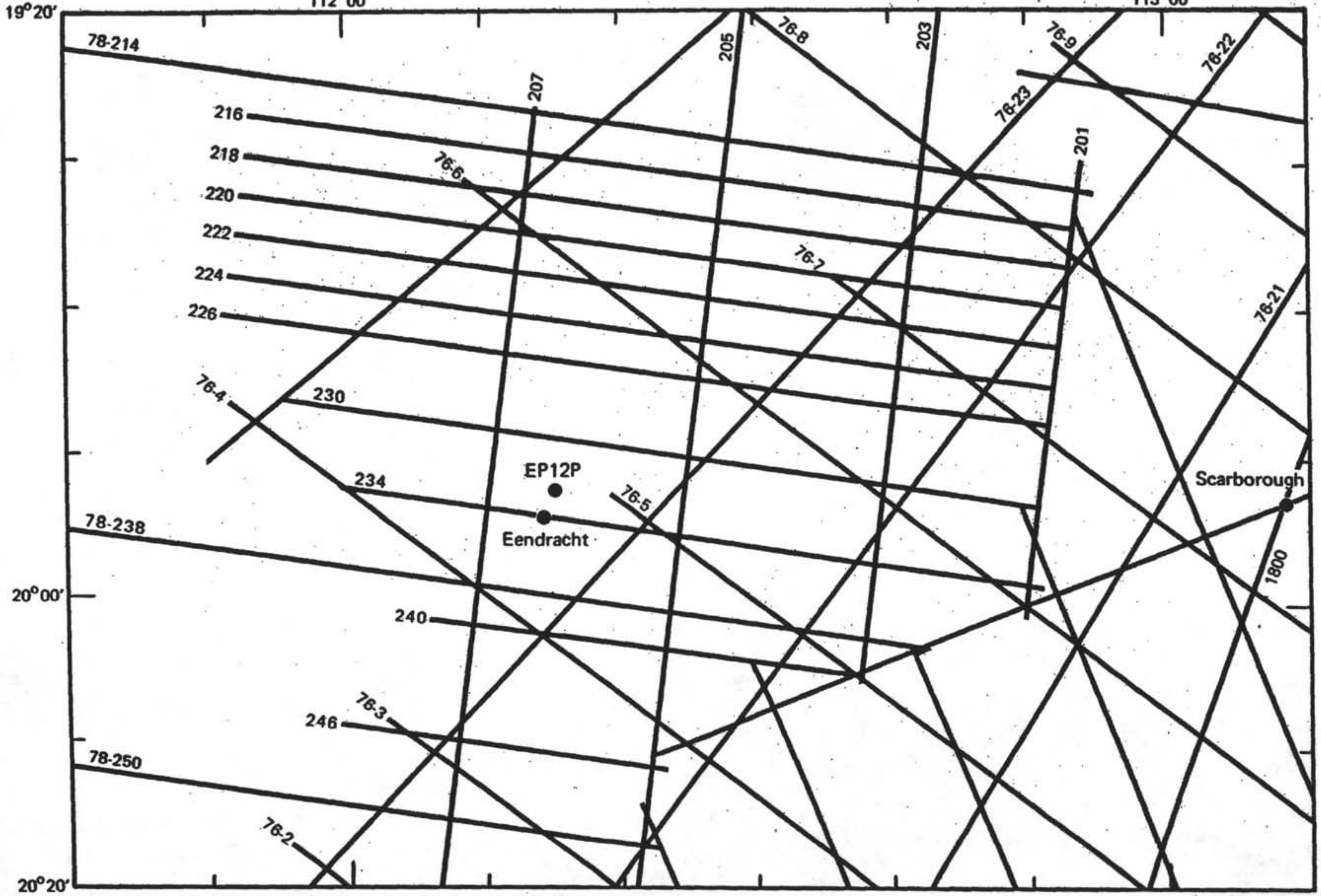
Figure 1. Location map showing seismic line X78A-234, EP12P, and Eendracht wellsite.

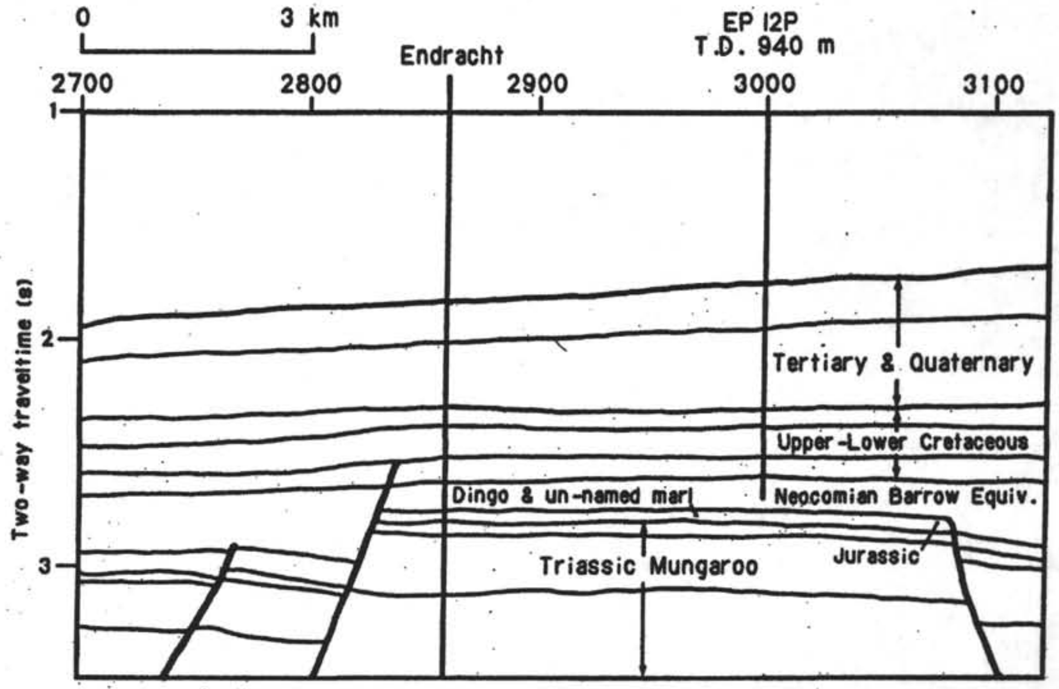
Figure 2. A. Schematic interpretation of seismic line shown in B, showing location of Eendracht well and projected location of EP12P.
B. Segment of seismic line X78A-234 showing projected location of EP12P.

