GP62A-06 1510h

Magnetic record of Lake Baikal sediments (Baikal Drilling Project 1998)

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Magnetic remanence vectors from 1500 samples taken from a 600 m core through Lake Baikal sediments are reported along with a complete magnetic susceptibility profile obtained from a pass-through system. Matching the stable remanence directions to the standard geomagnetic polarity timescale (GPTS) provides a robust chronology from the present back to 6.7 Ma and yields a remarkably constant sediment accumulation rate of 3.9 cm/ka. For earlier times - represented by depths below 270 m - correlation to the GPTS is more problematic. Susceptibility fluctuations reflect climatic changes that can be matched to the marine oxygen isotope pattern for the last 6.7 Ma. Spectral analysis of the resulting susceptibility time series then indicates that, for the most part, the Milankovitch obliquity signal dominates. However, when the temporal evolution of the frequency content is investigated by analysing sequences of time windows, a complex picture emerges in which eccentricity and precession power appears during some intervals. Furthermore, there is persistent evidence for significant power in a "non-Milankovitch" band between 28 and 35 ka.

GP62A-07 1525h INVITED

Comparison of Paleomagnetic Records with Different Mean Sedimentation Rates From the Rockall Plateau (ODP Sites 980-982)

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North Atlantic high-sedimentation-rate marine "drift" deposits with mean sedimentation rates of about10 cm/kyr, or greater, often exhibit rather constant sedimentation rates on scales of 0.1-1 Myr. On scales less than 100 kyr, however, sedimentation rates vary by a factor of at least 5 in cases where detailed oxygen isotope data offer precise age control. Guyodo and Channell (2002) have modeled the influence on geomagnetic paleointensity records of variable quality age control for a range of mean sedimentation rates. The simulations illustrate that high-quality age control and mean sedimentation rates in excess of a few cm/kyr are necessary to resolve wavelengths shorter than 25 kyr in stacked u-channel paleointensity records. The numerical simulations are compared with u-channel data from three ODP sites (Sites 980/981 and 982) drilled on the Rockall Plateau and off its eastern edge. The site located on the plateau (Site 982) has a magnetic record extending into the Gauss Chron and a mean sedimentation rate of 2 cm/kyr. One of the sites located at the edge of the plateau (Site 980) has a mean sedimentation rate to the Cobb Mountain Subchron (1.2 Ma) of about10 cm/kyr. The other site at the edge of the plateau (Site 981) reaches the base of the Reunion Subchron with a mean Matuyama sedimentation rate of 5.6 cm/kyr. The age models were derived by matching the benthic oxygen isotope data to an orbitally-tuned target curve. The boundaries of the Jaramillo, Cobb Mountain, Olduvai and Reunion subchronozones occur consistently in the expected marine isotope stages but appear consistently older at Site 982 by about 10 kyr. This implies an effective lock-in depth of several tens of centimeters, at least at Site 982 where the lock-in depth represents more time due to the lower sedimentation rate. Normalized remanence data can be correlated to paleointensity records from ODP Sites 983/984 (700 km to the NW from Site 980-982) and with paleointensity data from the Pacific Ocean, although large chronological offsets are apparent for Pacific records with imprecise age control.

GP62A-08 1540h

The Use of Extraterrestrial ^{3}He as Constant Flux Proxy in Paleoceanography

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A fundamental need in interpreting sedimentary records with respect to climatic aspects is the accurate knowledge of sediment mass accumulation rates. In this context, the development of constant flux proxies (CFP) has created an important asset and has led to reinterpretation of previously published paleoceanographic results with dramatic consequences.

Traditionally, mass accumulation rates are determined from stratigraphic methods (i.e. ^{18}O) and are often biased by sediment redistribution processes. Constant flux proxies represent an alternative approach to reconstruct fluxes of sedimentary constituents by exploiting the fact that the supply rate of the CFP is known to within well-defined limits. CFPs offer two fundamental advantages compared to normal stratigraphic methods. (i) Traditional stratigraphic methods are unable to evaluate the net gain or loss of sediment by lateral transport (focusing and winnowing by deep-sea currents). Fluxes derived using a CFP are insensitive to lateral redistribution of sediments. (ii) Fluxes can be constructed with higher temporal resolution. Whereas it is necessary to assume a constant sediment accumulation rate between age control points in traditional stratigraphic methods, normalizing to a CFP allows a temporal resolution that is limited only by bioturbation.

