Geophysical Research Abstracts
Vol. 12, EGU2010-11405, 2010
EGU General Assembly 2010

Paleoproductivity And Carbon Cycling During The Middle Miocene Monterey Excursion

K. Billups (1), L. Diester-Haass (2), K. Emeis (3), L. François (4), I. Jacquemin (5), and V. Lefebvre (6)

(1) University of Delaware, School of Marine Science and Policy, Lewes, United States (kbillups@udel.edu), (2) Zentrum für Umweltwissenschaften, Universität des Saarlandes, 66041 Saarbrücken, Germany, (3) Universität Hamburg, Inst. für Biogeochemie und Meereschemie, Bundesstrasse 55, 20146 Hamburg , Germany, (4) Département d'Astrophysique, Géophysique et Océanographie, Université de Liège, 17 Allée du Six Août, B-4000 Liège, (5) Département d'Astrophysique, Géophysique et Océanographie, Université de Liège, 17 Allée du Six Août, B-4000 Liège, (6) UMR 8157 Géosystèmes, UFR Sciences de la Terre, Université de Lille 1, Cité scientifique, F-59655 Villeneuve d'Ascq Cedex

A prominent middle Miocene (17.5 to 13.5 Ma) carbon-isotope excursion (the so-called Monterey event) is punctuated by six distinct carbon isotope maxima (CM). Orbital tuning of carbon isotope records links each CM event with the long term component of eccentricity (400 kyr) highlighting the importance of insolation control on the global carbon cycle (Holbourn et al., 2008). Here we use proxy reconstructions (benthic foraminiferal accumulation rates) from six sites in the Atlantic and Pacific Oceans combined with geochemical modelling to investigate whether there is a link between long term insolation forcing and the marine carbon isotope record via marine productivity and thus atmospheric CO2 levels. Our results show that none of the CM events are associated with distinctly large changes in paleoproductivity. This observation is consistent with our previous finding that the overall mid Miocene carbon isotope maximum is not associated with a change in marine productivity (Diester-Haass et al., 2009). There are, albeit minor, fluctuations in productivity that can be related to the 400 kyr variability in the carbon isotope records with several productivity maxima between CM events, whereas CM events often show minima in productivity. Only the last of the CM events (CM 6), which occurs in close association with the major step in mid Miocene Antarctic ice growth, is accompanied by an ocean-wide increase in paleoproductivity. To tentatively explain the observed 400 kyr variability of the deep ocean carbon isotope record an improved version of the geochemical box model used Diester-Haass et al. (2009) has been forced by sealevel fluctuations reconstructed for the middle Miocene (Holbourn pers. comm., 2009). Calculations indicate that the induced changes in weathering rates and carbon cycle can explain the temporal variability of the carbon isotope record, but not the observed amplitude.