Geophysical Research Abstracts
Vol. 19, EGU2017-8960, 2017
EGU General Assembly 2017

Major early Eocene carbon cycle perturbations and changes in planktic foraminiferal assemblages from the southeast Atlantic Ocean (ODP Site 1263)

Valeria Luciani (1), Roberta D'Onofrio (2), Gerald Roy Dickens (3), and Bridget Wade (4)

(1) University of Ferrara, Dipartimento di Fisica e Scienze della Terra, Ferrara, Italy (valeria.luciani@unife.it), (2) University of Ferrara, Dipartimento di Fisica e Scienze della Terra, Ferrara, Italy , (3) Department of Earth Science, Rice University, Houston, TX 77005, USA, (4) Department of Earth Sciences, University College London, Gower Street, London, United Kingdom

On a paleoclimatic perspective the early Paleogene represents one of the most interesting and dynamic intervals of the Earth's history. Present record indicates that the Earth climate system reached its Cenozoic maximum peak of global warming and probably of pCO_2 during the early Eocene climatic optimum (EECO, ~49-53 Ma). Superimposed to the general trend, our planet experienced short-term (~40-200 kyr) repeated peaks in global temperatures and major changes in the carbon cycle, known as hyperthermals. Great scientific interest has been focused on the early Paleogene hyperthermal events, given the assumed similarity with the current climatic scenario. Less attention has been dedicated to the EECO long lasting perturbation of extraordinary warming thus many characters of this interval still remain largely unconstrained, especially as for the biotic response.
We present here results on early Eocene planktic foraminiferal analysis from the southeast Atlantic Ocean Drilling Program (ODP) Site 1263 (Walvis Ridge, Leg 208) to explore possible relationship between changes in assemblages and carbon cycle perturbation. The time interval is of particular interest for an abrupt switch occurred at low-latitude of the northern hemisphere between two important calcifiers of the tropical-subtropical early Paleogene oceans, the genera Morozovella and Acarinina at the carbon isotopic excursion known as J event, at the EECO onset. Precisely, the relative abundance of Morozovella permanently decreased by at least half, along with a progressive decrease in the number of species. Concomitantly, Acarinina almost doubled its abundance and diversified. Site 1263 was located during the early Eocene at a latitude of ~40° south therefore representing a temperate setting of southern hemisphere not yet explored for planktic foraminiferal changes. We document a permanent decrease in Morozovella abundance at the beginning of the EECO, although this decline is delayed by ~165 kyr with respect to the low-latitudes of the northern hemisphere. We suppose that that this delay can be explained with a temporary migration of the warm water morozovellids southwards at the initiation of EECO warmth, but suffering consequently of the unfavourable environmental conditions triggered by the persistent EECO perturbation. Our data confirm that the Acarinina over Morozovella turnover was global and related to the EECO rather than local factors, even though the triggering mechanisms still remain elusive. We speculate that competition in the mixed-layer played a significant role in the switch in abundance that favoured Acarinina over Morozovella at the beginning of the EECO. A competition between the two genera is deducible by their anti-phase variations in abundances recorded at the early Paleogene hyperthermals in different settings and confirmed for Site 1263. In addition, we document at Site 1263 the virtual disappearance within the EECO of the biserial chiloguembelinids, commonly considered as inhabiting the Oxygen Minimum Zone, and a certain reduction in abundance of the thermocline-dweller subbotinids as a result ecological niches contraction. The significant and permanent modifications recorded by the foraminiferal assemblages at Site 1263 emphasize the prominent effect of the long-lasted EECO perturbation that superimposed and prevailed on the ephemeral changes linked to the early Eocene hyperthermals.