

DISTRIBUTION, SOURCE AND HISTORICAL TREND OF ALIPHATIC HYDROCARBONS IN SEDIMENT CORES FROM IMO RIVER, SE NIGERIA.

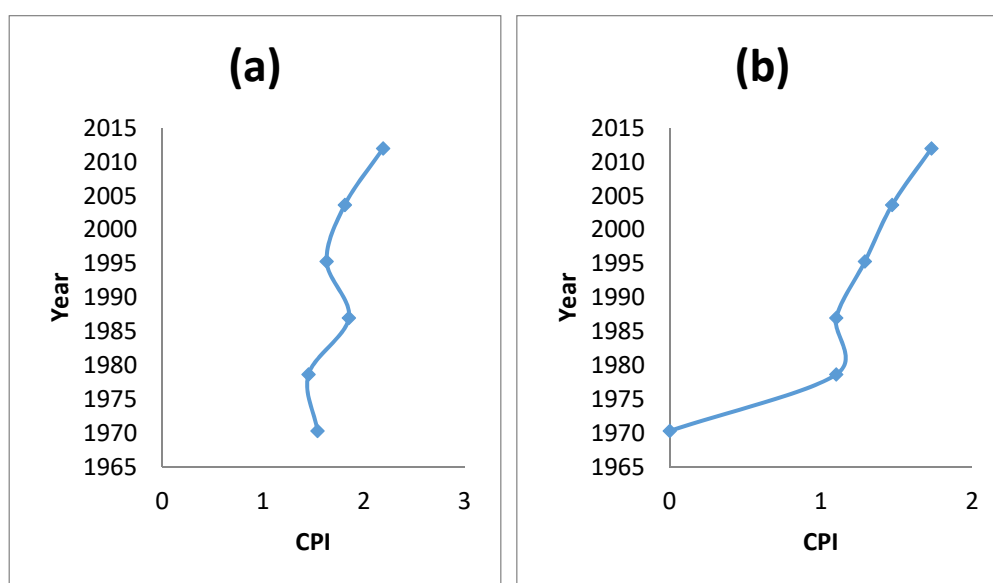
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Abstract

Four recent sediment cores (0-30 cm long) from Afam (AF), Mangrove (MG), Estuary (ES) and illegal Petroleum refinery (PT) sites of the Imo River, Southeastern Nigeria were analyzed using gas chromatography-mass spectrometry (GC-MS) in order to characterize the sources, distribution and fate of aliphatic hydrocarbons as well as examine their historical trends of deposition and assess humans-induced changes in the last ca. 5 decades. Evaluation of proxy parameters such as carbon preference indices (CPIs, 2.01 - 2.19), carbon maxima (C_{max} , 29, 31) and atomic carbon-nitrogen (C/N, 16.51-31.32) for the most recent top layers (0-5 cm) revealed greater wash-in of land-derived organic matter (OM), attributable to the recent rise in water height/flood following intense rainfall occasioned by global climate change. The bottom layer (PT1, 25-30 cm,) of the PT core deposited ca. 1964-1972 exhibited CPI of 0.97 and pristane/phytane (Pr/Ph, 3.75), suggesting that oil bunkering/illegal refinery activity had begun in the region about 8 years after the first commercial discovery of oil in Nigeria in 1956. The non-detection of petroleum biomarkers (eg. $\alpha\beta$ -hopanes) in the bottom layer (MG1, 25-30 cm; 1964-1972) of MG core revealed a period of relatively pristine depositional environment and the occurrence in high abundance of heptadecane (C_{17}) in the middle layer (ES4, 10-15cm, ca. 1981-1989) of ES core corresponded with the period of eutrophication that blocked the waterway in the area. Measurement of a marked unresolved complex mixture (UCM) at the near-top layer (AF5, 5-10 cm) of AF core indicated that heaviest contamination by petroleum hydrocarbons occurred at ca. 1997-2005. This time-frame coincided with the period of intensive bunkering and oil pipeline vandalization by Niger Delta militant groups who campaign for fair allocation of oil revenue in the oil-rich region.



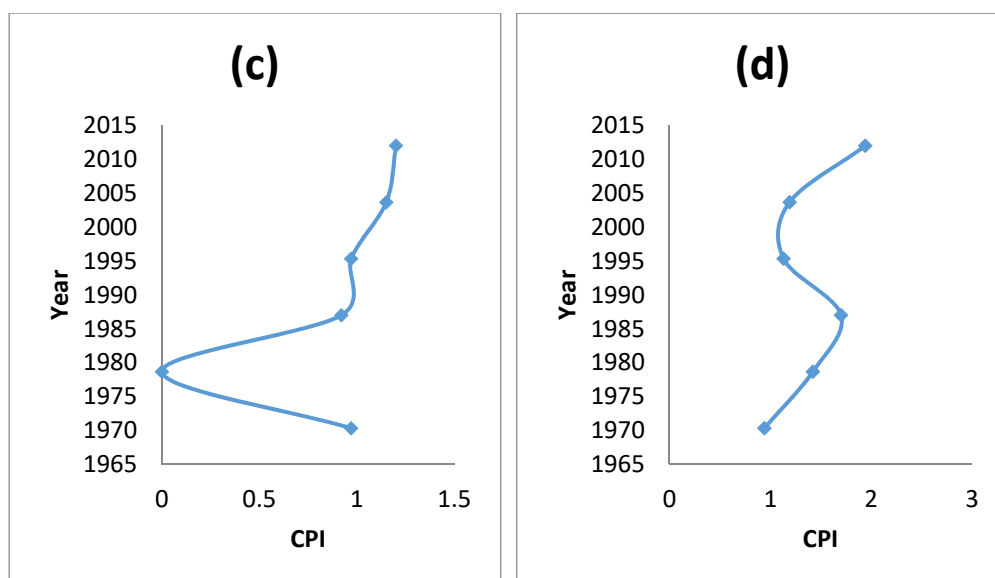


Fig. 5 a, b, c and d: Historical trends of CPIs for (a) Afam, (b) Mangrove, (c) illegal Petroleum refinery and (d) Estuary cores

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