

## **Stable-isotope tracers of processes on Quaternary Continental Shelves**

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The ratios of the principal stable isotopes of each of the elements oxygen, carbon, nitrogen, sulfur and boron provide a wealth of information about continental shelf environments, both modern and Quaternary. Using new examples from Australia and south-east Asia, the tracing of trophic status, and tracing of both natural terrestrial and pollution inputs to the continental shelf will be examined using C-13 and N-15. Pollution includes both effects wrought by changes in agricultural practices and by discharge of urban/industrial waste into the shallow marine environment. The dating of enclosing sediments provides the temporal resolution needed to determine the rates of delivery and deposition of such terrestrial input to the marine environment.

Over longer time scales, marine transgressions and regressions are shown to be readily traceable using both carbon-13, and boron-11. In this case the carbon-13/carbon-12 ratio of acid-insoluble organic carbon preserved in sediments distinguishes, in many cases, between terrestrial and marine sources of carbon. Carbonate-secreting organisms (for example, molluscs, ostracods, forams) incorporate boron that is indicative of terrestrial ( $\delta^{11}\text{B} \sim 0\text{‰}$ ) or marine ( $\delta^{11}\text{B} \sim +40\text{‰}$ ) sources, or mixtures thereof. Thus  $\delta^{11}\text{B}$  values of carbonate microfossils recovered from continuous sediment sequences on continental shelves record past transgressions and episodes of estuarine conditions. The  $\delta^{18}\text{O}$  values of the same microfossils further assist in palaeoenvironmental reconstructions, and bivariate  $\delta^{11}\text{B}/\delta^{18}\text{O}$  diagrams are particularly instructive.