



Oceanographic Research

Researchers are looking for new and improved ways of estimating the primary productivity of the world's oceans

Shown below is the PNF-300 Natural Fluorometer, an optical instrument for oceanographic research developed under NASA contract by Biospherical Instruments Inc. (BSI), San Diego, California. **At right**, Dr. John H. Morrow of BSI is using the instrument to measure natural fluorescence in coral during The Cousteau Society's 1990 Project Ocean Search off Fiji.

The instrument is an important innovation for oceanographers, who are looking for new and improved ways of estimating the primary productivity of the world's oceans. They are particularly interested in determining the factors that regulate photosynthesis in phytoplankton, the simple plant forms that are the major sources of sustenance for animal life in the oceans.

The BSI instrument is based on the fact that chlorophyll in phytoplankton emits a natural fluorescence during photosynthesis when exposed to sunlight; this offers a means of estimating phytoplankton production. Where earlier fluorometers use artificial light sources, the PNF-300 uses natural sunlight, offering an advantage because the light source is the same as that which drives

photosynthesis: the Sun. Among other advantages, it is less expensive than earlier methods of measuring photosynthetic productivity, it is non-intrusive (does not perturb the sample) and it can be used on site, eliminating the earlier need to remove a sample from



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its natural surroundings to make a measurement.

The PNF-300 is a portable, battery-powered, hand-deployed instrument designed specifically to measure profiles of light and natural fluorescence in the oceans. The system includes submersible sensors for measuring fluorescence, irradiance and depth, temperature and water pressure, plus menu-driven software for processing the data. BSI has also developed an INF-300 for long term unattended operation. Among applications are examination of the environmental impacts of coastal installations, including oil terminals, offshore platforms, coastal power plants and recreational harbors. The City of Los Angeles has used a PNF-300 as the heart of a sensor array for monitoring plankton concentrations in a municipal reservoir, a program aimed at eventual reduction of the cost of treating drinking water.

The BSI instruments have been deployed in environments ranging from the poles to the tropical South Pacific by scientists from the University of Southern California, Lamont-Doherty Geophysical Observatory, Jet Propulsion Laboratory, The University of Hawaii, and the Cousteau Society.