Figure 3. Segment of seismic line X79-1425 showing location of Eendracht well and EP12P.

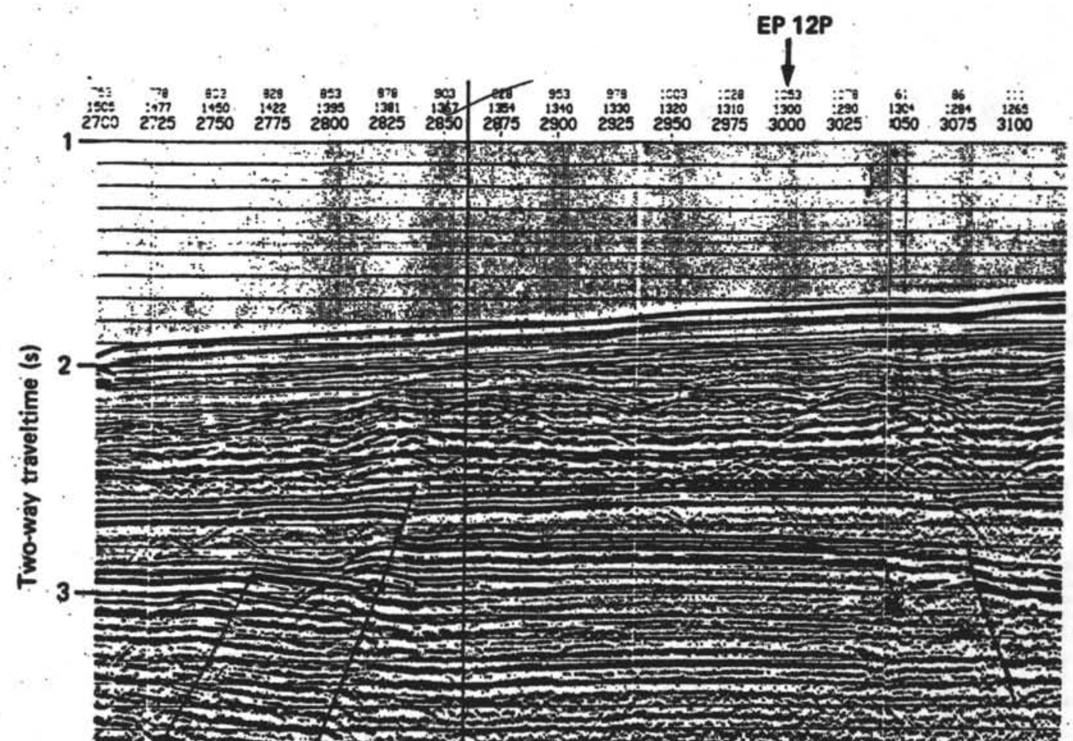
Figure 4. Time section to top of Barrow Group (Neocomian) with location of Eendracht well, EP12P, and adjacent seismic lines.

Figure 5. Interpretive depth section at Eendracht well with projected location of EP12P.

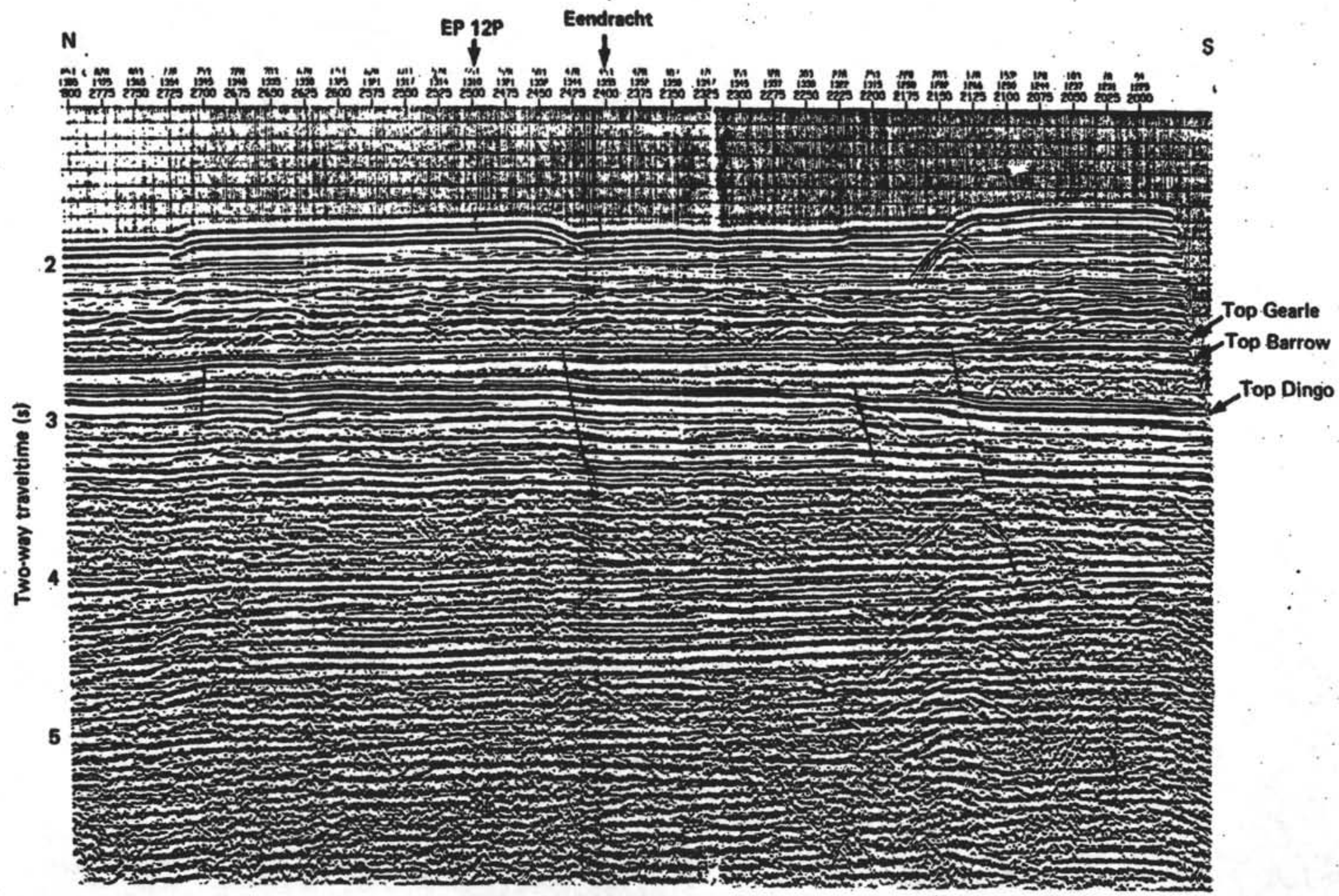

19°20'
112°00'
113°00'
20°00'
20°20'
78-214
216
218
220
222
224
226
230
234
78-238
240
246
78-250
207
205
203
201
76-8
76-9
76-22
76-23
76-6
76-7
76-21
76-4
76-5
76-3
76-2
1800
EP12P
Eendracht
Scarborough



