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9. Aptian through Eocene Magnetostratigraphic Correlation of the Blake Nose Transect (Leg 171B), Florida Continental Margin[1]

James G. Ogg[2] and Leon Bardot[3]

ABSTRACT

The full suite of magnetic polarity chrons from Subchron M″-2r″ (early Albian) through Chron C13r (latest Eocene) were resolved at one or more Ocean Drilling Program sites on the Blake Nose salient of the Florida continental margin. These sediments preserve diverse assemblages of calcareous and siliceous microfossils; therefore, the composite suite provides a reference section for high-resolution correlation of biostratigraphic datums to magnetic polarity chrons of the Late Cretaceous and Paleogene. Relative condensation or absence of polarity zones at different sites along the transect enhance the recognition and dating of depositional sequences and unconformities within the margin succession. A stable paleolatitude of ~25°N was maintained from the late Aptian through Eocene.

INTRODUCTION

Ocean Drilling Program (ODP) Leg 171B obtained expanded sections of Maastrichtian through Eocene strata and portions of the Albian–Cenomanian along a transect of the Blake Spur portion of the Blake Plateau off Florida. The sediments were dominated by a siliceous chalk facies that generally had excellent preservation of calcareous nannofossils, planktonic and benthic foraminifers, diatoms, and radiolarians. Several intervals of the stratigraphy at different sites display color and composi-

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[2] Department of Earth and Atmospheric Sciences, Purdue University, West Lafayette IN 47907-1397, USA. jogg@purdue.edu
[3] Department of Earth Sciences, University of Oxford, Parks Road, Oxford, OX1 3PR, United Kingdom.

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tional oscillations that appear to reflect a spectrum of Milankovitch orbital climate cycles.

The paleomagnetic component is critical to three main objectives of Leg 171: (1) to refine the Paleogene-Cretaceous biochronology and magnetochronology of the Paleogene-Cretaceous period, (2) to develop a cyclostratigraphy tuned to orbital cycles that could be used to establish an extremely accurate chronology for biozones and magnetochrons in the Cretaceous and Paleogene, and (3) to constrain Late Cretaceous through Eocene paleomagnetic poles for the North American plate. This report summarizes the detailed magnetostratigraphy of the various sites. A preliminary magnetostratigraphy at each site was presented in the Leg 171B *Initial Reports* volume (Norris, Kroon, Klaus, et al., 1998), but we have now analyzed many more discrete minicores to enhance resolution of polarity zone boundaries and we also have reinterpreted several of the polarity chron assignments. Paleolatitudes are derived from the same paleomagnetic data set, and an associated compilation of the Cretaceous–Paleogene polar wander path for North America.

In general, the reference scale of oceanic biomagnetochronology compiled by Berggren et al. (1995) for the Paleogene interval is consistent with our suites of results from Leg 171. At this stage, the main constraint appears to be the lower resolution of the paleontological investigations relative to the sampling density of the magnetostratigraphy. The uppermost Cretaceous (Campanian–Maastrichtian) lacks a well-calibrated reference scale, and combined biostratigraphic and magnetostratigraphic results from Leg 171 are an important step in this direction. This Campanian–Maastrichtian interval is the focus of a separate paper (L. Bardot and J. Self-Trail, unpubl. data).

In this paper, polarity chron (time) and polarity zone (stratigraphy) nomenclature is taken from the system of Cande and Kent (1992), with the suffix *n* denoting normal polarity or *r* denoting the preceding reversed-polarity interval. The relative timing (position) of an event (level) within a polarity chron (zone) is "defined as the relative position in time or distance between the younger and older chronal boundaries" (system of Hallam et al., 1985, p. 126). In this proportional stratigraphic convention, the location of the Cretaceous/Tertiary at Gubbio (Alvarez et al., 1977) occurs at C29r.75, indicating that 75% of reversed-polarity Zone C29r is below the event. (Cande and Kent [1992] used an inverted stratigraphic placement relative to present; therefore, C29r.3 in their notation indicates that 30% of reversed-polarity Chron C29r followed the event. This system mirrors the convention of measuring geological time and the numbering of magnetic anomalies backward from the present.)

The number of orbital cycles within each polarity zone provides a means to assign absolute durations to the associated polarity chrons and spreading rates to the corresponding marine magnetic anomalies. For example, the cyclostratigraphy of polarity Chron C27 (late Danian) at Site 1050 indicates a cycle-tuned duration of 1.45 m.y. (Röhl et al., 2001), which is about 10% less than in the magnetic polarity time-scale model derived by Cande and Kent (1995). Similar cycle-magnetostratigraphic analyses should be feasible through the Paleogene succession of Leg 171.

PROCEDURES AND GENERAL MAGNETIC PROPERTIES

Sampling and Demagnetization

Approximately 1100 discrete minicores were extracted from the "A" holes at the five sites, the "C" hole extension of Site 1050, and the Cretaceous/Paleogene boundary interval in the "C" hole of Site 1049. Sampling density averaged about two minicores per core section. Soft sediment samples were taken using oriented plastic cylinders (~10 cm^3) followed by extrusion, trimming, and air drying. Indurated sediment minicores were drilled into the cut face of the working half of the core with a water-cooled nonmagnetic drill bit attached to a standard drill press. Minicore orientations are perpendicular to the axis of the core, and therefore horizontal relative to bedding strata. Some of the advanced hydraulic piston cores (denoted by the suffix "H" in the core name) had attempts at downhole orientation relative to magnetic north using a tensor tool mounted on the core barrel, but these attempts were generally unreliable. Therefore, declinations of magnetization of the minicores are random, although stability or progressive rotation of the magnetic declinations during demagnetization can be used to identify characteristic magnetic polarity.

Shipboard pass-through cryogenic magnetometer measurements were made at ~5-cm intervals on all cores from all holes using alternating-field demagnetization at 10–20 mT. Even though these shipboard measurements were commonly distorted by coring recovery artifacts, such as biscuiting slurry, and were generally inadequate to remove magnetic overprints, the main polarity patterns were often remarkably indicative of the detailed demagnetization results from the suites of minicores.

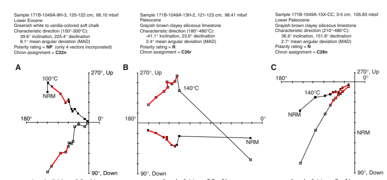
Paleomagnetic analyses of the suites of minicores were performed at the University of Oxford and at the University of Michigan. Progressive thermal demagnetization was tailored to each facies based on pilot studies of each lithology from each site, but it generally consisted of 30°C increments from ~100°–360°C, with continuation to higher thermal steps for the more stable samples. Bulk susceptibility was generally monitored after every second thermal demagnetization step <300°C, and after every higher temperature step to monitor changes in magnetic mineralogy and onset of viscous magnetization associated with formation of new magnetic phases. Magnetic directions were measured on a cryogenic magnetometer isolated from the Earth's magnetic field in a shielded room (Michigan) or with Helmholtz coils (Oxford). The practical limit on resolution of the natural remanence of the minicores was ~5×10^{-6} A/m, and duplicate measurements were taken whenever the intensity was $<2 \times 10^{-5}$ A/m.

Common Magnetic Overprints and Demagnetization Behavior

Even though magnetic characteristics varied greatly among the various lithologies, it is possible to summarize the typical behavior. Initial natural remanent magnetization (NRM) directions are dominated by a downward inclination, which is presumed to be the combined secondary overprints of normal polarity oriented parallel with the present dipole field and a drilling-induced remanence. The drilling-induced overprint has always plagued Deep Sea Drilling Project (DSDP) and ODP paleomagnetic studies and is characterized by a downward (high positive inclination) and radially inward orientation (e.g., the series of investigative studies made by the paleomagnetists during Leg 154, as summarized in successive site chapters in Curry, Shackleton, Richter, et al., 1995). This radial-inward overprint is exhibited as an apparent preferential declination toward 0° ("north"); therefore, relatively few samples displayed initial NRM declinations between 100° and 260°, in contrast to the expected random distribution.

Secondary overprints were largely removed upon heating above 180°C, and dual polarity was generally observed from 200° through 360°C. Upon heating >360°C, most samples displayed a rapid increase in susceptibility accompanied by viscous magnetization. Despite performing the thermal demagnetization and measurements within a shielded room, the onset of spurious viscous magnetizations generally rendered continued demagnetization to be fruitless. A minority of samples, generally from intervals with a more condensed accumulation or a reddish colored facies, could be demagnetized at temperatures >360°C without displaying viscous magnetizations (Fig. F1).

F1. Vector plots of thermal demagnetization, characteristic directions, and polarity ratings, Hole 1049A, p. 19.



The general magnetic behavior during thermal demagnetization suggests that a common carrier of characteristic magnetization (generally in the 200°–400°C range) is magnetite. The surge in susceptibility above 360°C observed in many samples is probably due to a combination of dehydration of iron-rich clays, oxidation of iron sulfides, and minor contributions from the alteration of iron minerals in the organic-rich claystone by organic combustion.

Characteristic Directions, Polarity Ratings, and Paleolatitudes

Polarity interpretation of the 180°–350°C magnetization component was generally obvious from the attained characteristic inclinations and relative rotation of declinations. Most samples either attained a direction that remained stable through multiple heating steps as the intensity of magnetization decreased (i.e., univectoral decay to the origin on the vector diagrams) or displayed development of a quasi-stable direction and intensity prior to the onset of erratic magnetization at higher temperatures. However, for a few samples, a stable end-point characteristic direction was not achieved prior to the onset of viscous magnetization and it was necessary to deduce polarity from their progressive demagnetization trends. Characteristic magnetization directions and associated variances were computed for each sample by applying a least-squares three-dimensional line fit (procedure of Kirschvink, 1980) to sets of vectors displaying removal of a single component in equal-area and vector plots of the progressive demagnetization.

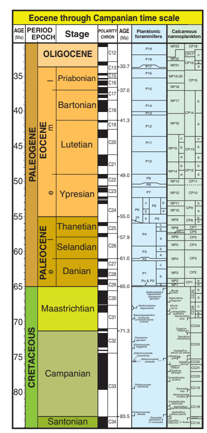
Each characteristic direction was assigned a polarity rating based upon the individual demagnetization behavior: (1) well-defined N or R directions computed from at least five vectors having a high degree of linearity and a univectorial trend toward the origin (e.g., Figs. F1B, F1C), (2) less precise NP or RP directions computed from three to four vectors having a high degree of linearity and a univectorial trend toward the origin (e.g., Fig. F1A) or from at least five vectors displaying a "noisy" linear trend, (3) NPP or RPP samples that did not achieve adequate cleaning during demagnetization and were omitted from paleolatitude computations, and (4) samples with uncertain N?? or R?? or indeterminate INT polarity that were generally not used to define polarity zones. To reduce the bias of a single observer, selection and rating of characteristic magnetization vectors and associated polarity interpretations were done independently by two people and the more conservative assignment was generally used; however, the minor differences in assigning ratings did not affect a common identification of polarity zones. Of the 1075 samples, 291 were rated N or R and 224 were NP or RP.

Assignment of polarity chrons of the standard magnetic polarity time scale to these stratigraphic polarity zones required biostratigraphic control, as will be summarized below for each site. In many cases, delimitation of polarity zone boundaries was further constrained by the high-resolution shipboard measurements with the long-core cryogenic magnetometer; however, the quality of this shipboard data was commonly compromised by a difficulty in removing secondary overprints through alternating-field demagnetization and a high degree of noise from drilling artifacts, as summarized in the Leg 171B *Initial Reports* site chapters.

Assignment of polarity chrons utilizes the pattern of normal- and reversed-polarity zones within each interval and the reference scales for biomagnetochronology of nannofossil and planktonic foraminifer datums compiled for the Paleogene (Berggren et al., 1995) and the Late Cretaceous (Erba et al., 1995) as compiled in the "Biostratigraphy" section of the "Explanatory Notes" chapter of the Leg 171B *Initial Reports* volume (Shipboard Scientific Party, 1998a) (Fig. F2). The biostratigraphy for each hole has undergone progressive refinement, and the columns for each site in this study are based upon the compilations in the Leg 171B *Initial Reports* volume (Norris, Kroon, Klaus, et al., 1998) with modifications to the Campanian–Maastrichtian interval presented by Brian Huber (foraminifers) and Jean Self-Trail (calcareous nannofossils) at the 1998 postcruise conference. In turn, the magnetostratigraphy has indicated inconsistencies both with some portions of the reference compilations of biomagnetochronology and with the assigned biostratigraphy at different sites. This iterative procedure of improving biostratigraphic calibrations and possible reinterpretation of the magnetostratigraphy and reassignment of polarity chrons is a common process before developing a robust biomagnetic chronology.

Paleolatitudes for successive time intervals at each site were derived from mean inclinations computed using the procedure of Kono (1980a, 1980b) for calculating statistics of inclination-only data from unoriented vertical drill cores. This method uses the mean and standard deviations of the sines of the inclinations to compensate for the circular Gaussian (Fisherian) distribution of paleomagnetic vectors. A simple mean of the inclinations gives unrealistic importance to the lower values. Kono's nonlinear simultaneous equations relating the true mean inclination and the circular dispersion parameter, K, to the statistics of the sines of the inclination data were solved using Newton's method to converge on the solutions. Samples having characteristic directions rated NP or RP were given one-half weight. To test the validity of Kono's procedure, we submitted previously analyzed sets of data from outcrops; the resulting mean inclination is within 0.1° of the inclination given by statistics on such directional data (procedure modified from Fisher, 1953). McFadden and Reid (1982) independently developed a different computational procedure to calculate mean inclinations from azimuthally unoriented paleomagnetic data, but the similarity of results suggests that it has the same mathematical basis as Kono's procedure.

F2. Assignment of magnetic polarity chrons to magnetostratigraphy, p. 20.



The magnetostratigraphy, paleolatitudes, and any significant departures from the general magnetic behavior at each site are summarized in the following sections from the most seaward (Site 1049) to the most landward (Site 1053).

MAGNETOSTRATIGRAPHY AND POLARITY CHRON ASSIGNMENTS

Site 1049

Site 1049 penetrated mid-Cretaceous alternations of calcareous clay and chalk, overlain by a relatively compact succession of Maastrichtian through middle Eocene nannofossil chalk. Paleomagnetic minicores were obtained from Hole 1049A, except the Cretaceous/Tertiary (K/T) boundary interval was sampled in Hole 1049C.

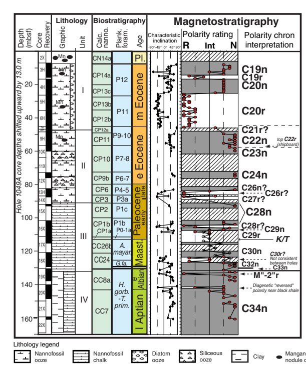
Albian Subchron M″-2r″ is resolved in two holes, and the condensed uppermost Cretaceous and Paleogene strata yielded an incomplete record of polarity Chrons C33n through C19n.

Aptian/Albian Boundary Interval and Albian Magnetic Polarity Subchron M″-2r″

The Aptian through lower Albian sediments are dominated by the normal polarity of Chron C34n (Cretaceous Long Normal Polarity Chron). Shipboard indications of two thin reversed-polarity zones within this interval were verified by the minicores (Fig. F3; Table T1). A reversed-polarity interval in the basal Albian within Sections 171B-1049A-20X-1 and 20X-2, 171B-1049B-11X-2, and 171B-1049C-12X-2 is immediately above a 0.5-m-thick interval of distinctive black shale. This organic-rich level has been correlated to Atlantic-Tethys oceanic anoxic event 1b (OAE 1b) and the equivalent Jacobi event in southeastern France, which is a candidate for defining the Aptian/Albian stage boundary (J. Erbacher, pers. comm., 1998). The overlying reversed-polarity zone coincides with an anomalous yellowish and greenish staining on the original sediments. This suggests that the apparent reversed-polarity magnetization is a diagenetic artifact of post-Albian iron mobilization induced by redox contrasts near this organic-rich interval.

The second reversed-polarity zone occurs 8.5 m above the base of the OAE 1b organic-rich shale (paleomagnetic minicore at Section 171B-1049A-19X-2, 103 cm, and shipboard magnetometer data at interval 171B-1049C-11X-3, 10–35 cm). This thin reversed-polarity band within the upper *Ticinella primula* planktonic foraminifer zone of the lower Albian appears to be coeval with brief reversed-polarity episodes reported from near the boundary of the *T. primula* and *Biticinella breggiensis* planktonic foraminifer zones at other DSDP sites (e.g., Leg 27 by Jarrard, 1974; Leg 40 by Keating and Helsley, 1978) and in Italian sections (VandenBerg and Wonders, 1980; Tarduno et al., 1992). Polarity Chron M0r is at the base of the Aptian, and the DSDP Leg 40 Scientific Party (Ryan et al., 1978) proposed a M″-1r″ through M″-3r″ nomenclature for the series of brief reversed-polarity subchrons within the Aptian–Albian. Further documentation is required to verify whether the reported M″-2r″ event or events represent true reversed-polarity episodes (J.E.T. Channell, pers. comm., 1999). Based on the Leg 40 ages for these episodes, we assign the thin (25 cm) reversed-polarity subzone of Site

F3. Magnetostratigraphy and polarity chron assignments, Site 1049, p. 22.



T1. Characteristic directions, polarity ratings, and polarity assignments, Holes 1049A and 1049C, p. 29.

1049 as the earliest subchron of the M″-2r″ suite. Albian sedimentation at Site 1049 was truncated shortly above this M″-2r″ polarity subzone.

The upper Aptian through lower Albian sediments display oscillation in geochemistry and reddish to greenish white color. Spectra of these variations yield ratios consistent with the suite of Milankovitch orbital-climate cycles of 413 and 100 k.y. (eccentricity), 54 and 40 k.y. (obliquity), and 23 and 19 k.y. (precession) (Ogg et al., 1999). The implied sedimentation rate for the lower Albian derived from these Milankovitch cycles is ~100 k.y./m. This rate implies that reversed-polarity Subchron M″-2r″ commenced ~0.75 m.y. after the initiation of OAE 1b. Polarity subzone M″-2r″ spans only ~25 cm in Hole 1049C; therefore, this polarity subchron had a duration of ~25 k.y.

K/T Boundary Interval and Uppermost Cretaceous

All three holes at Site 1049 recovered a spectacular record of the end-Cretaceous impact ejecta. Shipboard pass-through cryogenic measurements indicate that the greenish layer of spherules at the K/T boundary is reversed polarity, consistent with the placement of this event within polarity Chron C29r. This boundary layer is the only interval with an unambiguous polarity chron assignment.

The assignment of polarity chrons within the underlying uppermost Cretaceous is compromised by discontinuous strata, hiatuses, poor paleomagnetic characteristics, and synsedimentary slumping and/or drilling-induced disruption. The Maastrichtian and upper Campanian chalk recovered from the three holes at Site 1049, even though these holes are spaced only 10 m apart, yielded different biostratigraphic successions and relative thicknesses of biostratigraphic zones (Shipboard Scientific Party, 1998b; B. Huber and J. Self-Trail, pers. comm., 1998). We obtained independent Maastrichtian magnetostratigraphies from minicore sampling in Holes 1049A and 1049C. A reversed-polarity zone in Core 171B-1049A-18X is not present in the equivalent depth interval (relative to the K/T spherule horizon) within Hole 1049C. Biostratigraphic constraints suggest that this discontinuous reversed-polarity zone is polarity Chron C30r. There is no indication that mid-Maastrichtian polarity Chrons C31n–C31r are present, and the biostratigraphy associated with the underlying normal-polarity zone indicates a probable juxtaposition of C33n of the late Campanian and C32n of the early Maastrichtian.

Paleocene

Paleocene polarity Chrons C29n through C26n appear to be represented by alternating normal- and reversed-polarity zones in Hole 1049A, although resolution of the thicknesses and relative completeness of these zones is precluded by the patchy recovery of the interbedded chalk-chert-ooze facies. As a result, the assignment of the polarity chrons is based entirely on the biostratigraphic ages. Latest Danian polarity Chron C27n was not resolved, and the Paleocene/Eocene boundary interval spanning polarity Chrons C25r–C25n–C24r is either condensed or absent at this site.

Lower and Middle Eocene

Biostratigraphy indicates that the apparent pair of normal- and reversed-polarity intervals spanning the lower Eocene (Cores 171-1049A-

12X through 5H) is the concatenation of polarity Chrons C24n–C23n–C22n and C21r–C20r, respectively. The record of polarity Chron C23r may be absent because of a recovery gap. Measurements with the shipboard pass-through magnetometer suggest that a sliver of polarity Zone C21r of basal Lutetian (lowermost middle Eocene) may be present below the lower Lutetian hiatus spanning the majority of Chron C21r and all of Chron C21n.

The upper Lutetian portion of the middle Eocene is represented by polarity Chrons C20r, C20n, C19r, and C19n. In contrast to the underlying Paleocene and lower Eocene, this interval is relatively expanded and appears to be continuous sedimentation.

Site 1050

Site 1050 penetrated upper Albian claystone and lower Cenomanian chalk, overlain by a highly condensed Turonian through Coniacian and a nearly continual succession of upper Campanian through middle Eocene clayey to siliceous chalk and ooze. Paleomagnetic minicores were obtained from the Albian through Danian (lower Paleocene) in Hole 1050C and from the upper Paleocene through middle Eocene in Hole 1050A.

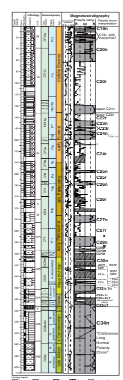
The magnetostratigraphy resolved a nearly complete succession of polarity Chrons C33n (late Campanian) through C19n (mid-middle Eocene).

Albian–Cenomanian and Upper Cretaceous

The suite of cores spanning the upper Albian claystone, lower Cenomanian chalk, and condensed Turonian–Coniacian yielded normal polarity, consistent with their deposition during the Cretaceous Long Normal Polarity Chron C34n (Fig. F4; Table T2).

A series of polarity zones is present within the upper Campanian through Maastrichtian. However, the assignment of polarity chrons is slightly ambiguous because of the presence of two major coring gaps (nonrecovery in Cores 171B-1050C-14R and 12R), a synsedimentary slumped interval in the uppermost Campanian that has probably reset the magnetization, possible magnetic overprints, and the lack of a well-calibrated biomagnetic reference time scale for this time period. The placement of the Campanian/Maastrichtian boundary indicates that Cores 171B-1050C-16R through 18R are probably polarity Chron C32n, including its reversed-polarity Subchron C32n.1r. The Maastrichtian biostratigraphy and magnetic polarity pattern above Chron C32n can be interpreted in at least two ways; therefore, dual alternatives spanning Chrons C31r through C30n are displayed in the polarity column (Fig. F4).

F4. Magnetostratigraphy and polarity chron assignments, Site 1050, p. 23.



Paleocene

A complete polarity succession of Chrons C29r through C24r spans a 200-m interval in upper Hole 1050C and lower Hole 1050A (Fig. F4). The relative widths of these polarity zones are nearly identical to the relative duration of chrons in the marine magnetic anomaly model (Cande and Kent, 1995), implying a fairly constant sedimentation rate. The only exception is that polarity Chron C27n is slightly expanded relative to the oceanic model (Fig. F2), a pattern also noted in nearby Hole 1051A and in Hole 1001A in the Caribbean Sea (V. Louvel and B.

T2. Characteristic directions, polarity ratings, and polarity assignments, Holes 1050A and 1050C, p. 33.

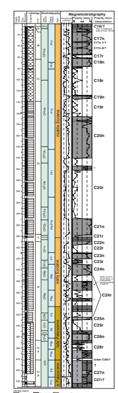
Galbrun, unpubl. data), suggesting that the relative durations in the oceanic model require slight modification.

Sediments deposited during polarity Chrons C27r and C27n display oscillations of color and relative carbonate content. This combined polarity Chron C27r–C27n spans 35–36 obliquity cycles in both the high-resolution geochemical stratigraphy and the natural gamma downhole logs (Röhl et al., in press). This yields a cycle-tuned duration of 1.45 m.y. for polarity Chron C27r–C27n. Similar cycle-duration analyses are underway for polarity Chrons C26r through C25n (U. Röhl and J. Ogg, unpubl. data). The cyclostratigraphy of the Paleocene/Eocene boundary interval within polarity Chron C24r implies an anomalous release of carbon at the associated isotopic excursion (Norris and Röhl, 1999).

Lower and Middle Eocene

Early Eocene polarity Chrons C24r through earliest C22n are assigned from the pattern of polarity zones in association with the biostratigraphy (Fig. F4). Within the interval corresponding to reversed-polarity Chrons C22r and upper C24r are narrow subzones of normal polarity that may represent either pervasive normal-polarity overprints at particular horizons or normal-polarity subchrons not present in the reference magnetic anomaly scale (Fig. F2). It is interesting that similar levels of normal polarity or uncertain magnetization occur within these two chrons at Site 1051 (Fig. F5).

F5. Magnetostratigraphy and polarity chron assignments, Hole 1051A, p. 24.



The lower/middle Eocene boundary (Ypresian/Lutetian stage boundary) is a hardground at 153 mbsf (Section 171B-1050A-16X-7, 42 cm) that coincides with the omission of calcareous nannofossil Zone CP12a (e.g., fig. 8 in Shipboard Scientific Party, 1998c). This hardground has juxtaposed sediments deposited during the earliest part of polarity Chron C22n and the later portion of Chron C21n, implying a hiatus of ~1.5 m.y. at this site.

