

6. DATA REPORT: DIATOM RECORDS OF ODP SITE 1143 IN THE SOUTHERN SOUTH CHINA SEA¹

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ABSTRACT

Diatoms from Ocean Drilling Program Leg 184 Site 1143 in the southern South China Sea were analyzed for this paper. We found that diatoms are barren or scarce from 27.94 to 304.04 meters below seafloor. The intervals with age-diagnostic species indicate a middle Miocene age from 472.18 to 469.98 mcd, a late Miocene age or younger at 389.42 mcd, and a late Pliocene to Holocene age from 26.7 to 0.0 mcd.

INTRODUCTION

The diversity and levels of bioproductivity in the equatorial Pacific Ocean are among the highest found anywhere on the globe today. The area is thought to be responsible for 50% of new global bioproduction (Chavez and Barber, 1987). Such high levels of bioproduction consequently lead to a high rate of pelagic sedimentation that may have the potential for providing high-resolution records of temporal and spatial change in the equatorial Pacific Ocean. The high level of primary production within the upwelling region of the area is likely due to the abundance of phytoplankton. Diatoms are among the most abundant aquatic organisms, and the resistance of their siliceous frustules to dissolution has led to their preservation over large areas of the ocean floor.

The South China Sea (SCS), situated in the southwestern Pacific Ocean region, is one of the largest marginal seas in the world and has been of increasing interest to marine scientists. Previous work in the

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SCS mainly focused on the changes in surface water paleotemperature, paleosalinities, paleoproductivity, and carbonate cycles in the late Quaternary (Wang and Wang, 1990; Wang et al., 1995; Chen et al., 2000; Tu et al., 2000). A few diatom studies were related to surface sediment diatoms in the SCS (Wang et al. 1988; Yu and Zhang, 1989; Lu, 1999, 2001). In addition, a few studies dealt with diatom biostratigraphy and the paleoenvironment, especially in the southern SCS. In this report, we present the diatom biostratigraphy and proxies for paleoupwelling at Site 1143.

METHODS

Site 1143 (9.362°N, 113.300°E) was drilled during Ocean Drilling Program (ODP) Leg 184 in the southern SCS in a water depth of 2772 m (Fig. F1). The sediment thicknesses were 400 m in Hole 1143A, 258 m in Hole 1143B, and 500 m in Hole 1143C.

A total of 410 samples were investigated. Sample intervals were 0.2 m above 23.6 meters composite depth (mcd) and averaged 0.5 m from 23.7 to 95.3 mcd. One sample was taken per 9.6 m from 94 to 290.1 mcd, and one sample was taken per 1.5 m from 290.1 to 513 mcd.

Every sample was dried, weighed to yield 1 g, and then treated with 10% hydrochloric acid to remove the calcium carbonate. The acid was removed with deionized water; 10% hydrogen peroxide was added; and the sample was boiled for 30 min to remove organic matter, cleaned, and dried. Diatoms were concentrated in a heavy liquid with a density of 2.4, and the heavy liquid was removed by rinsing with deionized water. The concentrated diatoms were then spread on a 20 mm × 20 mm coverslip, dried on a hot plate, and mounted in Canada balsam.

More than 200 specimens were counted and identified at a magnification of 600×, and a smaller number of specimens were identified at 1000×. The entire microscope slide was scanned if diatom specimens were absent or numbered <200. Identification of marker species for the stratigraphy is based on Akiba and Yanagisawa (1986) and Schrader (1973). Biostratigraphic zones were selected from Barron (1985a, 1985b) (Fig. F2). A total of 150 species from 55 genera were identified. The abundance of each species and the total abundance of diatoms for every sample are listed in Table T1 and are shown in Figures F3 and F4.

RESULTS

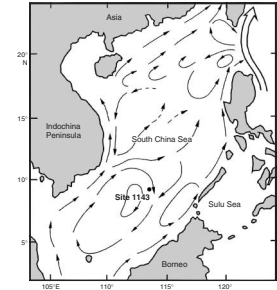
Diatom Biostratigraphy

183 samples had abundant diatoms, mainly consisting of pelagic and neritic species with few benthic species. The usefulness of the diatom stratigraphy is limited because marker species are rare in many samples, and many other samples are barren of diatoms, particularly between 26.7 and 389 mcd.

