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Paleomagnetism of ODP Leg 199

Sediments: Implications for Paleogene and Neogene Magnetic Stratigraphy and Paleolatitudes

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ODP Leg 199 was designated to collect sediments along a latitudinal transect in the Pacific Ocean to better understand Paleogene sedimentation patterns and the system of equatorial currents. At ODP Sites 1218 through 1220, the magnetic record of the Paleogene Equatorial sediments extends back to Polarity Chron C20r (Middle Eocene), providing an unprecedented record of Paleogene magnetostratigraphy in Equatorial Pacific sediments. Paleomagnetic data were acquired on the JOIDES-Resolution pass-through cryogenic magnetometer from archive halves of core sections. Ongoing analysis on u-channels corroborates the polarity pattern obtained on the shipboard magnetometer. Natural Remanent Magnetization was measured at 5-cm intervals for each core section, and was followed by four to five steps of alternating field demagnetization up to a maximum of 15 or 20 mT. In addition, shipboard and shore-based measurements of discrete samples were also carried out, including alternating field and thermal demagnetization. All measured lithologies, including an upper red clay, radiolarian ooze and nannofossil ooze/chalk yield reproducible results and have a moderate magnetization intensity, well above the noise level of the cryogenic magnetometer. Stepwise demagnetization of discrete samples indicates that the Characteristic Remanent Magnetization (ChRM) is stable and well defined for the most part of the sedimentary record. The obtained high-resolution magnetic stratigraphy allows to cross-calibrate magnetic reversal stratigraphy with biostratigraphy, including the placement of the Eocene-Oligocene and Oligocene-Miocene boundaries. Overall, results from Leg 199 provide the first complete magnetobiostratigraphic record for the Middle Eocene through the Pliocene in the Equatorial Pacific Ocean. A particularly important aspect of Leg 199 was to establish the latitudinal plate motion of the Equatorial Pacific, based on paleomagnetic data. ChRM directions for the demagnetized discrete samples are used to construct the paleolatitudinal evolution of Leg 199 sites. A progressive northward displacement of the Pacific Plate in the Paleogene, which places the equatorial mound of biogenic sediment in northern latitudes and moves sediments out of the high sediment flux area, is established from the analysis of paleomagnetic inclinations.

1520 Magnetostratigraphy

1535 Reversals (process, timescale,

magnetostratigraphy)

8150 Plate boundary--general (3040)

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