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1. Data Report: Calcareous Nannofossil Biostratigraphy of ODP Site 1193 Seaward of the Great Barrier Reef[1]

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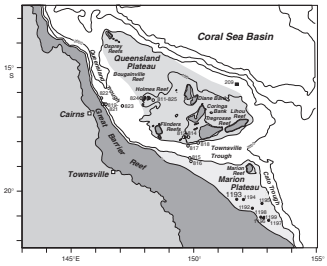
INTRODUCTION

During Leg 194, a series of eight sites was drilled through Oligocene–Holocene mixed carbonate and siliciclastic sediments on the Marion Plateau, northeast Australia (Fig. F1). The major objective was to constrain the magnitude and timing of sea level changes in the Miocene. Site 1193, located on the Marion Plateau in 348 m of water ~80 km from the south central Great Barrier Reef margin (Fig. F1), is probably the most important site for constraining the major middle to late Miocene sea level drop and reconstructing the evolution history of the Marion Plateau during the Miocene (Isern, Anselmetti, Blum, et al., 2002). However, there is no biostratigraphic or other chronological data for the critical interval between 36 and 211 meters below seafloor (mbsf) (virtually the entire late and middle Miocene) due to poor core recovery and a virtual absence of planktonic microfossils in the core catcher samples examined aboard the ship (Isern, Anselmetti, Blum, et al., 2002). The main purpose of this report is to refine the shipboard nannofossil biostratigraphy through examination of new samples and more detailed examination of those samples reported on board the ship. This results in a refinement for most of the nannofossil datums and provides some useful age information to fill the critical data gap for the middle Miocene.

Previous Neogene nannofossil biostratigraphic studies of the Marion Plateau and Queensland Plateau include Gartner et al. (1993) and Wei and Gartner (1993).

F1. Location of ODP Site 1193, p. 4.



[1]Wei, W., 2004. Data report: Calcareous nannofossil biostratigraphy of ODP Site 1193 seaward of the Great Barrier Reef. *In* Anselmetti, F.S., Isern, A.R., Blum, P., and Betzler, C. (Eds.), *Proc. ODP, Sci. Results,* 194, 1–7 [Online]. Available from World Wide Web: <http://www-odp.tamu.edu/publications/194_SR/VOLUME/CHAPTERS/002.PDF>. [Cited YYYY-MM-DD]
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MATERIALS AND METHODS

Smear slides were made from unprocessed sediments and examined with a light microscope at a magnification of 1000×. For the critical middle Miocene interval, a nannofossil range chart was developed (Table T1). The abundance of selected nannofossil taxa on each slide was recorded for this table using the following criteria: F = few, 1 specimen per 11–50 fields of view; R = rare, 1 specimen per 51–200 fields of view; B = barren. For preservation of nannofossil assemblages, P = poor, strong etching and/or overgrowth.

The bibliographic references for the species used in this study can be found in Perch-Nielsen (1985). Numerical ages discussed in this report refer to the timescale of Berggren et al. (1995).

T1. Distribution of calcareous nannofossils, p. 6.

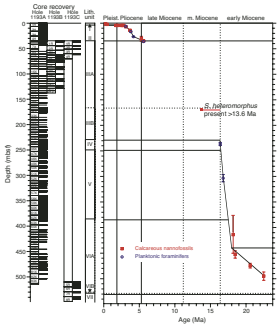
RESULTS AND SUMMARY

A refinement of the nannofossil biostratigraphy is presented in Table T2 and an age-depth plot based on the nannofossil datums of this study plus shipboard foraminiferal datums is shown in Figure F2.

T2. Summary of nannofossil datums, p. 7.

There are significant numbers of nannofossils in Cores 194-1193A-31X and 32X (Table T1), and these two cores are the only ones that recovered significant sediment in lithologic Unit III (Fig. F2). These nannofossils suggest that the carbonate platform had not prograded over the site or that the carbonate platform retreated from the site when the top of lithologic Subunit IIIB was deposited.

F2. Age-depth plot, Site 1193, p. 5.



