Can We Use Stable Isotopes to Fingerprint Carbonate Rich Layers in the Hudson and To Relate Them to Specific Climatic Processes and Events?

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We found layers with high concentrations of planktonic marine foraminifera in CD02-29A, a core from the lower Hudson River. We find these layers in parts of the core with low acoustic impedance, allowing us to selectively sieve for these layers and to minimize sieving and sampling time. In most cases, the layers contain enough foraminifera for multiple stable isotopic analyses of carbon and oxygen. Many of these layers contain tens of percent of G. ruber, and pink G. ruber, planktonic forminifera that are typically found in high concentrations in subtropical and tropical waters, respectively. This is in contrast to the New Jersey margin, where pink G. ruber is present at the 1-2% level, and G. ruber is also less abundant. The high concentrations of G ruber may mean that these layers derive their foraminifera from the incursion of warm marine water into the river. The warmer water could be the result of summer droughts or hurricane generated storm surges. Other layers with low concentrations of G. ruber may come from storm surges associated with winter storms. Stable isotopic measurements of oxygen and carbon isotopes on the foraminifera may be able to distinguish among winter storms, hurricanes and droughts. However, we have found that the foraminifera in modern sediments contain coal residues. The coal-derived carbon could seriously disturb carbon isotopic signatures. Therefore, we are simultaneously developing nondestructive methods of removing the coal residues from the foraminifera. We are also dating the sediments using Pb^{210} and Cs dating with Steve Chillrud and Todd Nelson. Preliminary results are encouraging, in that Cs has been found in the top 30 cm of the core but not below 52 cm. The base of modern Pb in the core is at 489 cm. There is a pronounced change in ratios of Fe/Ti and Ti./Zn below 439 cm. We hope to relate these changes to changes in the use of coal and in coal technology and to use them as time stratigraphic horizons. If our time control is accurate enough, we may be able to relate specific layers with high concentrations of planktonic foraminifera to individual storm surges or droughts.