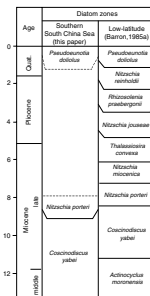
Three intervals contain age-dagnostic species:

1. Two samples at 472.18 and 469.98 mcd contain low abundances of *Coscinodiscus yabei* (only at 472.18 mcd), *Actinocyclus moronensis*, *Coscinodiscus lewisianus*, and *Denticulopsis punctata* f. *hustedtii*. According to Barron (1985b), the ranges of the last three species overlap in the *C. lewisianus* diatom zone of the middle

F1. Location of Site 1143, p. 5.

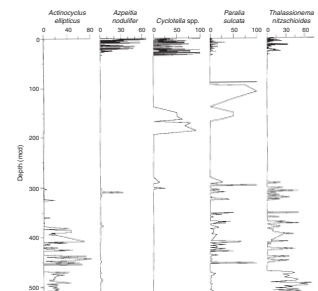


F2. Diatom zonation, p. 6.

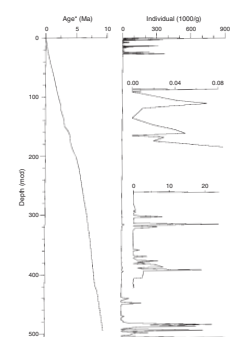


T1. Diatom abundances, p. 9.

F3. Relative abundance of dominant diatom species, p. 7.



F4. Diatom abundance, p. 8.



Miocene, whereas *C. yabei* has its lowest occurrence at or slightly above the *C. lewisianus* Zone. Because these species only occur in two samples and there is a 15-m barren interval above their occurrences, it is not possible to be certain of their true ranges at Site 1143. Therefore, we assign this narrow interval to middle Miocene.

2. The lowest occurrence of *Nitzschia marina* at 389.42 mcd indicates that the age of this sample is no older than the Subzone *Nitzschia porteri* B (Barron, 1985b), which is of late Miocene age. The next higher zonal marker, *Nitzschia miocenica*, was not found at Site 1143; therefore, we cannot constrain the age above this sample.
3. The interval from 26.7 to 0 mcd contains *Pseudoeunotia doliolus*, and the assemblage is dominated by *Azpeitia nodulifer*, *Cyclotella* spp., and *Thalassionema nitzschioides*. This interval may be correlated to the *Nitzschia reinholdii* to *P. doliolus* Zones, of late Pliocene to Holocene age, based on the range of *P. doliolus* (Barron, 1985b).

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Figure F1. Location of Site 1143 (9.362°N, 113.300°E), ODP Leg 184, in the South China Sea at a water depth of 2772 m.

