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Source identification of hydrocarbon contaminants and their transportation over the Zonguldak shelf, Turkish Black Sea

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Under great anthropogenic pressure due to the substantial freshwater input from the surrounding industrial and agricultural areas, especially central and middle-Eastern Europe, the Black Sea basin is ranked among the most ecologically threatened water bodies of the world. Oil levels are unacceptable in many coastal areas perilously close to polluted harbors and many river mouths; the places presenting the highest levels of bio-diversity and having a high socio-economic importance due to human use of coastal resources. There are about sixty sources of pollution which resulted in “hot spots” having disastrous impacts on sensitive marine and coastal areas and needing immediate priorities for action. Beyond such land-based sources, trans-boundary pollution sources from Black Sea riparian countries, heavy maritime traffic, particularly involving petroleum transports and fishing boats, and the improper disposal of ballast and bilge waters and solid waste are also important marine sources of pollution.

Found in fossil fuels such as Polycyclic Aromatic Hydrocarbons are generated by incomplete combustion of organic matter. In order to estimate their distribution in sediment and their sources, they were monitored from the bottom samples offshore the Zonguldak industry region, one of the most polluted spots in the Turkish Black Sea. There the budget of pollutants via rivers is not precisely known due to an evident lack of data on chemical and granulometric composition of the river runoff and their fluxes. Therefore the marine sediments, essential components of marine ecosystems, are very important in our estimating the degree of the damage given to the ecosystem by such inputs. Realization of the sources and transport of these contaminants will be a critical tool for future management of the Zonguldak industry region and its watershed.

The sea bottom in study area is composed of mainly sand and silt mixtures with small amount of clay. Geochemical analyses have shown that oil contamination was dominated in near-shore sediments. Their spatial distributions over the shelf area make an estimation of possible pollution sources and their transportation routes possible. Sea port activities, industrial inputs and partly maritime petroleum transport are the main sources of pollutants. They are under the control of the longshore currents supplied with river alluvium and coastal abrasion material.