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Pliocene shoaling of the Central American Seaway and its effect on Caribbean and tropical East Pacific upper ocean stratification.

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Multispecies planktonic δ^{18}O records and Mg/Ca-temperature reconstructions from ODP sites 999, 1000 and 1241 were used to assess changes in Caribbean and tropical East Pacific upper ocean stratification in response to the progressive closure of the Central American Seaway. Our studies focus on the time interval from 5.5 to 2.5 million years. Previous studies suggested that the sill depth of the Panamanian Gateway shoaled to less than 100 m by about 4.6 Ma as indicated by an increase in Caribbean sea surface salinity (SSS), reflecting the development of the modern Atlantic-Pacific SSS contrast. At site 1241, the general increase of δ^{18}O and Mg/Ca temperature gradients between the mixed-layer dweller *G. sacculifer* and the deeper dwelling foraminifer *G. tumida* suggests a shoaling of the tropical East Pacific thermocline from 5.5 Ma to 4 Ma. At Caribbean sites 999 and 1000, both δ^{18}O and Mg/Ca temperature gradients indicate a warming of subsurface water masses after 4.4 Ma, suggesting the development of the Caribbean warm pool. Our observations are consistent with results from modeling studies (open vs. closed seaway) using the UVic-ESCM. Evidence of further shoaling of the seaway is provided by Pacific-Caribbean Mg/Ca-derived SST reconstructions (sites 999 and 1241) of shallow-dwelling foraminifers (*G. sacculifer*). Similar SST values and fluctuations persisted until about 2.6 Ma, before larger-scale sea level fluctuations became important in response to the amplification of the northern hemisphere glaciation. After about 2.6 Ma, glacial stages (indicative of sea level lowstand) are associated with Pacific minima in SST (site 1241) and maxima in Caribbean SST. Thus, the cessation of the throughflow during glacials terminated the imprint of cooler Pacific surface waters in the Caribbean and allowed Caribbean temperatures to

increase. This documents the final phase of the closure of the Central American Isthmus, when sea level fluctuations on the order of 50-70 m start to control the Pacific inflow into the Caribbean.