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STUDY TITTLE: Northeastern Gulf of Mexico Satellite Oceanography Study

REPORT TITTLE: Satellite Oceanography Study and Oceanic Atlas Project, Final Report

CONTRACT NUMBER: 14-35-0001-30767

SPONSORING OCS REGION: Gulf of Mexico

APPLICABLE PLANNING AREA(S): Eastern Gulf of Mexico

FISCAL YEARS OF PROJECT FUNDING: 1995, 1996, 1997

COMPLETION DATE OF REPORT: January 1998

COSTS: FY 1995, $134,648; extended to FY 1997

PROJECT MANAGER: Dr. Kendall L. Carder

AFFILIATION: Department of Marine Science, University of South Florida

ADDRESS: 140 7th Ave. S., St. Petersburg, FL 33701

PRINCIPAL INVESTIGATORS*: Kendall Carder, Robert Weisberg, Frank Müller-Karger

KEY WORDS: Physical Oceanography, Gulf of Mexico, Loop Current, Loop Current eddies, satellite imagery

BACKGROUND: Remote Sensing via satellites, though only recently a viable technology, has produced vast amounts of data on the Earth's oceans, and the biogeophysical processes that affect them. Many researchers have entered this field, producing numerous databases on separate oceanic features or characteristics, or small collections of images depicting specific events. A need exist, however, for a comprehensive view of any part of the world's oceans that portrays, as whole, many of the salient oceanographic features. These include sea surface height and temperature, circulation, primary productivity and effects incurred from variations of natural processes such as El Niño Southern Oscillation (ENSO). A corresponding survey relating several aspects of remote sensing would also be very useful.

OBJECTIVES: This project attempts to address some of these deficiencies if only for a small part of the Earth's water resource: the northeastern Gulf of Mexico. Its purpose is to synthesize, from existing research and analysis archives, a digital CD-ROM atlas of satellite remote sensing images of this area. The goal is to provide a useful tool for resource management, education, and research by providing a climatology of physical

processes observable from satellites. Oceanographic features seen in satellite images attributable to the physical ecology of the region are to be depicted.

DESCRIPTION: The study encompassed three years of effort collecting satellite images of the northeastern Gulf of Mexico. These images were indicative of the advection, mixing, and primary production in the region. Images from 1979 to 1995 are included, and the processes evident in creating the patterns observed are discussed. The imagery includes various data types from the following sensors:

1. Sea surface temperature (SST) and suspended solids from the Advanced Very High Resolution Radiometer (AVHRR);
2. Chlorophyll concentration from the Coastal Zone Color Scanner (CZCS);
3. Altimetry from TOPEX and ERS-1;
4. Turbidity, absorption coefficients, salinity and bottom reflectance from the Airborne Visible-Infrared Imaging Spectrometer (AVIRIS) from 20 km altitude.

SIGNIFICANT CONCLUSIONS: Loop Current location, eddy shedding, eddy coupling, primary production centers, river plumes, and the SST response to the passing of a hurricane are all demonstrated as examples of the use of satellite imagery regarding the effects of physical processes in the Gulf of Mexico. Several hundred images are also provided as a history of the response of the Gulf to various forcing functions for use in our understanding possible future responses of the Gulf under similar conditions.

STUDY RESULTS: The study compiles remote sensing products from scientific sources involved in studying the Gulf of Mexico. These images are too expansive to be included in one article. This study is representative of remote sensing data available, how they are utilized, and by whom they are produced.

STUDY PRODUCT: Carder, K. L., F. Müller-Karger, R. H. Weisberg, B. D. Black, and C. Cattrall. 1998. Northeastern Gulf of Mexico Satellite Oceanography Study and Oceanic Atlas Project, Final Report. OCS Study MMS 97-0042. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. 57 pp and CD-ROM.

*P.I.’s affiliation may be different than that listed for Project Managers.