Middle Eocene siliceous chalks at most sites were not as generous in yielding their paleomagnetic secrets as lower Eocene and older sediments. A rapid loss of magnetic intensity upon thermal demagnetization, coupled with inadequate removal of secondary overprints prior to loss of signal, resulted in the majority of paleomagnetic samples being unsuitable for use in determining paleolatitudes. Prolonged contact with oxidized bottom waters after cessation of sedimentation in the late Eocene caused a secondary yellowish discoloration and associated magnetic overprinting of the upper 40 m in each hole (lithologic Unit IIB). Therefore, we are confident in assigning polarity Chrons C20r and C20n, but resolution of Chrons C19r and C19n is difficult (Fig. F4).

Site 1051

Site 1051 penetrated a thick succession of lower Paleocene through middle Eocene siliceous chalk to ooze. The magnetic properties and stratigraphy are similar to the coeval facies at Site 1050. The magnetostratigraphy from minicores in Hole 1051A, supplemented by shipboard data from Hole 1051B, resolved the complete succession of polarity Chrons C27n (Danian stage of the early Paleocene) through C16r (base of late Eocene).

Paleocene

In contrast to Site 1050, the gray chalks in the lower portion of the Paleocene (Danian and Selandian stages) at Site 1051 displayed relatively poor magnetic properties. The characteristic magnetization of the lower 80 m of Hole 1051A is dominated by poor-quality results of apparent normal polarity, and therefore are rated "NPP" (Fig. F5; Table T3). However, the biostratigraphy indicates that this upper Danian–lower Selandian interval should be dominated by reversed polarity of Chrons C27r and 26r, with only a relatively narrow normal-polarity interval associated with Chron C26n (Fig. F2). Therefore, we tentatively consider the "NPP"-dominated intervals to represent incomplete removal of a normal-polarity overprint from a primary reversed-polarity original magnetization. Chron C27n is assigned only to the relatively high-rated normal-polarity ("N" and "NP") characteristic directions from ~620 to 630 mbsf within planktonic foraminifer Zone P2, and the adjacent sediments have indeterminate polarity.

T3. Characteristic directions, polarity ratings, and polarity assignments, Hole 1051A, p. 43.

The upper Paleocene (Thanetian stage) yielded a good-quality magnetostratigraphy pattern that is assigned to polarity Chrons C26n, C25r, C25n, and early C24r (Fig. F5).

Lower and Middle Eocene

The early Eocene (Ypresian) pattern of polarity Chrons C24r, C24n, C23r, C23n, C22r, and early C22n is reflected without significant distortion in the magnetostratigraphy. The only exceptions are an interval of anomalous normal-polarity overprint or subchron in the upper portion of the polarity zone assigned to Chron C24r (~460–475 mbsf) and a band of indeterminate polarity within the zone assigned to Chron C23r. These levels seem to be coeval with similar features in the magnetostratigraphy of Site 1050.

The Ypresian/Lutetian stage boundary interval (contact between the lower Eocene and middle Eocene) is a biostratigraphic hiatus at all sites of Leg 171B. As in Site 1050, the majority of polarity Chron C22n of the latest Ypresian and the early portion of Chron C21r of earliest Lutetian are absent but the sediments overlying this hiatus at both holes of Site 1051 record the latest portion of C21r as a narrow band of reversed polarity (Fig. F5) (Shipboard Scientific Party, 1998d).

The middle Eocene Lutetian and Bartonian stages are relatively expanded, and the magnetostratigraphy pattern displays an excellent record of polarity Chrons C21n through C17n, including indications of the brief Subchrons C17n.1r and C17n.2r within polarity Chron C17n (Fig. F5). Within this succession, the apparent thickness of the polarity zone assigned to mid-Bartonian Chron C18n is shortened relative to the reference magnetic polarity time scale of Cande and Kent (1995). Shipboard measurements of cores from the upper portion of Hole 1051B in the pass-through cryogenic magnetometer suggest a reversed-polarity zone at the base of the upper Eocene, and the associated calcareous nannofossil Zone CP15 indicates a possible assignment to polarity Chron C16r.

Site 1052

Site 1052 penetrated upper Albian and lower Cenomanian silty claystone overlain by Maastrichtian through lower Paleocene clayey chalk to calcareous claystone, followed by a hiatus to middle and upper

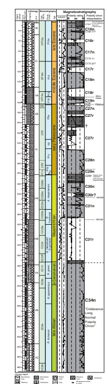
Eocene siliceous chalk and ooze. Paleomagnetic minicores were obtained from Albian through Danian (lower Paleocene) in Hole 1052E and uppermost lower Paleocene through upper Eocene in Hole 1052A. The suites from these two holes duplicate the uppermost portion of the Paleocene.

Above the Albian–Cenomanian normal polarity of Chron C34n, the magnetostratigraphy resolved a complete succession of polarity chrons C31r (early Maastrichtian) through C26r (basal Selandian of late Paleocene) followed by the series from C19r (latest Lutetian of middle Eocene) through C16n (early Priabonian of late Eocene).

Albian–Cenomanian and Maastrichtian

The upper Albian and lower Cenomanian consists entirely of normal polarity, consistent with deposition during the Cretaceous Long Normal Polarity Chron C34n (Fig. F6; Table T4). Cenomanian sedimentation is truncated, and deposition resumed with Maastrichtian clayey chalk of reversed polarity.

F6. Magnetostratigraphy and polarity chron assignments, Site 1052, p. 25.



Assignment of polarity Chrons C31r through C29r to the Maastrichtian magnetostratigraphy is based upon the distinctive polarity pattern and the biostratigraphy (Fig. F6). The upper limit of the polarity zone assigned to Chron C31n is at a synsedimentary slump feature, and a slump within the uppermost portion of the zone assigned to Chron C31r coincides with a nannofossil subzonal boundary. However, the relatively expanded biomagnetic stratigraphy of the Maastrichtian interval provides a useful reference site for calibration of biochronology to polarity chrons.

Lower Paleocene

The K/T boundary interval displays reversed polarity in shipboard pass-through magnetometer measurements, consistent with assignment to polarity Chron C29r (Shipboard Scientific Party, 1998e). An extended interval of normal polarity extends for ~55 m above the K/T boundary. Biostratigraphic constraints indicate that this normal-polarity zone represents the concatenation of polarity Chron C29n with Chron C28n. Reversed-polarity Chron C28r, which coincides approximately with the boundary between foraminifer Zone P1c and P2, is absent.

T4. Characteristic directions, polarity ratings, and polarity assignments, Holes 1052A and 1052E, p. 49.

Resolution of the upper Danian (late polarity Chron C27r and early Chron C27n) is compromised by low recovery and poor magnetic behavior. The top of the Paleocene succession is a narrow band of reversed polarity that probably represents the earliest part of polarity Chron C26r of earliest Selandian. Nearly the entire late Paleocene is absent.

Middle and Upper Eocene

Sedimentation resumes above the Eocene–Paleocene unconformity with a narrow band of reversed polarity. The biostratigraphy, coupled with the polarity pattern of the succeeding middle Eocene, indicates that this band represents the latest portion of polarity Chron C19r of latest Lutetian.

A hardground at 150 mbsf (Section 171B-1052A-18X-4, 10 cm) seems to coincide with the P12/P13 foraminifer zonal boundary (approximately coinciding with the Lutetian/Bartonian stage boundary) and with the contact between polarity zones assigned to Chrons C19n and

C18r. The relative widths of the polarity pattern with respect to Chrons C19n–C18r–C18n in the reference magnetic polarity time scale (Fig. F2) indicates a comparative shortening of Chron C18r. Therefore, we infer this hardground to be a temporary cessation of sedimentation during the early portion of polarity Chron C18r.

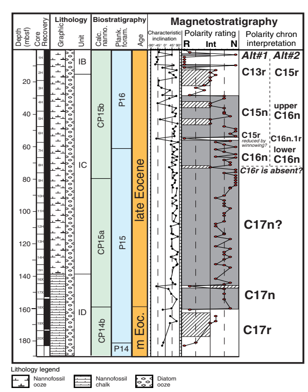
The full suite of polarity Chrons C18n through C16n, including the brief subchrons, is present within the complete sediment recovery of the upper portion of Hole 1052A. Shipboard measurements of cores on the pass-through cryogenic magnetometer suggest that the uppermost sediments were deposited during polarity Chron C15r of the mid-Priabonian stage, but this requires verification by progressive demagnetization of minicores.

Site 1053

Middle Eocene

Site 1053 penetrated upper Bartonian (uppermost middle Eocene) through upper Eocene siliceous chalk to ooze. The magnetostratigraphy from minicores in Hole 1053A was consistent with the shipboard cryogenic measurements of cores from Hole 1053B (Shipboard Scientific Party, 1998f). However, the sediment facies were weakly magnetized and generally did not yield reliable magnetic directions upon heating to 300°C and higher; therefore, we cannot ascertain whether the characteristic polarity at the relatively low-temperature demagnetization steps (typically 180°–270°C) represent adequate removal of later overprints. A long interval of normal polarity is bounded by 30-m-thick zones of reversed polarity in the upper Bartonian (lower 30 m of Hole 1050A) and in the uppermost Eocene (upper 30 m of each hole) (Fig. F7; Table T5). The long normal-polarity zone is interrupted by two to three narrow reversed-polarity excursions. The dominance by normal polarity is consistent with the late Bartonian through early Priabonian succession of C18n through C16n, with relatively brief reversed-polarity chrons and subchrons (Fig. F2). The biostratigraphy, especially the boundary between foraminifer Zones P14 and P15, indicates that the relatively thick reversed-polarity zone at the base of Hole 1053A is probably polarity Chron C17r.

F7. Magnetostratigraphy and polarity chron assignments, Hole 1053A, p. 26.



However, assignment of polarity chrons to the overlying general pattern is hindered by the broad biostratigraphic zones (e.g., only two foraminifer zones and a single calcareous nannofossil zone). This biostratigraphy does not provide adequate constraints to evaluate either the continuity of sedimentation or whether the weakly magnetized chalk had yielded its original polarity chronology.

Therefore, two of several alternative polarity assignments are displayed for the upper half of Hole 1053A (Fig. F7). The first alternative assumes that the relatively thick reversed-polarity zone at the top of Hole 1053A is polarity Chron C13r of the latest Eocene. Under this scenario, polarity Chrons C15r and C16r are either absent, condensed, or not resolved by the demagnetization procedures. The second alternative assigns the thick uppermost reversed-polarity zone to Chron C15r of mid-Priabonian. Applying relative durations results in an assignment of Subchron C16n.1r to the narrow reversed-polarity excursion at 55 mbsf and a similar absence of polarity Chron C16r. It may be possible to improve resolution and validity of the magnetostratigraphy by detailed demagnetization of samples from Hole 1053B, but the low-resolu-

T5. Characteristic directions, polarity ratings, and polarity assignments, Hole 1053A, p. 55.

tion biostratigraphic control may preclude an unambiguous assignment of polarity chrons.

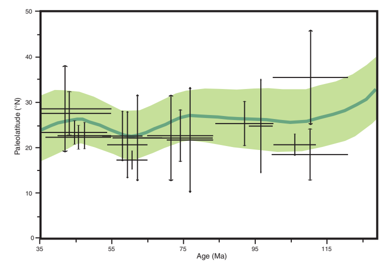
PALEOLATITUDES

Models of Cretaceous plate motion have commonly assumed that North America remained stationary throughout the entire Cretaceous period, and rapid spurts of continental drift occurred in the earliest and latest Cretaceous (e.g., Irving et al., 1993). According to the generalized Cretaceous compilation (Irving et al., 1993), the sites drilled during Leg 171B, which are presently at a latitude of 30°N, have a predicted mid-Cretaceous (Hauterivian to Santonian) paleolatitude of 30°N, a rapid Late Cretaceous northward drift to a Campanian–Maastrichtian position at 40°N, followed by a return southward to reach their present position in the late Tertiary.

However, the array of paleolatitudes from Aptian through Eocene from the five sites indicates that a remarkably stable paleolatitude of about 25°N was maintained during this time span (Table T6; Fig. F8). All sites and all sediment facies yield quite similar values. There is no evidence of any significant paleolatitude shifts during this interval. Indeed, the apparent motion during the late Tertiary merely consisted of a minor northward drift (<5°) rather than the southward motion from current models of North American polar wander.

T6. Paleolatitude of Leg 171B sites, p. 58.

F8. Paleolatitude history of the Blake Nose margin, p. 27.



This array of Leg 171B results, which are the most detailed continuous paleolatitude records of any location on the North American plate, suggests that the current Cretaceous through early Tertiary polar wander path for North America may contain artifacts of poor age constraints on magnetically suitable sediments on the North American craton and inadequate statistical processing of relevant paleomagnetic results. The "stable Cretaceous pole" of North America has been significantly mispositioned southward by nearly 10° latitude.

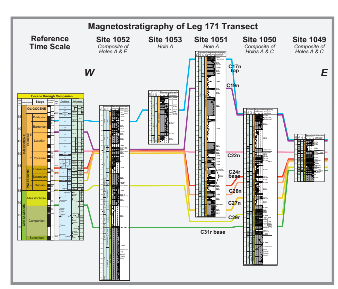
A reanalysis of the North American paleomagnetic database (C. MacNiocaill, L. Bardot, and J. Ogg, unpubl. data) is consistent with our paleolatitude path from the Blake Nose margin transect.

IMPLICATIONS OF MAGNETOSTRATIGRAPHIC CORRELATIONS

Cretaceous

Cretaceous strata were penetrated at only three of the five sites and indicate shifting depocenters and progressive condensation toward the seaward margin (Fig. F9).

F9. Correlation of magnetostratigraphy across the Blake Nose Transect, p. 28.



Mid-Cretaceous (Polarity Chron C34n)

The thick package of upper Albian through lower Cenomanian clay- and silt-rich sediments present at Sites 1052 and 1050 completely pinch out at seaward Site 1049, where the lower Albian is directly overlain by the Maastrichtian. The upper Aptian and lower Albian record at Site 1049, albeit relatively compact, provides a cycle-tuned time scale for this interval and a duplicate record of lower Albian polarity Subchron M"-2r".

Late Campanian through Maastrichtian (Polarity Chrons C33n to C29r)

The basal sediments overlying the major Late Cretaceous unconformity are progressively older toward the seaward margin: the early portion of Maastrichtian polarity Chron C31r is identified at landward Site 1052 and a sliver of mid-Campanian polarity Chron C33n is identified at Sites 1050 and 1049. Latest Campanian polarity Chron C32r was not recognized at any site. The Campanian/Maastrichtian boundary interval (polarity Chron C32n and its reversed-polarity subchron) is resolved only at Site 1050.

The Maastrichtian succession, which is relatively complete and expanded at Site 1052, is heavily distorted by condensation or hiatuses in the seaward sites. Early Maastrichtian polarity Chrons C31r and C31n are equivalent to nearly 120 m at Site 1052, but span only between 10 and 30 m at Site 1050, and are a depositional hiatus at Site 1049. Polarity zones corresponding to late Maastrichtian polarity Chron C30n and early Chron C29r also thin seaward but are partially preserved at all three sites. In contrast to the general tendency of seaward condensation, only Site 1049 has preserved an intact record of the K/T boundary impact event within polarity Chron C29r.

Paleocene

Paleocene strata were penetrated at four sites. The Maastrichtian pattern of seaward condensation was probably maintained, but apparently the upper Paleocene record at landward Site 1050 was later removed by middle Eocene erosion (Fig. F9).

Danian Stage (Polarity Chrons C29r through C27n)

The thickness of the Danian progressively thins from Site 1052 (135 m) through Sites 1051 and 1050 (~70 m) to Site 1049 (~25 m). There was a major mid-Danian episode of condensation or hiatus across the margin, as indicated by the absence or relative thinness of polarity Chrons C29n and C28r at all sites. Cycle stratigraphy through polarity Chrons C27r and C27n indicates that these chrons encompass 1.45 m.y. and that the total duration of the Danian stage should be shortened by ~0.35 m.y. to span from 65.5 to 61.85 Ma (Röhl et al., 2001).

Selandian Stage (Polarity Chron C26r)

The Selandian stage is approximately equivalent to the long reversed-polarity Chron C26r (Fig. F2) (Berggren et al., 1995). This interval is only significant at Site 1050 in the outer portion of the margin, where it spans ~50 m. At both the most landward (Site 1052) and most seaward (Site 1049) sites, only a thin sliver (<5 m) of the Selandian may be present. At landward Site 1052, this remaining Selandian sediment is directly overlain by the mid-Lutetian of the middle Eocene, and we postulate that this major unconformity was created by an episode of middle Eocene erosion that stripped away a significant thickness of upper Paleocene sediments in the landward portion of this margin. The reduced thickness of polarity Chron C26r at Site 1049 seems to be associated with a general pronounced condensation of the upper Paleocene through lowermost Eocene interval, rather than a specific unconformity.

Thanetian Stage (Polarity Chrons C26n to mid-C24r)

The pattern of relative thickness of the Thanetian strata across the margin mirrors the underlying Selandian. There is a progressive seaward thinning from Site 1051 through Site 1049.

Eocene

Sediments of the Ypresian (lower Eocene) and Lutetian (lower middle Eocene) display a progressive seaward thinning at Sites 1051, 1050, and 1049 but are an erosional hiatus at landward Site 1052 (Fig. F9). Bartonian (upper middle Eocene) and younger sediments are not preserved at seaward Sites 1050 and 1049. Cessation of deposition occurred at Site 1052 during the middle Priabonian (upper Eocene) and at the most landward Site 1053 near the Eocene/Oligocene boundary.

Ypresian Stage (Polarity Chrons mid-C24r through C22n)

All polarity chrons of the Ypresian are present at Sites 1051 (spanning 125 m) and 1050 (90 m). The Ypresian at seaward Site 1049 is partially condensed (35 m), with omission of late Ypresian polarity Chron C22r.

Lutetian Stage (Polarity Chrons C21r through C19n)

The basal Lutetian is represented by a hiatus across the margin, and there are indications of erosion of the uppermost Ypresian and differences of timing of resumption of sedimentation at the various sites. The termination of sedimentation below the hiatus is during polarity Chron C26r at Site 1052, early Chron C22n at Site 1051, earliest Chron C22n at Site 1050, and possibly the beginning of Chron C21r at Site 1049. Preservation of sedimentation resumed during polarity Chron C19r at Site 1052, latest C21r at Site 1051, late C21n at Site 1050, and early C20r at Site 1049. This irregular pattern and magnitude of the depositional hiatus suggests an early Lutetian (lasting until the latest Lutetian at landward Site 1052) episode of bottom-current erosion and prevention of sediment accumulation across the margin. This episode may have been an initial pulse of the western boundary current that would later terminate sedimentation in late Eocene.

Above this basal Lutetian hiatus, the thickness pattern of individual polarity zones (e.g., polarity zones corresponding to Chrons C20r and C20n) display the typical seaward thinning. Middle Lutetian polarity Chrons C20r and C20n encompass 170 m at Site 1051, 110 m at Site 1050, and only 30 m at Site 1049.

The end of the Lutetian (end of polarity Chron C19n) is the termination of preserved sedimentation at seaward Sites 1050 and 1049. This end Lutetian event is also reflected as a minor hardground in the cored sediments of Site 1052.

Bartonian Stage (Polarity Chrons C19r to C17n)

The package of Bartonian sedimentation at Sites 1052 and 1051 appears to record all polarity chrons and the major polarity subchrons (e.g., C17n.1r and C17n.2r). Site 1053 did not yield an unambiguous magnetostratigraphy in this interval. The total thickness of the Bartonian is nearly identical (120 m) at both Site 1052 and 1051, although individual polarity zones indicate slight differences in accumulation patterns during this interval.

Priabonian Stage (Polarity Chrons C17n through C13r)

There is a progressive landward termination of sedimentation through the Priabonian, with the end of accumulation occurring during polarity Chron C16r at Site 1051, latest Chron C16n or early Chron C15r at Site 1052, and either latest Chron C15r or C13r at Site 1053. No Oligocene or younger sediments have accumulated on this margin swept by the western boundary current system.

SUMMARY

The array of Leg 171B sites yielded a detailed magnetostratigraphy of the Aptian/Albian boundary interval (including polarity Subchron M″-2r″) and the Cenomanian through Eocene. All polarity chrons from C31r (early Maastrichtian) through C15r (latest Eocene) are present as relatively thick polarity zones at one or more sites. The precise placement of polarity reversals within individual Milankovitch orbital-sediment cycles should be possible with further focused sampling. The current array provides a reference suite for enhanced biostratigraphic calibration and general astronomical tuning of the Maastrichtian through Eocene magnetic polarity time scale and oceanic spreading rates.

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John Foster, a former graduate student at Purdue University, played a key role in the detailed demagnetization and analysis of the hundreds of paleomagnetic minicores. We thank Buffy McClelland (University of Oxford) and Rob Van der Voo (University of Michigan) for providing generous access to their laboratories for extended intervals. This project was supported by grants from USSAC and NERC. Our shipboard colleagues, especially the paleontology teams and the ODP curatorial staff, tolerated our extensive minicore sampling and eagerly worked with us on the biomagnetostratigraphic framework. Jim Channell performed a thorough review of the manuscript, and the ODP editorial office fine-tuned the presentation.

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Figure F1. Representative vector plots of thermal demagnetization, characteristic directions, and polarity ratings for Paleogene samples from Hole 1049A. Declination (solid squares) is relative to a perpendicular line into the cut face of the working half of the core and is projected onto a horizontal plane, and inclination (open squares) is the actual value and magnitude. The bold line is the succession of vectors used to compute the characteristic direction for each sample. **A.** Eocene chalk at 50°C heating steps between 100° and 650°C; characteristic direction is assigned an NP polarity rating because it is computed from only four vectors. **B.** Paleocene siliceous limestone at 140°C, then 30°C heating steps between 180° and 300°C, then 350°, 400°, and 480°C; characteristic direction is assigned an R polarity rating because it is computed from eight vectors with a low mean angular deviation. **C.** Paleocene siliceous limestone with the same demagnetization as in B; characteristic direction is assigned an N polarity rating because it is computed from seven vectors with a low mean angular deviation.

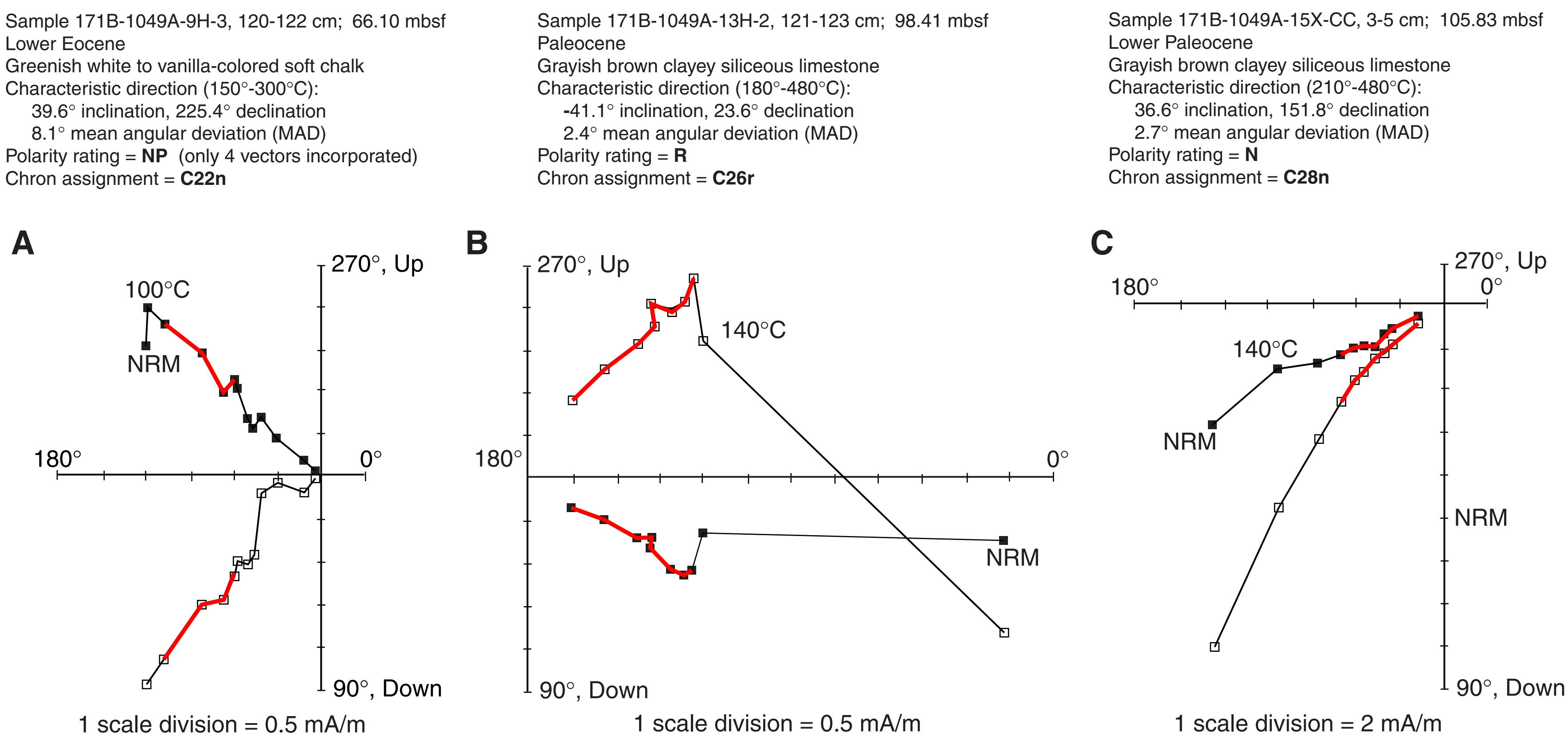


Figure F2. Late Cretaceous and Paleogene biochronology and the magnetic polarity time scale used as the reference standard for assigning magnetic polarity chrons to magnetostratigraphy of Leg 171 sites. The Paleogene portion is modified after Berggren et al. (1995), and the Late Cretaceous section is modified from Erba et al. (1995) and Shipboard Scientific Party (1998a). In the Polarity column, white bands = reversed-polarity chrons and black bands = normal-polarity chrons. (**Figure shown on next page.**)

Figure F2 (continued).