The currently most established CFP in paleoceanography is ^{230}Th. However, the use of ^{230}Th is limited by its 75 ka half-life to sediments deposited during the past $\sim$ 300 ka. Beyond this time-scale, extraterrestrial ^{3}He that is delivered to the earth surface by interplanetary dust particles (IDP) is a potential candidate. As the cosmic dust is enriched in ^{3}He by ca. 8 orders of magnitude compared to bulk terrigeneous matter, IDPs are the main contributor to the total ^{3}He concentration in many pelagic sediments and can be readily detected. If a constant IDP flux is assumed, the ^{3}He distribution in sediments can be used to determine instantaneous sediment accumulation rates. As ^{3}He is a stable isotope and it is extremely well preserved in marine sediments over at least 10^7-10^8 years, it holds huge potential for application as a CFP well back into the Mesozoic.

GP62A-09 1555h INVITED

Alternative Chronologies for Paleoclimatic Events Based on Excess 230Th and Grain Size Measurements in Marine Sediments.

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The constant production and rapid deposition on the seafloor of 230Th from the radioactive decay of 234U allows the possibility that this excess(230Thxs) can be used as a chronometer in deep-sea sediments. In locations of adequate vertical settling particles and negligible lateral remobilization, the integrated sedimentary inventory of 230Thxs can be used to establish a chronology over an interval as well as instantaneous fluxes for each depth. In such ideal situations, 230Thxs profiling provides a "clock" as well as a "stopwatch". Particle rain in the North Atlantic is generally sufficient to strip 230Thxs from the water column today, and has been greater in the past. Core V28-82 (49°N, 22°W. 3935 m) has approximately the mean regional sedimentation rate, and appears to have a focusing factor near 1.0. It thus serves as a likely location to establish an absolute chronology based on the measured inventory of 230Thxs. The 230Thxs chronology provides an independent estimate for the duration of warm intervals during marine isotope stage 5 (MIS 5). In particular, warm sea surface temperatures persist at the site of V28-82 for approximately 20 kyr, significantly longer than the elapsed portion of Holocene warmth at that location. At ODP Site 984 on the Reykjanes Ridge, lateral redeposition associated with a sediment drift deposit does not allow 230Thxs profiling to be applied for chronology. At this location, the persistence of a millennial oscillation in bottom current strength provides a chronometer beyond the useful life of U-series disequilibria. Here, the MIS 11 interglacial has been examined and shown to have similar variability of bottom flows as in the Holocene, based on the sortable-silt proxy for current velocity. A hanging chronology based on the millennial oscillation yields an estimate for the duration of warm interglacial conditions of approximately 20 kyr. Both methods of estimating the duration of peak interglacial conditions during MIS 5e and MIS 11 yield results that are consistent with orbital tuning, and both far exceed the elapsed duration of the Holocene. In addition, the 230Thxs profiling method yields absolute age estimates for events during the last ice age, including the Heinrich event iceberg discharges H4 and H5, which had previously eluded firm chronological constraints.

GP62B MCC: 121 Saturday 1615h

Magnetic Database Developments: Public Forum *(joint with OS, V)*

Presiding: **S Banerjee,** University of Minnesota

No abstracts available.

GP71A MCC: Hall C Sunday 0830h

Stratigraphic Chronologies: Determination, Interpretation, and Quality Control II Posters *(joint with OS, PP)*

Presiding: **D McMillan,** Scripps Institution of Oceanography**; P Huybers,** Massachusetts Institute of Technology

GP71A-0972 0830h POSTER

Magnetostratigraphical dating of the Majuangou Paleolithic site in the Nihewan Basin, North China

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Two adjacent sections named Haojiatai (HJT, 130.8 m thick) and Majuangou (MJG, 128.8 m thick) in the Nihewan Basin, North China were paleomagnetically examined. Field observations revealed that an artifact layer occurs in the MJG section at 65 m. Stratigraphy patterns between these two sections were correlated by variations in susceptibility as well as two distinctive marker beds, including a conglomerate layer (45-m-depth at MJG and 105-m-depth at HJT) and a greyish-yellow clay layer with mollusc fossils (66-m-depth at MJG and 122.4-m-depth at HJT). Four magnetozones were recognized at the HJT section: two normal, N1 (0-49 m) and N2 (78.8-80.2 m); and two reversed, R1 (49-75.8 m) and R2 (80.2-128.8 m), and six magnetozones were identified at the MJG section: three normal, N2 (17.2-22.2 m), N3 (85-89 m), and N4 (126.6-130.8 m); and three reversed, R1 (0-17.2 m), R2 (22-85 m), and