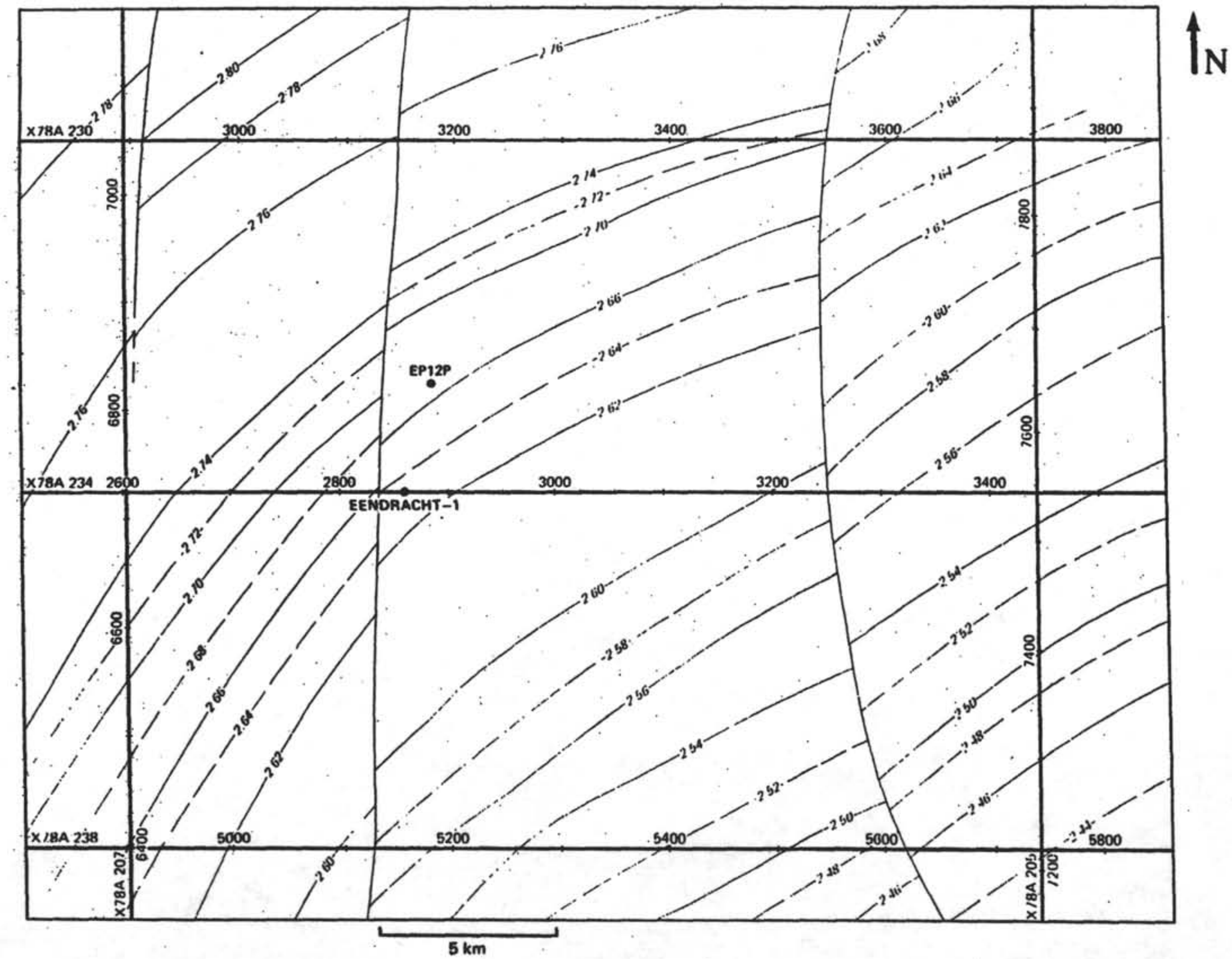
0
3 km
Endracht
EP 12P
T.D. 940 m
2700
2800
2900
3000
3100
1
2
3
Two-way traveltime (s)
Tertiary & Quaternary
Upper-Lower Cretaceous
Dingo & un-named marl
Neocomian Barrow Equiv.
Triassic Mungaroo
Jurassic



