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ANALYTICAL DEVELOPMENTS OF CARBON AND NITROGEN ISOTOPE COMPOSITION IN GULF OF MEXICO SEDIMENTS

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The stable isotope compositions of carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) were determined in 37 sediments from the southern Gulf of Mexico by gas chromatograph isotope ratio mass spectrometer (GC-IRMS).

The objective of this work is to discuss briefly the analytical developments of $\delta^{15}N$ measurements in sediments, the evaluation of the $\delta^{13}C$ from the saturate fraction, aromatic fractions and bulk of the sediments and compare the organic nitrogen and carbon isotope ratios of organic matter from marine sediments in an attempt to evaluate the technique for its applicability in the geochemistry studies.

$\delta^{15}N$ provides a powerful tool to trace sources for oceanic and costal production (different nitrate sources), to analyze biogeochemical processes affecting the nitrogen cycle in the sea, and to study trophic chain dynamics (López Veneroni, 1998). Variations in $\delta^{15}N$ and $\delta^{13}C$ ratios have been employed as useful natural tracers to test hypotheses regarding the biogeochemical cycles of nitrogen and carbon in the marine environment (Altabet, 1996).

$\delta^{15}N$ and $\delta^{13}C$ values varied from -1.0 to 13.0‰ and -27.98 to -20.21‰ respectively. Different distribution patterns of $\delta^{15}N$ and $\delta^{13}C$ were observed in the studied sediments. Sediments presenting higher organic carbon values (asphalt-sediments) show $\delta^{13}C$ values between -28‰ to -27.5‰, which are similar to those observed in some reported Tithonian sourced oils in Mexico (Guzmán Vega and Mello, 1999).

The isotopic composition of the C_{15+} saturate and aromatic fractions is plotted in Fig. 1. The totality of the samples falls below the marine-terrigenous separation line (Sofer, 1984), indicating a marine origin for the samples.

The wide range observed in the $\delta^{15}N$ values of these sediments could result from the degree of nitrate utilization. The denitrifacation process in the water column also plays an important role in the nitrogen cycle in sub-oxic conditions. So the enrichment in ^{15}N of some sediments might be caused by water column denitrification.

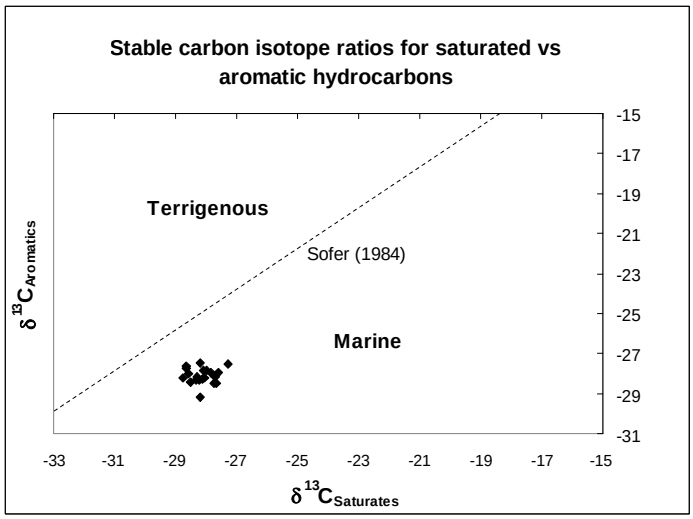

Figure1. Isotopic composition of the C_{15+} aliphatic and aromatic fractions. The plot locations suggest that these samples contain mainly marine organic matter.

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