Assessment and geographical prediction of sediments origin based on hydrocarbons content: application to the Gulf of Aqaba and Port of Tripoli

In this study, quantitative and qualitative chromatographic analysis for the content measurements of sediments collected from the Gulf of Aqaba/Jordan-Red Sea and Tripoli Port/Lebanon-Mediterranean Sea, were carried out. Sediment hydrocarbon contents were examined by GC-FID. The outcomes showed that 16 hydrocarbons were quantified and identified. Dotriacontane, tritriacontane, hentriacontane, octacosane, heptacosane, pentatriacontane, docosane, tetracosane, and hexatriacontane displayed the major contents at the Gulf of Aqaba. Regarding Tripoli Port sediments; nonacosane, pentatriacontane, pentacosane, dotriacontane, heptacosane, docosane and tetratriacontane were detected. GC-FID data were exposed to PCA and HCA to reveal: the variations of sediment chemical profiles as a result of geographical areas, to show the hydrocarbons that were responsible for clustering, and finally, to facilitate the future profile prediction and areas clustering of unknown sediments based on their chemical profile. By HCA and PCA, the six sediment-origin samples of Aqaba were classified into three clusters; Industrial area alone due to the distinct content of dotriacontane, tritriacontane, hentriacontane and octacosane, Central Power Station, Tala Bay and Hotel Areas in one cluster which was related to the close content of heptacosane and finally the National Tourist Camp and Marine Science in one cluster since they have pentatriacontane with close levels. Regarding Tripoli Port sediment samples, the two clusters revealed that the Current Waste Dump along with the Wastewater Treatment Plant were grouped together, where the Fishing Port, Tripoli Harbour and the Closed Waste Dump areas were clustered in one group. Nonacosane and pentatriacontane were dominant to separate the Tripoli Harbour, Fishing Port area and the Closed Waste Dump, where pentacosane, dotriacontane, heptacosane, docosane and tetratriacontane were responsible to isolate the Wastewater Treatment Plant and the Current Waste Dump together. Classification of sediments based on GC-FID profile will accelerate the future profile prediction and origin-clustering of unknown sediment based on their profile.

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