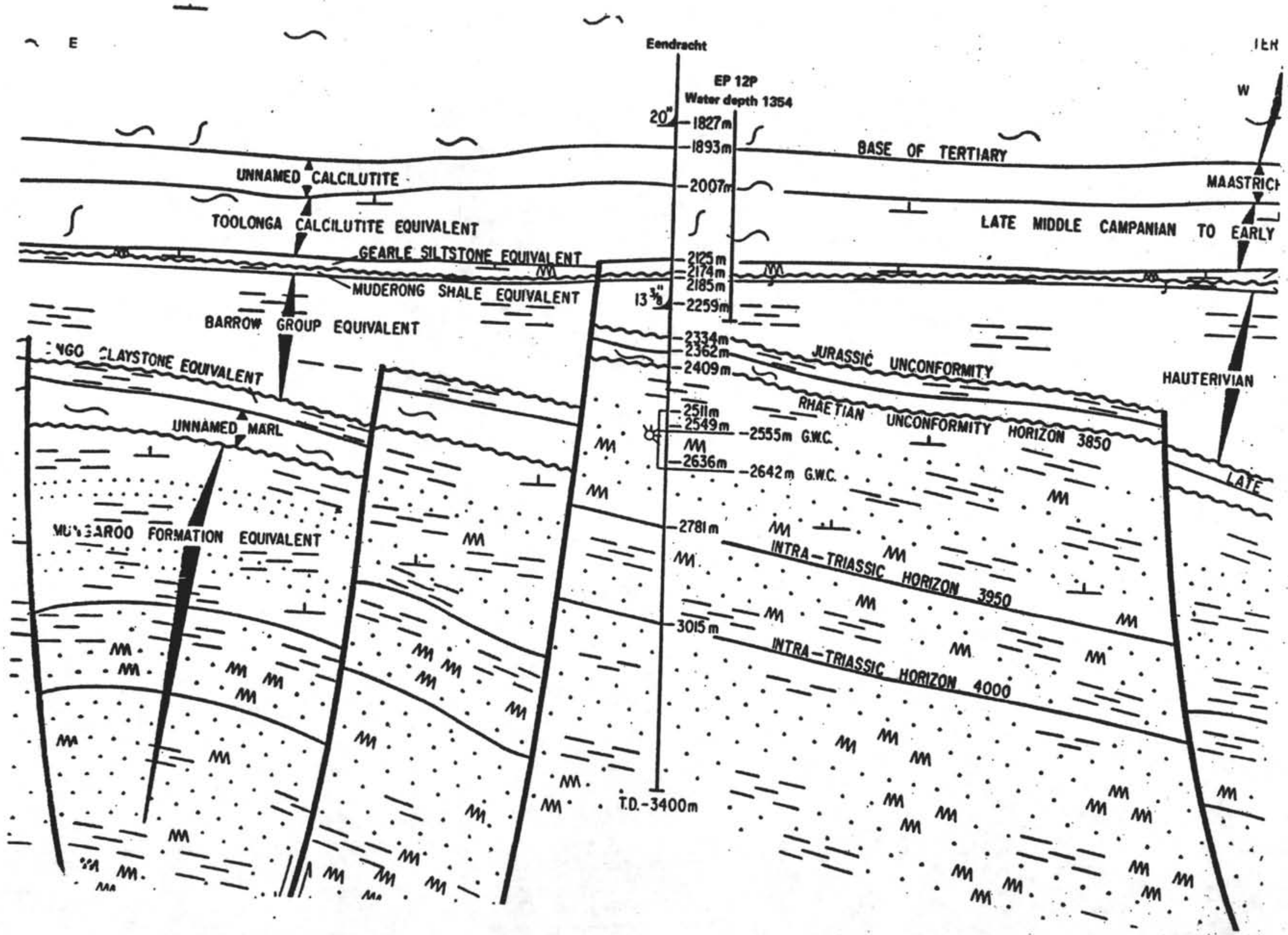
EP 12P
2700
2725
2750
2775
2800
2825
2850
2875
2900
2925
2950
2975
3000
3025
3075
3100
1
2
3
Two-way traveltime (s)



N
S
EP 12P
Eendracht
Two-way traveltime (s)
2
3
4
5
Top Gearle
Top Barrow
Top Dingo



N
X78A 230
3000
3200
3400
3600
3800
X78A 234
2600
2800
3000
3200
3400
EP12P
EENDRACHT-1
X78A 238
5000
5200
5400
5800
X78A 207
6400
6600
6800
7000
X78A 205
7200
7400
7600
7800
2.80
2.78
2.76
2.74
2.72
2.70
2.68
2.66
2.64
2.62
2.60
2.58
2.56
2.54
2.52
2.50
2.48
2.46
5 km


E
Eendracht
EP 12P
Water depth 1354
IER
W
20"
1827m
1893m
2007m
2125m
2174m
2185m
13 3/8"
2259m
2334m
2362m
2409m
2511m
2549m
2555m G.W.C.
2636m
2642m G.W.C.
2781m
3015m
T.D.-3400m
BASE OF TERTIARY
UNNAMED CALCILUTITE
MAASTRICH
TOOLONGA CALCILUTITE EQUIVALENT
LATE MIDDLE CAMPANIAN TO EARLY
GEARLE SILTSTONE EQUIVALENT
MUDERONG SHALE EQUIVALENT
BARROW GROUP EQUIVALENT
NGO CLAYSTONE EQUIVALENT
JURASSIC UNCONFORMITY
HAUTERIVIAN
UNNAMED MARL
RHAETIAN UNCONFORMITY HORIZON 3850
LATE
MUNGAROO FORMATION EQUIVALENT
INTRA-TRIASSIC HORIZON 3950
INTRA-TRIASSIC HORIZON 4000

SITE NUMBER: AAP1B

POSITION: 15°58'S, 117°34'E

JURISDICTION: International

SEDIMENT THICKNESS: 900 m

PRIORITY: 1

WATER DEPTH: 5740 m

PROPOSED DRILLING PROGRAM: APC upper 200 m, set reentry cone, RCB to 1150 m, including 250 m of basalt.

SEISMIC RECORD: BMR/*Rig Seismic* line 56/023C at 116/0258, near crossing of line 56/022 at 115/2048.

LOGGING: Standard, BHTV, hydrofracture, VSP

OBJECTIVES: 1. Nature and age of oceanic basement in one of the oldest oceanic basins. 2. Multiple stratigraphy for Jurassic time scale with emphasis on dating M25 (with AAP2). 3. Statistical modeling of Jurassic microfossil distribution (with AAP2). 4. Tethyan paleocirculation.

SEDIMENT TYPE:

0.23 s	Cenozoic siliceous/calcareous ooze/clay
0.15 s	?Upper Cretaceous zeolitic clay
0.35 s	Neocomian-Oxford carbonates and calcareous claystone
approx. 900 m	(oceanic) basement

