# Programmed-temperature pyrolysis/combustion $\Delta^{14}C$ and $\delta^{13}C$ determinations in marine and fluvial sediments to evaluate carbon cycling

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We have developed methodology for a programmed-temperature pyrolysis/combustion system (PTP/CS), originally used for radiocarbon (14C) dating on Antarctic sub-ice shelf sediments in the Ross Sea and the northeastern Weddell Sea. We apply our method to bulk acid insoluble organic matter (AIOM), utilizing the differences in diagenetic stability of AIOM to separate different components from the bulk. Improving the bulk AIOM radiocarbon age (21,000 years) of sediments from the northeastern Weddell Sea, the radiocarbon ages of individual temperature intervals from the AIOM ranged from 10,400 years (fm=0.274) to 21,600 years (fm=0.068) within a sediment horizon; PTP/CS on AIOM can retain information that is potentially lost when analyzing small proportions of organic material. We are currently working to extend our method to evaluate carbon cycling in areas such as the Mississippi River, the Ganges/Brahmaputra River System, and the Guianas marine mud-banks. Generating age spectra and isotopic values of sediments in major river systems such as the Mississippi and Ganges/ Brahmaputra will lend to the understanding of global carbon cycling by elucidating the lability of proportions of the AIOM. Additionally, the age spectra of sediments in the Guianas mud-banks, formed off the coast of northeastern South America from the deposition of sediment transported down the Amazon River will increase our understanding of the role of AIOM diagenesis in the marine environment. We work to test the hypothesis that even in such different sedimentary environments—marine environments such as the Guianas mud-banks and the Antarctic sub-ice shelf systems, and fluvial environments such as the Mississippi and Ganges/Brahmaputra River Systems - chemical structure within AIOM sediment horizons is related to age. In tandem with compound-specific stable isotope work, we would be able to elaborate upon this hypothesis compositionally and improve the PTP/CS technique.