Remote Sensing of Ocean Color in the Arctic

by

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The main objectives of the research are: 1) to increase the understanding of biological production (and carbon fluxes) along the ice edge, in frontal regions, and in open water areas of the Arctic and the physical factors controlling that production through the use of satellite and aircraft remote sensing techniques; and 2) to develop relationships between measured radiances from the Multichannel Aircraft Radiometer System (MARS) and the bio-optical properties of the water in the Arctic and adjacent seas. Several recent Coastal Zone Color Scanner (CZCS) studies in the Arctic have shown that, despite constraints imposed by cloud cover, satellite ocean color is a useful means of studying mesoscale physical and biological oceanographic phenomena at high latitutdes. The imagery has provided detailed information on ice edge and frontal processes such as spring breakup and retreat of the ice edge, influence of ice on ice effects of stratification on phytoplankton production, river sediment transport, effects of spring runoff, water mass boundaries, circulation patterns, and eddy formation in Icelandic waters and in the Greenland, Barents, Norwegian, and Bering Seas.

During the past year, a number of images in the Iceland region and in the Greenland Sea have been processed on both the SEAPACK and Miami systems. These are part of studies on spring blooming

in Icelandic waters in 1979, 1980, and 1981, the West Spitsbergen Current system, and ice edge phytoplankton dynamics in the Greenland Sea ice edge. Also in 1987/1988, the MARS sensor was completed at the Visibility Lab of Scripps Institution of Oceanography (SIO) and deployed during the Greenland Sea Experiment in May 1987, making eight successful flights over the Polar and Arctic Fronts including overflights of the German icebreaking research vessel, the POLARSTERN. Algorithms are being developed by J. Mueller at SIO and San Diego State University (SDSU). Data is presently being analyzed and will be shared with other participants in the Greenland Sea Experiment from the Alfred Wegener Institute, SIO, SDSU, University of Tennessee, Lamont Doherty Geological Observatory, and other NASA colleagues who participated in coincident overflight in the NASA P-3.

Future plans are to continue to use a combination of historical CZCS data and aircraft observations from high latitude study areas to help build a long-term data base on the Arctic and Antarctic, as well as, to serve as a guide in the selection of optimum sampling strategies in upcoming experiments such as GOFS and CEAREX. The MARS sensor is scheduled to participate in the 1989 CEAREX field season to find and investigate eddies in the Greenland Sea.