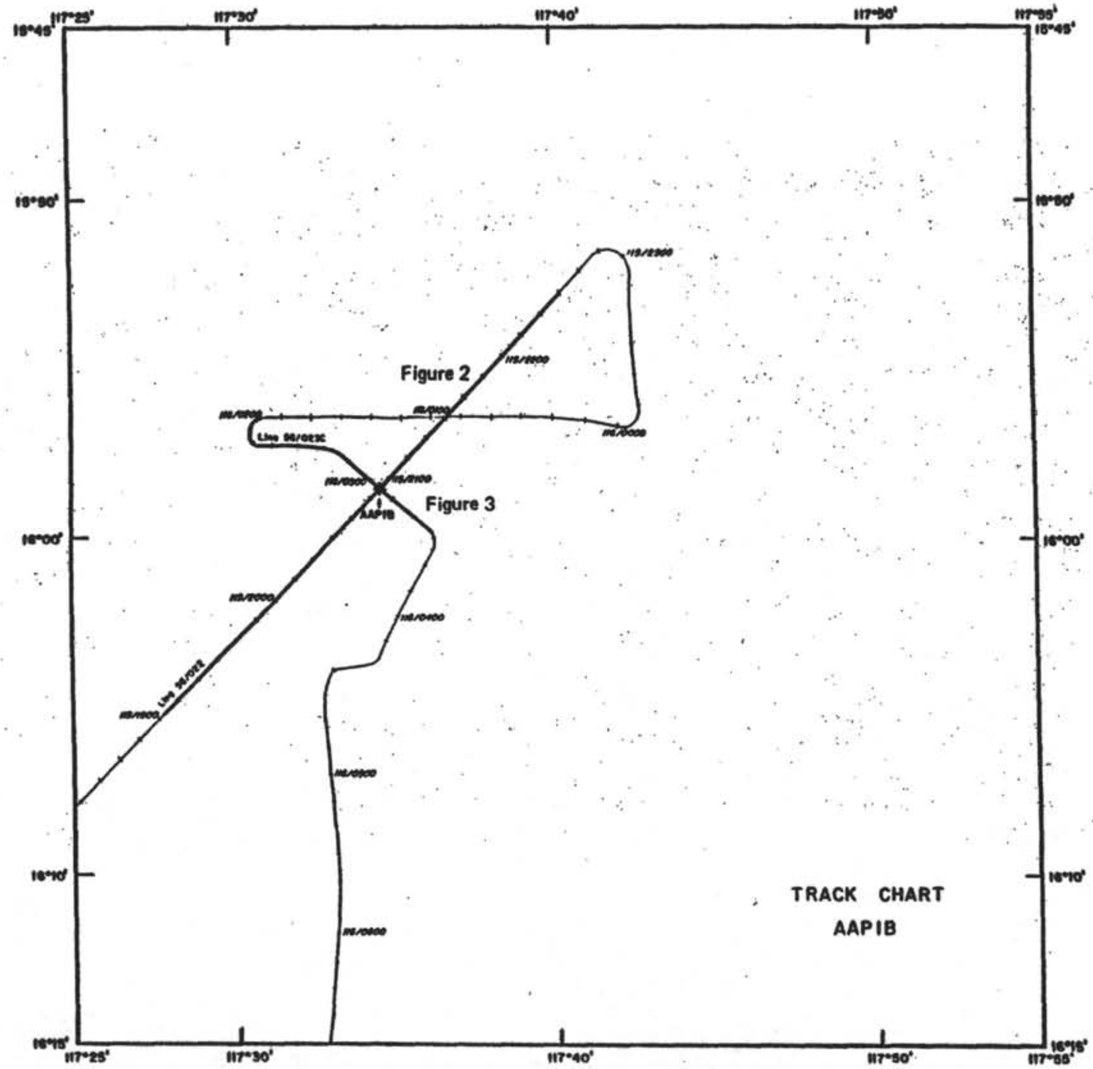
SITE FIGURES (following pages):

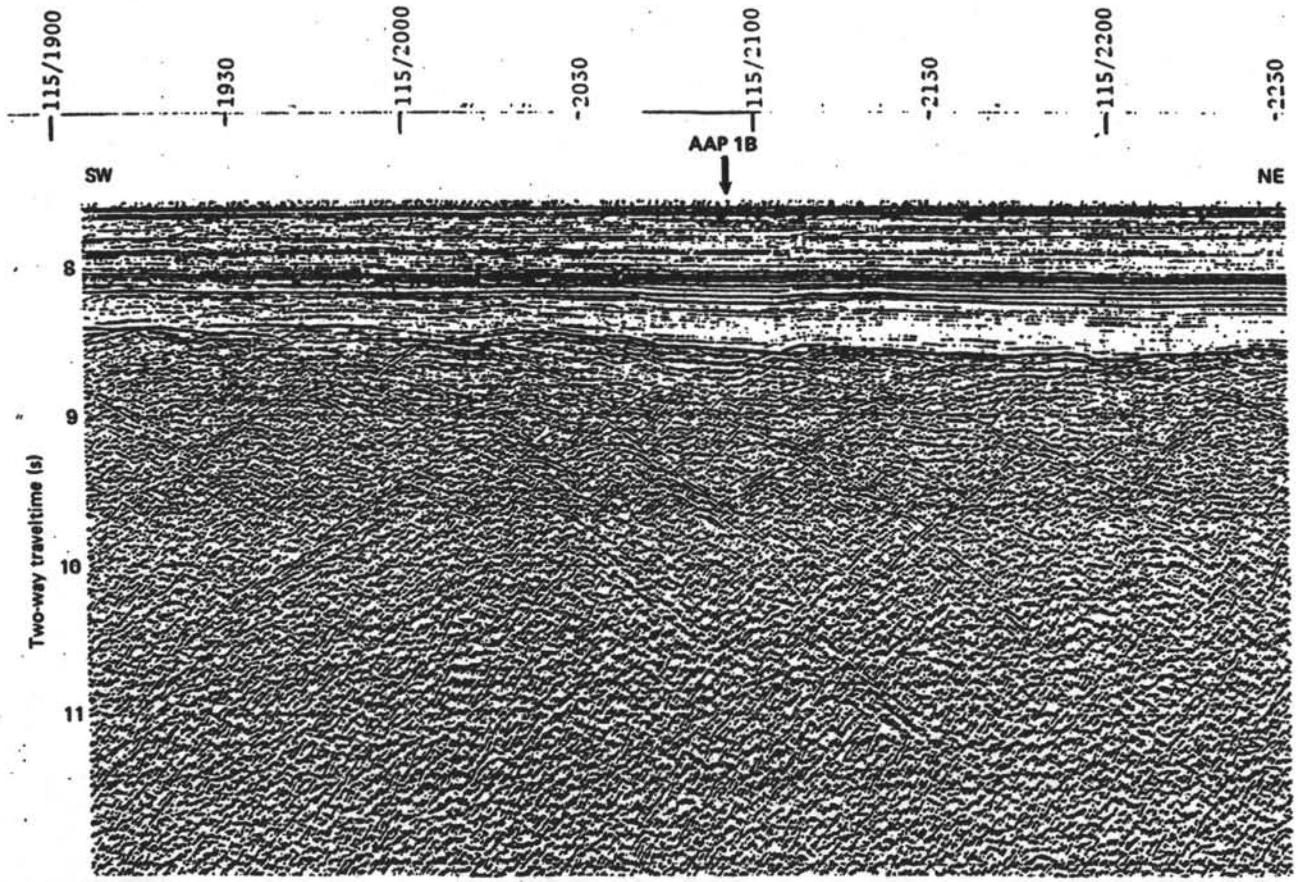
Figure 1. Track chart showing location of AAP1B and seismic lines 56/022 and 56/023C.

