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# **CoBOP: MICROBIAL BIOFILMS: A PARAMETER ALTERING THE APPARENT OPTICAL PROPERTIES OF SEDIMENTS, SEAGRASS AND OTHER SURFACES**

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## **LONG-TERM GOAL**

This grant commenced 10/96. The long-term goal of the research is to investigate the optical properties of microbial biofilms, which form coatings on sediments and other surfaces in coastal oceans. The project goals are to determine how biofilm coatings influence (i.e. alter) optical spectra of surfaces through reflection, refractance and fluorescence. This project is a part of the CoBOP (Coastal Ocean Bio-Optical Properties) initiative in the Environmental Optics Program.

## **OBJECTIVES**

The objectives of year one were: 1) to conduct initial laboratory exopolymer isolations involving the growth, isolation and purification of microbial exopolymers for use in later sediment experiments to be conducted at the field site; 2) prepare experimental hardware for field sediment experiments; 3) to attend the CoBOP Project Meeting, held in Tuscon, AZ (held during November 1996).

## **APPROACH**

Microbial exopolymers, isolated from laboratory cultures of marine organisms, will be used to construct artificial biofilm coatings on sediment particles. The coated sediments will be analysed in the field using optical measurements and sedimentological analyses made by collaborating investigators in the CoBOP Program, and compared with properties of natural sediments at the field site. Laboratory studies will investigate how exopolymer coatings alter optical spectra, depending on the gel-solution states of the biofilm coatings.

## **WORK COMPLETED**

During year one of the COBoP project we accomplished the following:

- 1) Several representative marine microorganisms have been cultured, and their exopolymers isolated and purified in sufficient quantities to be used for for upcoming field experiments (set for summer 1998).

2) Experimental containers, and other associated hardware, to be used in field sediment experiments have been constructed and are ready for use.

In addition to the stated objectives, preliminary field work was conducted in the Bahamas, during another ongoing NSF-sponsored project. This work was a collaborative effort involving two other Sediment-Group COBoP investigators (Drs. Brad Bebout and Pamela Reid). This baseline work was conducted in a similar coralline environment (Highborne Cay, Bahamas) in proximity to the recently selected ONR field site at Lee Stocking Island, Bahamas. The work involved preliminary examinations of how exopolymer coatings on sediments may influence the attenuation and spectral shifts in light as it penetrates into deeper sediment layers. Experimental coatings of natural sediment particles with exopolymers. Fiber optic probes were used to assess spectral changes with sediment depth.

## **RESULTS**

We learned, during these preliminary studies in year one, that exopolymer coatings on sediment particles may enhance light scattering and induce potential spectral shifts. The results of these experiments are presently being analyzed, and interpretations will be fine-tuned in order to provide directions for field experiments slated for summer 1998.