

A ubiquitous information services for the offshore fisheries around Japan



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Introduction

Results from the global-scale fish-landing data analysis, show that as catches increase, fisheries stocks decrease or may even collapse (Watson and Pauly, 2001). This is a key issue of global concern for the sustainable use of fish stocks. In addition, climate or oceanic environmental changes may also influence stock abundance (Cushing, 1982), and a central scientific question is whether fisheries activities or changes in climate and oceanic conditions have effects on stock abundance or not. Although the causes are not yet clarified, changes in climate and oceanic conditions must be considered for the sustainable development of fisheries. The Food and Agricultural Organization (FAO) of the United Nations (FAO, 1995) has adopted a "Code of Conduct for Responsible Fisheries" that describes in detail the guidelines for fishery management and research. In Japan, fisheries are facing problems such as the over-consumption of fuel and the overexploitation of fisheries resources due to difficulties in the accurate estimation of stock abundances. The Japanese Fishery Agency is responsible for the management of fisheries resources in Japan. The priority species for management are the Japanese common squid (*Todarodes pacificus*), Pacific saury (*Cololabis saira*), pollack (*Theragra chalcogramma*), mackerel (*Trachurus japonicus*), and the queen crab (*Chionoecetes opilio*). These were selected because both of their importance and popularity as a food resource, and also because of concerns about their abundance. Management is mainly based on the total allowable catch, calculated from the allowable biological catch. Its calculation is based only on catches. More accurate estimation of abundance should be obtained by monitoring the ecosystem and considering any environmental changes. The most important things to consider when estimating catch are the time period, and the location and the abundance of the target fish (taking into account migration routes), which must be recorded near-real time.

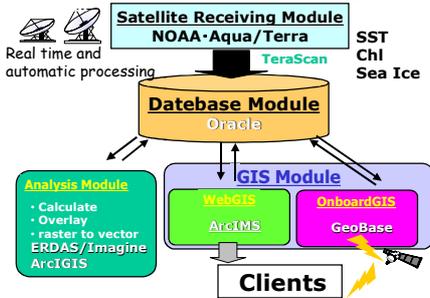
Data Receiving



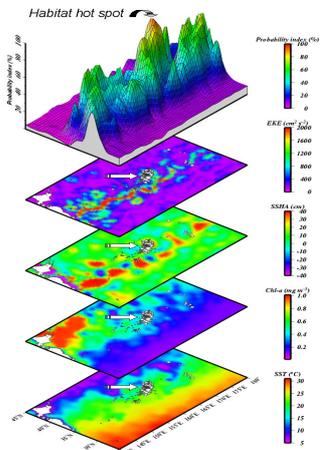
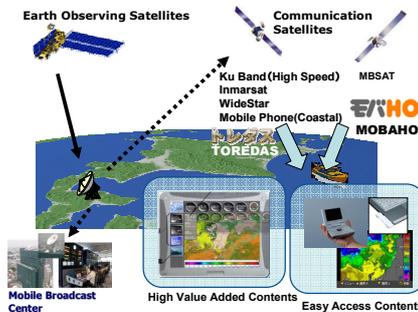
Development of Data Processing and Information Transfer System

This system consists of four subsystems; MODIS (Moderate Resolution Imaging Spectroradiometer) receiving subsystem, database subsystem, analysis subsystem, and GIS subsystem (WebGIS and onboard-GIS). MODIS system provides sea surface temperature, chlorophyll-a concentration and sea ice distribution. Database manages the all products under Oracle software. Analysis subsystem produces level 1 to level 5 products, which include fishing ground forecasting of Japanese common squid, Pacific saury, Skipjack tuna and Albacore tuna. These procedures run automatically, so that the fishermen could receive information in near real time through communications satellites (maritime satellite internet services and digital packet communication services) and S-band Digital Multimedia Broadcasting (S-DMB) Service. Using satellite communication services, users can operate all products dynamically such as overlaying, measuring distance from nearest port or fishing grounds on the onboard GIS. On the other hand, using S-DMB service, users can receive several marine information and weather information as broadcasting.

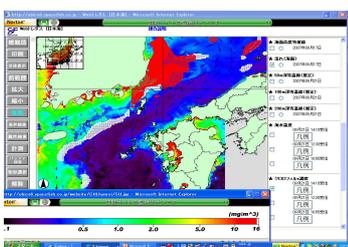
Fisheries Information System



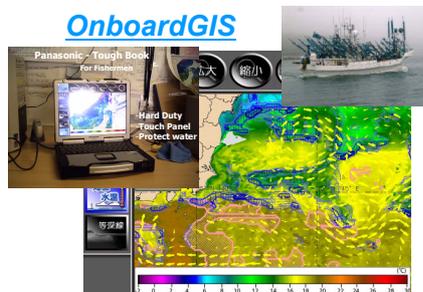
Overview of Information Transfer



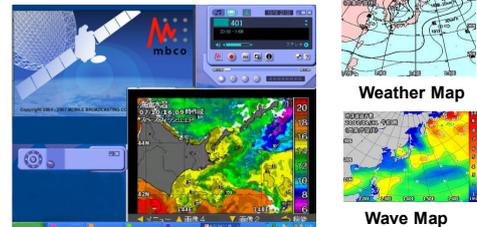
WebGIS



OnboardGIS



Mobile Broadcast



Perspectives

This system can help to support effective fishing activities such as economy with time for fishing ground destination or nearest landing port. The ubiquitous information services promise to promote sustainable fisheries operation and management in the offshore around Japan. The system was developed to facilitate the use of satellite data and GIS, especially by fisherman and fisheries managers. Developing the Ubiquitous Fisheries Information System would not be possible without using remote sensing and GIS. The next step is to develop the system even further, to make it useful for management purposes.

Acknowledgment

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