Talk by Ander Martinez de Lecea

The application of carbon and nitrogen stable isotopes in the biogeochemistry of the KZN marine ecosystems

Carbon and nitrogen stable isotopes have a broad range of applications in marine science. In this study they were applied to produce a novel understanding of the pelagic and benthic marine ecosystems of the KwaZulu-Natal Bight, on the East Coast of South Africa, in terms of their main drivers. The KZN Bight is considered to be oligotrophic with distinct sources of nutrients entering the system by a series of hydrographic processes, including an upwelling cell, a cyclonic-lee eddy and the outflow of several estuaries, of which the Thukela River is the most important. It has been suggested that the upwelling cell is the most dominant of these potential sources in controlling the marine ecosystems of the Bight, so this hypothesis was examined. To understand the function and drivers of the marine ecosystems, stable isotope ($\delta^{13}C$ and $\delta^{15}N$), %Corg, %N and C:N ratio analyses were carried out on a range of biotic and abiotic samples, collected on a research cruise and various other expeditions, including marine and riverine sediment samples, total suspended solids (TSS) and an array of marine organisms from across the Bight. Results suggested that the upwelling cell, which has been thought to occur intermittently, did not occur in either of the sampling seasons. However, there were indications that, unexpectedly, the residual primary productivity, i.e. phytoplankton bloom, of an old upwelling event was being transported southwards through the Bight with the current and was consequently sampled. The isotopic signatures of total suspended solids indicated that the Bight pelagic ecosystem was controlled by the marine hydrographic processes, while the isotopic signatures of the surface sediments of the Bight indicated that the benthic ecosystem was mainly dominated by riverine (via estuarine) input. Furthermore, organisms collected from the demersal environment appeared to be highly dependant on the organic matter from the sediments.