Since *Sphenolithus heteromorphus* has been found as high as Sample 194-1193A-31X-2, 25 cm (Table T2), it indicates an age older than 13.6 Ma. The sample immediately above is barren of nannofossils and the next 25 cores uphole did not yield any sediment samples suitable for this study. With the new age constraint (>13.6 Ma) from Sample 194-1193A-31X-2, 25 cm, together with those age constraints in the lower Miocene (Fig. F2), it is roughly estimated that the top of lithologic Unit III, or the termination of the carbonate platform and the large sea level fall, is middle Miocene, assuming sedimentation rates did not decline an order of magnitude in the middle Miocene compared to the late early Miocene and sea level fall did not remove >100 m of the platform sediment (Fig. F2).

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Figure F1. Location of ODP Site 1193. Other sites in the area are also shown. Modified from Isern, Anselmetti, Blum, et al. (2002).

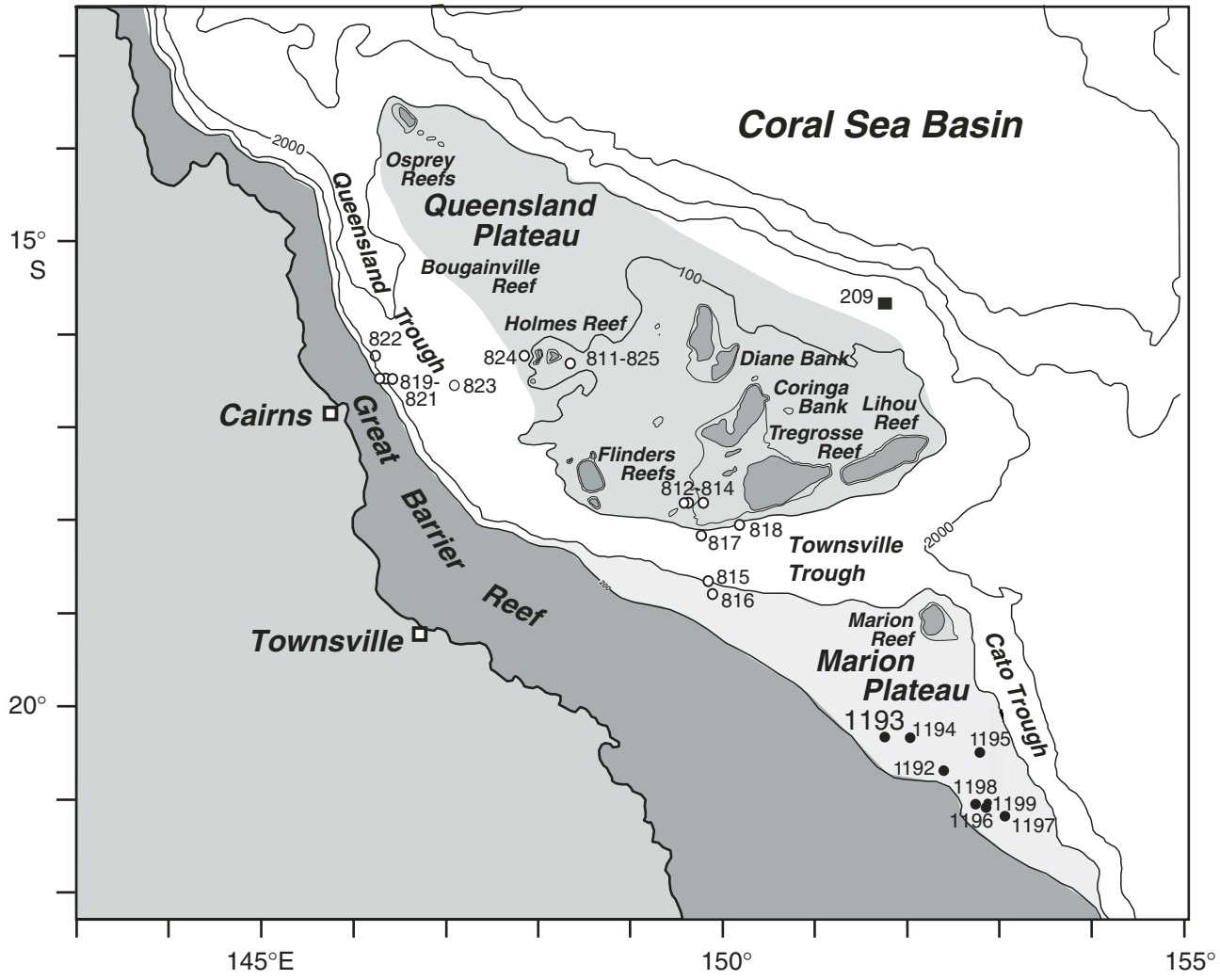

Figure F2. Age-depth plot of Site 1193 based on nannofossil datums from this study plus shipboard foraminiferal datums. Core recovery and lithologic unit information are from Isern, Anselmetti, Blum, et al. (2002).

