GCOM Data Utilization at NOAA

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1. INTRODUCTION

The Japan Aerospace Exploration Agency's (JAXA's), Global Change Observation Mission (GCOM) will observe environmental changes on Earth continuously for at least thirteen years starting in 2011. To achieve global, comprehensive, long-term, and homogeneous observations, GCOM consists of two satellite types, GCOM-W (Water) and GCOM-C (Climate). The GCOM-W1 satellite will carry the Advanced Microwave Scanning Radiometer-2 (AMSR2) and the GCOM-C1 satellite will carry the Second-generation Global Imager (SGLI). Additionally, the National Oceanic and Atmospheric Administration (NOAA), working with the National Aeronautics and Space Exploration Agency (NASA), is exploring the possibility of providing a Dual-Frequency Scatterometer (DFS) for the GCOM-W2 and W3 satellites. Using environmental satellites to observe the Earth from space is one of the key tools in forecasting weather, analyzing climate, and monitoring hazards worldwide. This 24-hour global coverage provides us with a never-ending stream of information critical for making decisions affecting everything from what you are going to wear today to governments making decisions about how to deal with climate change.

2. GCOM-W

The GCOM mission will provide global observations important to weather forecasting and warnings, and ocean and climate monitoring, modeling and research. GCOM-W1 will carry the Advanced Microwave Scanning Radiometer (AMSR) - 2), which is follow-on to the highly successful AMSR-E sensor aboard NASA's Aqua mission. The GCOM-W1 (currently scheduled to be launched in Fiscal year 2012) will observe precipitation, water vapor amounts, wind speed above the ocean, sea water temperatures (Fig. 1), soil moisture and snow cover. GCOM-W1 data will provide an important gap-filler to permit microwave radiometer data continuity between the termination of the NASA

Aqua mission which was launched in May 2002 with a design life of 5 years, and the launch of the NPOESS C-2 spacecraft in 2016 containing the Microwave Imager/Sounder (MIS) sensor.

3. GCOM-C

GCOM-C will carry a multi-wavelength optical radiometer (Second Generation Global Imager - SGLI). The GCOM-C1 (currently scheduled to be launched in Fiscal Year 2013) will observe clouds, aerosol, seawater color (Ocean Color), vegetation, snow and ice. Normalized water leaving radiances from SGLI will be used to generate additional parameters such as chlorophyll concentration, total suspended matter, colored dissolved organic matter, primary productivity and true color imagery. These products will be used to produce harmful algal bloom forecasts (Fig. 1), integrated ecosystem assessments, water quality assessments, ocean acidification/carbon flux studies. GCOM-C1 data will compliment the data provided by the Visible Infrared Imager Radiometer Suite (VIIRS) on NPOESS to support ocean color and climate-related requirements. The SGLI data will provide additional coverage by filling the NPOESS observation gap in the morning orbit.

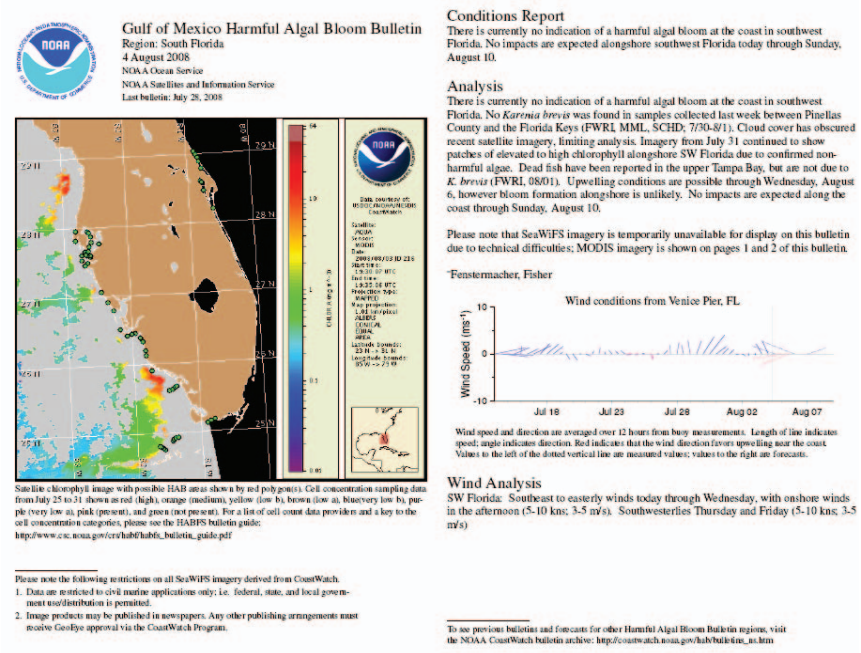

Fig. 1 Example of algal bloom forecast product produced by NOAA CoastWatch project. http://coastwatch.noaa.gov/hab/bulletins_ms.htm

4. IMPACT ON NOAA OPERATIONS

The GCOM satellites will provide comprehensive observations of the surface layer of the Earth such as the atmosphere, including clouds, land, oceans and the critical sea ice concentrations of the Northern and Southern hemispheres. The data from the GCOM mission will provide critical meteorological, oceanographic, climate and environmental observation data for NOAA to be used for monitoring, modeling, forecasting and research of the atmosphere, oceans and climate. The NWS will use the data to improve forecasting and warning products and services. National Marine Fisheries Service (NMFS) will use the sea surface temperature and ocean color data for ocean productivity and biological activity studies and to gain a greater understanding of marine habitat (Fig.2). National Ocean Service (NOS) will use the ocean color data to aid in the detection of harmful algal blooms along the coastline. This data will also provide continuity to the climate data records started by AMSR and MODIS on the NASA Aqua mission.