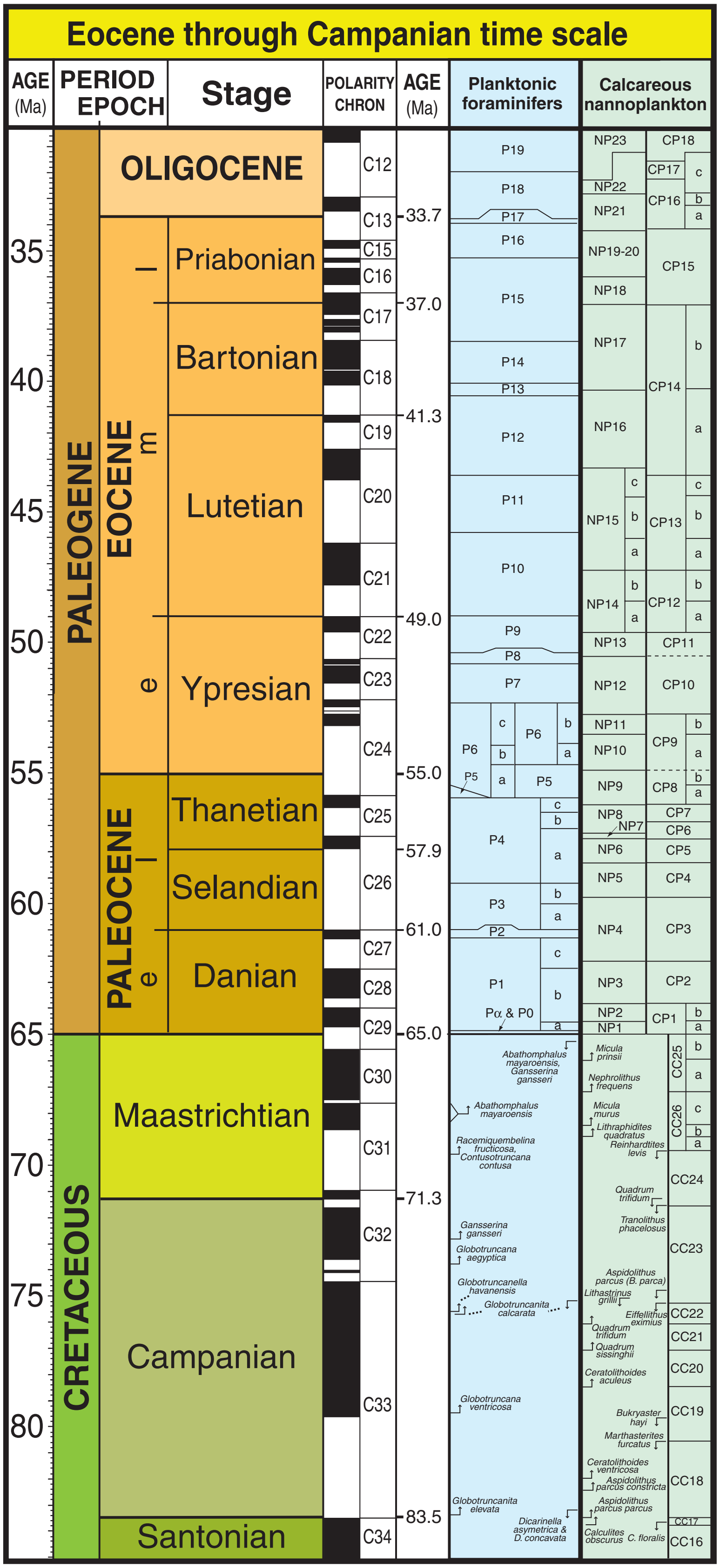


Figure F3. Magnetostratigraphy and polarity chron assignments for Site 1049. The generalized lithostratigraphy and biostratigraphy are from Shipboard Scientific Party (1998b), with Maastrichtian biostratigraphy and associated polarity assignments modified by J. Self-Train and B. Huber (pers. comm., 1998). The polarity rating system (see "Characteristic Directions, Polarity Rating, and Paleolatitudes," p. 4, in "Procedures and General Magnetic Properties") from left to right is R, RP, RPP (at left vertical dashed line), R??, INT, N??, NPP (at right vertical dashed line), NP, and N. Magnetic stratigraphy of a suite of minicores spanning the Maastrichtian–lower Paleocene interval at Hole 1049C is shown as open circles, but magnetic polarity chron assignments for the lower Maastrichtian and uppermost Campanian are for the Hole 1049A magnetostratigraphy (solid circles).

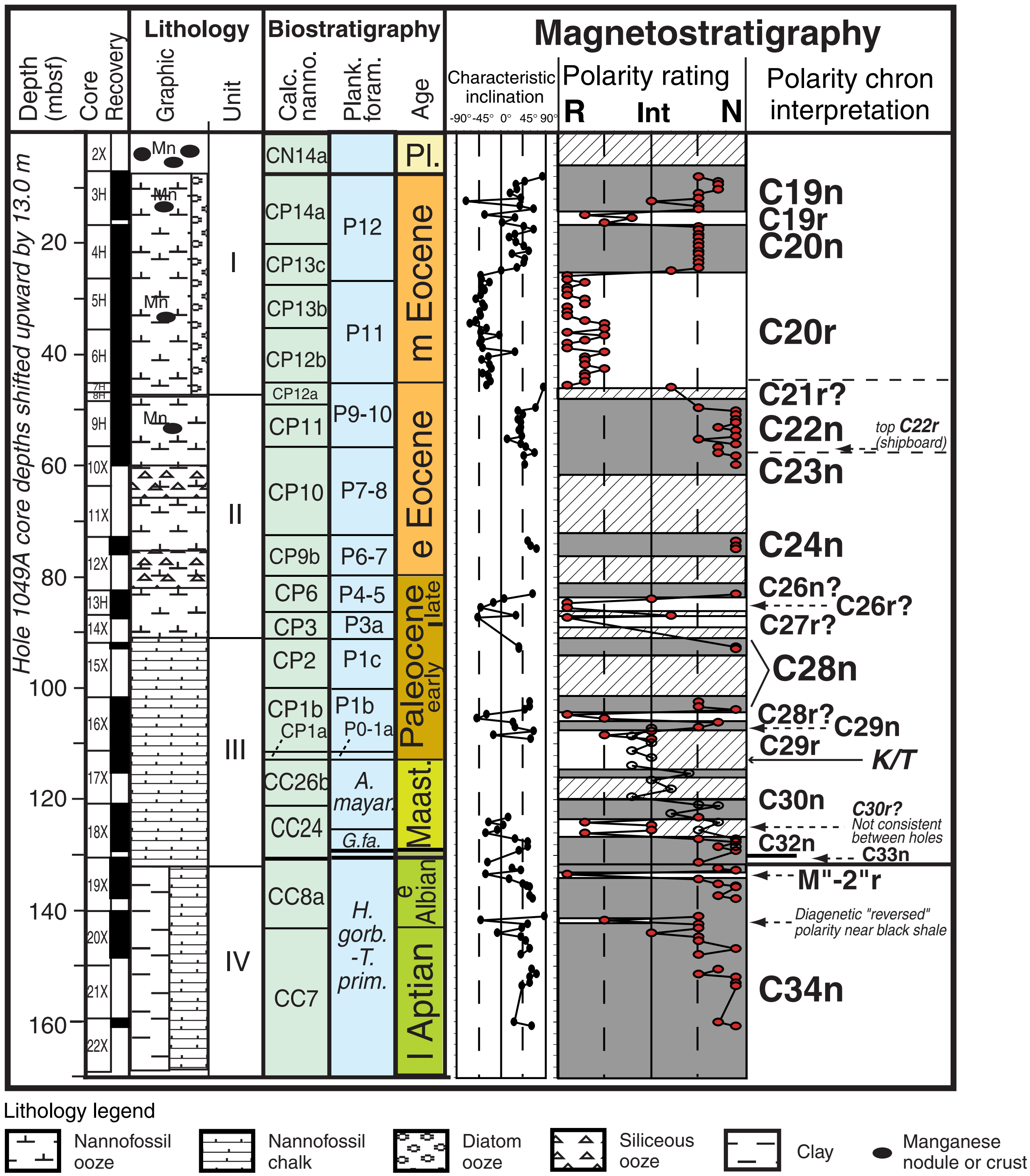


Figure F4. Magnetostratigraphy and polarity chron assignments for the composite succession of Site 1050 (composed from Holes 1050A and 1050C). The generalized lithostratigraphy and biostratigraphy are from Shipboard Scientific Party (1998c), with Campanian–Maastrichtian biostratigraphy and associated polarity assignments modified by J. Self-Train and B. Huber (pers. comm., 1998). The polarity rating system (see "Characteristic Directions, Polarity Rating, and Paleolatitudes," p. 4, in "Procedures and General Magnetic Properties") from left to right is R, RP, RPP (at left vertical dashed line), R??, INT, N??, NPP (at right vertical dashed line), NP, and N. (This figure is also available in an oversized format.)

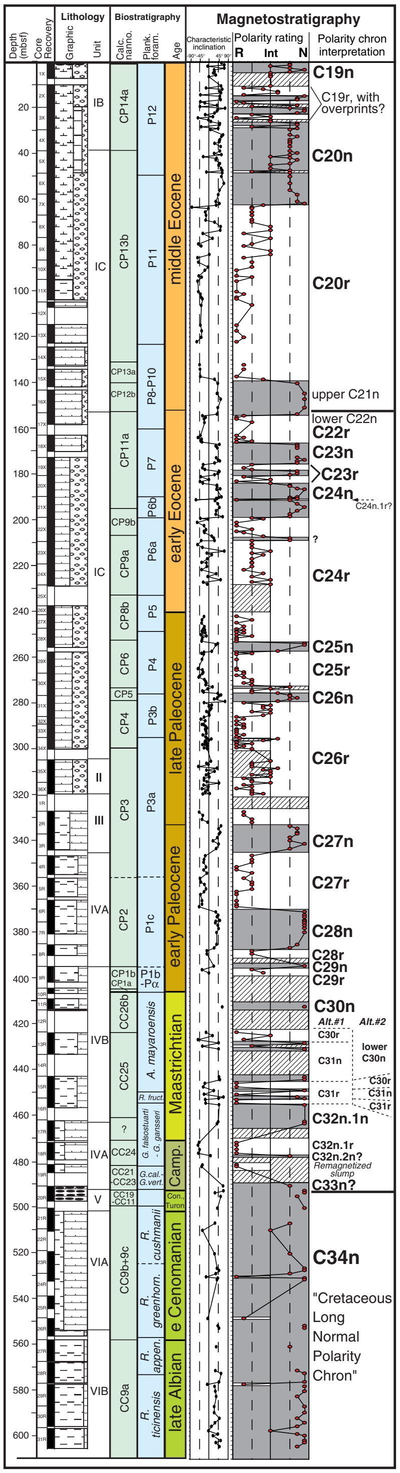


Figure F5. Magnetostratigraphy and polarity chron assignments for Hole 1051A. The generalized lithostratigraphy and biostratigraphy are from Shipboard Scientific Party (1998d). The polarity rating system (see **"Characteristic Directions, Polarity Rating, and Paleolatitudes,"** p. 4, in "Procedures and General Magnetic Properties") from left to right is R, RP, RPP (at left dashed line), R??, INT, N??, NPP (at right dashed line), NP, and N. (This figure is also available in an **oversized format.**)

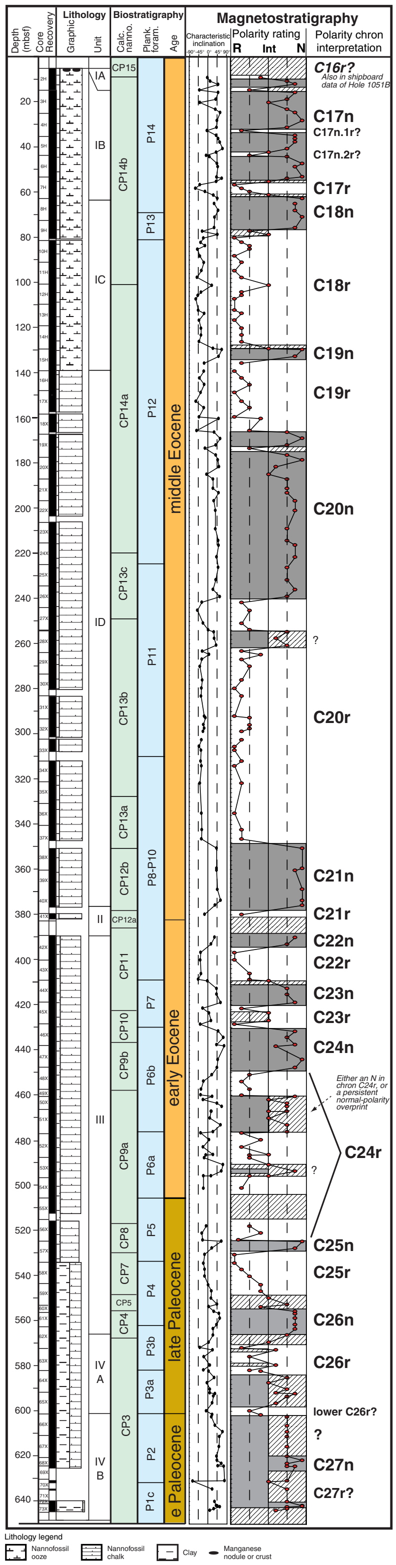


Figure F6. Magnetostratigraphy and polarity chron assignments for composite succession of Site 1052 (composed from Holes 1052A and 1052E). The generalized lithostratigraphy and biostratigraphy are from Shipboard Scientific Party (1998e) with Campanian–Maastrichtian biostratigraphy and associated polarity assignments modified by J. Self-Train and B. Huber (pers. comm., 1998). The polarity rating system (see "Characteristic Directions, Polarity Rating, and Paleolatitudes," p. 4, in "Procedures and General Magnetic Properties") from left to right is R, RP, RPP (at left vertical dashed line), R??, INT, N??, NPP (at right vertical dashed line), NP, and N. (This figure is also available in an oversized format.)

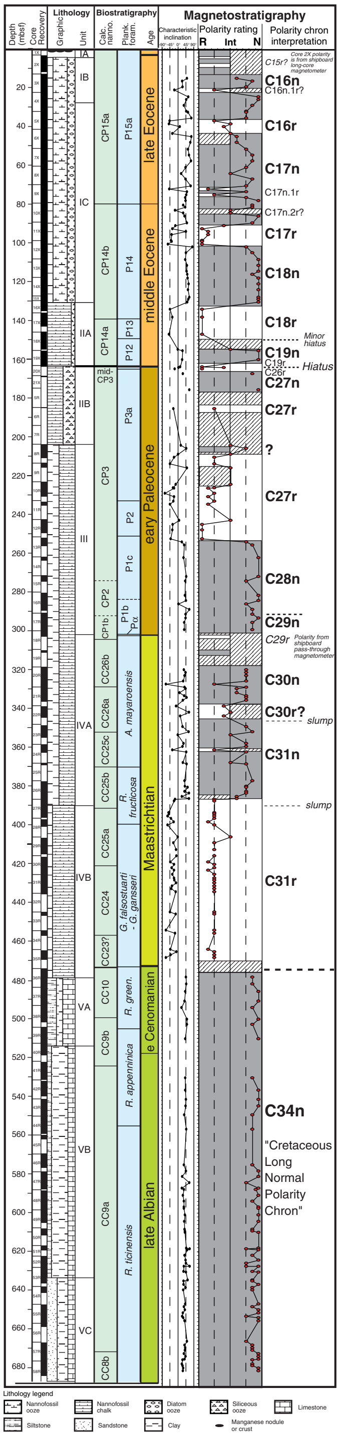
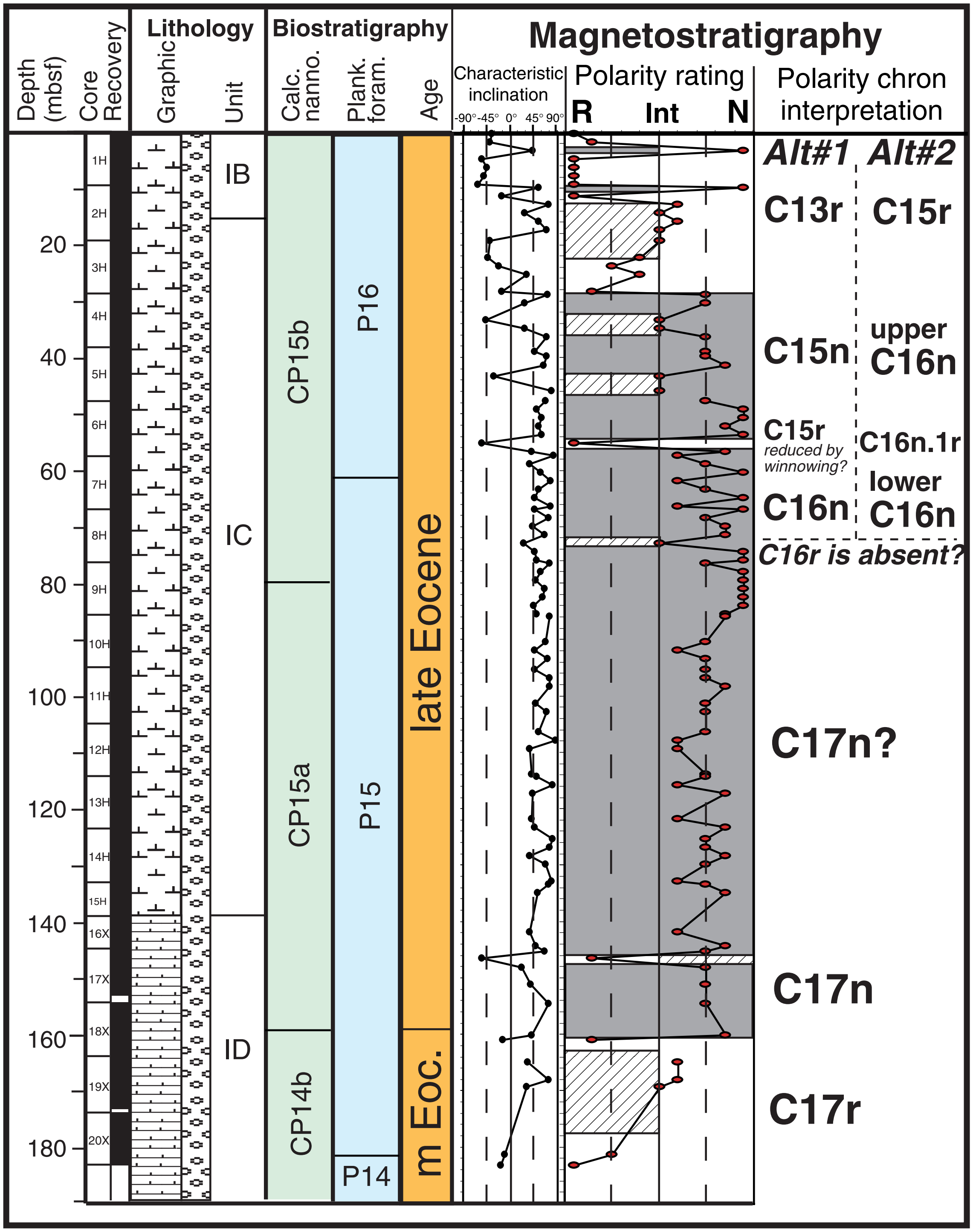


Figure F7. Magnetostratigraphy and polarity chron assignments for Hole 1053A. Generalized lithostratigraphy and biostratigraphy are from Shipboard Scientific Party (1998f). The polarity rating system (see **"Characteristic Directions, Polarity Rating, and Paleolatitudes,"** p. 4, in "Procedures and General Magnetic Properties") from left to right is R, RP, RPP (at left vertical dashed line), R??, INT, N??, NPP (at right vertical dashed line), NP, and N.



Lithology legend

Figure F8. Paleolatitude history of the Blake Nose margin from the late Aptian through the late Eocene. Bars on individual paleolatitude determinations (Table T6, p. 58) indicate the age span of the sample suite and 95% confidence on paleolatitude. The mean paleolatitude path of the North American plate at this location with standard deviation is indicated by the shaded band and the central solid line. There has been no apparent significant paleolatitude variation of these sites through the Late Cretaceous and Paleogene. The present latitude of these sites is ~30.1°N. The North American paleolatitude estimate is modified from a compilation by C. MacNiocaill, L. Bardot, and J. Ogg (unpubl. data).

