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Biomarker records of climate change in the Caribbean Sea and East Equatorial Pacific associated with the closure of the Central American Seaway

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Lipid biomarkers in three sediment cores taken from the Caribbean Sea (Ocean Drilling Program sites 999 and 1000) and from the East Equatorial Pacific (EEP) (Site 1241) were used to examine the timing of tectonic changes in the Central American Seaway (CAS) and its influence on paleoclimatic and paleoceanographic changes. Alkenone SSTs in both regions document a long-term cooling from the Late Miocene/Early Pliocene to the late Pleistocene, suggesting that the two regions responded similarly and dramatically to Plio-Pleistocene global climate change. Our data clearly show that the closure of the CAS has not induced a SST anomaly between the Caribbean Sea and EEP. This would suggest that the changes in foraminiferal 18O records reflect mainly changes in salinity as a result of a change in moisture transport related to the build-up of the Panama Isthmus and hence a significant change in the hydrological cycle. Alkenone concentrations also vary through this time; concentrations in Pacific samples are relatively higher prior to 5 Ma and during the period between 3 and 1.5 Ma but low during the Pliocene warm period (5-3 Ma). This is in marked contrast to the Caribbean Sea, where alkenone abundances are generally high from 5 to 4 Ma. The long-term variability of EEP productivity is probably caused by either changes in upwelling intensity or the nutrient status of source waters, probably associated with changes in the reorganization of global ocean circulation.