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Evaluation of organic geochemical and micropaleontological proxies for Holocene paleoclimate reconstructions in Tampa Bay, Florida

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The exact consequences of human induced climate change are as yet not known. One of the current debates concerns the relation between rising sea surface temperatures (SST) and enhanced hurricane activity. It has also been suggested that the El Niño Southern Oscillation (ENSO) variability plays a major role in providing favorable circumstances for hurricane development. Paleo-climate reconstructions can help understanding long-term trends in hurricane activity. However, reliable climate reconstructions first require that suitable proxies are developed and tested. For this purpose, a pilot-study was performed using biomarkers, pollen, dinoflagellates and diatoms in a core from Tampa-Bay, Florida, covering the Holocene. The hydrological cycle in this part of Florida is strongly affected by both ENSO [1] and hurricanes.

Biomarkers of both terrestrial and marine origin were abundant in the core sediments. High taraxerol concentrations were found which are characteristic for the close proximity of mangrove forests on the bays fringes. Other vascular plant derived biomarkers include friedelanone and -sitosterol. Marine biomarkers include amongst others dinosterol and long-chain C37 and C38 alkenones, indicative for dinoflagellates and haptophyte algae respectively. These biomarkers are absent in sediments older than 7 kyr BP, indicating a non-marine depositional environment. In sediments younger than 7 kyr BP, increasing amounts of marine biomarkers indicate a transition towards estuarine conditions. SST was reconstructed on the alkenones-based paleothermometer Uk'37 and indicates temperatures of $\tilde{2}6$°C for the past $\tilde{4}$ kyr. Between 7 and 4 kyr BP, concentrations of alkenones in the sediments are too low for reliable SST reconstructions.

The shift towards estuarine conditions is a consequence of rising sea-levels following the last deglaciation and is in agreement with earlier findings by Cronin et al. [2], who recognized a change from lacustrine to marine sediments around 7 kyr BP in the same sediment core. Dinoflagellates and diatoms indicate increasing marine conditions from 7 kyr BP onwards, implying that sea level continued rising. Also the pollen-record shows a shift around 7 kyr BP, with a decrease in Cypress swamp vegetation and a slight increase in mangrove pollen, indicative of transgression. Organic geochemical and micropaleontological proxies are in agreement with each other and confirm earlier findings for Holocene Tampa Bay development. The excellent preservation of both terrestrial and marine biomarkers makes them a useful proxy for the reconstruction of SST, precipitation and runoff and eventually hurricanes, especially when read a multi-proxy approach.