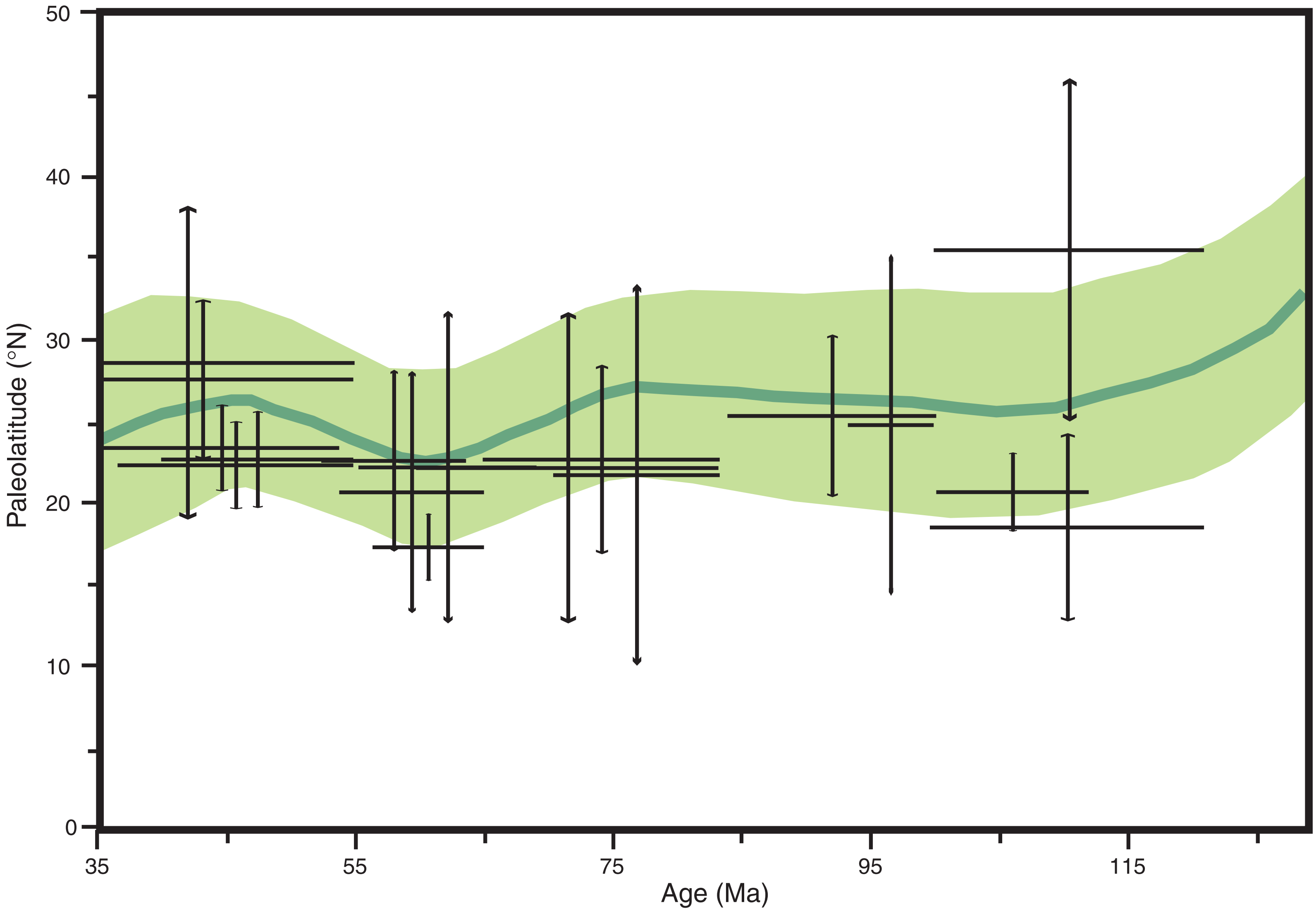


Figure F9. Correlation of magnetostratigraphy across the Blake Nose Transect. Selected magnetostratigraphic correlation horizons (colored lines) are near the stage boundaries of the Paleogene through Maastrichtian stages. Polarity Zone C22n (the boundary between the lower Eocene and middle Eocene) was used as a horizontal level to indicate relative thicknesses of strata, but this horizon currently becomes progressively deeper by ~1.5 km toward the seaward sites of this transect. (This figure is also available in an **oversized format.**)

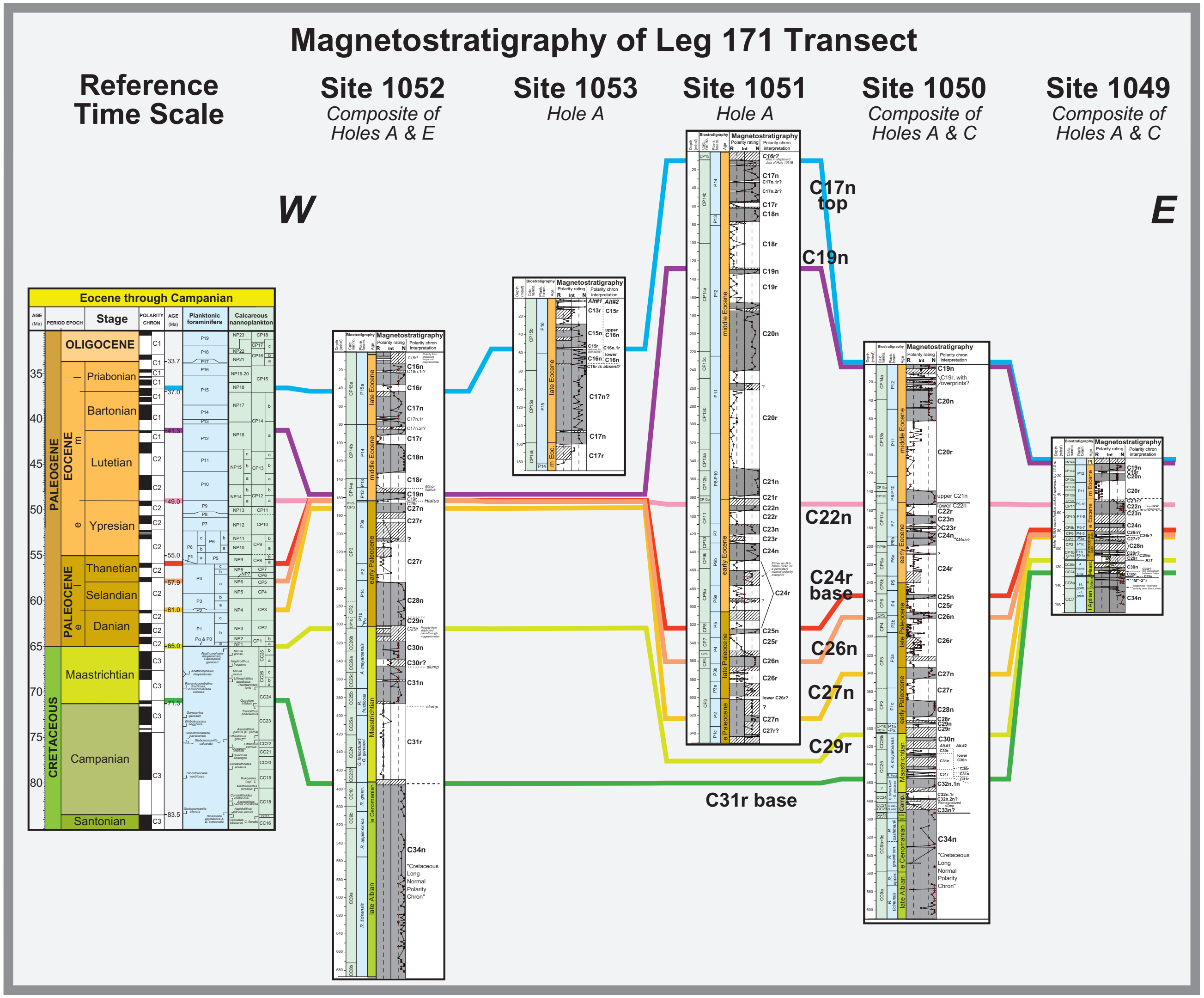


Table T1. Characteristic directions and polarity ratings and polarity chron assignments, Holes 1049A and 1049C. (See table notes. Continued on next three pages.)

Position, age, facies/Core, section, interval (cm)	Run name	Depth (mbsf)	Characteristic magnetization and polarity							Polarity chron assignment	Comments
			Interval (°C)	Characteristic direction			Polarity rating	Polarity column			
				Declination	Inclination	MAD		Schematic	Generalized		
middle Eocene											
Lemon yellow ooze-chalk											
171-1049A-											
3H-1, 30-32	31-30	20.90	200-420	271.3	84.4	12.0	NPP				
3H-1, 120-122	31-120	21.80	150-origin	292.0	48.1	16.9	NP				
3H-2, 30-32	32-30	22.40	200-300	312.3	30.4	10.4	NP				
3H-2, 120-122	32-120	23.30	200-origin	257.2	33.1	11.4	NP				
3H-3, 30-32	33-30	23.90	150-200	263.4	19.4	10.7	NPP			C19n	
3H-3, 120-122	33-120	24.80	200-200	264.8	40.3	3.5	NPP				
3H-4, 30-32	34-30	25.40	200-300	180.0	–70.7	7.2	INT				
3H-4, 120-122	34-120	26.30	200-250	240.6	38.8	9.0	NPP				
3H-5, 24-26	35-24	26.84	100-200	58.5	66.4	14.6	NPP				
3H-5, 120-122	35-120	27.80	250-300	67.8	–32.4	5.6	RP				
3H-6, 30-32	36-30	28.40	200-240	149.0	28.3	34.6	R??			C19r	
3H-6, 120-122	36-120	29.30	250-500	82.9	3.6	12.8	RPP				
3H-7, 30-32	37-30	29.90	200-250	299.9	46.9	32.8	NPP				
4H-1, 30-32	41-30	30.40	270-300	355.0	66.6	8.1	NPP				
4H-1, 120-122	41-120	31.30	150-300	72.0	29.1	34.7	NPP				
4H-2, 30-32	42-30	31.90	140-280	49.9	16.7	15.8	NPP				
4H-2, 120-122	42-120	32.80	150-200	72.2	30.6	35.6	NPP				During demagnetization, this NPP suite remains at a weak 10^{-2} mA/m intensity with no decay.
4H-3, 30-32	43-30	33.40	270-310	43.7	45.7	13.9	NPP				
4H-3, 120-122	43-120	34.30	150-origin	37.6	56.9	16.1	NPP			C20n	
4H-4, 30-32	44-30	34.90	150-450	23.6	22.5	46.4	NPP				
4H-4, 120-122	44-120	35.80	250-350	29.5	48.0	3.3	NPP				
4H-5, 30-32	45-30	36.40	270-310	358.5	47.0	6.0	NPP				
4H-5, 120-122	45-120	37.30	200-300	29.6	32.6	7.5	NPP				
4H-6, 30-32	46-30	37.90	140-420	56.0	0.3	14.7	N??				Sharp magnetic intensity drop coincides with polarity change. Underlying C20r has almost an order of magnitude stronger intensity than C20n.
4H-6, 120-122	46-120	38.80	160-370	207.0	–39.9	1.8	R				
4H-6, 120-122	46-120	38.80	200-origin	207.0	–39.9	1.8	R				
4H-7, 30-32	47-30	39.40	160-370	195.8	–38.7	4.3	R				
5H-1, 30-32	51-30	39.90	400-550	258.2	–22.1	1.6	RP				
5H-1, 120-122	51-120	40.80	200-450	244.2	–38.6	6.5	R				
5H-2, 30-32	52-30	41.40	160-370	213.7	–32.2	3.9	R				
5H-2, 120-122	52-120	42.30	200-450	231.3	–40.6	9.2	R				
5H-3, 30-32	53-30	42.90	370-420	241.0	–49.9	1.7	RP				
5H-3, 120-122	53-120	43.80	150-450	245.7	–36	7.1	RP				
Greenish to vanilla-colored ooze-chalk											
5H-4, 30-32	54-30	44.40	200-370	231.1	–32.2	3.0	R				
5H-4, 120-122	54-120	45.30	150-450	230.9	–42.7	7.5	R				
5H-5, 33-35	55-33	45.93	150-550	235.7	–41.3	5.1	R				
5H-5, 120-122	55-120	46.80	250-400	229.1	–49.8	9.9	RP			C20r	
5H-6, 30-32	56-30	47.40	160-310	188.6	–62.3	30.7	RPP				
5H-6, 120-122	56-120	48.30	200-300	228.9	–28.7	8.2	RPP				
5H-7, 30-32	57-030	48.90	140-420	241.0	–40.0	13.9	R				

Table T1 (continued).

Position, age, facies/Core, section, interval (cm)	Run name	Depth (mbsf)	Characteristic magnetization and polarity: Interval (°C)	Characteristic direction: Declination	Inclination	MAD	Polarity rating	Polarity column: Schematic	Generalized	Polarity chron assignment	Comments
6H-1, 30-32	61-30	49.40	160-240	268.9	–3.9	8.0	RPP				
6H-1, 120-122	61-120	50.30	300-origin	287.9	–38.1	16.2	RP				
6H-2, 30-32	62-30	50.90	150-origin	296.6	–42.4	4.8	R				
6H-2, 120-122	62-120	51.80	200-350	296.0	–36.2	9.6	R				
6H-3, 30-32	63-030	52.40	160-310	311.6	27.9	47.7	RPP				
6H-3, 120-122	63-120	53.30	250-400	307.2	–25.3	14.8	RP				
6H-4, 30-32	64-30	53.90	200-320	265.3	–39.5	7.9	RP				
6H-4, 120-122	64-120	54.80	250-origin	304.6	–23	16.4	RP				
6H-5, 30-32	65-30	55.40	160-310	286.9	–19.8	36.3	RPP				
6H-5, 120-122	65-120	56.30	150-400	294.1	–37.3	12.5	RP				
6H-6, 30-32	66-36	56.90	150-400	292.2	–24.3	11.2	RP				
6H-6, 120-122	66-120	57.80	200-400	318.4	–20.4	6.7	RP			C21r?	Below hiatus
6H-7, 30-32	67-30	58.40	160-370	278.8	–29.4	9.4	R				
early Eocene											
7H-1, 30-32	71-30	58.90	140-420	301.3	86.2	7.0	N??				
9H-1, 56-58	91-56	62.46	200-370	14.0	71.1	8.9	NPP				
9H-1, 120-122	91-120	63.10	300-origin	224.9	35.6	3.2	N				
9H-2, 30-32	92-30	63.70	140-420	230.7	44.3	3.9	N				
9H-2, 120-122	92-120	64.60	200-550	237.5	33.9	3.4	N				
9H-3, 35-37	93-35	65.25	160-370	228.5	40.2	3.2	N			C22n	
9H-3, 120-122	93-120	66.10	150-300	225.4	39.6	8.1	NP				
9H-4, 23-25	94-23	66.63	200-420	234.9	37.0	3.6	N				
9H-4, 120-122	94-120	67.60	300-550	222.7	42.4	8.6	N				
9H-5, 30-32	95-30	68.20	160-370	312.4	13.5	6.2	NPP				Biostratigraphy indicates a hiatus between C22n and C23n.
9H-5, 120-122	95-120	69.10	150-450	334.9	40.3	5.6	N				Polarity Zone C22r (assigned to lowest Core 171B-1049A-9H in shipboard cryogenic analyses) was not observed in discrete sample suite.
Light tan chalk; some chert layers											
10X-1, 25-27	10125	69.65	370-420	134.2	50.4	4.9	NP			C23n	
10X-1, 120-122	101-120	70.60	200-origin	126.0	68.0	2.6	NP				
10X-2, 27-29	102-27	71.17	200-370	325.9	45.9	3.8	N				
10X-3, 29-32	103-29	72.69	200-370	307.2	49.2	4.0	N				
13-m gap in recovery											
Light greenish brown											
12X-1, 30-32	121-30	86.40	160-370	287.4	55.2	3.4	N				
12X-1, 120-122	121-120	87.30	350-550	196.6	59.9	4.0	N			C24n	
12X-2, 30-32	122-30	87.90	140-420	279.1	72.8	5.8	N				
8-m gap in recovery											
Paleocene											
Grayish brown clayey siliceous limestone											
13H-1, 30-32	131-30	96.00	160-370	274.8	63.3	2.0	N			C26n?	
13H-1, 120-123	131-120	96.90	200-450	29.1	7.0	6.9	INT				Upward transition R→N.
13H-2, 30-32	132-30	97.50	240-420	43.0	–14.6	2.9	R			C26r?	
13H-2, 121-123	132-121	98.41	180-480	23.6	–41.1	2.4	R				
13H-3, 119-122	133-119	99.89	210-480	338.4	30.7	1.9	N??			C27n?	
14X-CC, 4-7	149-4	100.14	160-370	233.4	–45.6	1.1	R			C27r?	Chron assignment based on biostratigraphy.
15X-1, 23-25	151-23	105.53	180-420	201.0	37.0	2.8	N				

Table T1 (continued).

Position, age, facies/Core, section, interval (cm)	Run name	Depth (mbsf)	Characteristic magnetization and polarity: Interval (°C)	Characteristic direction: Declination	Characteristic direction: Inclination	Characteristic direction: MAD	Polarity rating	Polarity column: Schematic	Polarity column: Generalized	Polarity chron assignment	Comments
15X-CC, 3-5	159-3	105.83	210-480	151.8	36.6	2.7	N			C28n	
Gray marl to cream chalk											
16X-1, 30-32	161-30	115.30	160-310	27.6	58.0	23.9	NPP				
16X-1, 118-120	161-118	116.18	200-310	143.4	58.0	23.9	NPP				
16X-2, 30-32	162-30	116.80	240-420	214.4	48.0	6.0	N				
16X-2, 120-122	162-120	117.70	180-270	267.6	–28.9	4.6	R			C28r?	
16X-3, 30-32	163-30	118.30	200-310	244.2	–48.5	18.6	RPP				
16X-3, 114-116	163-114	119.14	180-300	224.2	24.6	1.4	NP			C29n	
16X-4, 38-40	164-38	119.88	140-200	134.2	28.3	19.8	NPP				
16X-4, 109-111	164-109	120.59	140-300	175.6	65.7	37.6	INT				
16X-5, 28-30	165-28	121.28	200-270	138.8	–14.4	15.4	RPP			C29r	
16X-5, 113-115	165-113	122.13	000-100	178.3	61.1	6.1	INT				
14-m gap in sampling											
Maastrichtian											
White chalk											
18X-2, 30-32	182-30	136.10	180-origin	245.5	13.9	12.3	NPP			C30n	If N, then polarity chron is assigned as C30n.
18X-2, 120-122	182-120	137.00	210-origin	158.9	–23.9	13.5	RP			C30r?	
18X-3, 22-24	183-30	137.52	200-origin	160.6	5.6	20.3	INT				
18X-3, 120-122	183-120	138.50	180-270	64.1	–6.0	33.3	INT				
18X-4, 26-28	184-22	139.06	180-origin	164.5	–31.3	6.6	RP				
18X-4, 120-122	184-120	140.00	210-origin	189.2	27.7	9.7	NPP				Maastrichtian polarity chron assignments are difficult because of condensation.
18X-5, 31-33	185-31	140.61	240-origin	351.2	53.7	6.4	N			C32n	
18X-5, 120-122	185-120	141.50	180-300	128.9	54.8	11.4	NP				
late Campanian											Foraminifer biostratigraphy indicates hiatus in lowest Core 171B-1049A-18X.
18X-6, 31-33	186-31	142.11	220-origin	3.6	36.2	3.8	N			C33n	
19X-1, 38-40	191-38	144.28	200-200	281.8	–25.8	2.9	NPP				
early Albian											
Red-white cycles											
19X-1, 140-142	191-140	145.30	240-origin	186.8	22.6	5.9	NP			C34n	
19X-2, 31-33	192-31	145.71	180-origin	64.3	39.8	4.0	N				
19X-2, 103-105	192-103	146.43	180-origin	277.8	–30.3	4.8	R			M-2	
19X-3, 30-32	193-30	147.20	270-330	265.1	16.1	42.9	NPP				
19X-3, 123-125	193-123	148.13	140-300	260.4	44.5	9.8	NP			C34n	
19X-4, 121-123	194-12	148.52	180-origin	231.2	51.5	3.2	N				
19X-4, 31-33	194-31	148.71	180-origin	194.5	58.8	4.5	N				
19X-5, 33-35	195-33	150.23	300-origin	226.3	58.0	2.5	NP				
19X-CC, 26-28	199-26	150.84	180-origin	180.7	64.3	3.5	N				
20X-1, 49-51	201-49	153.99	240-origin	222.6	87.6	7.5	NPP				
20X-1, 121-123	201-121	154.71	210-origin	40.3	–41.3	13.9	RPP				Diagenetic artifact above black shale.
late Aptian (below organic-rich shale)											
20X-2, 30-32	202-30	155.30	220-260	120.8	53.7	1.6	NPP				
20X-2, 114-116	202-114	156.14	210-400	50.6	42.7	26.3	NPP				
20X-3, 44-46	203-44	156.94	200-origin	218.9	–6	18.3	INT				

Table T1 (continued).

Position, age, facies/Core, section, interval (cm)	Run name	Depth (mbsf)	Characteristic magnetization and polarity: Interval (°C)	Characteristic direction: Declination	Characteristic direction: Inclination	Characteristic direction: MAD	Polarity rating	Polarity column: Schematic	Polarity column: Generalized	Polarity chron assignment	Comments
20X-3, 120-122	203-20	157.70	100-400	303.1	40.4	31.8	NPP				
20X-4, 40-42	204-40	158.40	180-origin	300.8	50.9	15.5	NPP				
20X-5, 30-32	205-30	159.80	200-origin	30.1	59.1	4.7	N			C34n	
20X-6, 27-29	206-27	160.77	140-350	319.4	39.9	4.8	NPP				
Red-white cycles											
21X-1, 30-32	211-30	163.40	260-origin	101.3	62.8	11.1	NP				
21X-1, 119-121	211-119	164.29	150-400	134.6	72.5	5.0	NPP				
21X-2, 19-21	212-19	164.79	200-origin	191.1	57.5	3.0	N				
21X-2, 129-131	212-129	165.89	180-origin	256.6	57.4	3.2	N				
21X-3, 35-37	213-35	166.45	180-origin	263.2	42.1	5.6	N				
22X-1, 30-32	221-30	173.00	200-330	221.8	26.6	11.8	NP				
22X-2, 30-32	222-30	173.75	180-origin	178.7	61.7	6.8	N				
early Paleocene											
K/T boundary interval											
171B-1049C-											
8X-1, 97		107.07					INT				
8X-2, 87		108.47					R??				
8X-3, 66		109.76					INT				
8X-4, 56		111.16					R??			C29r	
8X-5, 22		112.32					INT				
late Maastrichtian		113.00									K/T = interval 171B-1049C-8X-5, 90cm.
White chalk										C29r	
8X-6, 28		113.88					R??				
8X-7, 14		115.24					NPP				
9X-1, 75		116.45					INT				
9X-2, 75		117.95					N??				
9X-3, 75		119.45					R??				← R?? apparent polarity is considered anomalous.
9X-4, 65		120.85					NPP				
10X-1, 75		120.95					NP			C30n	
10X-2, 75		122.45					N??				Maastrichtian polarity chron assignments are difficult because of condensation.
10X-3, 75		123.95					NP				
10X-4, 75		125.45					NPP				
10X-5, 75		126.95					N			C32n	
10X-6, 75		128.45					N				

Notes: Sediment facies are generalized color-texture descriptions from shipboard observations, and the lithologic units for each hole are displayed on the associated magnetostratigraphic figure. Interval (°C) indicates the demagnetization range that was used to compute the characteristic direction and polarity of magnetization for each sample. Declination and inclination are in degrees. MAD (mean angular dispersion) values indicate the precision of the three-dimensional line fit of these paleomagnetic vectors to obtain the characteristic direction. The polarity rating system (R, RP, RPP, R??, INT, N??, NPP, NP, N) is explained in the text. Two polarity columns are shown with the shades of gray or hatchure fill in the schematic column reflecting the polarity rating of individual samples and the generalized column indicating the main polarity intervals. Polarity chron assignments are based on the polarity pattern and biostratigraphic constraints in correlating to the reference magnetic polarity time scale.

Table T2. Characteristic directions and polarity ratings and polarity chron assignments, Holes 1050A and 1050C. (See table notes. Continued on next nine pages.)

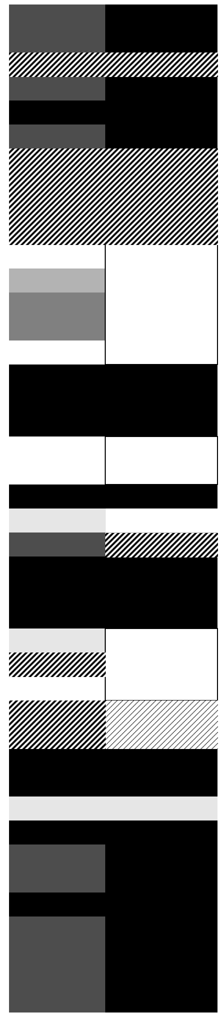
Position, age, facies/Core, section, interval (cm)	Run name	Depth (mbsf)	Characteristic magnetization and polarity: Interval (°C)	Characteristic direction: Declination	Characteristic direction: Inclination	Characteristic direction: MAD	Polarity rating	Polarity column: Schematic	Polarity column: Generalized	Polarity chron assignment	Comments
middle Eocene											
Yellowish white ooze-chalk											
171B-1050A-											
1X-1, 30-32	011-030	0.30	210-330	201.5	60.3	20.2	NPP				
1X-1, 120-122	011-120	1.20	140-330	143.4	72.4	21.6	NPP			C19n	
1X-2, 30-32	012-030	1.80	270-350	172.2	–5.4	15.0	INT				
1X-2, 120-122	012-120	2.70	180-330	280.1	73.0	16.0	NPP				
1X-3, 30-32	013-030	3.30	180-330	64.3	24.7	5.3	N				
1X-3, 120-122	013-120	4.20	255-330	87.0	26.9	15.9	NPP				
1X-4, 30-32	014-030	4.80	210-300	2.5	21.7	3.8	INT				
1X-4, 120-122	014-120	5.70	140-240	101.5	31.7	33.5	INT				
1X-5, 30-32	015-030	6.30	180-270	183.7	0.9	10.0	INT				
2H-1, 30-32	021-030	10.40	180-240	155.9	56.6	28.5	INT				
2H-1, 120-122	021-120	11.30	140-300	64.8	–12.7	16.3	RP				
2H-2, 30-32	022-030	11.90	180-210	23.8	62.3	14.3	R??				
2H-2, 120-122	022-120	12.80	140-300	203.8	52.4	19.1	N??			C19r	
2H-3, 30-32	023-030	13.40	210-270	234.9	57.9	11.1	N??				
2H-3, 120-122	023-120	14.30	300-450	48.8	–39.7	16.7	RP				
2H-4, 30-32	024-030	14.90	180-330	241.2	51.9	7.6	N				
2H-4, 120-122	024-120	15.80	140-270	250.5	51.0	14.6	NP			Overprinted?	
2H-5, 30-32	025-030	16.40	300-400	230.8	55.4	5.9	NP				
2H-5, 120-122	025-120	17.30	140-300	64.5	–40.4	10.1	R				Polarity Zone C19r is poorly resolved.
2H-6, 30-32	026-030	17.90	140-330	43.6	–18.9	25.7	RP				
2H-6, 120-122	026-120	18.80	140-300	216.3	37.5	10.2	NP				
2H-7, 30-32	027-030	19.40	270-400	47.3	–41.4	15.1	RPP				
3H-1, 45-47	031-045	20.05	140-330	101.4	77.4	16.7	NPP				
3H-1, 104-106	031-104	20.64	150-450	272.2	42.0	5.0	N				
3H-2, 30-32	032-030	21.40	270-400	74.3	39.1	11.1	N			Overprinted?	
3H-2, 120-122	032-120	22.30	180-255	186.2	26.0	14.4	NP				
3H-3, 30-32	033-030	22.90	140-330	226.1	–17.4	33.8	RPP				
3H-3, 120-122	033-120	23.80	180-255	193.4	19.3	14.1	INT			C19r	
3H-4, 30-32	034-030	24.40	300-480	238.6	–52.1	8.6	R				
3H-4, 120-122	034-120	25.30	140-255	54.0	–1.6	27.7	INT				
3H-5, 30-32	035-030	25.90	180-270	54.8	10.4	15.5	INT				
3H-5, 120-122	035-120	26.80	140-300	78.4	51.7	18.2	NP			C20n	
3H-6, 30-32	036-030	27.40	270-480	39.8	50.4	12.4	NP				
3H-6, 120-122	036-120	28.30	140-255	61.5	–36.7	21.6	RPP				
3H-7, 30-32	037-030	28.90	180-270	37.3	44.9	11.3	NP				
4H-1, 30-32	041-030	29.40	180-240	174.2	7.0	22.7	NPP				
4H-2, 120-122	042-120	31.80	020-150	160.8	66.3	8.6	NPP				
4H-3, 30-32	043-030	32.40	210-400	212.1	59.1	18.1	NP				
4H-4, 30-32	044-030	33.90	180-330	227.6	51.3	20.8	NPP				No "N"-rated sample behavior in this interval.
4H-4, 120-122	044-120	34.80	100-350	240.0	50.4	11.4	NPP				
4H-5, 30-32	045-030	35.40	180-270	190.3	27.0	29.4	NPP				
4H-6, 30-32	046-030	36.90	180-240	198.4	55.9	27.3	NPP				

Table T2 (continued).

