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In-Water Instrumentation for Measurement of Phytoplankton Optical Properties

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LONG-TERM GOAL

My long-term scientific goal is to contribute to the understanding of the causes and consequences of variability of phytoplankton optical properties in the coastal zone.

OBJECTIVES

The objective of this project is the purchase a suite of in-water, optical instruments and computers for data acquisition and analysis that will allow me to examine, *in situ*, the optical properties of phytoplankton. Of particular interest is the spectral shape of the phytoplankton absorption coefficient, a coefficient that is highly variable among coastal phytoplankton assemblages. The variability in the phytoplankton coefficient constitutes one of the greatest challenges to the extraction and correct identification of in-water optical properties from hyperspectral, remote-sensing measurements.

APPROACH

There are two main reasons for *in situ* measurement of absorption coefficients. The first is that as soon as phytoplankters are taken out of their environments, their physiologies start to change. Present methods for determining these absorption coefficients are laboratory- (or ship-) based and not *in situ*; hence, there is an unavoidable delay between sampling and measurement. The second motivation is the high rate of data collection of the *in situ* instruments vs. the laboratory-bench method that depends upon collecting discrete water samples and processing them individually in the laboratory. In contrast, an in-water optics package provides instantaneous, fine-depth resolution of coefficients when used in a profiling mode. The instrument package purchased with DURIP funds consists of two WET Labs' Histars for measuring total and dissolved spectral absorption and attenuation (particulate coefficients are obtained by difference); a SAFIRE for spectral excitation of phytoplankton fluorescence; a super MODAPS (modular ocean data and power system); and a SeaBird CTD.

WORK COMPLETED

The SAFIRE was used during the Thin Layers program in East Sound in June 1998. The complete in-water will be field-tested in December, before the end of the contract year.

RESULTS

Data from the East Sound deployment of the SAFIRE are currently being analyzed in conjunction with bench measurements to characterize filter responses and temperature responses. Results from the integration tests of the complete package will be available before the end of the contract year.

IMPACTS

Acquisition of this instrument package will enhance the rate of progress of our ONR-funded research on the causes and consequences of variability of phytoplankton optical properties in the coastal zone.

TRANSITIONS

None at this time.

RELATED PROJECTS

The acquisition of the in-water optical package is in support of my ONR-sponsored project on "In-situ observation of irradiance- and time-dependent changes in phytoplankton absorption coefficients."

REFERENCES

None at this time.