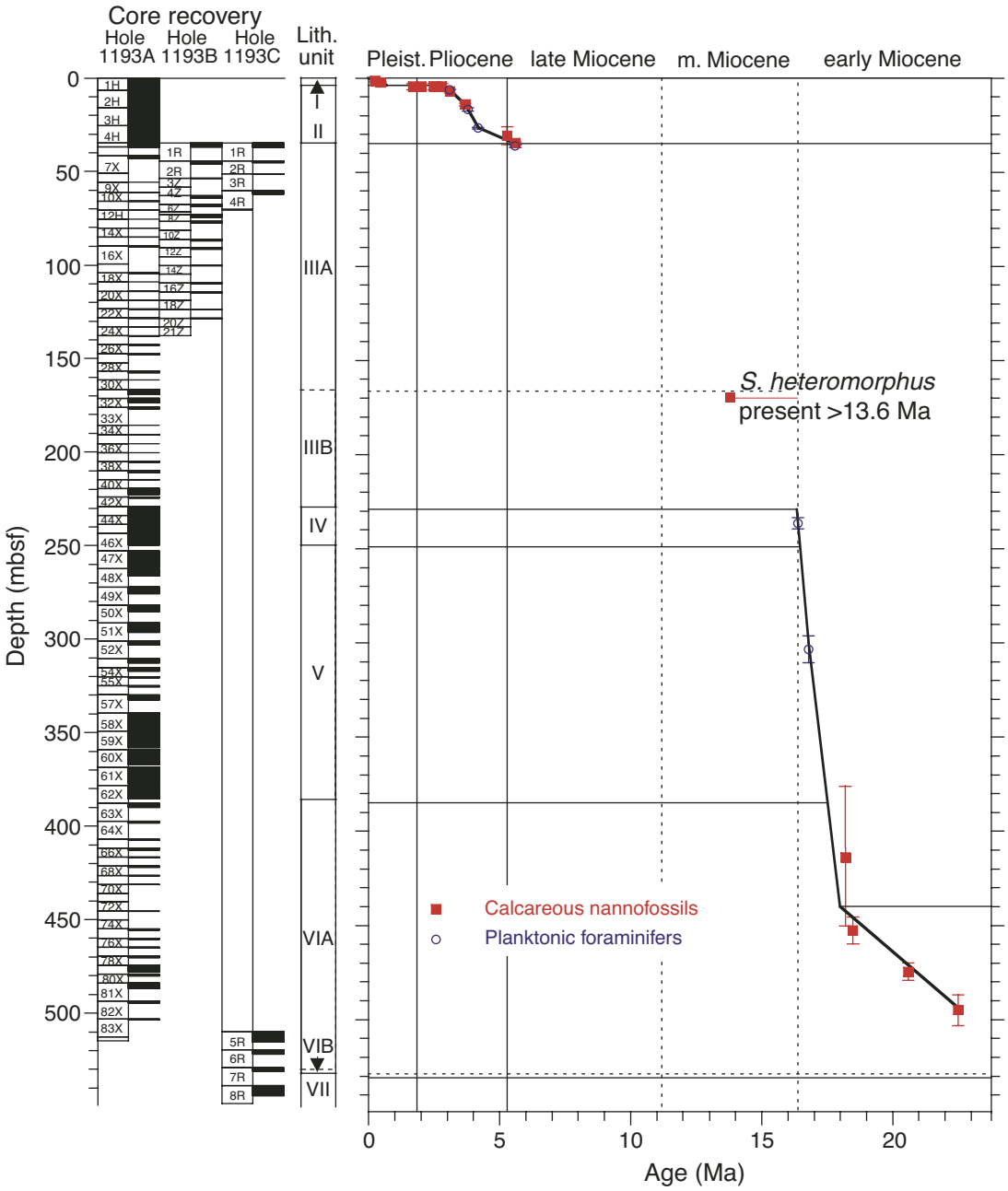

Table T1. Distribution of calcareous nannofossils in the critical Miocene interval, Site 1193.

Core, section, interval (cm)	Depth (mbsf)	Abundance	Preservation	*Calcidiscus premacintyrei*	*Coccolithus pelagicus*	*Coccolithus miopelagicus*	*Cyclicargolithus floridanus*	*Discoaster* spp.	*Reticulofenestra* spp. (small)	*Sphenolithus abies*	*Sphenolithus heteromorphus*
194-1193A-											
31X-1, 26	166.86	B									
31X-2, 25	168.35	F	P		R	R	R	R	R	R	R
31X-CC	169.56	R	P				R		R		
32X-1, 25	171.75	R	P		R		R				R
32X-2, 25	173.25	R	P		R		R				
32X-CC	173.76	B									
33X-CC	186.76	B									
35X-CC	191.08	B									
38X-CC	210.54	B									
39X-CC	211.29	R	P		R		R		R		R
41X-1, 25	219.85	F	P	R	R		F	R	F	F	R
41X-2, 25	221.35	R	P		R		R	R	R	R	R
41X-CC	224.40	B									
42X-1, 25	224.65	B									
43X-1, 25	229.45	R	P		R	R	R	R	R	R	R
43X-2, 25	230.95	F	P		F	R	R	R	R	R	R
43X-3, 25	232.45	F	P	R	F	R	R	R	R	R	R
43X-CC	233.76	R	P		R	R	R	R	R	R	R

Table T2. Summary of nannofossil datums, Site 1193.