Position, age, facies/Core, section, interval (cm)	Run name	Depth (mbsf)	Characteristic magnetization and polarity: Interval (°C)	Characteristic direction: Declination	Characteristic direction: Inclination	Characteristic direction: MAD	Polarity rating	Polarity column: Schematic	Polarity column: Generalized	Polarity chron assignment	Comments
Greenish white ooze-chalk											
5H-1, 30-32	051-030	38.90	210-300	277.7	52.4	23.5	NPP				
5H-1, 120-122	051-120	39.80	140-330	116.4	25.7	20.5	NP				
5H-2, 30-32	052-030	40.40	180-270	150.4	59.8	38.2	NPP				
5H-2, 118-120	052-118	41.28	100-300	50.3	–25.9	37.6	INT			C20n	
5H-3, 31-33	053-031	41.91	210-300	113.8	37.1	37.7	NPP				
5H-3, 118-120	053-118	42.78	150-350	72.6	32.6	8.2	NP				
5H-4, 120-122	054-120	44.30	180-270	147.4	50.9	23.1	NPP				
5H-5, 31-33	055-031	44.91	180-300	276.4	46.1	33.5	INT				
5H-6, 31-33	056-031	46.41	180-210	120.3	57.2	28.3	INT				
5H-6, 120-122	056-120	47.30	140-240	297.4	63.2	13.8	NPP				
5H-7, 31-33	057-031	47.91	180-400	156.9	–10.9	15.7	RPP				
6H-1, 30-32	061-030	48.40	180-240	318.1	62.9	15.9	NPP				
6H-2, 30-32	062-030	49.90	240-300	325.2	58.9	22.9	NPP				
6H-4, 30-32	064-030	52.90	140-210	182.0	70.4	19.9	NPP				
6H-6, 30-32	066-030	55.90	180-270	313.8	49.9	22.7	NPP				
7H-1, 30-32	071-030	57.90	210-270	343.5	43.8	15.7	NP				
7H-3, 30-32	073-030	60.90	210-300	347.0	31.7	12.4	NP				
7H-3, 120-122	073-120	61.80	180-270	332.6	50.6	5.5	N				
7H-4, 30-32	074-030	62.40	140-180	146.2	34.4	17.1	R??				
7H-4, 120-122	074-120	63.30	140-300	251.2	–81.0	17.7	RPP				
7H-5, 30-32	075-030	63.90	180-300	179.8	–1.5	8.7	RPP				
7H-6, 30-32	076-030	65.40	180-210	163.6	–17.9	6.9	RPP				
7H-7, 31-33	077-031	66.91	140-210	184.0	–12.9	14.6	RPP				
8H-2, 31-33	082-031	68.91	180-240	179.9	–15.7	18.8	RPP				
8H-2, 121-123	082-121	69.81	100-150	221.7	27.6	15.5	RPP				
8H-4, 30-32	084-030	71.90	240-270	38.9	55.2	24.9	INT				
8H-5, 30-32	085-030	73.40	180-210	177.3	54.0	41.1	INT				
8H-6, 30-32	086-030	74.90	240-300	186.5	–29.2	12.9	RP				
9H-1, 42-44	091-042	77.02	180-210	343.8	16.6	17.0	INT				
9H-3, 30-32	093-030	79.47	140-180	51.5	–48.9	22.8	RPP				
9H-3, 120-122	093-120	80.37	200-400	1.8	–36.1	19.8	RP				
9H-5, 28-30	095-028	82.45	000-000				INT				
9H-6, 28-30	096-028	83.95	180-240	343.4	2.8	14.8	INT				
9H-7, 28-30	097-028	85.45	240-400	335.4	–52.8	14.7	RP				
White chalk											
10H-1, 121-123	101-121	87.31	140-180	184.4	–49.0	26.9	RPP				
10H-3, 30-32	103-030	89.40	180-240	190.9	–3.9	7.4	RPP			C20r	
10H-4, 33-35	104-033	90.93	180-240	227.2	–18.3	18.5	R				
10H-5, 122-124	105-122	93.32	250-400	219.6	–48.2	9.7	R				
10H-6, 30-32	106-030	93.90	350-480	217.5	–34.1	13.0	RPP				
11X-1, 10-11,	111-010	95.70	180-300	63.5	–52.7	2.7	R				
11X-4, 7-9	114-007	100.17	150-290	37.3	–49.8	6.0	R				
11X-4, 124-126	114-124	101.34	140-240	312.9	–40.9	15.6	RP				
11X-5, 115-117	115-115	102.75	140-240	98.4	–37.1	6.3	R				
11X-6, 32-34	116-023	103.42	140-210	252.1	–30.2	7.0	R				
12X-1, 95-97	121-095	106.15	140-240	38.5	–35.4	38.6	RPP				

Table T2 (continued).

Position, age, facies/Core, section, interval (cm)	Run name	Depth (mbsf)	Characteristic magnetization and polarity: Interval (°C)	Characteristic direction: Declination	Characteristic direction: Inclination	Characteristic direction: MAD	Polarity rating	Polarity column: Schematic	Polarity column: Generalized	Polarity chron assignment	Comments
13X-1, 10-12	131-010	114.90	210-300	300.9	–40.4	6.6	R				
13X-2, 100-102	132-100	117.30	150-290	27.2	–35.3	3.7	R				
13X-4, 82-84	134-082	120.12	180-240	11.1	–36.6	6.7	RP				
13X-5, 138-140	135-138	122.18	180-270	199.2	–57.6	11.7	R				
10-m gap in sampling											
Light-gray chalk											
14X-6, 30-32	146-030	132.20	250-320	277.6	–43.6	12.0	RP				
15X-1, 9-11	151-009	134.09	140-240	6.9	–42.8	8.5	RP				
15X-3, 27-29	153-027	137.27	140-300	149.7	–39.5	3.7	R				
15X-4, 8-10	154-008	138.58	140-180	316.9	26.9	18.6	R??				
15X-5, 28-30	155-028	140.28	230-320	49.9	41.5	13.0	NP				
16X-1, 114-116	161-114	144.74	140-300	237.5	38.7	1.6	N				
16X-3, 52-54	163-052	147.12	150-320	244.8	55.0	1.9	N				
16X-5, 129-132	165-129	150.89	140-300	255.0	41.3	4.8	N			upper C21n	Hiatus assigned from calcareous nannofossil biostratigraphy.
early Eocene											
17X-1, 51-54	171-051	153.71	270-300	41.6	38.0	3.0	NP			lower C22n	
17X-1, 123-126	171-123	154.43	210-240	241.0	–30.7	3.5	RP				
17X-2, 46-49	172-046	155.16	230-290	36.9	–15.7	4.3	R				
17X-2, 118-121	172-118	155.88	210-330	153.4	–23.7	4.9	R				
17X-3, 113-116	173-113	157.33	180-300	137.8	–20.6	19.6	RPP				
18X-1, 27-29	181-027	163.07	210-300	268.9	–40.1	10.3	R			C22r	
18X-1, 115-117	181-115	163.95	270-300	51.3	–52.5	9.6	RP				
18X-2, 32-34	182-032	164.62	150-320	254.5	–34.1	2.3	R				
18X-2, 123-125	182-123	165.53	270-300	211.0	–38.5	37.9	RPP				
18X-3, 15-17	183-015	165.95	180-300	56.5	–33	4.2	R				
18X-3, 121-123	183-121	167.01	140-330	163.9	50.2	6.4	NP				
18X-4, 38-40	184-038	167.68	140-180	248.2	32.6	0.9	NP				
18X-4, 126-128	184-126	168.56	140-240	123.0	40.8	10.2	NP				
Light-green chalk-limestone											
19X-1, 29-31	191-029	172.69	150-260	273.9	34.3	8.5	NP			C23n	
19X-1, 134-136	191-134	173.74	140-270	133.3	44.2	7.9	N				
19X-2, 23-25	192-023	174.13	140-240	228.5	52.4	6.2	NP				
19X-2, 118-120	192-118	175.08	140-300	133.5	26.1	6.7	NP				
19X-3, 41-43	193-041	175.81	210-250	100.1	–26.5	7.9	RPP				
19X-4, 31-33	194-031	177.21	140-270	348.0	–30.7	11.0	RP			C23r	
19X-4, 98-100	194-098	177.88	140-300	343.7	–20.0	32.2	RPP				
19X-5, 27-29	195-027	178.67	210-270	8.1	50.5	11.7	NP				
19X-5, 127-129	195-127	179.67	180-240	311.6	42.4	0.9	NP			?	Normal polarity zone is probably either a pervasive overprint or a subchron within C23r.
19X-6, 27-29	196-027	180.17	150-230	267.3	26.1	8.1	NPP				
19X-6, 118-120	196-118	181.08	270-330	199.2	–37.4	18.0	RP				
20X-1, 34-36	201-034	182.34	140-300	40.4	–0.3	35.4	INT				
20X-1, 109-111	201-109	183.09	180-255	196.3	–41.5	6.6	R			C23r	
20X-2, 33-35	202-033	183.83	250-290	95.7	–28.0	11.0	RPP				
20X-2, 124-126	202-124	184.74	180-210	43.2	37.6	21.0	NPP				
20X-3, 24-26	203-024	185.24	180-210	257.0	37.6	10.9	NPP				

Table T2 (continued).

Position, age, facies/Core, section, interval (cm)	Run name	Depth (mbsf)	Characteristic magnetization and polarity: Interval (°C)	Characteristic direction: Declination	Characteristic direction: Inclination	Characteristic direction: MAD	Polarity rating	Polarity column: Schematic	Polarity column: Generalized	Polarity chron assignment	Comments
20X-3, 128-130	203-128	186.28	140-300	21.1	53.9	14.0	NP				
20X-4, 7-9	204-007	186.57	140-270	206.9	37.2	5.4	N			C24n	
21X-1, 33-35	211-033	189.93	210-290	245.2	58.4	6.8	NP				
20X-6, 54-56	206-054	190.04	190-260	354.2	47.4	15.7	NPP				
20X-6, 115-117	206-115	190.65	140-255	132.7	37.4	10.4	NP				
20X-7, 10-12	207-010	191.10	180-270	286.0	–60.5	4.8	R			C24n.1r?	
21X-1, 105-107	211-105	190.65	180-240	306.2	34.4	9.0	NPP				
21X-2, 27-29	212-027	191.37	180-240	304.7	28.5	23.3	NPP				
21X-3, 33-35	213-033	192.93	140-270	193.6	42.4	10.0	NP				
21X-4, 30-32	214-030	194.40	150-320	9.0	49.4	6.2	N			C24n	
21X-5, 28-31	215-028	195.88	140-270	127.1	34.0	13.6	NP				
21X-6, 28-31	216-028	197.38	150-290	157.1	32.4	38.8	NPP				
21X-6, 137-139	216-137	198.47	180-210	8.1	64.9	30.0	NPP				
21X-CC, 9-11	219-009	199.15	180-270	151.0	–40.0	28.9	RPP				
22X-1, 32-34	221-032	199.52	180-270	27.9	–3.0	14.6	R??				
22X-2, 29-31	222-029	200.99	190-290	165.2	–56.2	5.0	R				
22X-3, 23-25	223-023	202.43	180-270	157.0	–22.2	7.2	R				
22X-4, 40-42	224-040	204.10	250-320	54.6	–12.5	24.5	RPP			C24r	
22X-4, 124-126	224-124	204.94	300-500	157.2	–22.1	20.1	R				
22X-5, 28-30	225-028	205.48	140-300	310.2	–20.9	31.7	RP				
22X-6, 33-35	226-033	207.03	180-300	307.4	13.7	36.9	R??				
22X-6, 124-126	226-124	207.94	180-330	13.9	23.4	10.0	NPP			Brief N subchron in C24r?	
22X-CC, 20-22	229-020	208.88	150-260	303.5	26.9	19.1	NPP				
23X-1, 18-20	231-018	208.98	210-270	236.8	–36.2	30.3	RPP				
23X-2, 33-36	232-033	210.63	250-290	126.2	–53.7	31.1	RPP				
23X-3, 19-21	233-019	211.99	180-270	176.8	–30.1	28.3	RPP				
23X-4, 25-27	234-025	213.55	180-210	310.5	72.4	12.2	INT				
23X-4, 115-117	234-115	214.45	140-240	137.6	–8.8	10.5	RPP				
23X-5, 28-30	235-028	215.08	150-190	99.3	14.2	12.0	R??				
23X-6, 60-62	236-060	216.90	270-300	54.0	–7.8	42.8	RPP			C24r	
23X-CC, 26-28	239-026	218.53	150-210	118.2	–34.2	23.7	RPP				
24X-1, 27-29	241-027	218.67	180-210	146.9	–10.9	6.9	RPP				
24X-2, 29-31	242-029	220.19	180-240	54.3	–10.4	13.6	RPP				
24X-3, 27-29	243-027	221.67	190-260	348.1	–34.5	15.8	RP				
24X-4, 44-46	244-044	223.34	140-210	240.3	34.8	22.4	R??				
24X-5, 25-27	245-025	224.65	210-250	106.6	–5.2	6.7	RPP				
24X-6, 13-15	246-013	226.03	180-210	92.8	56.1	14.8	INT				
24X-6, 112-114	246-112	227.02	240-255	288.3	–26.5	39.0	RPP				
24X-CC, 11-13	249-011	227.96	140-180	58.2	–7.8	7.3	INT				
13-m gap in recovery and sampling											
late Paleocene											
27X-1, 34-36	271-034	242.04	180-340	254.8	–22.4	5.3	R				
27X-2, 34-36	272-034	243.54	300-330	13.9	–31.9	21.5	RPP				
27X-3, 20-22	273-020	244.90	250-340	241.5	–34.5	5.6	R				
27X-4, 23-25	274-023	246.43	180-250	7.8	–21.7	6.1	RP				
27X-4, 135-137	274-135	247.55	200-360	156.2	–27.4	4.1	R				

Table T2 (continued).

Position, age, facies/Core, section, interval (cm)	Run name	Depth (mbsf)	Characteristic magnetization and polarity							Polarity chron assignment	Comments
			Interval (°C)	Characteristic direction			Polarity rating	Polarity column			
				Declination	Inclination	MAD		Schematic	Generalized		
28X-1, 32-34	275-021	247.62	180-310	19.8	–25.6	5.2	R				
27X-5, 21-23	275-110	247.91	200-400	293.4	–18.5	8.3	RP			C24r	Lowermost Core 171B-1050A-27X overlaps uppermost Core 28x assigned depth interval.
28X-1, 120-123	281-032	248.50	180-270	147.4	–32.1	3.8	R				
27X-5, 110-112	281-120	248.80	200-290	91.0	–30.9	8.3	R				
28X-2, 36-38	282-036	249.16	220-280	255.3	–17.1	6.5	RP				
28X-2, 132-134	282-132	250.12	140-320	64.2	–37.4	5.0	R				
28X-3, 33-35	283-033	250.63	220-310	307.5	–11.6	13.1	RPP				
28X-3, 104-106	283-104	251.34	140-450	112.4	–30.4	5.2	R				
28X-4, 31-33	284-031	252.11	190-320	226.0	–31.9	2.8	R				
28X-4, 112-114	284-112	252.92	240-330	55.7	–34	6.0	R				
28X-5, 54-56	285-054	253.84	220-310	176.5	43.0	6.4	N				
28X-5, 116-118	285-116	254.46	140-290	178.6	32.5	6.2	N			C25n	
29X-1, 30-32	291-030	257.20	180-210	319.7	13.1	6.7	N??				
29X-1, 80-82	291-080	257.70	220-310	225.7	–23.4	5.2	R				
29X-1, 126-128	291-126	258.16	200-290	275.2	–33.8	19.6	RPP				
29X-2, 19-21	292-019	258.59	180-280	297.4	–24.5	4.9	R				
29X-3, 92-94	293-092	260.82	180-280	72.4	–32.4	6.9	R				
29X-6, 41-43	296-041	264.81	180-340	192.1	–51.5	3.1	R				
29X-6, 102-104	296-102	265.42	200-290	130.9	–31.2	4.6	R				
29X-7, 46-48	297-046	266.36	210-300	330.4	–27.4	9.4	RP				
30X-1, 53-55	301-053	267.03	250-310	127.2	–30.2	19.2	RP			C25r	
30X-1, 134-136	301-134	267.84	170-260	146.3	–42.5	7.8	R				
30X-2, 57-59	302-057	268.57	180-310	343.4	–47.1	9.7	RP				
30X-3, 16-18	303-016	269.66	180-220	104.2	–21.0	14.0	RPP				
30X-3, 109-111	303-109	270.59	170-290	236.4	–15.5	14.1	RPP				
30X-4, 18-20	304-018	271.18	180-240	13.6	–11.4	13.3	RP				
30X-4, 98-100	304-098	271.98	140-200	171.6	–15.6	23.4	RPP				
30X-5, 31-33	305-031	272.81	220-280	93.9	16.3	19.9	NPP				
30X-5, 114-116	305-114	273.64	140-170	261.7	–5.8	15.3	INT				
30X-6, 52-54	306-052	274.52	180-310	123.2	–31.0	19.3	RPP				
30X-6, 110-112	306-110	275.10	170-290	122.2	–24.6	19.6	RPP				
30X-7, 8-10	307-008	275.58	140-230	221.8	41.2		N??				
31X-1, 29-32	311-027	276.39	180-250	2.8	56.8	20.8	NPP				
31X-2, 27-30	312-027	276.73	180-210	3.8	47.7	18.5	NPP			C26n	
31X-2, 116-119	312-116	277.62	100-290	254.0	39.4	9.7	NP				
31X-3, 15-18	313-015	278.11	180-280	333.5	25.7	16.1	NPP				
31X-3, 116-119	313-116	279.12	100-140	13.4	75.8	4.9	N??				
31X-4, 24-27	314-024	279.70	250-280	37.1	–23.3	12.1	RP				
31X-4, 130-133	314-130	280.76	170-290	33.0	13.7	16.6	INT				
31X-5, 24-27	315-024	281.20	150-260	19.1	0.2	7.9	R??				
31X-5, 115-118	315-115	282.11	140-200	87.8	11.2	8.5	R??				
31X-6, 35-38	316-035	282.81	210-300	67.6	5.2	23.1	INT				
31X-6, 110-113	316-110	283.56	140-290	254.7	–10.8	14.0	RPP				
31X-7, 30-33	317-030	284.26	150-230	169.4	0.4	5.8	INT				
31X-8, 29-31	318-029	285.23	280-340	295.2	2.0	17.1	R??				
32X-1, 25-27	321-025	285.95	190-320	141.5	–23.3	8.7	R				
32X-1, 113-115	321-113	286.83	320-450	301.8	–38.7	13.3	RP				

Table T2 (continued).

Position, age, facies/Core, section, interval (cm)	Run name	Depth (mbsf)	Characteristic magnetization and polarity: Interval (°C)	Characteristic direction: Declination	Characteristic direction: Inclination	Characteristic direction: MAD	Polarity rating	Polarity column: Schematic	Polarity column: Generalized	Polarity chron assignment	Comments
32X-2, 44-46	322-044	287.64	180-300	6.4	–16.5	3.9	R				
32X-3, 49-51	323-049	289.19	290-320	158.2	–32.6	3.5	RP				
33X-1, 43-45	331-043	289.33	260-320	117.0	–23.7	5.2	R				
33X-1, 123-125	331-123	290.13	140-230	171.9	–14.5	4.3	RP				
33X-2, 37-39	332-037	290.77	310-380	287.5	–9.7	5.6	RP				Lowermost Core 171B-1050A-32X overlaps uppermost Core 33x assigned depth interval.
32X-4, 104-106	324-104	291.24	170-260	181.3	–16.7	4.3	R				
33X-2, 119-121	332-119	291.59	290-360	288.0	–15.1	6.6	R				
33X-3, 38-41	333-038	292.28	230-320	226.6	–13.3	5.0	R			C26r	
33X-3, 125-127	333-125	293.15	170-320	359.1	–10.7	4.4	R				
33X-4, 34-36	334-034	293.74	210-340	319.2	–27.8	14.7	RP				
33X-4, 123-125	334-123	294.63	140-320	326.1	–14.9	3.0	R				
33X-5, 33-35	335-033	295.23	190-290	182.4	–8.9	5.0	RPP				
34X-1, 25-27	341-025	295.55	190-260	153.8	11.8	7.6	N??				Lowermost Core 171B-1050A-33X overlaps uppermost Core 34x assigned depth interval.
33X-5, 121-123	335-121	296.11	140-290	194.5	–0.9	8.3	R??				
34X-1, 118-120	341-118	296.48	200-290	66.2	–16.5	3.9	R				
33X-6, 27-29	336-027	296.67	250-340	117.3	–14.3	5.7	R				
34X-2, 23-25	342-023	297.03	180-340	37.2	–19.2	4.2	R				
33X-6, 111-113	336-111	297.51	170-360	192.5	–7.6	10.4	RPP				
34X-2, 114-116	342-114	297.94	230-400	342.5	–19.8	5.3	R				
33X-CC, 32-34	339-032	298.07	190-290	59.0	–30.7	8.7	R				
34X-3, 31-33	343-031	298.61	150-230	305.2	–7.8	3.0	RP				
34X-3, 106-108	343-106	299.36	140-320	326.2	–22.3	11.0	R				
34X-CC, 23-25	349-023	299.85	210-270	76.5	–7.4	9.1	RPP				
35X-1, 30-32	351-030	305.20	180-250	182.1	9.4	18.1	INT				
35X-1, 116-118	351-116	306.06	200-260	303.2	–10.9	15.9	RPP				
35X-2, 33-35	352-033	306.73	280-310	123.4	–2.0	25.1	RPP				
35X-2, 117-119	352-117	307.57	260-360	327.8	–49.4	38.1	RPP				
35X-3, 40-42	353-040	308.30	210-240	70.7	37.8	32.1	N??				
35X-3, 119-121	353-119	309.09	140-200	248.0	–11.1	11.5	R??				
35X-4, 22-24	354-022	309.62	250-310	215.6	26.3	28.2	INT				
35X-4, 128-130	354-128	310.68	140-260	319.3	–1.0	6.5	R??				
35X-5, 35-37	355-035	311.25	240-270	159.7	–12.6	15.0	RPP				
35X-5, 119-121	355-119	312.09	150-250	181.3	2.1	10.6	R??				
35X-6, 34-36	356-034	312.74	180-280	193.3	–23.4	15.0	RP				
35X-6, 118-120	356-118	313.58	260-320	221.8	–23.5	13.0	RPP				
35X-7, 32-34	357-032	314.22	310-330	100.9	–9.8	11.8	RPP				
36X-1, 21-22	361-021	314.71	220-220	144.6	47.4		INT				
36X-1, 115-117	361-115	315.65	200-290	183.3	–25.1	3.7	RP				
36X-2, 35-37	362-035	316.35	220-340	6.4	–1.1	17.5	RPP				
36X-2, 118-120	362-118	317.18	230-320	33.8	–31.6	6.8	R				
36X-3, 30-32	363-030	317.80	180-300	38.5	–5.3	28.9	RPP				
36X-3, 124-126	363-124	318.74	140-450	338.1	–17.6	20.9	RPP				
36X-4, 46-49	364-046	319.46	180-310	67.3	4.8	15.6	R??				
36X-CC, 5-7	369-005	319.64	220-280	180.0	–28.5	17.9	RPP				

Table T2 (continued).

