Clim. Past Discuss., 5, C186–C188, 2009
www.clim-past-discuss.net/5/C186/2009/

Climate of the Past Discussions

Interactive comment on "High resolution cyclostratigraphy of the early Eocene – new insights into the origin of the Cenozoic cooling trend" *by* T. Westerhold and U. Röhl

Anonymous Referee #2

Received and published: 11 May 2009

This paper provides beautifully detailed XRF Fe intensity data for a ca. 100 m-thick section of Early to Middle Eocene sediments from ODP Site 1258 from the Demarara Rise (western equatorial S. Atlantic), which are used to develop a cycle stratigraphy with the potential to evaluate relative ages of the geomagnetic polarity sequence. The paper is well written and reasonably well documented, if supplemental information is taken into account and if the main data figures, i.e., 1, 3, 4, 8, were appreciably expanded to make them more readable in print! However, I believe that there are significant (and understated) uncertaintiues in the fundamental magnetostratigraphic data for the site that limit the utility of these data for calibration of the time scale.

Previous work on Leg 154 on the Demarara Rise showed that the sediments have an excellent cycle stratigraphic expression but unfortunately no useful magnetostratigraphic data could be derived ultimately because of the near-equatorial paleolatitudes (which means that the shallow inclinations cannot be used to diagnose the polarity of a sample) and rotary coring (which means there is no azimuthal orientation and hence declinations also cannot be used to diagnose polarity) (e.g., see Shackleton et al., 2000, Geology). So how did Suganuma and Ogg (2006) get around these problems on Leg 207? Basically, they didn't. Instead, Suganuma and Ogg categorized the demagnetization behavior of each sample and assigned polarity and reliability rating. In fact, it is these subjective categorical values that are plot in Figure S2 for ODP1258 and inadvertently labeled as 'Inclination'.

What is more, Suganuma and Ogg state that the polarity chrons were identified on the basis of biostratigraphy, but there is no discussion of this aspect in the manuscript under review even though the cycle stratigraphy may be more pertinent for calibration of biodatums than the presumed polarity chrons based on them (e.g., see Shackleton et al. who in fact used this strategy). Moreover, it is rather disconcerting to read that $\sim$20 m (a big percentage) of section was apparently removed by a fault in 1258A but not in teh adjacent 1258B according to Suganuma and Ogg (and mentioned in the caption to Figure S2) who don't preclude the possibility of other unrecognized faults. The bottom line is that although the polarity assignments and thicknesses in ODP1258 are not unreasonable, the magnetostratigraphy of ODP1258 does not seem to be sufficiently independent and precise for calibration of the geomagnetic polarity time scale.

Section 5.3 (end of EECO and an apparent obliquity anomaly) seems rather speculative and not well connected to the rest of the paper. As it stands, some statements could use more supportive documentation, e.g., there are several published records of Chron C22r in pelagic (if not deep deep sea) sediments from the Apennines and northern Italy, e.g. Agnini et al. (2006 EPSL). And another idea for EECO the authors might consider is that it simply represents the end of subduction decarbonation of Tethyan

pelagic carbonates with the collision of India with Asia (Edmond and Huh, 2002 EPSL; Kent and Muttoni 2008 PNAS).

Interactive comment on Clim. Past Discuss., 5, 495, 2009.