Figure 2. Seismic line 56/022 showing location of AAP1B.

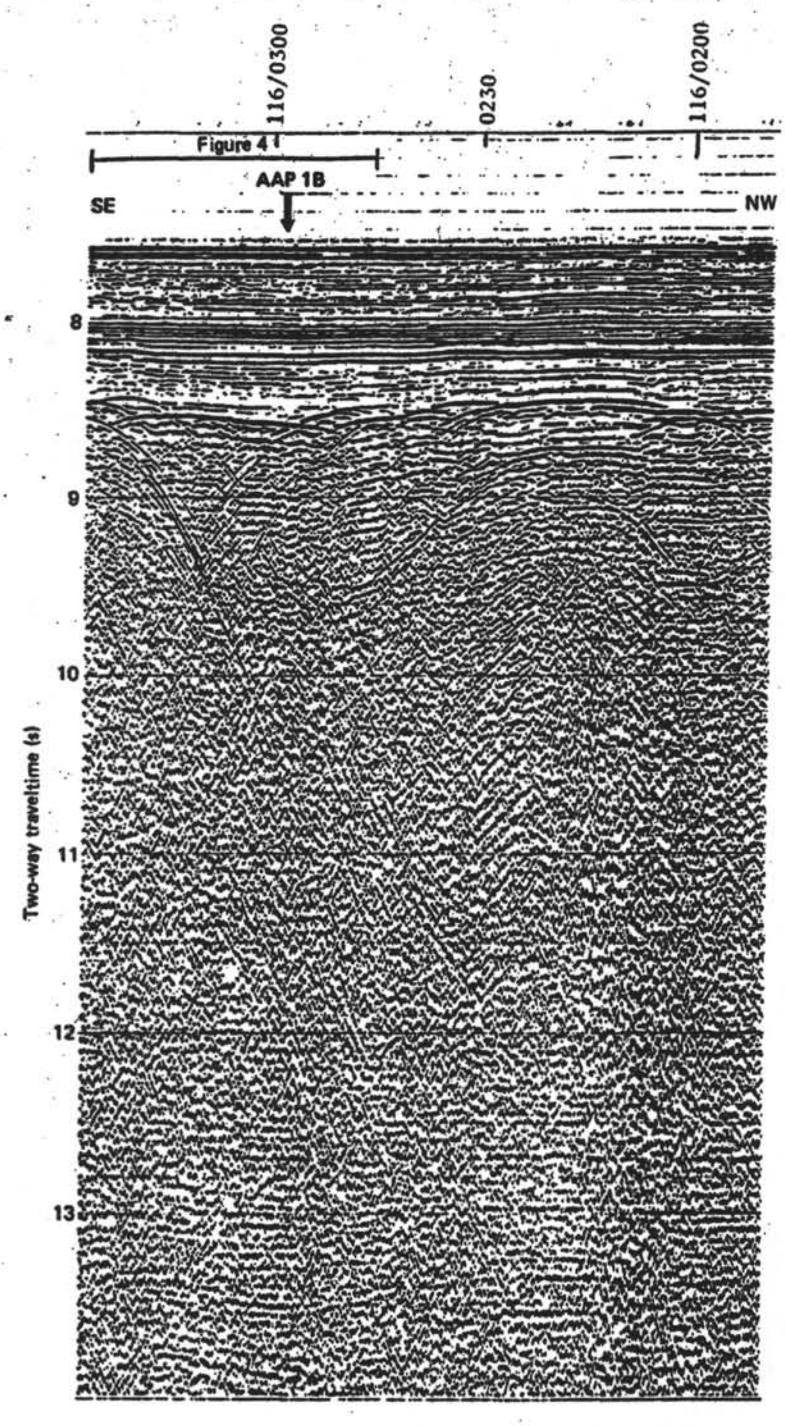
Figure 3. Seismic line 56/023C showing location of AAP1B and Figure 4.

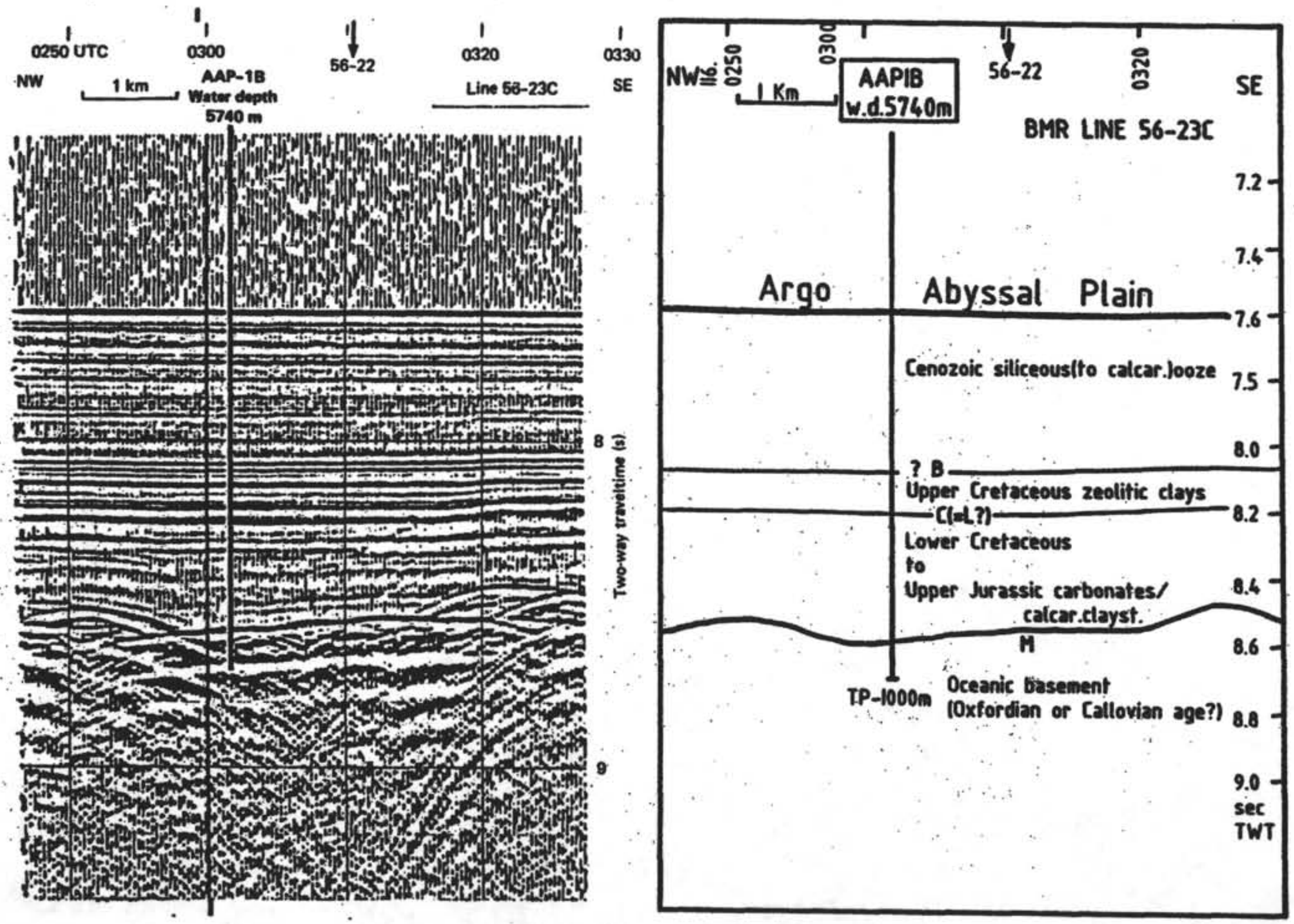
Figure 4. Short segment of seismic line 56/023C with interpretation.