Position, age, facies/Core, section, interval (cm)	Run name	Depth (mbsf)	Characteristic magnetization and polarity							Polarity chron assignment	Comments
			Interval (°C)	Characteristic direction			Polarity rating	Polarity column			
				Declination	Inclination	MAD		Schematic	Generalized		
basal late Paleocene											
Green-gray chalk											
171B-1050C-											
2R-1, 32-34	021-032	327.42	140-320	61.8	–46.5	15.4	RP				
2R-2, 29-31	022-029	328.89	200-300	306.6	–28.8	10.1	RP			C26r	
2R-3, 52-54	023-052	330.62	140-290	157.6	–33.3	19.1	RPP				
2R-4, 32-34	024-032	331.92	180-240	67.1	–5.7	18.0	RPP				
early Paleocene											
2R-5, 45-47	025-045	333.55	100-230	253.9	56.6	23.4	NPP				
2R-6, 6-9	026-006	334.66	200-300	109.5	45.5	10.3	NP				
2R-7, 30-32	027-030	336.40	140-230	88.8	54.1	18.1	NP				
3R-1, 31-33	031-031	337.01	100-290	39.0	47.4	10.0	NP			C27n	
3R-2, 35-37	032-035	338.55	180-250	45.3	39.6	2.4	NPP				
3R-3, 25-27	033-025	339.95	140-200	26.2	18.7	31.3	NPP				
3R-4, 26-28	034-026	341.43	180-240	176.9	45.5	17.8	N				
3R-5, 74-76	035-074	343.41	140-200	116.4	34.4	10.4	NPP				
4R-1, 19-21	041-019	346.49	230-320	165.1	–16.6	20.8	RPP				
4R-2, 36-38	042-036	348.16	200-270	166.1	–22.7	8.9	RPP				
4R-3, 13-15	043-013	349.43	140-290	107.1	–24.6	16.8	RPP				
4R-4, 68-70	044-068	351.48	200-300	38.6	–14.1	2.8	R				
4R-5, 41-43	045-041	352.71	140-320	33.4	–24.6	7.8	R				
4R-6, 27-29	046-027	354.07	220-340	274.5	–9.5	7.7	RPP				
5R-1, 50-52	051-050	356.40	200-300	94.9	–41.9	11.0	RP			C27r	
5R-2, 65-67	052-065	358.05	140-170	140.9	–38.9	7.7	RPP				
5R-3, 20-22	053-020	359.10	180-340	56.1	–21.7	28.6	RPP				
5R-4, 69-71	054-069	361.09	140-320	284.1	–14.2	20.6	RPP				
5R-5, 52-54	055-052	362.23	200-300	55.3	–22.3	7.6	R				
5R-6, 23-25	056-023	363.44	200-320	156.9	–40.5	6.9	R				
6R-1, 70-72	061-070	366.20	180-380	245.9	–32.4	4.7	R				
6R-2, 80-82	062-080	367.80	140-320	222.6	–31.7	4.2	R				
Pinkish-greenish cycles in gray chalk											
6R-3, 28-30	063-028	368.78	200-470	207.4	–45.5	5.7	R				
6R-4, 103-105	064-103	371.03	140-260	3.9	32.1	5.6	N				
6R-5, 91-93	065-091	372.41	240-470	215.3	44.1	7.8	N				
6R-6, 22-24	066-022	373.22	230-320	233.9	37.4	4.7	N				
6R-7, 28-30	067-028	374.78	240-470	212.0	52.2	3.8	N				
6R-CC, 4-6	069-004	375.22	140-400	354.8	32.8	3.6	N			C28n	
7R-1, 67-69	071-067	375.87	180-420	303.3	31.1	9.7	N				
Greenish cycles in gray chalk											
7R-2, 28-30	072-028	376.98	140-400	271.4	41.7	4.0	N				
7R-3, 8-10	073-008	378.28	300-420	165.5	46.5	7.2	N				
7R-4, 39-42	074-039	380.09	100-290	342.6	35.8	7.7	N				
8R-1, 38-40	081-038	385.28	180-270	134.6	36.7	11.7	NP				
8R-2, 39-41	082-039	386.79	140-260	134.0	24.8	30.5	NPP				
8R-3, 17-19	083-017	388.07	200-420	77.0	–9.5	18.2	RPP			C28r	
8R-4, 54-56	084-054	389.44	170-230	60.5	–9.1	20.7	RPP				

Table T2 (continued).

Position, age, facies/Core, section, interval (cm)	Run name	Depth (mbsf)	Characteristic magnetization and polarity: Interval (°C)	Characteristic direction: Declination	Characteristic direction: Inclination	Characteristic direction: MAD	Polarity rating	Polarity column: Schematic	Polarity column: Generalized	Polarity chron assignment	Comments
9R-1, 24-26	091-024	394.74	140-290	107.4	23.8	8.9	N			C29n	
9R-2, 26-28	092-026	396.26	250-280	100.9	–33.3	6.1	RPP			C29r	
9R-3, 16-18	093-016	397.66	150-250	153.8	0.3	14.0	R??				
14-m gap in sampling											
Maastrichtian											
Light green-gray cyclic chalk											
11R-3, 77-79	113-077	412.47	140-260	150.4	63.4	7.7	N			C30n	
17-m gap in recovery											
13R-1, 30-32	131-030	423.60	240-360	151.5	–13.2	4.3	R				
13R-2, 31-33	132-031	425.11	100-230	269.3	17.2	20.6	INT			C30r?	Alternatively, this is a remagnetized interval within polarity Zone C30n.
13R-3, 56-58	133-056	426.86	180-340	344.6	–51.1	19.0	RP				
13R-4, 51-53	134-051	428.31	140-400	123.3	46.9	13.6	N			C31n?	Alternatively, this is still polarity Zone C30n.
13R-5, 36-39	135-036	429.66	330-470	308.3	–30.9	19.2	RPP				
13R-6, 16-18	136-016	430.96	100-600	97.4	45.9	2.4	N			C31n?	Alternatively, this is still polarity Zone C30n.
15-m gap in recovery											
Red-pink cycles in gray chalk											
15R-1, 56-58	151-056	443.16	140-360	186.4	48.1	5.3	N			C31n?	Alternatively, this is the lower part of polarity Zone C30n.
15R-2, 14-16	152-014	444.24	180-420	143.4	51.1	3.6	N				
15R-3, 25-27	153-025	445.85	440-600	5.0	–18.2	4.3	R			?	Alternatively, this is polarity Zone C30r.
15R-4, 42-44	154-042	447.52	240-470	306.8	–26	3.2	R				
15R-5, 46-48	155-046	449.06	230-600	102.9	23.1	7.4	N			C31n	
15R-6, 64-66	156-064	450.74	380-470	323.5	–22.2	3.1	R			?	
15R-7, 23-25	157-023	451.83	230-320	207.9	69.6	13.4	NP			C31n	
16R-1, 27-29	161-027	452.47	100-360	114.2	45.9	3.6	N				
16R-1, 83-85	161-083	453.03	270-470	298.2	–17	5.1	R			C31r	
16R-2, 83-85	162-083	454.53	400-600	334.7	–14.9	3.7	R				
16R-3, 10-12	163-010	455.30	180-420	136.6	47.5	2.7	N				
17R-1, 82-84	171-082	462.62	240-420	144.5	44.8	3.9	N			C32n.1n	
17R-2, 20-22	172-020	463.50	100-520	79.0	38.7	6.9	N				
18R-1, 34-36	181-034	471.74	180-340	340.7	–45.8	2.7	R				
18R-2, 8-10	182-008	472.98	200-440	122.2	–51.9	4.6	R			C32n.1r	
18R-3, 41-43	183-041	474.81	200-420	93.4	–44.7	3.8	R				
18R-4, 56-58	184-056	476.46	170-560	106.4	–50.3	4.5	R				
18R-5, 16-18	185-016	477.56	250-420	149.9	7.6	6.0	NPP			C32n.2n	
Campanian											
Tan chalk with cyclic red-brown-green											
19R-1, 47-49	191-047	481.47	240-470	304.5	–31.3	3.8	R				Remagnetized to reversed-polarity during slumping. Original polarity uncertain.
19R-1, 128-130	191-128	482.28	230-600	336.7	–35.1	2.0	R				
8-m gap in recovery											
20R-1, 11-13	201-011	490.71	420-470	338.0	66.8	13.4	NPP			C33n?	

Table T2 (continued).

Position, age, facies/Core, section, interval (cm)	Run name	Depth (mbsf)	Characteristic magnetization and polarity: Interval (°C)	Characteristic direction: Declination	Characteristic direction: Inclination	Characteristic direction: MAD	Polarity rating	Polarity column: Schematic	Polarity column: Generalized	Polarity chron assignment	Comments
Coniacian											
Pinkish tan chalk											
20R-2, 67-69	202-067	492.77	230-520	355.3	68.4	4.2	N				
20R-3, 12-14	203-012	493.67	240-470	106.8	28.2	2.6	N			C34n	
Turonian											
Brownish red marl											
20R-4, 19-21	204-019	495.24	140-400	73.0	54.8	14.8	NP			C34n	
21R-1, 14-17	211-014	500.34	280-470	40.5	40.0	3.9	N				
Cenomanian											
Light-gray chalk with light-dark cycles											
21R-5, 83-85	215-083	507.03	290-350	121.7	28.8	13.0	NPP				Near slumped interval!
22R-1, 26-28	221-026	510.06	200-420	285.7	–30.9	8.3	INT				
23R-1, 92-94	231-092	520.32	100-200	30.7	26.9	17.5	NPP				
23R-5, 123-125	235-123	526.63	180-420	338.4	39.1	3.5	N			C34n	
23R-6, 66-68	236-066	527.56	140-440	356.7	47.2	4.0	N				
23R-7, 59-61	237-059	528.99	200-270	124.2	33.4	9.9	NPP				
24R-1, 135-137	241-135	530.45	180-340	83.8	–12.6	1.5	R			?	
24R-2, 35-38	242-035	530.95	150-400	179.2	42.6	5.8	N				
24R-3, 14-17	243-014	531.60	200-420	48.5	37.7	3.5	N				
26R-1, 20-22	261-020	548.60	200-350	203.5	–5.1	6.0	RP			?	
Red marly interval (Sections 171B-1050C-26R-2, 90 cm, through 26R-4, 30cm)											
26R-3, 38-40	263-038	551.78	180-470	283.7	42.3	2.4	N				
26R-3, 135-137	263-135	552.75	140-560	293.2	47.0	3.1	N				
Gray marly chalk											
27R-2, 140-142	272-140	560.90	100-320	0.5	33.7	23.0	NPP			C34n	
Dark gray silty nannoclaystone											
28R-3, 79-81	283-079	571.39	170-350	6.6	29.7	11.3	NP				
28R-4, 54-57	284-054	572.64	200-270	111.7	57.0	7.3	N				
28R-6, 117-119	286-117	576.27	200-290	19.1	47.9	8.0	N				
28R-CC, 8-10	289-008	577.29	220-340	73.5	–7.2	11.5	RP			?	
late Albian											
29R-1, 98-100	291-098	578.18	170-350	64.5	26.7	3.1	N				
29R-3, 15-17	293-015	580.35	200-330	187.9	30.5	6.7	N				
29R-4, 100-102	294-100	582.70	140-320	241.5	33.6	14.3	NP				
30R-1, 29-31	301-029	587.09	180-330	203.5	24.6	8.9	N				
30R-2, 142-144	302-142	589.72	140-350	300.2	24.7	1.9	N				
30R-4, 84-86	304-084	592.14	140-440	265.2	50.1	10.3	NP				
30R-5, 126-128	305-126	594.06	240-330	61.9	28.0	5.5	N			C34n	
30R-CC, 12-14	309-012	595.73	150-350	196.4	11.7	2.8	NP				
31R-1, 120-122	311-121	597.60	180-340	64.5	–1.5	7.0	INT				
31R-2, 122-123	312-122	599.12	140-320	125.7	42.5	12.1	NP				
31R-3, 40-42	313-040	599.80	270-360	176.6	18.5	3.6	N				
31R-4, 103-105	314-103	601.93	100-480	183.4	56.2	8.7	N				

Table T2 (continued).

Position, age, facies/Core, section, interval (cm)	Run name	Depth (mbsf)	Characteristic magnetization and polarity							Polarity chron assignment	Comments
			Interval (°C)	Characteristic direction			Polarity rating	Polarity column			
				Declination	Inclination	MAD		Schematic	Generalized		
31R-5, 30-32	315-030	602.70	180-340	118.1	33.4	4.2	N				
31R-6, 70-72	316-070	604.60	150-450	186.8	49.9	6.4	NP				

Notes: Sediment facies are generalized color-texture descriptions from shipboard observations, and the lithologic units for each hole are displayed on the associated magnetostratigraphic figure. The interval (°C) indicates the demagnetization range that was used to compute the characteristic direction and polarity of magnetization for each sample. Declination and inclination are in degrees. MAD (mean angular dispersion) values indicate the precision of the three-dimensional line fit of these paleomagnetic vectors to obtain the characteristic direction. The polarity rating system (R, RP, RPP, R??, INT, N??, NPP, NP, N) is explained in the text. Two polarity columns are shown with the shades of gray or hatchure fill in the schematic column reflecting the polarity rating of individual samples and the generalized column indicating the main polarity intervals. Polarity chron assignments are based on the polarity pattern and biostratigraphic constraints in correlating to the reference magnetic polarity time scale.

Table T3. Characteristic directions and polarity ratings and polarity chron assignments, Hole 1051A. (See table notes. Continued on next five pages).

Position, age, facies/ Core, section, interval (cm)	Run name	Depth (mbsf)	Characteristic magnetization and polarity: Interval (°C)	Characteristic direction: Declination	Characteristic direction: Inclination	Characteristic direction: MAD	Polarity rating	Polarity column: Schematic	Polarity column: Generalized	Polarity chron assignment	Comments
late Eocene											
Yellow-white ooze-chalk											
171B-1051A-											
2H-3, 30-33	023-030	9.10	140-330	358.5	–2.7	17.4	R??			C16r?	Uncertain polarity zone assignment.
2H-4, 30-32	024-030	10.60	140-300	119.3	10.0	37.8	NPP				
2H-5, 21-23	025-021	12.01	200-300	137.7	48.8	8.1	NP			C17n	
2H-7, 31-33	027-030	14.61	240-270	97.1	–40.1	14.1	RPP				
middle Eocene											
3H-1, 30-32	031-030	15.60	140-270	303.7	48.9	9.1	NP				
3H-3, 30-32	033-030	18.60	210-240	44.4	37.0	15.8	NPP				
3H-4, 30-32	034-030	20.10	140-300	228.9	–39.4	6.8	INT				
3H-6, 30-32	036-030	23.10	150-200	287.0	35.0	31.1	NPP			C17n	
3H-7, 30-32	041-032	24.60	300-340	294.7	58.0	10.2	NP				
4H-3, 31-33	043-031	28.11	200-340	183.4	41.7	8.0	N				
4H-5, 31-33	045-031	31.11	180-240	172.2	41.2	10.5	NPP				
4H-6, 30-32	046-030	32.60	140-300	19.4	–4.1	12.5	RP			C17n.1r?	
5H-1, 33-35	051-033	34.63	300-340	349.2	39.5	6.7	NP				
5H-2, 30-32	052-030	36.10	240-300	355.9	48.6	6.8	NP				
5H-3, 30-32	053-030	37.60	200-300	297.5	55.1	12.4	NP				
5H-5, 30-33	055-030	40.60	160-300	13.9	70.1	14.3	NPP				
5H-6, 30-32	056-030	42.10	140-210	31.0	38.1	7.7	INT				
5H-7, 30-32	057-030	43.60	140-180	86.2	–9.4	33.1	RPP			C17n.2r?	
6H-1, 32-34	061-030	44.12	180-270	208.1	5.8	21.7	NPP				
6H-3, 30-32	063-030	47.10	140-300	2.1	43.3	4.6	N				
6H-4, 30-32	064-030	48.60	150-300	10.9	45.6	5.9	NP			C17n	
6H-7, 30-32	067-030	53.10	160-340	298.3	41.3	4.7	N				
7H-1, 35-37	071-035	53.65	160-240	270.9	65.1	20.3	NPP				
7H-2, 30-32	072-030	55.10	140-140	118.6	38.5	5.3	INT				
7H-3, 30-32	073-030	56.60	140-350	325.1	–38.7	5.0	R				
7H-4, 30-32	074-030	58.10	140-300	327.4	–58.9	16.7	RP			C17r	
7H-5, 30-32	075-030	59.60	300-340	85.5	–13.3	8.2	RPP				
7H-6, 30-32	076-030	61.10	140-210	114.7	24.7	36.5	INT				
7H-7, 30-32	077-030	62.60	140-300	107.1	44.4	6.4	N				
Greenish white ooze-chalk											
8H-3, 30-32	083-030	64.89	140-270	293.7	29.9	14.8	NP				
8H-5, 30-32	085-030	67.89	140-240	302.2	48.8	13.9	NP			C18n	
8H-7, 30-32	087-030	70.89	160-300	280.0	31.5	4.3	N				
9H-3, 30-32	093-030	75.60	200-270	319.4	29.1	27.7	NP				
9H-4, 30-32	094-030	77.10	240-300	335.4	–27.9	24.2	RPP				
9H-5, 30-32	095-030	78.60	140-180	201.0	44.2	16.4	INT				
9H-6, 30-32	096-030	80.10	180-300	312.2	–21.6	6.6	R				
10H-1, 30-32	101-030	82.10	180-240	251.5	–35.4	11.3	RP				
10H-2, 30-32	102-030	83.60	210-300	273.0	–14.4	23.7	RPP				
10H-3, 30-32	103-030	85.10	240-270	274.1	–51.0	4.7	RPP				
10H-5, 29-31	105-029	88.09	200-300	286.7	–39.7	6.2	R				

Table T3 (continued).

Position, age, facies/ Core, section, interval (cm)	Run name	Depth (mbsf)	Characteristic magnetization and polarity: Interval (°C)	Characteristic direction: Declination	Characteristic direction: Inclination	Characteristic direction: MAD	Polarity rating	Polarity column: Schematic	Polarity column: Generalized	Polarity chron assignment	Comments
10H-7, 17-19	107-017	90.97	180-240	319.1	–20.4	14.3	RP				
11H-3, 30-32	113-030	94.60	210-350	119.9	–32.2	4.5	R			C18r	
11H-5, 30-32	115-030	97.60	180-240	103.0	–52.4	8.8	RP				
12H-1, 30-32	121-030	101.10	180-240	201.4	17.2	17.1	INT				
12H-3, 29-31	123-029	104.09	200-300	230.4	–32.8	9.0	RP				
12H-4, 30-32	124-030	105.60	100-250	240.4	–48.3	10.8	RP				
12H-5, 30-32	125-030	107.10	160-340	220.8	–57	4.7	R				
13H-2, 31-33	132-031	112.11	210-300	157.0	–46.7	4.1	R				
13H-3, 30-32	133-030	113.60	240-300	156.5	–18.1	10.2	RP				
13H-5, 30-32	135-030	116.60	180-300	180.3	–42.6	11.3	R				
14H-1, 30-32	141-030	120.10	180-240	273.4	–33.6	14.2	RP				
14H-3, 30-32	143-030	123.10	240-300	303.8	–33.6	14.0	RP				
14H-5, 30-32	145-030	126.10	180-350	282.2	–43.1	6.9	R				
14H-7, 30-32	147-030	129.10	140-180	0.1	22.7	22.8	INT				
15H-1, 30-32	151-030	129.60	180-350	303.2	66.3	7.0	N			C19n	
15H-3, 30-32	153-030	132.60	180-240	314.4	50.8	19.2	NP				
15H-5, 30-32	155-030	135.60	140-270	142.6	–18.4	12.8	RP				
White chalk											
16H-1, 30-32	161-030	139.10	140-300	109.1	–20.8	12.1	R				
16H-3, 31-33	163-031	142.11	240-330	119.6	–40.8	10.6	RP				
16H-5, 31-33	165-031	145.11	200-300	106.5	–17.2	10.9	RPP				
17X-1, 26-28	171-026	148.56	140-300	306.3	–34.7	9.4	R			C19r	
17X-3, 121-123	173-121	152.51	150-320	80.1	–58.2	7.2	RP				
17X-5, 99-101	175-099	155.29	210-350	21.3	–19.7	15.0	RPP				
18X-1, 116-118	181-116	159.36	150-250	36.7	–41.7	4.6	R				
18X-2, 42-44	182-042	160.12	100-300	125.2	51.0	30.3	R??				
18X-5, 134-137	185-134	165.54	210-350	340.4	–54.4	18.3	RPP				
18X-6, 54-57	186-054	166.24	140-180	57.4	29.8	35.1	NPP				
19X-1, 115-117	191-115	168.95	180-290	77.4	58.1	6.6	N			C20n	
19X-3, 108-110	193-108	171.88	180-240	169.3	36.9	30.5	NPP				
19X-, 4, 106-108	194-106	173.36	140-240	325.0	–14.6	14.8	RPP			?	
19X-6, 107-109	196-107	176.37	140-180	78.5	37.4	12.3	NPP				
20X-1, 103-105	201-103	178.43	180-250	212.6	46.1	10.7	N				
20X-3, 101-103	203-101	181.41	140-270	223.2	51.4	14.1	N??				
20X-5, 142-144	205-142	184.82	140-300	60.7	–6.7	33.0	INT				
21X-1, 3-5	211-003	187.03	150-210	26.4	23.0	42.1	NPP				
21X-3, 108-110	213-108	191.08	100-200	186.1	23.3	9.6	NPP				
21X-5, 2-4	215-002	193.02	180-240	283.0	49.8	18.4	NPP				
22X-1, 3-5	221-003	196.63	250-290	265.4	27.6	7.4	NP				
22X-3, 132-134	223-132	200.92	180-270	147.4	35.1	15.4	NP			C20n	
23X-2, 128-130	232-128	208.98	180-290	273.5	35.4	28.1	NPP				
23X-6, 55-57	236-055	214.25	140-240	116.6	48.3	16.6	NPP				
24X-1, 47-49	241-047	216.27	140-210	112.5	50.3	6.2	NP				
24X-4, 115.5-117.5	244-115	221.46	140-210	308.8	40.3	12.2	NP				
25X-1, 68.5-70.5	251-068	226.09	140-300	252.2	47.6	23.9	NPP				
25X-5, 22-25	255-022	231.62	180-210	158.1	37.1	15.1	NPP				
26X-1, 88-90	261-068	235.88	140-400	92.5	24.5	20.7	NP				

Table T3 (continued).

Position, age, facies/ Core, section, interval (cm)	Run name	Depth (mbsf)	Interval (°C)	Characteristic magnetization and polarity: Characteristic direction: Declination	Inclination	MAD	Polarity rating	Polarity column: Schematic	Generalized	Polarity chron assignment	Comments
26X-3, 102-104	263-102	239.02	140-270	98.9	55.6	13.5	NPP				
26X-5, 57-59	265-057	241.57	180-250	182.2	–29.4	7.4	RP				
27X-1, 56-58	271-056	245.16	140-180	95.6	–49.4	1.9	RPP			C20r	
27X-5, 27-29	275-027	250.87	180-290	266.9	–23.6	9.5	RP				
27X-7, 16-18	277-016	253.76	180-240	47.5	0.7	26.4	RPP				
28X-1, 48-50	281-048	254.68	140-210	242.0	27.0	25.1	NPP				
28X-3, 36-38	283-036	257.56	140-180	76.9	29.8	31.8	N??			?	
28X-5, 42-44	285-042	260.62	180-250	315.9	38.9	27.7	NPP				
28X-7, 4-6	287-004	263.24	180-300	217.2	–26.9	10.5	RP				
29X-1, 91-93	291-091	264.71	140-300	353.9	5.0	11.5	R??				
29X-3, 3-5	293-003	266.83	180-270	258.9	–29.7	9.1	RP				
29X-5, 21-23	295-021	270.01	180-290	143.8	–38.3	19.6	RPP				
30X-2, 116-118	303-116	276.06	140-270	209.3	–27.1	9.4	RP				
30X-5, 24-26	305-024	279.64	140-290	252.5	–31.8	5.1	R				
31X-1, 10-12	311-010	283.10	180-240	234.3	–33.9	17.9	RP				
31X-6, 145-147	316-145	291.95	210-290	223.3	–18.3	7.2	R				
32X-1, 19-21	321-019	292.79	270-350	206.4	–12.9	29.5	RPP			C20r	
32X-3, 24-26	323-024	295.84	210-250	140.9	–22.5	7.6	RPP				
32X-4, 33-35	324-033	297.43	250-300	12.5	–17.4	9.0	RPP				
32X-5, 24-26	325-024	298.84	270-350	324.1	–23.5	9.0	RP				
White limestone (contrasted to chalk above)											
33X-1, 23-25	331-023	302.43	180-250	48.1	–32.1	13.5	RP				
33X-3, 24-26	333-024	305.44	140-300	15.4	–43.1	5.3	R				
33X-4, 45-47	334-045	307.15	200-400	293.8	–33.7	4.6	R				
34X-1, 20-22	341-020	312.00	210-330	201.1	–35	11.8	RP				
34X-2, 73-75	342-073	314.03	180-290	326.6	–31.8	7.0	R				
35X-1, 21-23	351-021	321.71	180-240	43.8	–37.9	19.0	RP				
36X-3, 101-103	363-101	335.11	140-290	279.4	–30.8	5.0	R				
37X-2, 21-23	372-021	342.41	210-300	288.4	–29.2	11.6	RP				
37X-4, 130-132	374-130	346.50	180-300	132.7	–30.4	6.4	RP				
38X-1, 19-21	381-019	350.59	140-330	75.3	40.8	8.4	N				
38X-7, 2-4	387-002	359.42	140-290	250.0	40.8	3.2	N			C21n	
39X-1, 19-22	391-019	360.29	140-400	159.1	40.2	7.4	NP				
39X-6, 117-119	396-117	368.77	140-290	351.1	44.2	6.0	N				
40X-3, 95-97	403-095	373.65	140-300	343.6	60.3	3.4	N				
40X-5, 6-8	405-006	375.76	180-300	75.8	32.8	3.5	N				
41X-1, 61-63	411-061	379.91	210-330	357.1	–16.1	2.9	RP			C21r!	
10-m gap in recovery											
early Eocene											
Greenish gray chalk											
42X-1, 14-16	421-014	390.04	250-290	282.3	31.6	6.3	NP			C22n	
42X-3, 14-16	423-014	393.04	210-300	335.0	14.4	10.6	NPP				
42X-5, 81-83	425-081	396.71	140-270	261.9	–35.6	5.9	R				
43X-1, 58-60	431-058	400.08	180-290	246.6	–37.2	6.8	R			C22r	
43X-5, 58-61	435-058	406.08	180-300	283.0	–32.7	11.8	RPP				
43X-7, 16-19	437-016	408.66	270-300	152.0	–46.6	13.5	RPP				

Table T3 (continued).