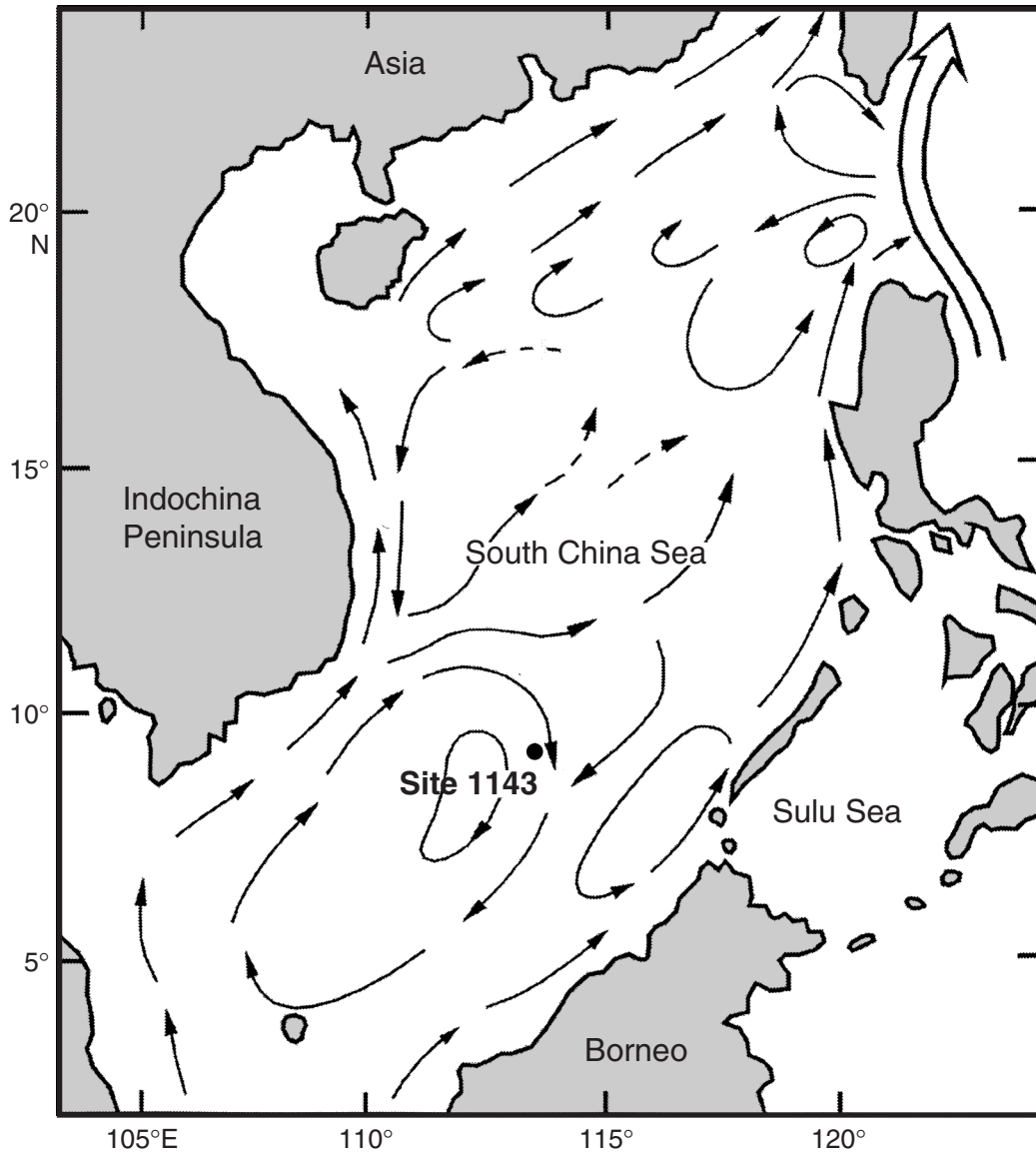


Figure F2. Diatom zonation.

