

DOE/ER/60338-7

DOE/ER/60338--7

DE89 015809

## TECHNICAL REPORT

### PROGRAM OF MINERALIZATION AND CYCLING IN MARINE SYSTEMS - ORGANIC GEOCHEMISTRY OF PARTICULATES AND SEDIMENTS (CaBS)

#### Progress Report

November 15, 1988 - May 14, 1989

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June 1989

PREPARED FOR THE U.S. DEPARTMENT OF ENERGY  
UNDER GRANT NUMBER DE-FG05-85ER60338

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## Objectives

The principal objective of the current on-going project is to understand the processes involved in the cycling of organic carbon in the southern California Bight. This involves the evaluation of the relative flux of planktonic carbon to the seafloor versus the import of terrestrial carbon components and the determination of the rate of decomposition of sedimenting organic matter in the water column. These goals were achieved by the chemical characterization of sedimenting particles (from traps) as well as in the near surface sediments. The organic matter in the marine regime comprises contribution from land plants, marine productivity (plankton and bacteria) as well as anthropogenic sources. At UCLA, we have been focussing on the chemical characterization of selected classes of organic carbon compounds derived from these various sources, to understand the vertical flux and the chemical composition of the particulate organic matter which are controlled by complex transport, transformation, degradation and remineralization processes.

## Southern California Bight: Site Characteristics and Sample Selection

The west coast margin is tectonically more active than the east coast margin and the network of deep basins close to shore can trap the coastal sediments very efficiently. The varied inputs to the organic carbon listed above in sediments of the southern California Bight is further complicated by the presence of oil seeps.

Due to the proximity of Santa Monica Basin, our target site, to the coastal urban centers, pollution derived from municipal wastewater outfalls can also have a major impact on the organic burden of the sediments and need to be investigated by using natural tracers to track the dispersion throughout the region.

Particle interceptor trap (PIT) material as well as sediment cores have been studied. PIT material was collected for about 3-6 months using Soutar-type Funnel traps. Data pertaining to five box cores on a NE to SW transect in Santa Monica Basin and three sets of PIT samples were presented in earlier reports. This report focusses on two box core sediments (from 33°48.6'N; 118°44.6'W and 33°47.9'N; 118°46.1'W) between stations BC 12 and BC 102 which were

studied earlier to follow the trend along the transect more closely and to understand the geochemical transition between the oxic (<750m) and anoxic zones. Also reported here is the progress made in extracting and analyzing two sets of PIT material deployed in February and in September of 1988. The former is from a water depth of 850m and the latter consists of a set of six samples, two from shallow waters (200m, 350m) and four from deep waters (200m, 500m, 700m and 850m).

**Methodology:** Details of methodology and the extensive protocol employed have been included in an earlier report (May 1986).

### **Report of Progress**

About ten sections (2cm intervals) from each of the two box cores and all the PIT samples have been extracted successively with methanol and then methylene chloride. The solvent extracts were concentrated and fractionated into different classes of lipid components.

Gas chromatographic analysis of alkanes and fatty acids and alcohol/sterol fractions have been completed. The identifications of individual compounds have been confirmed by gas-chromatographic/mass spectrometric (GC/MS) analysis of a selected samples. GC/MS analysis of the remaining samples will be continued.

Analytical data collected over the past few years on the CaBS program are being studied and synthesized to understand the geochemistry of the region.

Manuscripts have been submitted for publication. The data from the CaBS project were presented at the Spring AGU Meetings (May 1989) at Baltimore. Abstracts have also been submitted to international meetings at Paris and in Hawaii.

## PUBLICATIONS FROM DOE CONTRACT

1. Venkatesan, M.I., 1988, Organic geochemistry of marine sediments in Antarctic region: Marine lipids in McMurdo Sound. Org. Geochem. 12: 13-27.
2. Venkatesan, M.I., 1988, Diploptene in Antarctic sediments. Geochim. Cosmochim. Acta 52: 217-222.
3. Venkatesan, M.I. and Dahl, J., 1989, Organic geochemical evidence for global fires at the Cretaceous/Tertiary boundary. Nature 338: 57-60.
4. Venkatesan, M.I. and Santiago, C.A., 1989, Sterols in ocean sediments: Novel tracers to examine habitats of cetaceans, pinnipeds and humans. Mar. Biol., in press.
5. Venkatesan, M.I. and Kaplan, I.R., Sedimentary coprostanol as an index of sewage contamination in Santa Monica Basin. Being revised after peer review for publication in Environ. Sci. Technol..

### Manuscripts in Preparation

Venkatesan, M.I. and Kaplan, I.R., Sewage vs. seepage in Santa Monica Basin. To be submitted to Mar. Pollut. Bulletin.

Venkatesan, M.I., Ruth, E. and Kaplan, I.R., Triterpenols from sediments of Santa Monica Basin, Southern California Bight. To be submitted to 14th International Organic Geochemistry Meetings for publication in Org. Geochem. This paper will also be presented at the meetings in Paris, France, September 1989.

### Paper Presented at Meeting

Venkatesan, M.I. and Kaplan, I.R., 1989, Organic carbon cycling in southern California Borderland: Geochemistry of particle interceptor trap material. AGU Spring Meetings, May 7-12, Baltimore; EOS 70: 369.

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