Geophysical Research Abstracts,
Vol. 11, EGU2009-10433-1, 2009
EGU General Assembly 2009

High resolution sedimentary record from the Cocos Ridge: evidence of land-ocean linkages in the Eastern Equatorial Pacific over the last 70 ka

I. Murdmaa (1), E. Ivanova (1), G. Leduc (2,3), L. Beaufort (2), V. Peresypkin (1), L. Vidal (2), E. Ovsepyan (1), G. Alekhina (1), V. Kravtsov (4), and V. Vasileva (1)

(1) Shirshov Institute of Oceanology, Russian Academy of Sciences, Moscow, Russia (murdmaa@mail.ru) Fax: +7499 1245983, (2) CEREGE, Aix-Marseille Université, CNRS, Collège de France, IRD Europôle de l'Arbois, Aix-en-Provence, France, (3) Department of Geosciences, Christian-Albrechts-University, Kiel, Germany, (4) Atlantic Branch of Shirshov Institute of Oceanology, Russian Academy of Sciences, Kaliningrad, Russia

We analyzed n-alkanes spectra, TOC content, and C/N ratio in the upper 12 m of the giant IMAGES Core MD02-2529 from the Cocos Ridge (08°12.33'N; 84°07.32'W; 1619 m w.d.) to estimate terrestrial organic matter (TOM) and marine organic matter (MOM) contribution to the total organic matter budget in sediments. Multi-proxy studies of nannofossils, benthic and planktic foraminifers reveal productivity variations during the time interval of the last ∼ 70 ka recovered by the upper part of the core according to the age model based on AMS-14C dates and benthic oxygen isotope record. According to the shipboard core description, the slightly calcareous hemipelagic mud recovered by Core MD02-2529 contains a considerable admixture of terrestrial plant remains. This is confirmed by optical microscopic and SEM studies which reveal a strong pyritization of the particular terrestrial organic matter. As estimated by the proportion of the mainly terrestrial long-molecular alkanes (C23 – C38) relative to mainly planktic short-molecular ones (C10 – C22), the TOM input largely controls variations in the TOC content throughout the studied core interval, possibly except for the Upper Holocene, where higher TOC values correspond to relatively increased MOM content. TOM strongly dominates over the MOM content in sediments of the beginning of Termination 1, most enriched in total organic matter (up to 3.4% TOC). High content of the TOM is also fixed by n-alkane data over the Younger Dryas and H-events. Mass accumulation rates (MAR) of TOC, as well as terrestrial and marine organic matter, generally support the data on percentages, but show that the MOM flux was considerable even during the maximum TOM input at the beginning of Termination I. We suggest that this abundant TOM flux was related to the glacioeustatic sea level lowstand at the LGM, during which the emerged shelf became a vegetated coastal plain affected by seasonally humid tropical monsoon climate. The terrestrial organic debris was most intensely washed off the coastal plain at the beginning of post-glacial transgression ∼17 cal. ka BP. Glacioeustatic sea level oscillations, along with climate and river runoff changes, controlled variations in the TOM flux throughout the studied interval. The MOM commonly prevails in intervals with a low TOC content, although its relatively high MAR values may also coincide with TOC maxima, as at the beginning of Termination I. The MOM contribution to the total organic matter increased in the Early Holocene, at ∼ 8 cal. ka, and especially at ∼ 60 cal. ka (possibly coeval with the H-6 event). Relatively low and less variable accumulation rates of MOM, as compared to those of TOM may be explained by the location of the site MD02-2529 between the two high-productivity areas associated with coastal upwellings in the Panama Bight and Gulf of Papagayo. The paleoproductivity estimates based on coccolithophoride counts show a short-term variability with the extremal values during the Termination I. This high-productivity event corresponds to the highest planktic foraminiferal abundance and the maximum values of foraminiferal productivity index. The productivity increase at 16-14 cal ka BP might result from the nutrient rearrangement related to reorganization of the thermohaline circulation over the termination. However, high total abundance of benthic foraminifera and maximum values of several productivity-related benthic species are found at MIS 2, from ∼ 25 to 22 cal ka BP. MOM export from the upper continental slope by the bottom nepheloid layer during the LGM sea level lowstand might serve as the food source for this benthic production pulse. Meanwhile, calcareous phytoplankton production seems to remain rather high through the late MIS3 - Termination I and decreased during the Holocene. The low total abundance of planktic foraminifera and an enhanced content of oligotrophic mixed-layer dwelling planktic foraminiferal species in the Holocene sediments confirm the productivity decrease. The low productivity might result from a pycnocline deepening due to abundant

moisture supply from the Caribbean and corresponding surface water freshening at site MD02-2529.