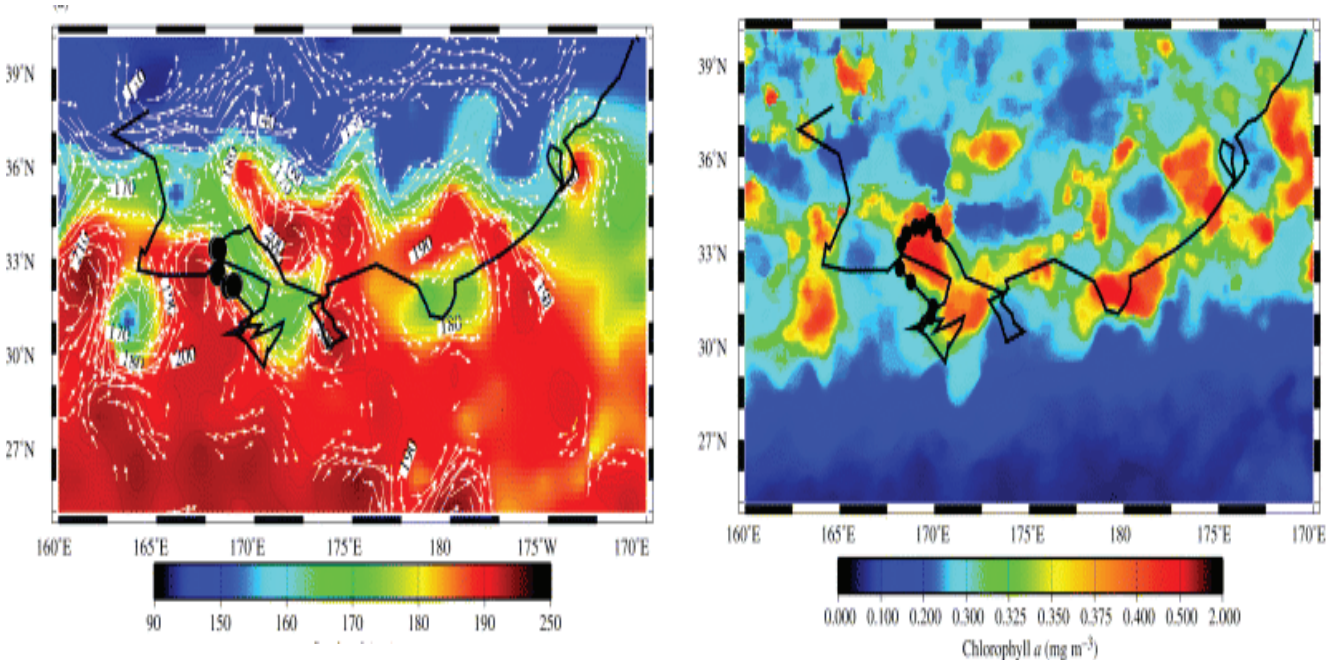

Fig. 2 Example of chlorophyll retrievals from and … for impact on loggerhead turtle tracks along the Transitional Zone Chlorophyll Front (TZCF) in the N. Pacific during Feb. '01 The TZCF is an important foraging ground for a number of commercial and protected species. Interannual variability in its location has been tied to the reproductive success of endangered monk seal pups. (Polovina et al 2004)

GCOM cooperation directly contributes to the Global Earth Observation System of Systems (GEOSS) Disaster, Water, Weather and Climate Societal Benefit Areas (SBA) by providing critical

meteorological, climate and environmental observation data. The cooperation also will contribute indirectly to the other SBAs of Health, Energy, Ecosystem, Agriculture and Biodiversity. GCOM-W will provide continuity of oceanographic and maritime meteorological data currently provide by NASA's Aqua satellite. These measurements have proven valuable for numerical weather prediction in areas over the open oceans which subsequently impact medium to long range weather forecasting in coastal regions. Precipitation data from this instrument will aid forecasting of major storm systems threatening human safety, and damage to coastal infrastructures. GCOM-C will provide additional advanced Visible and Infra-Red Imaging capability which will supplement coverage from the NPP and NPOESS spacecraft resulting in a more complete balanced nominal coverage of the earth every 4-hours. This high resolution data provides faster identification of hazardous weather conditions, smoke, and volcanic ash due to the increased 4 hourly imaging coverage of a geographic area with the addition of GCOM-C versus having an 8 hour gap with only NPP and NPOESS. In addition, Oceanographic benefits include improved ocean current analysis and forecast, fine scale ocean color, turbidity, and sea state. Both of these global microwave imaging/ sounding data and high resolution Vis/IR imaging capabilities have been identified by the National Academies of Science Decadal Survey as critical to our understanding of the ocean-atmosphere interactions driving global climate change.

5. BIBLIOGRAPHY

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