

Distribution of Aliphatic and Aromatic Hydrocarbon in Dated Sediment Cores of the Gulf of Thailand

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Sediment core samples from 8 stations in the Gulf of Thailand were collected during September 1992- August 1994. The sample sites were chosen in the followings (Fig 1) : Upper Gulf of Thailand, near Chao Phraya River mouth (very high risk area), Upper Gulf of Thailand down to Ban Don Bay, Surat Thani (high risk area), along the coastal area of Rayong, Nakorn Srithamarat and Phuket Island (medium risk area), and along the coastal area of Chantaburi and Trad province (low risk area) (Rungruangsin, 1989 (in Thai)).

Sediment cores have been dated by ²¹⁰Pb dating method. Aliphatic and aromatic hydrocarbon have been analyzed by gas chromatographic technique. Total n-alkane in surface sediment were 0.237-2.210, 0.672, 0.458, and 0.118-0.171 $\mu\text{g/g}$ dry weight with the average of 0.940, 0.672, 0.458, and 0.144 $\mu\text{g/g}$ dry weight for area 1, 2, 4 and 3 respectively. Total n-alkane in surface sediment in area 4 were higher than those in area 3 eventhough area 4 was considered as the lowest risk area probably due to the development of industrial complex along the east coast(Rayong, Chantaburi and Trad provinces). Comparison of total n-alkane in the Gulf of Thailand showed the high value to be at the station near-shore and tend to decrease with the distance away off-shore.

Polycyclic aromatic hydrocarbon (PAHs) at all stations were found to be rather low in concentrations and few in species. Therefore the analysis had been done on surface sediment samples only. Concentration of PAHs in the Gulf of Thailand sediment ranged from trace-0.095 $\mu\text{g/g}$ dry weight with the average of .044 $\mu\text{g/g}$ dry weight in the Upper Gulf (area 1), .067 $\mu\text{g/g}$ dry weight in area 2, .043 $\mu\text{g/g}$ dry weight in area 4, and ranged from .014 -.067 with the average of .046 $\mu\text{g/g}$ dry weight in area 3. Total PAHs contents were not significantly different with respect to area of the sample site.

Hydrocarbon contamination was found in near-shore sediments particularly around industrial and urbanized sites. Hydrocarbon found in near-shore sediment derived from both biogenic (phytoplanktons and higher plants) and anthropogenic sources. In off-shore area, hydrocarbon were mostly from biogenic sources particularly from phytoplanktons. This indicated that fallout on to land and transport of with terrigenous particles from the drainage basin is more important source of hydrocarbon contamination than fallout directly into the Gulf.

The aliphatic hydrocarbon concentrations decrease with respect to depth in all cores. Contamination of hydrocarbon from pyrogenic sources were found at much earlier date at station near- shore (from 100 years ago at station A) when compared to station off-shore (from 25-45 years ago at station B, D and E), correlate with Thailand's first import of kerosene , 100 years ago during King RamaV reign (Tapthong, 1994 (in Thai)).

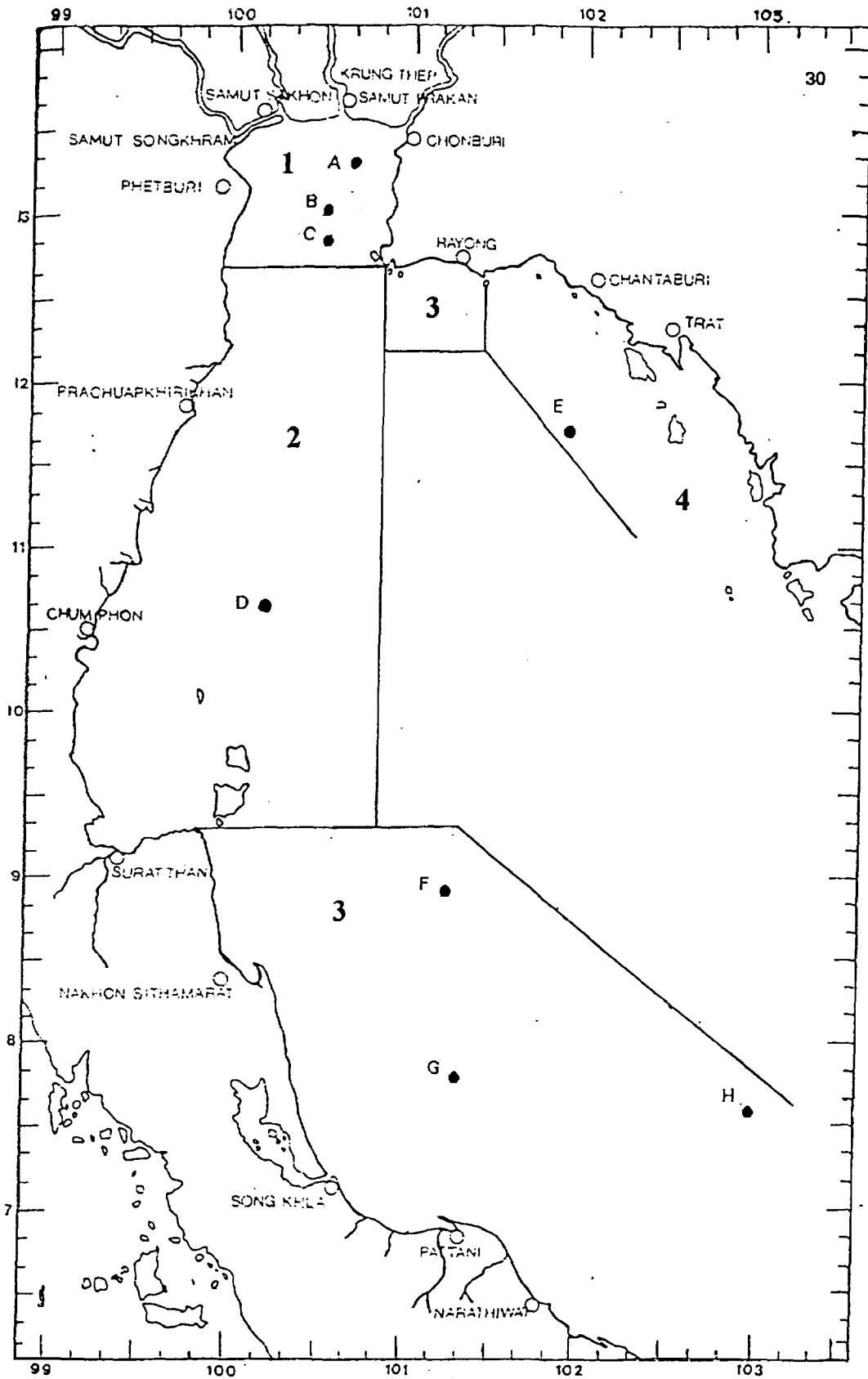


Fig 1. Sampling locations in the gulf of Thailand indicated area 1 is very high risk area, area 2, high risk area, area 3, medium risk area, and area 4, low risk area (Rungruangsin, 1989 (in Thai)).