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BIOGEOCHEMICAL CYCLING OF CHLORINATED HYDROCARBON PESTICIDES AND POLYCHLORINATED BIPHENYLS IN COASTAL ZONES

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Terrestrial organic matter (natural and anthropogenic) transported to coastal regions is diluted by marine organic material from plankton and benthos. The processes controlling the transport and fate of organic species in the limnic and marine environment should help understand their biogeochemical cycling in the interdependent compartments such as atmosphere, water and sediment. For example, at the sediment-water interface, the sedimentary organic matter is exposed to the physical as well as biological and chemical degradation processes of early diagenesis. These phenomena are studied in the context of geochemical cycling at different scales such as from the kinetics and mechanisms of reactions at molecular and/or cellular level to the estimation of mass transfer and energy flow at a given ecosystem or continental level.

The current lecture will focus on the transport and fate of toxic contaminants in the coastal regions. The specific case studies presented will integrate information on these processes into a regional picture of organic carbon cycling. The selected toxic compounds will be of topical interest, for example, chlorinated hydrocarbon pesticides including DDTs and polychlorinated biphenyls (PCBs). Their spatial and temporal distribution in the sediments of the Santa Monica and San Francisco Bays along the California coast (USA) and their mode of transport from land into the coastal environment will be presented. The inter-correlation of various other contaminants with these target compounds will be considered to resolve their sources to the Bay. The source of hotspots of preferential accumulation of contaminants will also be discussed. Concentration levels of the contaminants will be examined in the light of sediment quality objectives to assess potential adverse biological effects and the Baywide inventories of the contaminants estimated.

Keywords: biogeochemical cycling; contaminants; chlorinated hydrocarbon pesticides; DDTS; polychlorinated biphenyls; coastal sediments; Santa Monica Bay; San Francisco Bay; California coast; fate; transport; spatial distribution; temporal distribution; sediment quality.