117°25'
117°30'
117°40'
117°50'
117°55'
15°45'
15°50'
16°00'
16°10'
16°15'
Figure 2
Figure 3
AAP1B
TRACK CHART
AAP1B


115/1900
1930
115/2000
2030
115/2100
2130
115/2200
2250
AAP 1B
SW
NE
8
9
10
11
Two-way traveltime (s)

56/022


116/0300
0230
116/0200
Figure 4
AAP 1B
SE
NW
8
9
10
11
12
13
Two-way traveltime (s)



0250 UTC
0300
56-22
0320
0330
NW
1 km
AAP-1B
Water depth
5740 m
Line 56-23C
SE
8
9
Two-way traveltime (s)
NW
0250
0300
0320
1 Km
AAPIB
w.d.5740m
56-22
SE
BMR LINE 56-23C
7.2
7.4
Argo
Abyssal Plain
7.6
Cenozoic siliceous(to calcar.)ooze
7.5
8.0
? B
Upper Cretaceous zeolitic clays
C(=L?)
8.2
Lower Cretaceous
to
Upper Jurassic carbonates/
calcar.clayst.
8.4
M
8.6
TP-1000m
Oceanic basement
(Oxfordian or Callovian age?)
8.8
9.0
sec
TWT

SITE NUMBER: AAP2

POSITION: 15°42'S, 117°20'E

JURISDICTION: International

SEDIMENT THICKNESS: 900 m

PRIORITY: 2

WATER DEPTH: 5700 m

PROPOSED DRILLING PROGRAM: Wash upper 300-400 m of Cenozoic clay and turbidite ooze (if permission given), recover lower sediments and 100 m of basement.

SEISMIC RECORD: *Atlantis II* cruise 93, Leg 14 at point corresponding to marine magnetic anomaly M25.

LOGGING: Standard

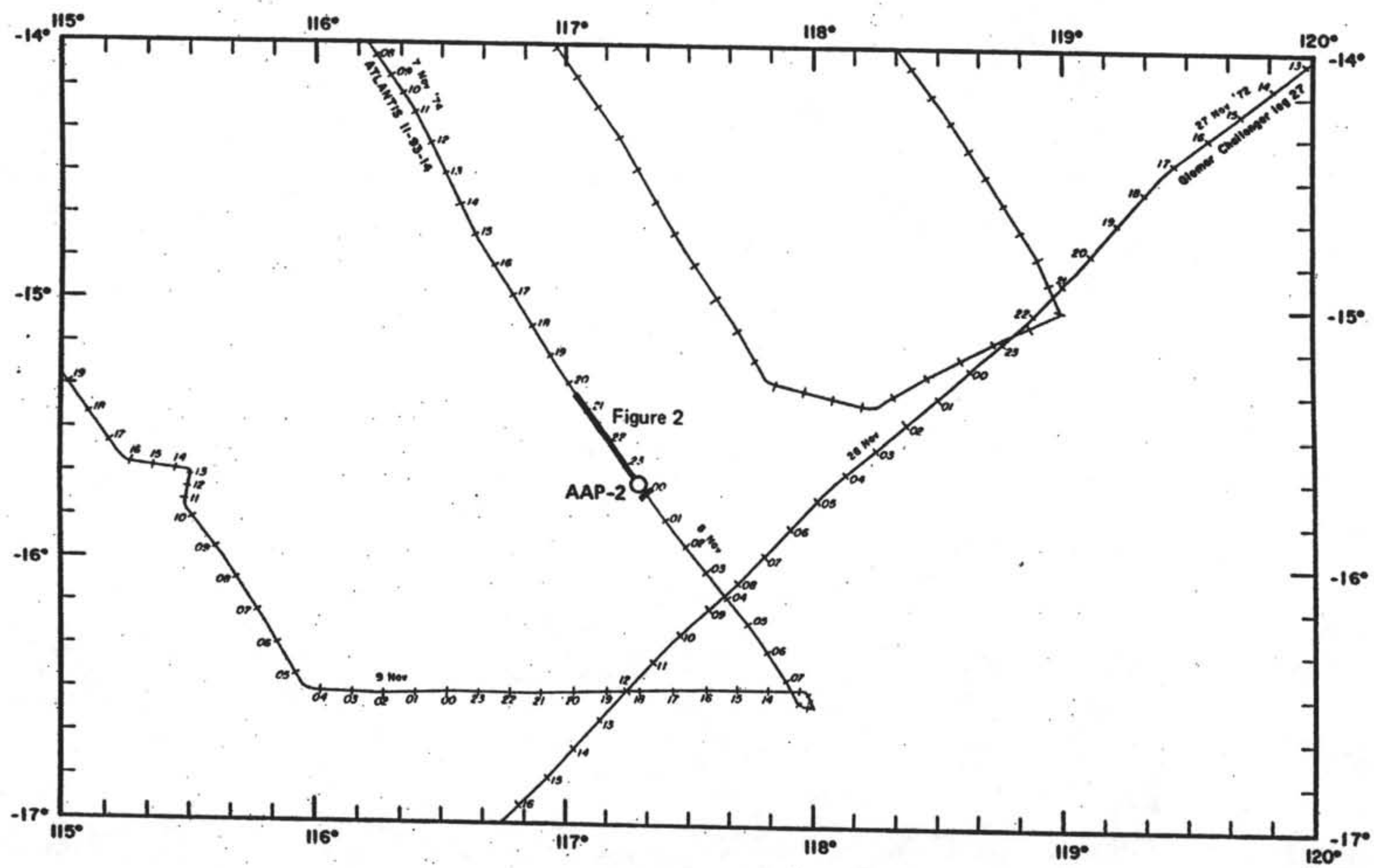
OBJECTIVES: 1. Nature and age of oceanic basement. 2. Multiple stratigraphy for magnetic anomalies M18-M25. 3. Statistical modeling of Jurassic microfossil distribution (control section). 4. Tethyan paleocirculation.

