EVOS ANNUAL PROJECT REPORT

All recipients of funds from the *Exxon Valdez* Oil Spill Trustee Council must submit an annual project report in the following format by September 1 of each fiscal year for which project funding is received, with the exception of the final funding year in which a final report must be submitted. Satisfactory review of the annual report is necessary for continuation of multi-year projects. Failure to submit an annual report by September 1 of each year, or unsatisfactory review of an annual report, will result in withholding of additional project funds and may result in cancellation of the project or denial of funding for future projects.

PLEASE NOTE: Significant changes in a project's objectives, methods, schedule, or budget require submittal of a new proposal that will be subject to the standard process of proposal submittal, technical review, and Trustee Council approval.

Project Number: G030685

Project Title: Visible remote sensing of the Gulf of Alaska

PI Name: W. Scott Pegau

Time Period Covered by Report: 12/02 – 09/03

Date of Report: 09/02/03

1. **Work Performed:**

The past year has been a busy and scientifically profitable period for the KBRR and UAF team working on visible remote sensing in the Gulf of Alaska. We participated in the EVOS annual meeting in January 2003. While there I served on a panel to discuss the role of remote sensing in the GEM program. The panel discussion was further refined during a one-day workshop held in Homer during March 2003. Fifteen people attended representing resource managers, scientists, data managers, and education interests. The focus of this workshop was to determine what visible remote sensing products are most desired and how they should be made available (Objective 1 of the proposal). We developed a broad wish-list of products, many of which are not currently available. The approach was taken to allow us to not only determine what products we should make available soon, but also what products we should let agencies, such as NASA, know are desired by resource managers. One commonly expressed desire is to have very high temporal and spatial resolution, especially for land resource management. Chlorophyll and total suspended sediment (TSS) measures were the two oceanographic products that can be most readily provided. These products were of interest because of their importance in the productivity of an area (chlorophyll) or indications of sediment transport (TSS) and both may provide an indication of circulation patterns and the position of fronts. Land products included lake sediments and chlorophyll, land use patterns, and vegetation cover. These products represent the most obtainable and desirable of over 40 products that were discussed.

The discussion on how the data should be made available was in one sense more unified and in another more diverse than the discussion on what products should be available. The unified aspect is that people want a one-stop shop that can provide processed data from a wide range of sensors with a range of download options. The divergence in opinion came about in the mechanism to deliver that capability. Buck Sharpton provided an overview of the GINA program and we also discussed the Oregon State remote sensing website (**http://picasso.coas.oregonstate.edu/ORSOO/MODIS/DB/index.html**) as possible examples of data serving sites. For education purposes a few select images showing interesting features at various geographical locations, similar to NASA's Visible Earth website, was desirable. For scientists and managers there was a need to get data as well as images. GeoTiff format was desired for input as a GIS layer. The data would need to be complete with metadata describing the processing. It was also desirable to be able to determine the level of spatial and temporal averaging when ordering the data.

With a feel for the products of interest we began examining the data from SeaWiFS and the two MODIS platforms to determine data quality and possible quality control flags (Objective 2). With SeaWiFS we found that the data processing should follow the recommendations of NASA in processing with one exception. NASA has a processing flag that blanks all data within 5 pixels of the coast to reduce possible stray light contamination. Given the rugged nature of the coastline and the number of coastal features that are of interest, we found that removing the nearshore data removed too many possible areas of interest. We recommend that a quality control flag be used to inform people that stray light contamination may affect pixels within the nearshore region. Other important flags are for suspended sediment load that interferes with the chlorophyll algorithm and scan angle, which determines the size of the pixel and affects the atmospheric error. MODIS provides several estimates of chlorophyll. There were apparent problems with the algorithm for Case II (turbid) waters. Some of the problems may have arisen because of using SeaDAS to plot the MODIS data. We are currently re-evaluating the data quality using a second set of tools.

We examined ways to reduce the amount of data that must be processed. For SeaWiFS one can use the pass time as a preliminary filter. Data collected around 2230 ± 45 minutes provided the best coverage of the full Gulf of Alaska. Data from an hour earlier provided good data in Prince William Sound and data from a pass an hour later would provide good data for Cook Inlet and Kodiak Island. MODIS passes do not follow as simple a pattern so time cannot be used to identify passes that may contain usable data.

For estimation of errors in the chlorophyll algorithm we collected optical and chlorophyll samples within Kachemak Bay and during the GLOBEC mesoscale survey cruises in May and July. The busy summer field schedule has prevented us from processing these samples. Processing will begin in September.

At the beginning of September Rachel Potter attended a MODIS data processing workshop held by NOAA-NESDIS at Oregon State University. There she obtained tools and advise to improve MODIS data selection and plotting.

2. **Future Work:**

To complete this project we are currently implementing IDL routines to run SeaDAS for processing SeaWiFS data and provide mapped products. We will continue to improve the tools for MODIS data. We will also be completing the processing of chlorophyll samples and evaluating algorithm performance. These tasks are expected to be completed by December. This is a deviation from the original timeline that became necessary because of changes in algorithms and tools as well as a busier than expected summer field season.

3. **Coordination/Collaboration:**

The sample collection was closely coordinated with the GLOBEC mesoscale survey program. In that program two 3-week cruises were conducted in the Gulf of Alaska to map the physical and biological characteristics of the shelf. Surface water samples for chlorophyll were collected every 4 hours and at the times of expected satellite overpasses. Additional samples were collected for HPLC analysis. By coordinating efforts with the GLOBEC program we were able to collect samples over a wide geographic region and during two very different phytoplankton distributions.

4. **Community Involvement/TEK & Resource Management Applications:**

The workshop to determine appropriate products was designed to help transition the work to resource managers. Representatives from several resource management agencies were in attendance and provided input to the types of products they needed.

5. **Information Transfer:**

Two remote sensing workshops were attended as part of this program. The first was the annual MODIS science team meeting and the second was the MODIS data tools workshop described earlier in this report. At this stage we are continuing with sample processing and image processing algorithms so not data has been made available.

6. **Budget:** none

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SUBMIT ANNUAL REPORTS ELECTRONICALLY TO phil_mundy@oilspill.state.ak.us. THE REPORTS WILL BE POSTED ON THE TRUSTEE COUNCIL'S WEB SITE AND SHOULD ALSO BE POSTED ON THE PI'S WEB SITE. The subject line of the e-mail transmitting the report must include the project number and the words "annual report" (e.g., "035620 Annual Report"). Electronic reports must be submitted either as an Acrobat Portable Document Format (PDF) file or word processing document (Microsoft Word 2000 for Windows or lower or WordPerfect 9.0 or lower) with any figures and tables imbedded. Acrobat PDF 4.0 or above file format must be used, preferably in 'formatted text with graphics' (called "PDF normal" under

Acrobat PDF 4.0) format. Minimally, "PDF searchable image" (called "PDF original image with hidden text" under Acrobat PDF 4.0) may be used if pre-approved by the Trustee Council Office. In either case, the PDF file must not be secured or locked from future editing, or contain a digital signature from the principal investigator.