Position, age, facies/ Core, section, interval (cm)	Run name	Depth (mbsf)	Characteristic magnetization and polarity: Interval (°C)	Characteristic direction: Declination	Characteristic direction: Inclination	Characteristic direction: MAD	Polarity rating	Polarity column: Schematic	Polarity column: Generalized	Polarity chron assignment	Comments
44X-1, 22-24	441-022	409.32	180-210	232.4	–2	11.6	INT				
44X-3, 58-60	443-058	412.68	210-300	117.7	39.8	16.1	NPP				
44X-5, 19-22	445-019	415.29	140-400	144.1	40.0	18.1	NPP			C23n	
45X-1, 24-26	451-024	418.94	140-250	356.6	59.3	10.0	NP				
45X-2, 129-131	452-129	421.49	180-330	180.9	–25.8	38.5	RP				
45X-4, 33-35	454-033	423.53	140-180	195.2	5.5	5.7	INT			C23r	
45X-6, 67-69	456-067	426.87	140-270	154.4	14.9	4.3	INT				Need more samples to support C23r!
46X-1, 16-18	461-016	428.46	180-290	152.6	–37.7	4.6	R				
46X-3, 34-36	463-034	431.64	180-300	111.1	48.2	14.8	NP				
46X-5, 12-14	465-012	434.42	140-180	331.2	72.1	20.2	NPP				
46X-7, 32-34	467-032	437.62	140-240	98.2	40.3	14.2	NP			C24n	
47X-1, 29-31	471-029	438.19	180-250	234.9	76.4	7.9	N??				
47X-5, 23-25	475-023	444.13	150-290	281.6	45.5	6.6	N				
48X-1, 23-25	481-023	447.73	140-290	167.6	42.8	6.7	NP				
48X-3, 39-41	483-039	450.89	180-210	128.6	17.5	15.0	RPP				
48X-5, 35-37	485-035	453.85	190-260	342.0	–21.4	9.3	RP				
49X-1, 25-27	491-025	457.35	180-210	314.7	–33.2	18.6	RPP			C24r	Nannofossil Zone CP9a-DP9b transition within this reversed-polarity interval implies it is C24r.
Greenish gray marly chalk											
49X-3, 29-31	493-023	459.89	230-320	287.0	–35.9	21.1	RP				
50X-1, 29-31	501-029	460.49	190-260	231.0	20.5	7.0	NP				
50X-2, 31-33	502-031	462.01	240-270	288.6	–24.5	26.9	INT				
50X-3, 28-30	503-028	463.48	160-250	208.8	41.8	27.6	NPP				This interval of "NPP"-"INT" is either a persistent normal-polarity overprint or an N-polarity subzone within polarity Zone C24r (probably the former).
50X-4, 30-32	504-030	465.00	140-300	201.3	66.0	25.7	NPP				
Cycles of light-dark marl and limestone											
51X-1, 27-29	511-027	467.07	160-160	146.9	16.7	3.1	INT				Lowermost Core 171B-1051A-50X overlaps uppermost Core 51x's assigned depth interval.
50X-CC, 23-25	509-023	467.15	230-230	309.4	13.8	25.2	NPP				
51X-3, 30-32	513-030	470.10	140-240	7.5	9.3	27.8	INT				
51X-5, 29-31	515-029	473.09	000-150	61.7	59.5	3.2	NPP				
51X-7, 29-31	517-029	476.09	300-330	98.1	23.3	5.2	NPP				
52X-1, 24-26	521-024	476.74	280-310	172.6	–35.5	8.6	RP				
52X-3, 22-24	523-022	479.72	200-250	101.0	3.8	26.8	R??				
52X-5, 39-41	525-039	482.89	150-290	101.6	–23.5	4.2	RP			C24r	
52X-CC, 34-36	529-034	486.32	150-250	162.4	23.4	9.1	INT				
53X-1, 33-36	531-033	486.43	180-240	266.9	–11.1	19.6	RPP				
53X-2, 7-10	532-007	487.67	220-280	194.6	–17.8	14.6	RPP				
53X-4, 8-10	534-008	490.68	150-300	330.5	71.0	24.4	INT				
53X-6, 4-6	536-004	493.64	260-290	330.0	63.9	1.0	NP			Brief N in C24r?	
53X-CC, 28-30	539-028	495.73	140-270	123.9	14.2	28.3					
54X-1, 6-8	541-006	495.76	160-310	6.9	–21.0	18.0	RPP			C24r	
54X-4, 95-97	544-095	501.15	150-260	12.5	–21.2	11.8	RP			(cont.)	
20-m gap in sampling											

Table T3 (continued).

Position, age, facies/ Core, section, interval (cm)	Run name	Depth (mbsf)	Characteristic magnetization and polarity: Interval (°C)	Characteristic direction: Declination	Inclination	MAD	Polarity rating	Polarity column: Schematic	Generalized	Polarity chron assignment	Comments
late Paleocene											
Pale green chalk											
56X-3, 12-14	563-012	518.02	160-310	22.7	–8.5	3.5	RPP			C24r	
56X-5, 18-20	565-018	521.08	180-180	159.9	–28.4	6.8	R??				
56X-7, 20-22	567-020	524.10	150-290	37.7	–26	3.7	R				
57X-1, 23-25	571-023	524.73	220-280	172.2	64.1	7.5	N			C25n?	
57X-3, 23-25	573-023	527.73	180-300	81.0	18.2	5.3	NP				
57X-5, 13-15	575-013	530.63	230-320	331.2	–15.6	6.0	R				
58X-1, 31-33	581-031	534.41	160-310	312.0	–21.5	3.9	R				
58X-3, 9-11	583-009	537.19	240-300	141.8	–15.8	26.2	RP			C25r	
58X-5, 8-10	585-008	540.18	150-320	303.4	–15.4	15.5	RPP				
59X-1, 29-31	591-029	543.99	150-320	290.0	1.4	20.4	R??				
59X-3, 7-9	593-007	546.77	140-180	291.0	16.6	17.6	R??				
59X-5, 16-18	595-016	549.86	220-280	165.0	13.4	18.8	INT				
59X-6, 145-147	596-145	552.65	180-330	41.6	41.9	25.1	NPP				
60X-1, 37-39	601-037	553.67	220-310	343.4	3.4	15.1	R??				Resolution and extent of polarity Zone C26n is uncertain. Nannofossil biostratigraphy (Zone CP4) suggests that the lower portion of the "NP" interval may be a pervasive overprint.
60X-2, 92-94	602-092	555.72	180-330	266.5	28.2	16.9	NP			C26n	
61X-1, 29-31	611-029	556.69	150-320	115.2	52.2	12.4	NP				
61X-2, 83-85	612-083	558.73	270-330	69.1	55.3	7.0	NP				
61X-4, 74-76	614-074	561.64	160-310	290.3	41.2	19.9	NP			?	
62X-1, 54-56	621-054	563.44	180-300	182.6	24.1	7.2	NP				
62X-3, 37-39	623-037	566.27	230-320	46.6	23.3	9.7	NPP				
62X-5, 52-52	625-052	569.42	240-270	138.9	2.7	25.9	INT				
62X-7, 44-46	627-044	571.84	180-300	194.4	–39.2	15.3	RP				
63X-1, 30-32	631-030	572.80	220-310	159.9	20.9	16.5	N??				
63X-3, 31-33	633-031	575.81	210-330	6.7	–20.2	28.1	RPP			C26r	
63X-5, 107-109	635-107	579.57	150-260	336.3	7.8	7.6	N??				
63X-7, 30-32	637-030	581.80	210-270	349.8	–21.5	13.3	RPP				
Dark gray marly chalk											
64X-1, 14-16	641-014	582.24	160-310	129.8	3.5	14.4	R??				
64X-2, 147-149	642-147	585.07	210-300	160.4	30.0	25.1	NPP				
64X-4, 78-80	644-078	587.38	190-290	237.2	–4.6	5.4	INT				
64X-6, 68-70	646-068	590.28	200-400	191.9	8.7	11.4	NPP			Overprinted?	Planktonic foraminifer (Zone P3a) would imply that this interval is within C26r.
64X-CC, 34-36	649-034	591.87	160-310	239.1	8.5	15.4	N??				
65X-1, 37-39	651-037	592.17	150-350	185.6	33.6	10.0	NP				
65X-2, 6-8	652-006	593.36	150-320	219.6	25.5	27.0	NPP				
65X-4, 10-12	654-010	596.40	140-330	194.6	19.0	20.5	N??				
65X-6, 54-56	656-054	599.84	220-250	293.7	–8.8	8.9	RPP			lower	
65X-CC, 28-30	659-028	601.55	140-240	294.2	20.5	33.1	R??			C26r?	
early Paleocene											
66X-1, 99-101	661-099	602.49	150-320	265.8	15.7	11.9	NPP				Resolution and extent of polarity Zone C27n is uncertain.
66X-4, 32-34	664-032	606.32	220-280	212.7	33.4	21.1	NPP				
66X-6, 6-8	666-006	609.06	230-260	132.2	69.7	24.1	NPP				
67X-1, 13-15	671-013	611.23	220-250	13.9	53.3	18.3	NPP				

Table T3 (continued).

Position, age, facies/ Core, section, interval (cm)	Run name	Depth (mbsf)	Characteristic magnetization and polarity: Interval (°C)	Characteristic direction: Declination	Characteristic direction: Inclination	Characteristic direction: MAD	Polarity rating	Polarity column: Schematic	Polarity column: Generalized	Polarity chron assignment	Comments
67X-4, 2-4	674-022	615.62	180-300	123.9	52.2	15.1	NPP				
67X-CC, 39-41	679-039	619.88	150-290	3.4	40.8	21.7	NPP				
68X-1, 107-109	681-107	621.77	150-400	194.4	42.3	10.8	N			C27n	
68X-2, 92-94	682-092	623.12	160-310	130.7	64.1	27.0	NPP				
69X-1, 1-3	689-003	624.31	210-330	188.5	47.1	16.7	NPP				Lowermost Core 171B-1051A-69X overlaps uppermost Core 69x's assigned depth interval.
68X-CC, 3-5	691-001	624.39	150-230	251.9	74.9	10.0	NP				
70X-1, 33-36	701-033	630.73	220-280	351.5	79.4	7.4	NPP				
70X-CC, 27-29	709-027	631.06	180-330	61.5	–73.3	20.9	INT				NRM inclination is steep UP → suspicious. Inverted core catcher?
71X-CC, 4-6	719-004	634.54	210-300	163.4	19.3	10.7	NPP			?	
Light gray limestone											
72X-1, 6-9	721-006	640.06	150-260	213.0	32.0	15.4	NPP				
73X-1, 16-18	731-016	641.76	150-450	156.7	38.2	5.3	N			?	Lowermost Core 171B-1051A-72X overlaps uppermost Core 73x's assigned depth interval.
72X-2, 44-47	722-044	641.94	180-330	224.7	45.0	7.3	N				
72X-CC, 5-7	729-005	642.32	220-280	219.1	55.1	11.0	NPP			? C27r ?	Planktonic foraminifer (Zone P1c) suggests that this "NPP"-dominated interval may be pervasive overprint on reversed-polarity Zone C27r.
73X-2, 8-10	732-008	643.18	190-320	358.1	26.9	13.7	NPP				
73X-CC, 12-14	739-012	643.87	210-300	250.7	9.0	14.6	N??				

Notes: Sediment facies are generalized color-texture descriptions from shipboard observations, and the lithologic units for each hole are displayed on the associated magnetostratigraphic figure. The interval (°C) indicates the demagnetization range that was used to compute the characteristic direction and polarity of magnetization for each sample. Declination and inclination are in degrees. MAD (mean angular dispersion) values indicate the precision of the three-dimensional line fit of these paleomagnetic vectors to obtain the characteristic direction. The polarity rating system (R, RP, RPP, R??, INT, N??, NPP, NP, N) is explained in the text. Two polarity columns are shown with the shades of gray or hatchure fill in the schematic column reflecting the polarity rating of individual samples and the generalized column indicating the main polarity intervals. Polarity chron assignments are based on the polarity pattern and biostratigraphic constraints in correlating to the reference magnetic polarity time scale.

Table T4. Characteristic directions and polarity ratings and polarity chron assignments, Site 1052. (**See table notes.** Continued on next five pages.)

Position, age, facies/Core, section, interval (cm)	Run name	Depth (mbsf)	Characteristic magnetization and polarity							Polarity chron assignment	Comments
			Interval (°C)	Characteristic direction			Polarity rating	Polarity column			
				Declination	Inclination	MAD		Schematic	Generalized		
late Eocene											
171B-1052A-											
3H-2, 30-32	032-030	15.00	100-200	116.0	51.9	18.6	N??				
3H, 3, 30-32	033-030	16.50	140-210	152.6	24.0	11.2	NP			C16n	
3H-5, 31-33	035-031	19.51	180-240	191.5	26.2	25.2	NPP				
3H-6, 30-32	036-030	21.00	140-140	279.2	–19.5		RPP			C16n.1r?	Shipboard pass-through cryogenic magnetometer data also displayed this "R??" polarity zone.
4H-2, 30-32	042-030	24.50	200-400	275.3	59.5	8.9	N				
4H-3, 30-32	043-030	26.00	180-400	294.4	47.8	9.8	N				
4H-5, 31-33	045-031	29.01	140-270	318.3	33.7	9.0	NP			C16n	
4H-7, 31-33	047-031	32.01	140-240	290.2	47.5	14.6	NPP				
5H-1, 30-32	051-030	32.50	140-240	299.8	57.4	36.6	NPP				
5H-3, 30-32	053-030	35.50	140-210	345.6	77.1	11.2	NPP				
5H-4, 30-32	054-030	37.00	140-240	73.1	–47.4	27.2	RPP				
5H-5, 30-32	055-030	38.50	140-270	197.6	–52.0	29.0	INT			C16r	
5H-6, 30-32	056-030	40.00	180-240	259.3	11.5	23.4	R??				
6H-2, 30-32	062-030	43.50	100-350	182.8	–31.7	34.7	INT				
6H-3, 30-32	063-030	45.00	140-350	72.4	75.7	31.6	N??				
6H-5, 30-32	065-030	48.00	140-300	178.2	71.0	47.4	N??				
7H-1, 30-33	071-030	51.50	140-270	237.4	56.5	33.3	NPP				
7H-3, 30-32	073-030	54.50	140-400	268.3	62.0	19.6	NP			C17n	
7H-5, 30-32	075-030	57.50	140-270	269.1	73.8	26.4	NP				
8H-1, 30-32	081-030	61.00	180-270	177.0	43.0	30.6	NPP				
8H-3, 44-46	083-044	64.14	140-350	174.5	18.4	29.3	INT				
8H-5, 30-32	085-030	67.00	180-300	185.8	43.7	17.3	NP				
9H-1, 35-37	091-035	70.55	140-270	67.9	72.0	15.1	NPP				
9H-2, 30-32	092-030	72.00	140-270	304.3	–48.7	33.0	RP			C17n.1r	
9H-3, 30-32	093-030	73.50	140-240	261.4	50.4	38.7	NPP				
9H-4, 30-32	094-030	75.00	140-270	255.0	47.4	40.4	RPP			C17n.1r?	Uncertain validity of this lower "C17n.1r" zone.
9H-5, 30-32	095-030	76.50	140-180	49.4	41.6	14.7	NPP				
9H-6, 30-32	096-030	78.00	140-300	117.9	44.1	7.8	N				
middle Eocene											
10H-1, 62-64	101-062	80.32	140-240	214.8	30.3	11.2	NP			C17n	
10H-2, 31-33	102-031	81.51	180-350	201.4	41.3	22.0	NP				
10H-3, 30-32	103-030	83.00	140-240	161.8	–16.8	8.7	INT				
10H-4, 30-32	104-030	84.50	140-140	221.3	30.1	5.3	INT			C17n.2r?	
10H-5, 31-32	105-031	86.01	180-270	235.5	38.2	8.1	N				
11H-1, 30-32	111-030	89.50	140-300	37.6	51.4	10.2	NP			C17n	
11H-2, 31-33	112-031	91.01	140-240	170.6	–13.6	34.3	R??				
11H-3, 31-33	113-031	92.51	180-300	210.6	–31.2	8.4	R				
11H-4, 31-33	114-031	94.01	140-350	199.2	46.2	39.5	RP				
11H-5, 31-33	115-031	95.51	140-240	197.8	–36.7	11.8	RP			C17r	
11H-7, 30-32	117-030	98.50	180-400	203.6	–39.6	6.4	R				
12H-1, 45-47	121-045	99.15	180-350	351.7	–35.3	6.5	R				
12H-2, 31-33	122-033	100.51	180-300	311.9	–57.8	6.2	R				
12H-3, 31-33	123-031	102.01	140-140	244.7	83.1	3.4	INT				

Table T4 (continued).

Position, age, facies/Core, section, interval (cm)	Run name	Depth (mbsf)	Interval (°C)	Characteristic magnetization and polarity: Characteristic direction: Declination	Inclination	MAD	Polarity rating	Polarity column: Schematic	Generalized	Polarity chron assignment	Comments
12H-5, 30-32	125-030	105.00	180-400	194.5	45.9	6.8	NP				
13H-1, 32-34	131-032	108.52	140-350	49.0	41.0	7.0	N				
13H-3, 31-33	133-031	111.51	140-350	34.9	50.4	7.5	N				
13H-5, 32-34	135-032	114.52	140-300	37.4	49.9	3.6	N				
13H-6, 32-34	136-032	116.02	150-300	43.7	53.7	12.9	NP			C18n	
14H-1, 30-32	141-030	118.00	210-350	5.4	55.3	9.2	N				
14H-3, 30-32	143-030	121.00	140-270	6.5	60.5	7.2	N				
14H-5, 30-32	145-030	124.00	140-350	61.5	57.2	6.4	N				
15H-1, 69-71	151-069	127.89	210-300	348.7	65.8	6.4	N				
15H-2, 30-32	152-030	129.00	140-270	322.2	59.1	6.0	N				
16X-1, 72-74	161-072	130.42	140-350	331.0	54.1	5.9	N				
16X-3, 146-148	163-146	134.16	140-300	205.1	–46.3	10.2	R				
17X-2, 57-59	172-057	138.07	210-350	338.1	–32.9	7.1	R			C18r	
18X-1, 127-129	181-127	146.97	140-400	118.8	–51.3	3.1	R				
18X-CC, 14-16	189-014	154.74	000-400	22.6	-0.9	2.6	INT				
19X-1, 15-17	191-015	155.45	180-300	36.0	26.9	1.7	N				
19X-4, 25-27	194-025	160.05	180-300	10.8	23.3	2.7	N			C19n	
19X-6, 101-103	196-101	163.81	260-380	2.6	12.9	4.6	R			C19r	
19X-CC, 15-17	199-015	164.14	350-550	161.1	2.3	4.6	R??				
Paleocene										C26r	Shipboard pass-through cryogenic magnetometer indicates uppermost Core 171B-1052A-20X is a reversed-polarity zone, and biostratigraphy implies it is Chron C26r.
20X-CC, 24-26	209-024	165.37	270-330	135.7	28.7	12.9	NP			C27n?	2 m added to avoid overlap with Core 171B-1052A-19X.
late Paleocene											
171B-1052E-											
3R-CC, 6-8	039-006	159.40	150-290	310.4	–17.8	2.5	R			C26r	Core 171B-1052E-3R is paleontologically below Core 171B-1052A-19X, even though assigned meter levels overlap.
15-m gap in recovery											
early Paleocene											
5R-1, 32-34	051-032	175.52	180-220	71.8	64.2	6.2	N			C27n	Calcareous nannofossils (mid-Zone CP3) imply that this normal-polarity zone is Chron C27n.
10-m gap in recovery											
6R-CC, 3-5	063-003	185.33	170-230	269.3	–26.4	25.6	RPP			C27r	
20-m gap in recovery											
8R-1, 23-25	081-023	204.23	150-230	71.2	15.8	17.5	INT				
8R-2, 26-28	082-026	205.76	100-200	89.0	46.9	17.5	NPP			?	
8R-4, 27-29	084-027	208.77	180-180	271.7	1.4	4.6	INT				
8R-CC, 7-9	089-007	210.32	170-200	123.9	–22.7	21.4	RPP				
9R-1, 23-26	091-023	213.83	100-230	32.9	–44.9	21.7	RPP				
9R-CC, 12-14	099-012	215.92	150-230	355.4	50.4	20.2	INT				
10R-1, 116-118	101-116	224.36	100-170	225.4	–12.0	23.0	INT				
10R-2, 133-135	102-133	226.03	220-300	24.5	–29.0	19.5	RPP				
10R-3, 2-4	103-002	226.22	100-170	33.9	–23.0	3.9	RP			C27r	
10R-4, 121-123	104-121	228.91	150-260	73.0	–74.4	20.2	RPP				

Table T4 (continued).

Position, age, facies/Core, section, interval (cm)	Run name	Depth (mbsf)	Characteristic magnetization and polarity							Polarity chron assignment	Comments
			Interval (°C)	Characteristic direction			Polarity rating	Polarity column			
				Declination	Inclination	MAD		Schematic	Generalized		
10R-6, 47-49	106-047	230.67	140-230	221.9	–22.7	20.3	RP				
11R-1, 21-23	111-021	233.01	180-300	269.5	–26.3	19.8	RPP				
11R-2, 29-31	112-029	234.59	140-200	316.6	–45.7	16.2	RP				
12R-1, 50-52	121-050	242.90	100-200	292.9	6.4	20.6	INT				
12R-2, 106-108	122-106	244.96	150-290	326.5	–29.4	6.4	R				
12R-4, 108-110	124-108	247.77	150-400	279.3	–32.3	4.9	R				
13R-1, 40-42	131-040	252.40	140-420	207.4	–41.5	3.1	R				
13R-2, 57-59	132-057	254.07	180-260	356.5	21.4	14.4	NPP				
13R-3, 59-61	133-059	255.59	140-230	300.4	35.7	11.5	NP				
14R-1, 45-47	141-045	262.15	150-320	4.5	31.9	3.8	N				
15R-1, 61-63	151-061	271.91	180-380	195.4	48.1	6.7	N				
15R-CC, 19-21	159-019	274.11	100-170	328.9	41.3	12.4	NPP			C28n	
16R-1, 70-72	161-070	281.60	150-320	342.1	40.2	5.2	N				
16R-3, 34-36	163-034	284.24	200-400	168.5	45.5	14.5	N				
16R-4, 68-70	164-068	286.04	260-340	205.1	2.3	12.5	NPP				
16R-6, 45-47	166-045	288.81	140-350	204.0	64.4	10.2	NP				
17R-1, 79-81	171-079	291.29	290-320	235.9	43.7	10.3	NP				Apparently, reversed-polarity Chron C28r was not resolved or is absent in recovery.
17R-2, 141-143	172-141	293.28	140-320	9.9	43.7	7.7	N			C29n	
17R-4, 65-67	174-065	295.52	260-340	1.1	35.9	9.3	NP				
17R-6, 139-141	176-137	299.24	100-230	68.3	36.3	24.4	NP				
20-m gap in sampling; polarity Zone C29r resolved in shipboard pass-through magnetometer.											
Maastrichtian											
20R-1, 64-66	201-064	319.94	140-210	345.6	34.2	40.8	NPP				
20R-2, 46-48	202-046	321.26	100-140	313.4	43.9	13.9	NPP				
20R-3, 60-62	203-060	322.90	140-210	321.9	37.3	23.0	NPP				
20R-5, 47-49	205-047	325.77	140-300	73.0	29.3	19.9	NPP				
20R-6, 48-50	206-048	327.28	230-260	302.4	–69.4	14.3	RPP				?
20R-7, 59-61	207-059	328.89	180-270	336.8	38.7	19.2	NPP			C30n	
21R-1, 70-72	211-070	329.60	100-200	355.5	44.2	39.1	N??				
21R-2, 142-144	212-142	331.82	140-210	42.3	8.4	12.1	N??				
21R-3, 145-147	213-145	333.35	180-270	339.5	35.4	21.3	NPP				
21R-4, 86-88	214-086	334.26	140-210	306.5	50.1	24.4	NPP				
21R-5, 72-74	215-072	335.62	100-200	318.4	27.7	19.5	NPP				
22R-1, 11-13	221-011	338.71	260-290	213.5	–11.5	25.6	R??			C30r?	
22R-3, 23-25	223-023	341.83	140-210	15.6	63.3	19.0	INT				
22R-4, 58-60	224-058	343.68	140-200	306.8	12.3	22.8	R??				
23R-1, 100-102	231-100	349.30	260-290	136.4	25.7	28.3	NPP				Slump.
23R-3, 61-63	233-061	351.91	140-180	342.1	61.0	8.2	NP			C31n	
23R-4, 69-71	234-069	353.49	140-240	179.3	–1.8	31.1	INT				
24R-1, 7-9	241-007	357.97	190-260	138.3	31.8	30.6	NPP				
24R-2, 4-7	242-004	359.44	200-400	66.9	26.1	17.4	NPP				
24R-3, 31-33	243-031	361.21	140-210	298.8	–32.1	26.7	RPP			?	
24R-4, 8-11	244-008	362.28	140-210	340.7	48.2	19.7	NPP				
25R-1, 27-29	251-027	367.77	100-170	255.3	29.0	22.1	INT				
25R-1, 99-102	251-049	368.49	140-210	169.8	50.1	35.5	NPP				
26R-1, 13-15	261-013	377.23	140-300	26.4	37.4	17.5	NP			C31n	

Table T4 (continued).

