Prahl, F.G., J. M. Hayes, and T.M. Xie. "Diploptene: An indicator of Terrigenous Organic Carbon in Washington Coastal Sediments." ***Limnology and Oceanography*** **37.6 (1992): 1290-1300.**
(Reviewed by Lucy Cho)

This is a biogeochemical study done on the levels of diploptene in the coastal region of Washington state. Diploptene is a good indicator of organic carbon levels in the sediment. The researchers compared data collected from sediment samples of the coast with those of the Willamette River and the Columbia drainage basin because it was hypothesized that soil erosion was responsible for diploptene accumulation along the coast. In comparison to riverine dissolved organic carbon, particulate organic carbon from detritus is easily transported by water currents, and is deposited mostly on continental shelves. It is known that in the Washington coastal region, approximately 14.3 Tg per year of sedimentary particulate material and its associated organic constituents are hydraulically deposited and sorted in bands along the coast in the process of dispersion.

Prahl, Hayes and Xie collected data on levels of diploptene as well as levels of long-chain n-alkanes because these alkanes can provide information about the origin of the diploptene in a particular region. There are several sources of diploptene, including methylotrophic bacteria, cyanobacteria, and certain species of ferns. Isotopic levels of 13 C were found to be nearly identical in both Washington coastal sediments as well as sediments from the Willamette River, indicating that the source of diploptene in both sites is mostly likely the same, and that soil-erosion is responsible for accumulation of diploptene along the coast. However, there was a complication in this hypothesis in that the sediment from the Columbia River showed a complete depletion of 13 C. This indicated that methylotrophic bacteria plays a significant role in diploptene production. It is suggested that the reason 13 C levels in the Washington coast were similar to those of the Willamette River is that the 13 C-depleted diploptene produced in the Columbia River drainage basin is quickly biodegraded before the sediment is passed through and deposited along the coast.

Critique

Although the focus of this paper was not on man-made pollutants, I thought it was very interesting for several reasons. First, it very carefully observed the biological processes that occur in freshwater and the ocean and second, it demonstrated how complex the river systems are in showing that the biological processes that occur in the Willamette River have a rather direct effect on those in the Washington coast. Third, their hypotheses and data analyses were very carefully done. They looked at a very broad range of possibilities to explain the data they collected. For instance, to find an explanation in the change in isotopic data of the Columbia River, they did another set of experiments to test the degradation hypothesis, in which they treated bulk sediment with hydrogen peroxide to degrade it. In the end this showed no change in isotopic data, but they explained that their hypothesis may still hold true. Despite some unanswered questions that require more data collection in the future, I felt this was a complete study.

return to info sources page

return to home page