



GLOBAL IMAGING

Fisheries Oceanography Application Note

Remote sensing products have been used to: 1) Assist commercial and sports fishermen harvest fish from the sea; 2) Provide marine resource managers with information for assessing fish recruitment and mortality; 3) Provide indications of the onset of major climate events such as El Niño which can effect an operational fishery; 4) Increase our understanding of the scientific basis of marine fisheries; and 6) Help identify the occurrence of natural marine and man-made toxins which can seriously threaten a marine fishery. Recent advances in data acquisition, mass storage and data communication technologies, especially when coupled with powerful analysis methods, suggest that the role of satellite and environmental oceanography will expand considerably in the near future. This is especially true for both near-real-time support of an operational fishery and the retrospective analysis of historical and climate data to determine the long-term trends and variations in a fishery.

Fisheries Oceanographic Community

The Fisheries oceanographic community is characterized by three primary activities: fishing, fisheries research, and fisheries management (fig 1).

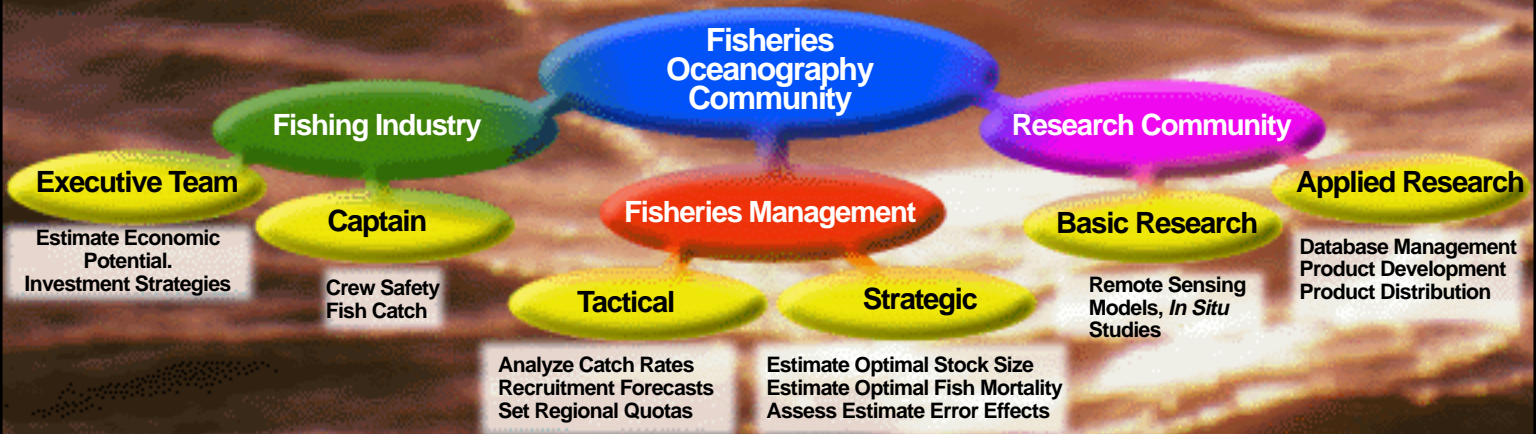


Figure 1. Conceptual model of the various sectors in the operational fisheries oceanography community and some of the functions performed by each. (Based on Simpson, 1994 Can J. Fish. Acquat. Sci, Vol 51, 743-711)

Fisheries Applications

The fishing industry first must accurately assess the long term economic potential of a given fishing region, then safely and efficiently catch fish. These activities, as well as those of the other two primary sectors of the community (Fig. 1), need remote sensing and environmental data to successfully achieve their respective goals.

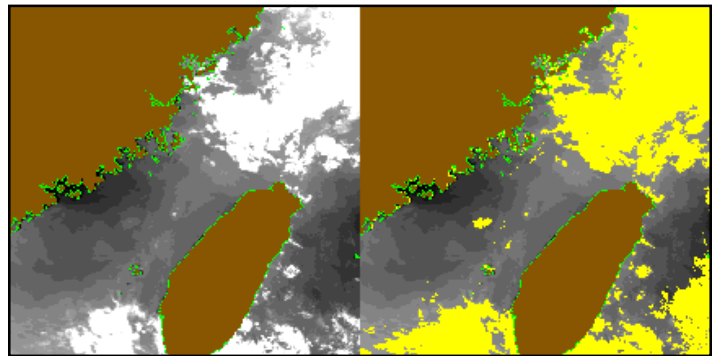
Most offshore fishing, for example, can be profitable only in areas where fish tend to aggregate. Satellite data can be used to detect most of the environmental factors, such as oceanic temperature gradients, which produce fish aggregation.

The Global Imaging Solution

Global Imaging can provide the fisheries community with remote sensing technology which can be utilized to better manage our renewable marine resources. System features include the following:

- Real-time capture and archiving of full resolution polar orbiting (AVHRR) and geostationary (GVAR, GMS, and Meteosat) satellite data using state-of-the-art antenna and RF downlink equipment, powerful Hewlett-Packard UNIX workstations, and modern data analysis and visualization software.
- Accurate co-registration of coastal and bathymetric boundaries with image data.
- State-of-the-art atmospheric correction procedures to minimize the effects of atmospheric contaminants such as water vapor and aerosols on the accuracy of derived sea surface temperature (SST).
- State-of-the-art cloud detection algorithms to remove cloud cover from both daylight and nighttime AVHRR scenes prior to computation of SST. Cloud contaminated SST can produce false thermal gradient maps, which can misdirect a fishing effort or lead to incorrect scientific analysis. Undetected clouds can produce errors in SST estimates as large as 50%.
- Accurate thermal gradient analysis. Both the position and magnitude of the thermal fronts are accurately computed and co-registered to the user-selected map projection.

- Accurate estimates of the near surface velocity field. The flow field can be represented either as velocity vectors or stream functions.
- Ancillary data field overlays for visually integrating fish catch statistics, recruitment and mortality estimates with the satellite data products.
- Accurate detection of sea ice-ocean boundaries.
- A flexible library-based software design which allows users to build their own custom analysis and display functions.
- Both interactive and batch modes of data analysis and display.



Left Panel: AVHRR Channel 4 image showing part of China, Taiwan, and the Strait of Formosa. Land is masked in tan and the coastline is shown in green.

Right Panel: Same as left, except cloud screen is shown in yellow. The AVHRR channel 2 data (not shown) reveals low clouds not visible in the infrared band, but which are detected by the cloud mask.



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