Can stable isotopic composition of tropical East Africa flora be used as source indicators in costal marine sediments?

Muzuka, A.N.N.
Institute of Marine Sciences, P. O. Box 668, Zanzibar, Tanzania

Abstract

The carbon and nitrogen stable isotopic compositions of some flora from costal Tanzania are used to assess if they can be used as terrestrial end members during estimation of the terrestrial fraction in coastal marine sediments. The results of carbon isotopic composition of various tree leaves, which average -29.3 ± 1.4 $^{0}/_{00}$ indicate that these tropical higher land plant species follow a Calvin-Benson or non-Kranz (C_3) type metabolism. The results for grass species, which average -13.2 ± 2.4 $^{0}/_{00}$ indicate most of the follow a Hatch slack or Kranz (C_4) type metabolism. The nitrogen isotopic values are relatively higher than expected for terrestrial organic matter.

The average $\delta\ ^{15}N$ values for both tree and grass samples are higher than 5 $^{0}/_{00}$ and fall within the range of normally considered to be marine. The high enrichment in ^{15}N may be related to conditions in the environment in which the pant thrive. Plants growing on sandy, dry and overgrazed environment are expected are expected to be enriched in ^{15}N owing to full utilisation of all available nitrogen species regardless of their isotopic compositions. Other processes which may cause an enrichment in ^{15}N includes tye of clay minerals present in the soil, supply of ^{15}N-enriched nitrate through sea spry, and local de-nitrification especially in swampy and lake margins where inputs of organic matter may be higher than the rate of decomposition.

In the savannah environment where contribution of the C_4 types plants might be substantial, terrestrial and member need to established prior to evaluation of the terrestrially derived organic matter in the marine environment. Furthermore, the results indicate that stable nitrogen isotopes seem to have limited applicability as a source indicator in coastal waters of East Africa. However, more work need to be conducted to determine the terrestrial end member value for the coastal areas.