Position, age, facies/Core, section, interval (cm)	Run name	Depth (mbsf)	Interval (°C)	Characteristic magnetization and polarity: Characteristic direction: Declination	Inclination	MAD	Polarity rating	Polarity column: Schematic	Generalized	Polarity chron assignment	Comments
26R-2, 131-134	262-131	379.91	150-260	46.4	38.9	23.4	NPP				
26R-3, 45-47	263-045	380.55	170-200	172.1	55.2	8.6	NPP				
26R-4, 99-102	264-099	382.59	140-180	116.0	38.2	21.0	NPP				
26R-5, 44-46	265-044	383.54	100-200	97.6	62.3	16.0	NPP				
26R-6, 66-68	266-066	385.26	140-180	26.1	22.6	35.8	N??				
26R-7, 16-18	267-016	386.26	100-170	319.7	63.7	32.0	N??				
26R-CC, 7-9	269-007	386.73	150-260	100.2	–16.9	25.9	RPP				
27R-1, 87-89	271-087	387.57	210-240	116.2	–22.8	13.5	RPP				
27R-5, 85-87	275-085	393.55	180-210	189.8	–53.5	11.7	RPP				
27R-6, 4-6	276-004	394.24	170-200	222.3	–51.6	15.9	RPP				
27R-CC, 9-11	279-009	395.30	290-320	284.0	–59.7	27.5	RPP				
28R-1, 32-34	281-032	396.62	140-210	14.1	–38.9	26.8	RPP				
28R-2, 57-59	282-057	398.37	140-210	97.5	–24.9	26.4	RP				
28R-3, 59-61	283-059	399.89	140-210	85.5	–59.8	12.6	RPP				
29R-1, 27-29	291-027	406.17	210-240	7.0	–0.9	18.4	INT				
29R-3, 25-27	293-025	409.15	190-230	218.3	–25.6	16.4	RPP				
29R-5, 69-71	295-064	412.59	180-210	327.0	–10.2	7.6	RPP				
30R-1, 30-32	301-030	415.80	140-240	44.3	–9.4	18.5	RPP			C31r	
30R-3, 59-61	303-059	419.09	230-320	16.9	–42.8	20.6	RP				
30R-4, 25-27	304-025	420.25	170-200	246.2	–22.8	2.0	RPP				
30R-5, 47-49	305-047	421.97	210-240	17.8	–34.9	40.4	RPP				
30R-6, 31-33	306-031	423.31	180-240	51.5	–23.2	20.4	RP				
31R-1, 29-31	311-029	425.39	150-200	350.4	–32.7	14.1	RPP				
31R-2, 64-66	312-064	427.24	140-200	64.3	–21.7	8.6	RPP				
31R-3, 32-34	313-032	428.42	250-250	67.1	–20.9	14.3	RPP				
31R-4, 24-26	314-024	429.84	190-260	90.8	–11.4	14.4	RPP				
31R-5, 30-32	315-030	431.40	180-240	346.0	–34.1	20.2	RPP				
31R-6, 20-22	316-020	432.80	210-240	90.0	–37.8	27.1	RPP				
31R-7, 30-32	317-030	434.40	100-170	359.0	–11.7	23.0	RPP				
33R-1, 46-48	331-046	444.76	180-180	118.0	–45.8	15.3	RPP				
33R-CC, 4-6	339-004	445.84	170-170	48.6	–12.8	8.5	RPP				
34R-1, 31-33	341-031	454.21	190-320	222.8	–67.8	25.9	RPP				
34R-2, 30-32	342-030	455.70	100-100	10.7	–16.6	9.6	RPP				
35R-1, 47-49	351-047	464.07	140-210	79.9	–42.7	28.7	RP				
35R-2, 28-30	352-028	465.38	100-140	25.6	–8.4	26.4	RPP				
35R-3, 33-35	353-033	466.93	140-210	2.8	–413	38.9	RPP				
35R-4, 13-15	354-013	468.23	140-200	339.6	–68.5	39.5	RPP				
early Cenomanian											
36R-4, 64.5-66.5	364-064	478.35	180-260	0.3	45.1	12.2	NP				
36R-6, 127-129	366-127	481.97	200-300	175.5	46.7	12.2	NP				
37R-3, 51.5-54	373-051	485.83	200-300	39.3	41.0	10.1	N				
37R-6, 84-86	376-084	490.65	150-500	172.3	38.7	3.8	N			C34n	
38R-2, 26-28	382-026	494.16	180-260	36.6	21.2	7.6	NP				
38R-6, 19-21	386-019	500.09	140-380	311.1	51.8	5.7	N				
39R-1, 76-78	391-076	502.76	140-320	307.6	50.4	15.2	NP				
39R-6, 114-116	396-114	510.14	200-330	228.9	40.8	5.0	N				

Table T4 (continued).

Position, age, facies/Core, section, interval (cm)	Run name	Depth (mbsf)	Characteristic magnetization and polarity: Interval (°C)	Characteristic direction: Declination	Characteristic direction: Inclination	Characteristic direction: MAD	Polarity rating	Polarity column: Schematic	Polarity column: Generalized	Polarity chron assignment	Comments
late Albian											
42R-1, 46-48	421-046	530.36	260-380	101.2	40.8	5.3	NP				
42R-5, 72.5-75	425-073	536.63	140-420	53.2	41.0	3.3	N				
43R-2, 58-60	432-058	541.52	220-300	175.9	45.8	7.8	N				
43R-4, 87-89	434-087	544.81	140-350	151.9	44.5	3.2	N				
44R-1, 26-28	441-026	549.36	270-360	48.9	35.6	12.8	NP				
44R-6, 23-25	446-023	556.83	170-230	18.4	46.8	8.8	NP				
46R-5, 146-148	465-146	575.22	180-300	140.0	33.0	4.1	NP				
47R-1, 30-32	471-030	578.30	200-360	355.4	44.6	5.8	N				
47R-3, 16-19	473-016	581.16	200-320	301.6	24.8	11.7	N				
47R-5, 29-31	475-029	584.29	260-300	182.4	65.7	18.3	NPP				
47R-7, 18-20	477-018	587.18	200-290	232.2	22.8	3.3	N				
48R-1, 37-39	481-037	587.97	240-360	118.3	33.5	8.2	N				
48R-3, 35-37	483-035	590.95	140-260	211.2	28.6	8.0	N				
48R-5, 27-29	485-027	593.87	220-300	247.3	33.5	8.7	NP				
48R-7, 30-32	487-030	596.90	200-290	165.0	33.2	8.1	N				
49R-1, 30-32	491-030	597.60	140-350	343.1	34.0	4.3	N				
49R-3, 72-74	493-072	601.02	180-300	278.3	39.0	11.8	N			C34n	
49R-5, 97-99	495-097	604.27	140-350	246.7	36.5	7.6	N				
50R-1, 144-146	501-144	608.34	140-250	110.3	38.7	3.7	NP				
50R-2, 94-96	502-094	609.34	240-330	351.9	39.1	6.6	NP				
50R-3, 14-16	503-014	610.04	200-380	195.8	40.1	8.9	N				
51R-1, 143-145	511-143	618.03	180-300	245.7	46.7	10.3	N				
51R-2, 40-42	512-040	618.50	140-300	282.0	67.7	5.6	NPP				
51R-2, 81-83	512-081	618.91	200-330	16.2	52.6	3.9	N				
52R-1, 20-22	521-020	621.90	180-260	300.6	38.4	5.9	NP				
52R-2, 106-108	522-106	624.26	170-290	227.5	44.4	5.6	N				
52R-3, 119-121	523-119	625.89	200-330	91.3	46.3	15.4	NPP				
52R-4, 119-121	524-119	627.39	230-320	257.7	66.2	15.1	NPP				
53R-1, 21-23	531-021	627.41	180-340	6.2	33.9	4.5	N				
53R-2, 141-143	532-141	630.11	140-320	214.5	32.0	17.7	NP				
53R-3, 32-34	533-032	630.52	180-300	342.3	45.8	6.2	N				
53R-5, 140-141	535-140	634.60	200-270	7.8	54.8	1.9	NP				
53R-6, 40-42	536-040	635.10	170-290	9.0	32.6	13.1	NP				
54R-1, 9-11	541-009	636.89	140-320	111.1	32.7	2.8	N				
54R-2, 3-5	542-003	638.33	220-300	115.6	43.9	8.1	NP				
54R-2, 138-140	542-138	639.68	170-350	127.8	29.7	10.3	NP				
55R-1, 56-58	551-056	646.96	180-300	298.4	42.0	9.9	N				
55R-2, 46-48	552-046	648.36	170-380	336.7	34.6	16.1	NP				
55R-3, 49-51	553-049	649.89	200-330	339.9	40.6	8.8	N				
55R-4, 66-68	554-066	651.56	100-320	329.7	28.6	8.8	N				
55R-5, 81-83	555-081	653.21	180-260	290.5	24.2	11.7	NPP				
55R-6, 8-10	556-008	653.98	140-290	339.0	29.3	3.3	N				
55R-7, 16-18	557-016	655.56	180-300	86.7	38.0	8.8	N				
57R-1, 50-52	571-050	666.10	100-290	238.1	51.8	16.1	NPP				
57R-2, 140-142	572-140	668.01	180-340	275.0	37.3	8.2	NP				
57R-3, 144-146	573-144	669.55	200-300	335.8	41.9	2.7	NP				

Table T4 (continued).

Position, age, facies/Core, section, interval (cm)	Run name	Depth (mbsf)	Characteristic magnetization and polarity							Polarity chron assignment	Comments
			Interval (°C)	Characteristic direction			Polarity rating	Polarity column			
				Declination	Inclination	MAD		Schematic	Generalized		
57R-4, 120-122	574-120	670.81	200-270	318.2	38.8	7.5	NP				
57R-5, 142-144	575-142	672.53	140-260	283.8	34.0	5.3	N				
57R-6, 132-135	576-132	673.93	180-300	269.5	42.8	6.8	N				
57R-CC, 6-8	579-006	675.31	200-320	56.7	38.3	10.9	N				
58R-1, 43.5-45.5	581-044	675.64	200-290	182.4	26.9	3.8	NP				
58R-2, 116-118	582-116	677.84	180-300	192.6	22.8	5.7	NP				
58R-3, 49-51	583-049	678.67	150-350	95.9	26.5	9.1	NP				
58R-4, 20.5-22.5	584-020	679.89	180-300	91.2	29.8	7.5	N				
58R-5, 20.5-23	585-021	681.39	140-350	9.1	28.4	4.0	N				

Notes: Sediment facies are generalized color-texture descriptions from shipboard observations, and the lithologic units for each hole are displayed on the associated magnetostratigraphic figure. The interval (°C) indicates the demagnetization range that was used to compute the characteristic direction and polarity of magnetization for each sample. Declination and inclination are in degrees. MAD (mean angular dispersion) values indicate the precision of the three-dimensional line fit of these paleomagnetic vectors to obtain the characteristic direction. The polarity rating system (R, RP, RPP, R??, INT, N??, NPP, NP, N) is explained in the text. Two polarity columns are shown with the shades of gray or hatchure fill in the schematic column reflecting the polarity rating of individual samples and the generalized column indicating the main polarity intervals. Polarity chron assignments are based on the polarity pattern and biostratigraphic constraints in correlating to the reference magnetic polarity time scale.

Table T5. Characteristic directions and polarity ratings and polarity chron assignments, Hole 1053A. (**See table notes.** Continued on next two pages.)

Position, age, facies/Core, section, interval (cm)	Run name	Depth (mbsf)	Characteristic magnetization and polarity							Polarity chron assignment	Comments
			Interval (°C)	Characteristic direction			Polarity rating	Polarity column			
				Declination	Inclination	MAD		Schematic	Generalized		
late Eocene											
171B-1053A-											
1H-1, 30-32	011-030	0.30	150-270	158.8	–34.8	5.1	R				
1H-2, 29-32	012-029	1.79	150-200	163.5	–38	5.9	RP			C13r?	
1H-3, 30-33	013-030	3.30	240-400	359.9	42.0	4.3	N			?	Was assigned "C13r" in *Initial Reports*, but biostratigraphy also allows C15r.
1H-4, 30-33	014-030	4.80	150-480	183.6	–54.7	3.3	R				
1H-5, 31-33	015-031	6.31	150-480	184.6	–44.2	5.9	R			C13r	Alternatively, this interval could be upper C15r.
1H-6, 30-33	016-030	7.80	150-550	184.9	–51	2.1	R				
1H-7, 24-27	017-024	9.24	140-400	201.2	–60.8	8.6	R				
2H-1, 30-32	021-030	9.80	150-480	80.4	54.3	9.6	N				
2H-2, 30-32	022-030	11.30	150-480	100.3	–16.6	8.9	R				
2H-3, 30-32	023-030	12.80	150-480	319.7	72.8	8.6	N??				
2H-4, 30-32	024-030	14.30	140-180	184.0	26.7	10.0	INT				
2H-5, 30-32	025-030	15.80	150-180	176.7	54.2	10.1	N??			?	Alternatively, this interval could be poorly resolved C15n (if underlying interval is C15r).
2H-6, 30-32	026-030	17.30	180-210	42.5	69.2	22.7	INT				
3H-1, 30-32	031-030	19.30	240-270	93.9	–39.2	38.4	INT				
3H-3, 30-32	033-030	22.30	140-210	80.7	–42.4	28.4	R??				
3H-4, 30-32	034-030	23.80	000-180	207.9	–21.8	21.3	RPP			C13r?	Alternatively, this interval could be lower C15r.
3H-5, 31-33	035-031	25.31	150-210	222.7	30.9	29.2	R??				
3H-7, 28-30	037-028	28.28	180-270	116.3	–16.0	24.2	RP				
4H-1, 30-32	041-030	28.80	180-210	32.6	71.7	33.0	NPP				
4H-2, 30-32	042-030	30.30	150-240	27.2	27.6	33.7	NPP				
4H-4, 30-32	044-030	33.30	140-210	313.5	–46.5	31.7	INT				
4H-5, 30-32	045-030	34.80	150-240	203.5	28.3	30.5	INT				
4H-6, 30-32	046-030	36.30	150-270	19.9	68.5	26.0	NPP			C15n?	Alternatively, this interval could be upper C16n.
5H-1, 92-94	051-092	38.92	140-210	146.5	46.4	32.4	NPP				
5H-2, 28-30	052-028	39.78	180-210	176.6	68.7	1.2	NPP				
5H-3, 30-32	053-030	41.30	150-240	203.7	62.9	5.5	NP				
5H-5, 30-32	055-030	43.30	140-140	65.2	–31.0	6.7	INT			?	This interval was assigned as "C15r" in *Initial Reports* based on shipboard pass-through magnetometer but is probably an artifact of weak magnetics.
5H-6, 31-33	056-031	45.81	150-180	343.3	79.2	32.7	INT				
6H-1, 30-31	061-031	48.30	180-210	136.9	66.4	9.9	NPP				Sampling of Cores 171B-1053A-6H through 9H was a later addition.
6H-2, 30-31	062-031	49.80	140-180	316.1	50.4	6.1	N				In these four cores, the characteristic direction estimates were computed as simple means, rather than three-dimensional line fits.
6H-3, 30-31	063-031	51.30	140-180	97.5	60.5	3.9	N				
6H-4, 30-31	064-031	52.80	180-210	260.0	53.4	21.8	NP				
6H-5, 30-31	065-031	54.30	140-180	252.8	60.4	11.8	N				
6H-6, 30-31	066-031	55.80	180-240	178.1	–54.5	9.4	R			C16n.1r	This possible polarity Zone C15r may be reduced by winnowing. Alternatively, it could be Subchron C16n.1r within C16n.
6H-7, 30-31	067-031	57.30	140-180	99.0	40.9	13.7	NP				
7H-1, 30-31	071-031	57.90	100-140	198.8	82.7	3.7	N??				
7H-2, 30-31	072-031	59.40	100-140	91.1	37.1	18.3	NPP				
7H-3, 30-31	073-031	60.90	100-140	292.3	58.4	2.7	N				
7H-4, 30-31	074-031	62.40	100-140	247.4	75.9	6.9	N??				
7H-5, 30-31	075-031	63.90	140-140	288.6	54.7	1.3	NPP			C16n	

Table T5 (continued).

Position, age, facies/Core, section, interval (cm)	Run name	Depth (mbsf)	Characteristic magnetization and polarity: Interval (°C)	Characteristic direction: Declination	Characteristic direction: Inclination	Characteristic direction: MAD	Polarity rating	Polarity column: Schematic	Polarity column: Generalized	Polarity chron assignment	Comments
7H-6, 30-31	076-031	65.40	100-210	112.3	47.3	10.4	N				
7H-7, 30-31	077-031	66.90	100-180	189.6	77.0	6.1	N??				
8H-1, 30-31	081-031	67.50	100-180	163.8	45.8	10.1	N				
8H-2, 30-31	082-031	69.00	140-210	280.6	73.3	10.4	NPP				
8H-3, 30-31	083-031	70.50	140-180	109.7	42.3	28.8	NP				
8H-4, 30-31	084-031	72.00	100-210	192.0	65.7	9.9	NP				
8H-5, 30-31	085-031	73.50	100-100	139.7	26.3	7.4	INT				Biostratigraphy suggests that polarity Zone C16r is either unresolved because of pervasive overprints or is absent.
8H-6, 30-31	086-031	75.00	100-140	201.2	47.0	4.8	N				
8H-7, 30-31	087-031	76.50	140-240	224.4	50.4	10.2	N				
9H-1, 30-31	091-031	77.10	140-180	107.5	73.9	13.1	NPP				
9H-2, 30-31	092-031	78.60	100-180	67.0	57.6	13.1	N				
9H-3, 30-31	093-031	80.10	140-240	11.9	48.9	6.5	N				
9H-4, 30-31	094-031	81.60	140-180	51.9	64.5	4.1	N			C17n?	
9H-5, 30-31	095-031	83.10	100-180	232.9	61.5	7.2	N				
9H-6, 30-31	096-031	84.60	100-180	345.7	45.2	9.1	N				
9H-7, 30-31	097-031	86.10	100-180	132.9	50.0	10.4	NP				
10H-1, 30-32	101-030	85.80	150-210	272.3	74.8	16.1	NP				
10H-4, 31-33	104-031	90.31	150-270	306.6	68.0	20.0	NPP				
10H-5, 30-32	105-030	91.80	140-210	41.6	47.3	15.9	N??				
10H-6, 30-32	106-030	93.30	150-270	348.2	71.9	28.3	NPP				
11H-1, 30-32	111-030	95.30	180-240	320.8	46.9	31.4	NPP				
11H-2, 31-33	112-031	96.81	180-270	267.8	74.1	16.7	NPP				
11H-3, 33-35	113-030	98.33	150-270	132.1	74.7	11.8	NP				
11H-5, 30-32	115-030	101.30	210-240	23.3	48.6	28.5	NPP				
11H-6, 30-32	116-030	102.80	150-240	119.5	69.6	8.0	NPP				
12H-2, 30-32	122-030	106.30	100-250	274.7	53.2	40.5	NPP				
12H-3, 30-32	123-030	107.80	140-240	295.2	86.6	16.8	N??			C17n?	
12H-4, 30-32	124-030	109.30	150-240	157.1	37.1		N??				
12H-7, 30-32	127-030	113.80	180-240	145.0	40.1	26.3	NPP				
13H-1, 31-33	131-031	114.31	140-210	115.4	49.4	22.1	NPP				
13H-2, 31-33	132-031	115.81	100-200	138.7	80.0	14.9	N??				
13H-3, 31-33	133-031	117.31	150-210	180.8	41.9	12.4	NP				
13H-6, 31-33	136-031	121.81	240-270	4.2	40.3	24.7	N??				
13H-7, 31-33	137-031	123.31	150-240	218.9	46.9	40.1	NP				
14H-2, 30-32	142-030	125.30	140-300	300.1	80.7	17.4	NPP				
14H-3, 30-32	143-030	126.80	180-270	96.8	74.4	30.0	NPP				
14H-4, 30-32	144-030	128.30	180-270	301.0	37.8	20.2	NP				
14H-5, 30-32	145-030	129.80	150-240	213.9	66.3	31.0	NPP				
14H-7, 30-32	147-030	132.80	240-240	328.5	77.8	0.0	N??				
15H-1, 29-31	151-029	133.29	150-270	91.7	72.8	6.3	NPP				
15H-2, 29-31	152-029	134.79	210-270	84.9	52.9	19.1	NP				
16X-2, 125-128	162-125	141.75	180-300	120.6	37.7	42.9	N??				
16X-4, 80-83	164-080	144.30	150-240	184.1	48.7	6.3	NP				
16X-5, 25-27	165-025	145.25	140-300	205.6	64.5	22.6	NPP				
17X-2, 23-25	172-025	146.43	240-330	324.4	–53.2	23.1	RP			Subchron in C17n?	Alternatively, it may be a condensed polarity Zone C16r.
17X-3, 36-38	173-036	148.06	140-180	273.3	21.8	15.0	NPP				

Table T5 (continued).

Position, age, facies/Core, section, interval (cm)	Run name	Depth (mbsf)	Characteristic magnetization and polarity							Polarity chron assignment	Comments
			Interval (°C)	Characteristic direction			Polarity rating	Polarity column			
				Declination	Inclination	MAD		Schematic	Generalized		
17X-5, 40-42	175-040	151.10	140-270	44.8	38.1	17.7	NPP				
middle Eocene											
18X-1, 20-22	181-020	154.50	140-180	35.9	73.0	12.3	NPP			C17n	
18X-4, 129-131	184-129	160.09	100-200	172.1	41.1	12.5	NP				
18X-5, 62-64	185-062	160.92	140-480	262.9	–14.7	26.0	RP			C17r	
19X-1, 93-95	191-093	164.83	140-300	268.2	32.6	25.8	N??				
19X-3, 113-115	193-113	168.03	180-240	314.5	72.6	13.8	N??			?	
19X-4, 87-89	194-087	169.27	140-180	330.5	32.0	20.6	INT				
12-m gap in discrete sampling											
20X-6, 33-35	206-033	181.33	180-300	179.1	–9.6	22.2	RPP			C17r	
20X-CC, 25-28	209-025	183.17	150-400	96.6	–18.6	6.7	R				

Notes: Sediment facies are generalized color-texture descriptions from shipboard observations, and the lithologic units for each hole are displayed on the associated magnetostratigraphic figure. The interval (°C) indicates the demagnetization range that was used to compute the characteristic direction and polarity of magnetization for each sample. Declination and inclination are in degrees. MAD (mean angular dispersion) values indicate the precision of the three-dimensional line fit of these paleomagnetic vectors to obtain the characteristic direction. The polarity rating system (R, RP, RPP, R??, INT, N??, NPP, NP, N) is explained in the text. Two polarity columns are shown with the shades of gray or hatchure fill in the schematic column reflecting the polarity rating of individual samples and the generalized column indicating the main polarity intervals. Polarity chron assignments are based on the polarity pattern and biostratigraphic constraints in correlating to the reference magnetic polarity time scale.

Table T6. Paleolatitude of Leg 171B sites.

	Hole 1049A		Hole 1050A, C		Hole 1051A		Hole 1052A, E		Hole 1053A	
Age	Paleolatitude	(N*, α_{95})	Paleolatitude	(N*, α_{95})	Paleolatitude	(N*, α_{95})	Paleolatitude	(N*, α_{95})	Paleolatitude	(N*, α_{95})
Eocene	22.8	(31.5, 2.7)	23.6	(54.5, 2.9)	22.3	(61.5, 2.7)	28.5	(28.5, 4.7)	27.1	(14.5, 9.6)
Paleocene	22.7	(8.5, 9.4)	17.1	(57.5, 2.1)	20.8	(12, 7.7)	23.2	(14.5, 5.5)		
Maastrichtian	22.2	(4.5, 12.3)	23.3	(21.5, 5.8)			22.4	(6, 9.3)		
Coniacian-Turonian			21.9	(2.5, 19)						
Cenomanian			26.2	(8.5, 4.9)			24.7	(4.5, 10.5)		
Albian							20.9	(40, 2)		
Aptian-Albian	35.6	(11.5, 10.9)	18.4	(10, 6)			23.0	(720, 2.6)		

Notes: Paleolatitudes are in °N. Parameters N* and α_{95} are the weighted number of samples of N, NP, RP, and R polarity rating ("P"-rated are given half weight) and the 95% confidence on the paleolatitude computed by the method of Kono (1980). The second Albian listing for Site 1052 is from the mean inclination of 720 shipboard pass-through cryogenic magnetometer measurements at 5-cm intervals within the recovered sediments of Hole 1052E (Shipboard Scientific Party, 1998e).