MICROPALAEONTOLOGICAL ANALYSIS, ARCHER-1, GIPPSLAND BASIN

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C O N T E N T S

I. SUMMARY

Archer-1 was drilled in offshore petroleum permit Vic P/20, Gippsland Basin to a depth of 4050mKB. Ditch cuttings from 1000m to 2690m have been examined for foraminifera. A summary of the biostratigraphic and environmental subdivision is given below:-

Planktonic Foraminiferal Subdivision

1000m	:	Zones A3 & A4	Late-Middle Pliocene
1200m	:	Zones B1 & B2	Early Pliocene-Late Miocene
1310m	:	Zones B2 & C	Late-upper Middle Miocene
1330m-1700m	:	Zone D1	mid Middle Miocene
1900m	:	Zone D2	lower Middle Miocene
2000m	:	Zone E1	basal Middle Miocene
2140m	:	?Zone F	?upper Early Miocene
2160m	:	Zones F & G	upper-mid Early Miocene
2300m	:	Zone G	mid Early Miocene
2550m	:	Zone J2	lower Early Oligocene
2565m	:	Zones J2 & K	lower Early Oligocene-upper Late Eocene
2580m	:	Zone K	upper Late Eocene
2600m	:	Zone N	upper Middle Eocene
2640m-2690m	:	Indeterminate	

Environment of Deposition

Samples 1000-1400m inclusive	:	outer neritic-upper bathyal
Samples 1560-2300m inclusive	:	upper bathyal
2550m	:	undifferentiated marine
Samples 2565-2600m inclusive	:	undifferentiated neritic
Samples 2640-2690m inclusive	:	indeterminate

II. INTRODUCTION

A total of 20 ditch cuttings samples have been scrutinized for foraminifera from the interval 1000m to 2690m in Archer-1. Fossil assemblages identified in the well section, interpreted zonation and depositional environment subdivision have been plotted on the distribution chart (Enclosure No. 1).

III. BIOSTRATIGRAPHIC ANALYSIS

The planktonic foraminiferal letter zonal scheme of Taylor (in prep.) is used for biostratigraphic subdivision.

1. 1000m : Zones A3 & A4 (Late-Middle Pliocene)

   The abundance of the Globorotalia inflata group and the lack of post-Zone A3 index species indicates that the cuttings sample at 1000m is assignable to Zones A3 and A4.

2. 1200m : Zones B1 & B2 (Early Pliocene-Late Miocene)

   Assignment to Zones B1 and B2 is based on the occurrence of Globorotalia acostaensis and the lack of Turborotalia mayeri (top Zone C index species) and the Globorotalia inflata group (base Zone A4 defining event). Minor Globorotalia inflata recorded in the sample is interpreted to have caved downhole.

3. 1310m : Zones B2 & C (Late-upper Middle Miocene)

   The cuttings sample at 1310m includes very rare Turborotalia aff. mayeri together with minor Globorotalia miotumida, and lacks Globorotalia acostaensis. The assemblage is probably near the boundary between Zones B2 and C.

4. 1330m-1700m : Zone D1 (mid Middle Miocene)

   The association of Globorotalia praescitula and Globorotalia miozea miozea in the interval, and the lack of several taxa with known last appearances in Zone D2 (Globigerinoides sicanus, Orbulina suturalis and Praeorbulina glomerosa), indicates that the interval is assignable to Zone D1.

5. 1900m : Zone D2 (lower Middle Miocene)

   The sample at 1900m is assigned to Zone D2 on the basis of the association of Globigerinoides sicanus, Orbulina suturalis and Orbulina universa.

6. 2000m : Zone E1 (basal Middle Miocene)

   The rich planktonic foraminiferal fauna at 2000m includes frequent Orbulina suturalis together with minor Praeorbulina glomerosa. On this basis the sample is assigned a Zone E1 age although it is possible it may be older (Zone E2 or even Zone F) if Orbulina suturalis has caved downhole. The lack of Orbulina universa (base Zone D2 index species) however indicates that Orbulina suturalis is likely to be in-situ.

7. 2140m : ? Zone F (? upper Early Miocene)

   The occurrence of minor Globigerinoides sicanus and very low numbers of younger index species (e.g. Orbulina group) indicates a probable Zone F assignment for the sample at 2140m.

8. 2160m : Zones F & G (upper-mid Early Miocene)

The occurrence of common Globigerinoides trilobus and frequent Globorotalia miozea miozea indicates an age no older than Zone G. The presence of several specimens of Globigerinoides sicanus, and the lack of younger index species, suggests a Zone F assignment. It is possible however that the specimens of Globigerinoides sicanus have caved downhole. For that reason the cuttings sample at 2160m is assigned to Zones F and G.