Datum	Core, section, interval (cm)		Depth (mbsf)		Age (Ma)
	Top	Bottom	Top	Bottom	
	194-1193A-	194-1193A-			
FO *Emiliania huxleyi*	1H-1, 90	1H-2, 25	0.90	2.30	0.26
LO *Pseudoemiliania lacunosa*	1H-2, 80	1H-3, 10	2.30	3.10	0.46
LO *Calcidiscus macintyrei*	1H-4, 25	1H-5, 10	4.75	6.10	1.70
LO *Discoaster brouweri*	1H-4, 25	1H-5, 10	4.75	6.10	2.00
LO *Discoaster pentaradiatus*	1H-4, 25	1H-5, 10	4.75	6.10	2.50
LO *Discoaster surculus*	1H-4, 25	1H-5, 10	4.75	6.10	2.60
LO *Discoaster tamalis*	1H-4, 25	1H-5, 10	4.75	6.10	2.80
LO *Reticulofenestra pseudoumbilicus*	2H-5, 90	2H-6, 98	13.50	15.08	3.70
LO *Discoaster quinqueramus*	4H-6, 80	4H-CC	33.90	35.39	5.60
FO *Discoaster surculus*	5H-CC	31X-2, 25	36.06	168.35	7.50
LO *Sphenolithus heteromorphus*	5H-CC	31X-2, 25	36.06	168.35	13.60
FO *Sphenolithus heteromorphus*	61X-6, 25	73X-CC	376.45	445.70	18.20
LO *Sphenolithus belemnos*	73X-CC	75X-CC	445.70	455.54	18.50
FO *Sphenolithus belemnos*	78X-CC	79X-CC	470.03	478.02	20.60
LO *Zygrhablithus bijugatus*	81X-CC	82X-CC	486.92	494.70	22.50

Note: FO = first occurrence, LO = last occurrence.