



Loop Current variability in the Gulf of Mexico over the last 400 kyr in relation to changes in meridional overturning circulation and Mississippi discharge

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Planktic and benthic foraminiferal Mg/Ca and oxygen isotopes, grainsizes, organic carbon and carbonate content were analysed from IMAGES core MD02-2575 recovered from the DeSoto Canyon, eastern Gulf of Mexico (GOM). The marginal position of the core to the West Atlantic Warm Pool appears to be an ideal place to decipher the evolutionary history of the warm pool on glacial/interglacial and even shorter time scales, and to reconstruct the dynamic evolution of the Loop Current, a prominent current exporting warm tropical waters from the Caribbean through the Yucatan Channel in the GOM, and further to Florida Strait. The reconstructed SST_{Mg/Ca} record (*G.ruber*) shows a close correspondance to the $\delta^{18}\text{O}$ -record over the last 400 kyr, with an overall SST_{Mg/Ca} range from 22°C to 30°C and a deglacial SST-amplitude of 5.5°C at Termination I. Hence, the SST_{Mg/Ca} variability in the eastern GOM is much larger than in the central Caribbean with SST_{Mg/Ca} coming close to central Caribbean SST during interglacials, while glacial SST_{Mg/Ca} were significantly cooler than in the central Caribbean. SST_{Mg/Ca}, and $\delta^{18}\text{O}_{\text{seawater}}$ variations calculated from the combined measurement of planktic Mg/Ca and oxygen isotopes exhibit temperate and high saline conditions during interglacials/interstadials, and cool and low saline conditions during glacials/stadials. The comparison of our $\delta^{18}\text{O}_{\text{seawater}}$ data to those from Orca Basin and the central Caribbean point to generally fresher sea-surface conditions during extreme cool periods, most likely due to a strengthened Mississippi discharge, a less established Loop Current, and reduced evaporation in combination with a southern position of the Intertropical Convergence Zone (ITCZ). Interstadial and interglacial sea-surface conditions, in turn, point to a strong, northward flowing Loop Current in line with the northward position of the ITCZ, allowing for resembling

central Caribbean and eastern GOM conditions. The continuous $SST_{Mg/Ca}$ increase during the last deglaciation being synchronous with the Byrd ice core oxygen isotope record reflecting climate change over Antarctica, and the lead of $SST_{Mg/Ca}$ over global ice volume change by 3 kyrs implies a key role of the tropical ocean in forcing global climate change.