9. 2300m : Zone G (mid Early Miocene)

The sample at 2300m includes common Globigerinoides trilobus, and lacks Globigerinoides sicanus, and on this basis is assigned to Zone G.

10. 2550m : Zone J2 (lower Early Oligocene)

The cuttings sample at 2550m is assigned to Zone J2 on the basis of the association of Subbotina angiporoides and Turborotalia gemma, and the lack of Subbotina linaperta.

11. 2565m : Zones J2 & K (lower Early Oligocene-upper Late Eocene)

The cuttings sample at 2565m contains frequent Subbotina angiporoides. Although the Zone K index species Subbotina linaperta was not recorded, it is interpreted that the sample may be as old as Zone K. The lack of Subbotina angiporoides minima indicates an age no older than Zone K.

12. 2580m : Zone K (upper Late Eocene)

The occurrence of minor Subbotina linaperta, and the lack Subbotina angiporoides minima, indicates that the cuttings sample at 2580m is assignable to Zone K.

13. 2600m : Zone N (upper Middle Miocene)

The occurrence of rare Subbotina angiporoides minima, and lack of pre-Zone N index species, is consistent with a Zone N assignment.

14. 2640m-2690m : Indeterminate

The cuttings in the interval contain moderate to low yielding planktonic foraminiferal faunas. Unfortunately the majority of these taxa represent cavings from higher in the well section. The interval lacks in-situ index species.

IV. ENVIRONMENT OF DEPOSITION

1. Samples 1000m-1400m inclusive : Outer neritic-upper bathyal

The calcilutites in the interval contain rich foraminiferal faunas with the percentage of planktonics generally exceeding 80%. The diverse benthonic faunas include: Euuvigerina peregrina group (frequent-abundant), Pleurostomella (rare), Siphouvigerina proboscidea (rare-few) and Pullenia bulloides (rare-few). Sporadic and rare occurrences of Planulina aff. wuellerstorfi (rare at 1200m), Globobulimina pacifica (rare at 1000m) and Melonis aff. pompilioides (rare at 1310m) indicates a bathyal setting. The assemblage as a whole however is consistent with deposition in an outer neritic to upper bathyal environment.

2. Samples 1560m-2300m inclusive : Upper bathyal

The samples of calcareous claystone and calcilutite in the interval are interpreted to have been deposited in an upper bathyal environment. The rich foraminiferal faunas are dominated by planktonics with the percentage generally ranging from 85% to 97%. The benthonic assemblages include Hoeglundina cf. elegans (few at 1560m), Pullenia bulloides (rare-few), Siphouvigerina proboscidea (rare-few), Pleurostomella (rare-few), Osangularia (rare at 2140m and 2160m) and Hyperammina (rare-few at 2160m and 2300m).

3. 2550m : Undifferentiated marine

The high proportion of caved taxa restricts environmental interpretation. The occurrence of in-situ Zone J2 planktonic foraminifera indicates deposition in an undifferentiated marine environment.

4. Samples 2565m-2600m : Undifferentiated neritic

The cuttings in the interval contain minor to common pelletal glauconite (fresh and oxidised grains). In-situ benthonic foraminifera are lacking although a single specimen of Bathysiphon angleseaensis was recorded in the sample at 2600m. Deposition in an undifferentiated neritic environment seems likely given the occurrence of pelletal glauconite and in-situ planktonic foraminifera in the interval.

5. Samples 2640m-2690m inclusive : Indeterminate

The interval comprises essentially caved foraminifera from higher in the well section. No environmental assessment is possible although the relatively common occurrence of pelletal glauconite in all cuttings samples suggests probable deposition in a neritic setting.

V. REFERENCES

TAYLOR, D.J., (in prep.). Observed Gippsland biostratigraphic sequences of planktonic foraminiferal assemblages.

APPENDIX NO. 1: SUMMARY OF MICROPALAEONTOLOGICAL DATA, ARCHER-1

CUTTINGS SAMPLE	FORAM YIELD	FORAM PRESERV.	FORAM DIVERSITY
1000m	high	mod/poor	moderate
1200m	high	moderate	mod/high
1310m	high	mod/poor	moderate
1330m	high	moderate	moderate
1400m	high	moderate	mod/high
1560m	high	moderate	mod/high
1700m	high	moderate	mod/low
1900m	mod/high	poor	moderate
2000m	mod/high	moderate	mod/low
2140m	mod/high	moderate	mod/low
2160m	high	poor	mod/high
2300m	high	mod/poor	high
*2550m	mod/low	mod/poor	moderate
*2565m	low	poor	low
*2580m	low/very low	poor	low
*2600m	low/very low	poor	low
*2640m	low/very low	poor	low
*2650m	low/very low	poor	low
*2670m	very low	poor	very low
*2690m	moderate	poor	mod/low

* moderate to very high proportion of caved taxa.