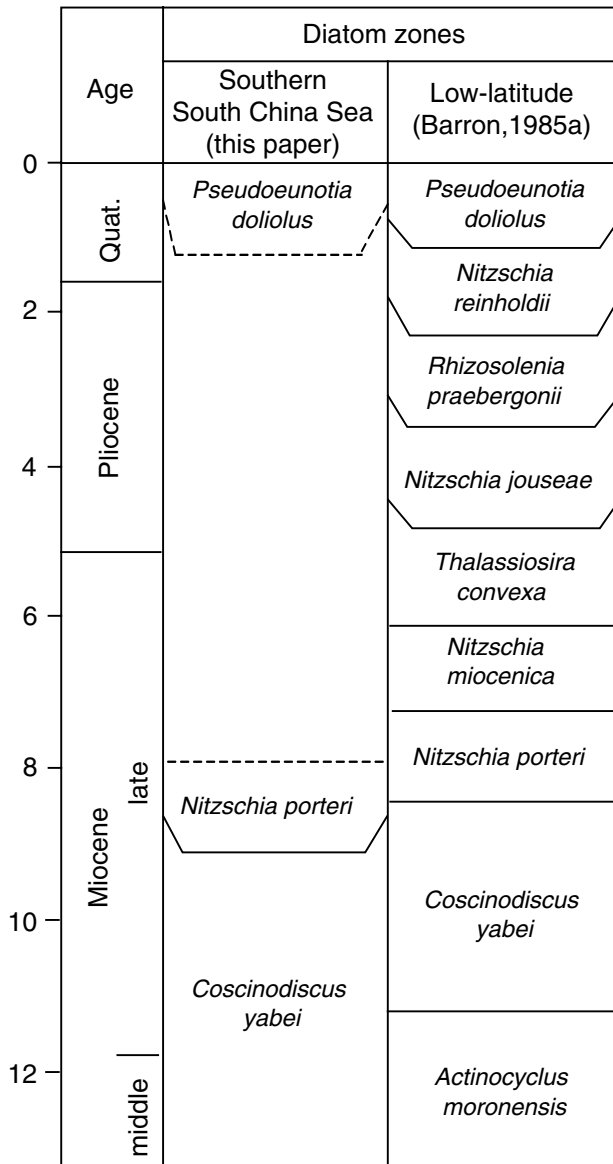


Figure F3. Relative abundance of dominant diatom species.

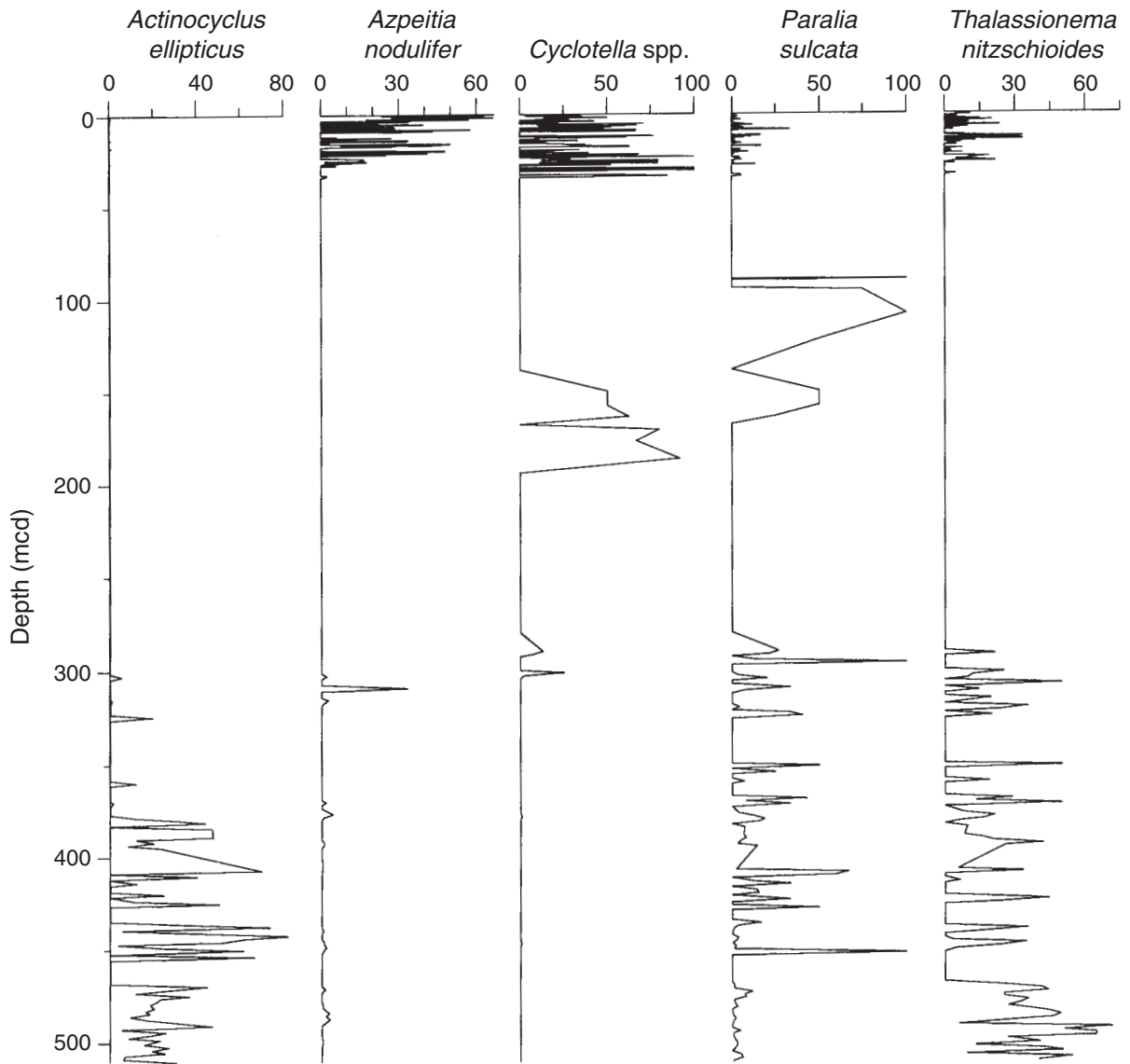


Figure F4. Diatom abundance. * = after Wang et al. (2000).