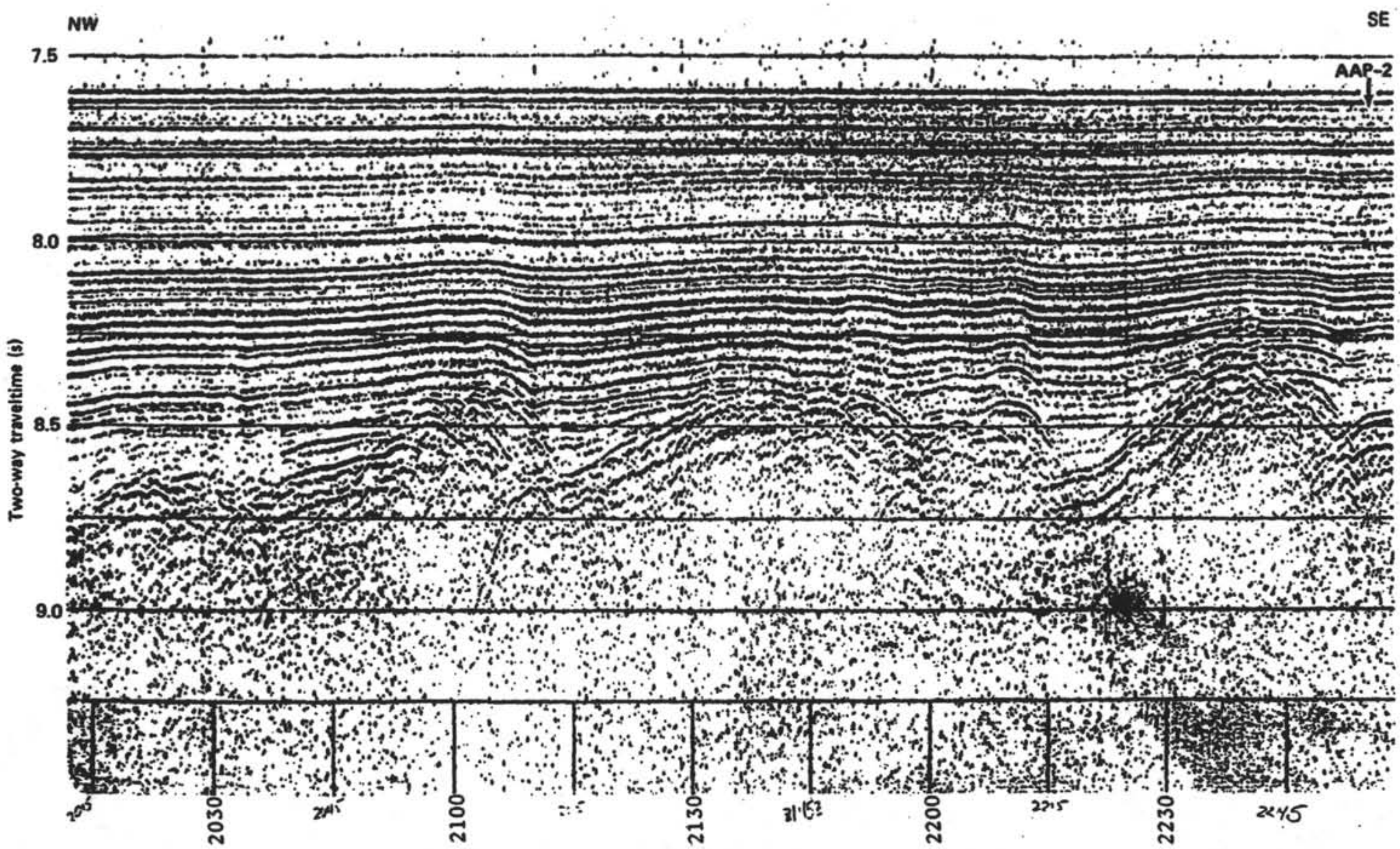
SEDIMENT TYPE: Only detailed coring of Neocomian-Oxfordian carbonates and claystones ±300 m and 100 m in oceanic crust (see AAP1B).

SITE FIGURES (following pages):

Figure 1. Track chart showing location of seismic line *Atlantis* II-93-14 and AAP2.

Figure 2. *Atlantis* II-93-14 seismic line with location of AAP2.


115°
116°
117°
118°
119°
120°
-14°
-15°
-16°
-17°
ATLANTIS II-93-14
7 Nov '74
27 Nov '72
Glomar Challenger leg 27
26 Nov
8 Nov
9 Nov
Figure 2
AAP-2


NW
SE
AAP-2
7.5
8.0
8.5
9.0
Two-way traveltime (s)
2030
2100
2130
2200
2230

SHIPBOARD PARTICIPANTS

OCEAN DRILLING PROGRAM LEG 122

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Sedimentologist:

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Paleomagnetist:	BRUNO GALBRUN Universite Paris VI Laboratoire de Stratigraphie 4 Pl Jussieu 75253 Paris Cedex France
Inorganic geochemist:	ERIC H. DE CARLO Hawaii Institute of Geophysics 2525 Correa Road Honolulu, HI 96822
Organic geochemist:	PHILIP A. MEYERS Department of Geological Sciences 2024 C.C. Little Bld. University of Michigan Ann Arbor, MI 48109-1063
Organic geochemist:	LLOYD R. SNOWDON Geological Survey of Canada 3303 - 33rd St., NW Calgary, Alberta Canada T2L 2A7
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Physical Properties Specialist:	DAVID K. O'BRIEN Hawaii Institute of Geophysics 2525 Correa Rd. Honolulu, HI 96822
Logging Scientist/ Physical Properties Specialist:	JUAN M. LORENZO Lamont-Doherty Geological Observatory Palisades, NY 10964
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