Holocene climate variability in the Mississippi catchment as inferred from Gulf of Mexico sediments.

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For this study, we measured the elemental composition in a sediment core from Pigmy Basin in the Gulf of Mexico (GOM) in high resolution. Pigmy Basin is located on the Louisiana continental slope about 300 km southwest of the Mississippi River mouth. Since the Mississippi River system drains almost half of the conterminous US, we expect to see an integrated signal of North American climate in the GOM sediments.

We analyzed the relative abundance of 8 major and minor elements (Al, Si, S, K, Ca, Ti, Mn, and Fe) by X-ray fluorescence core scanning. Thereby, we obtained data in 1cm as well as 2mm resolution, which correspond to 25 and 5 years, respectively. Most of these elements are derived from terrestrial sources and co-vary strongly throughout the core. Exceptions are Ca, which shows clear anticorrelation due to dilution in the sediment by carbonate, as well as S and Mn. The relative contribution of terrigenous elements shows large and periodic variations throughout the Holocene, which we interpret as changes in Mississippi transport. Interestingly, a peak in terrigenous element abundance occurs just before 8.2 kyr before present, a time of large but yet unexplained changes in many climate records.

Poore et al. (2004, 2005) reconstructed the Holocene variability of surface circulation in the GOM using the same core. The observed periodic fluctuations were linked to changes in the mean position of the Intertropical Convergence Zone (ITCZ) and seem to covary with the strength of the North American monsoon. Overall, we find only a weak correlation of our elemental composition record with the ITCZ record of Poore et al. (2004, 2005), however. The same is true for other ITCZ recorders, such as the Ti record from Cariaco Basin off Venezuela (Haug et al. 2001). Hence, the first comparisons point towards an additional northern source for the observed signal in element composition.

REFERENCES


