Geophysical Research Abstracts
Vol. 17, EGU2015-669, 2015
EGU General Assembly 2015

Changes in seasonality of organic matter supply to the sea floor in the Eastern Equatorial Pacific over the last 260 kyr based on benthic foraminiferal assemblages

Ekaterina Ovsepyan (1), Elena Ivanova (1), and Laurence Vidal (2)

(1) Shirshov Institute of Oceanology RAS, Moscow, Russian Federation (ameli_cat@mail.ru), (2) Universite Paul Cézanne - CEREGE, Aix en Provence, France

At present, short- and long-term variations of sea-surface biological productivity in the Eastern Equatorial Pacific have been extensively studied in order to evaluate changes in efficiency of biological carbon dioxide pump in the past. Benthic foraminiferal assemblages are investigated from the IMAGES giant Core MD02-2529 (8°12.5' N, 84° 07.5'W, w.d. 1619 m) off Costa Rica recovered the last 262 kyr according to oxygen isotope stratigraphy confirmed by 15 AMS14C dates in the upper part of the core. A predominance of high productivity species (e.g. hispid Uvigerina, U. peregrina, M. barleeanus, B. mexicana, C. carinata, T. delicata, C. wuellerstorfi, P. bulloides, Chilostomella spp., Globobulimina spp.) in benthic foraminiferal assemblages indicates intensive organic matter supply to the sea floor throughout the interval studied. CABFAC factor analysis applied for the species percentages matrix reveals that changes in taxonomic composition are described by three factors. Factor 1 is loaded mainly to U. hispida and in a less degree to U. peregrina. According to the modern ecological notion (e.g. Loubere, Fariduddin, 1999), U. hispida is associated with high and fairly constant organic matter flux to the seabed. Hence, high values of factor 1 reflect high productivity and low seasonality conditions. Factor 2 is loaded positively to U. peregrina and negatively to U. hispida. U. peregrina prefers slightly degraded organic matter, whereas U. hispida is abundant within the regions where organic matter is fresh and dominated by diatoms. Thus, we suppose that maxima of factor 2 mirror high productivity conditions with non-regular flux of organic matter to the sea floor with several events of phytoplankton blooms over the year (moderate seasonality). We believe that fresh organic matter derived from the photic layer underwent bacterial decomposition between multiple flux pulses and thereby contributed to thrift U. peregrina assemblages. Factor 3 is loaded positively to M. barleeanus and negatively to U. hispida. M. barleeanus prefers more degraded organic matter than U. peregrina (Fontanier et al., 2002) therefore our data suggest a decrease in frequency of flux events over the year (strong seasonality) under high annual sea-surface bioproductivity conditions during intervals of high factor 3 values. A comparison of three factors demonstrates cyclic recurrence of gradual transition from low to moderate and then to a high seasonality of organic matter supply to the sea floor over the last 262 kyr. In addition, variations of factor 3 (high seasonality) demonstrate in-phase correlation with the obliquity cycle whereas previous studies (Beaufort et al., 2001; Ivanova et al., 2012) documented precession control on primary production.