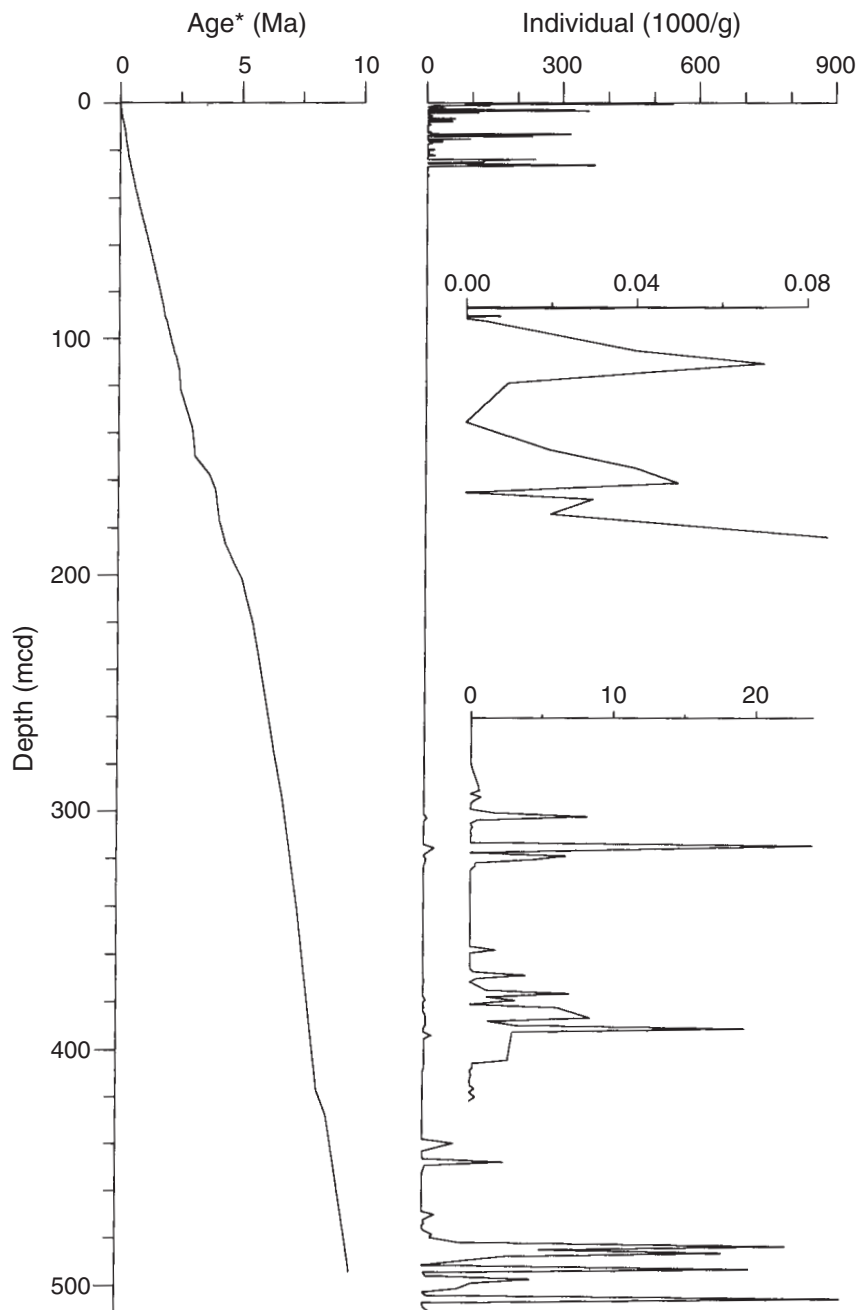


Table T1. Diatom abundances, Site 1143. (This table is available in an [oversized format.](#))