CGMS-XXXI

Prepared by IOC
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Plenary

SATELLITE REQUIREMENTS OF IOC PROGRAMMES

(Submitted by IOC)

Summary and purpose of document

To inform CGMS Members on satellite requirements of the IOC GOOS programmes. The GOOS coastal applications require satellite products with high spatial resolution and quick delivery of sea state information. Establishing and improving the GOOS coastal module are critically dependent on the coordinated development of GOOS Regional Alliances (GRAs) that contribute to and benefit from the global observing system, e.g., satellite-based remote sensing.

ACTION PROPOSED

The IOC satellite requirements, especially the data dissemination methods, need to be considered incorporating the ongoing formations of GRAs.

IOC STRATEGY FOR REMOTE SENSING

1. The increasing population of the world's coastal zones imposes new challenges on society to manage the finite marine resources of the planet in a sustainable and environmentally responsible manner. For the oceans in particular, the challenge to humankind of observing the oceans, understanding them, and transferring knowledge and information about them into management processes is very demanding. Many of the countries of the world do not yet have the resources to enable them to routinely and systematically collect from their coastal seas and Exclusive Economic Zones the observations at high resolution that are required on the one hand for fully effective ocean management in the pursuit of sustainable development, and on the other hand for the improvement of weather and climate forecasting.

2. Recalling the World Summit on Sustainable Development Implementation Plan for widespread use of remote sensing from space as a tool for sustainable development, IOC member states need to make best use of satellite data and to make remote sensing a new focus for IOC's capacity building efforts. Developing countries evidently need to make best use of the data from the satellites that overfly their waters day after day for the integrated coastal area management.

IOC Satellite requirements and discussions

3. The IOC, UNEP, WMO and ICSU sponsored Global Ocean Observing Programme has been designed (1) a global ocean module concerned primarily with detecting and predicting changes in the ocean-climate system and improving marine services (led by the Ocean Observations Panel for Climate: OOPC) and (2) a coastal module concerned with the effects of large scale changes in the ocean-climate system and of human activities on coastal ecosystems, as well as improving marine services (led by the Coastal Ocean Observations Panel: COOP). The present satellite data requirements from the GOOS are summarized in Table 1 shown in the next page.

4. The satellite parameters for the GOOS coastal modules (marine biology and surface in the Table 1) require high spatial resolution. In order to improve the safety and efficiency of marine operations and more effectively control and mitigate the effects of natural hazards, quick delivery of the sea state information (e.g., surface waves) is essentially important. The Coastal Ocean Observing Panel is reconsidering the present requirements on the bases of the recently published "The Integrated Strategic Design Plan for the Coastal Ocean Observations Module of the Global Ocean Observing System" (http://ioc.unesco.org/goos/docs/GOOS_125_COOP_Plan.pdf).

5. Most of users of the satellite-derived information are in the coastal seas. Establishing and improving the GOOS are critically dependent on the coordinated development of GOOS Regional Alliances (GRAs) that contribute to and benefit from the global observing system, e.g., the satellite remote sensing. GRAs are formed by agreement between participating countries, national organizations, and/or international bodies (Regional monitoring networks, Regional Fishery Bodies, Regional Sea Conventions, etc.). The activity and cooperation of GRAs are especially important to the development of the coastal module of GOOS.

Table 1 IOC Satellite requirements

(References, e.g., http://ioc.unesco.org/goos/docs/act_pl/Table_B_requir_02.htm for the global ocean module, and http://ioc.unesco.org/goos/docs/GOOS_125_COOP_Plan.pdf for the coastal module)

"USE"	"Requirement"	"Hor Res"	"HR Min"	"Obs Cycle	"OC Min"	"Delay of ava	"DA Min"	"Acc - RMS"	"AC Min"
GOOS Climate - large scale	Ocean chlorophyll	25 km	100 km	1 d	3 d	1 d	3 d	0.1 % (Max)	0.5 % (Ma
GOOS Climate - large scale	Ocean dynamic topography	100 km	300 km	10 d	30 d	10 d	30 d	2 cm	5 cm
GOOS Climate - large scale	Ocean salinity	200 km	500 km	10 d	30 d	10 d	30 d	0.1 psu	1 psu
GOOS Climate - large scale	Sea surface bulk temperature	10 km	300 km	6 h	720 h	6 h	720 h	0.1 K	1 K
GOOS Climate - large scale	Sea-ice cover	10 km	100 km	1 d	6 d	0.125 d	1 d	2 % (Max)	10 % (Ma>
GOOS Climate - large scale	Wind speed over sea surface (horizontal)	25 km	100 km	24 h	168 h	24 h	168 h	1 m/s	2 m/s
GOOS Climate - large scale	Wind vector over sea surface (horizontal)	25 km	100 km	24 h	168 h	24 h	168 h	1 m/s	2 m/s
GOOS Climate - mesoscale	Ocean dynamic topography	25 km	100 km	7 d	30 d	2 d	15 d	2 cm	10 cm
GOOS Surface	Dominant wave direction	10 km	30 km	1 h	6 h	2 h	4 h	10 degrees	20 degree
GOOS Surface	Dominant wave period	10 km	30 km	1 h	6 h	2 h	4 h	0.5 s	1 s
GOOS Surface	Sea surface bulk temperature	1 km	10 km	6 h	12 h	2 h	4 h	0.1 K	2 K
GOOS Surface	Sea-ice thickness	25 km	100 km	1 d	6 d	1 d	6 d	50 cm	100 cm
JGOOS-III	Geoid	250 km	500 km	240 mo	360 mo	12 y	24 y	2 cm	5 cm
Marine biology (coastal water)	Aerosol (total column) size	1 km	10 km	24 h	48 h	3 h	7 h	0.1 µm	1 µm
Marine biology (coastal water)	Ocean chlorophyll	1 km	5 km	1 d	3 d	3 d	7 d	5 % (Max)	20 % (Ma>
Marine biology (coastal water)	Photosynthetically Active Radiation (PAR)	1 km	5 km	0.04 d	1 d	3 d	7 d	5 % (Max)	20 % (Ma>
Marine biology (coastal water)	Sea surface bulk temperature	1 km	5 km	24 h	48 h	3 h	7 h	0.1 K	0.5 K
Marine biology (open ocean)	Aerosol (total column) size	4 km	50 km	24 h	48 h	3 h	7 h	0.1 µm	1 µm
Marine biology (open ocean)	Air pressure over sea surface	50 km	100 km	24 h	48 h	3 h	7 h	10 hPa	15 hPa
Marine biology (open ocean)	Ocean chlorophyll	10 km	50 km	1 d	3 d	3 d	7 d	0.1 % (Max)	0.5 % (Ma
Marine biology (open ocean)	Ocean yellow substance absorbance	1 km	5 km	1 d	2 d	3 d	7 d	5 % (Max)	20 % (Ma>
Marine biology (open ocean)	Ozone profile - Total column	50 km	200 km	24 h	48 h	3 h	7 h	10 DU	20 DU
Marine biology (open ocean)	Photosynthetically Active Radiation (PAR)	10 km	50 km	0.04 d	1 d	3 d	7 d	5 % (Max)	20 % (Ma>
Marine biology (open ocean)	Sea surface bulk temperature	10 km	50 km	24 h	48 h	3 h	7 h	0.1 K	0.5 K
Marine biology (open ocean)	Specific humidity profile - Total column	Missing	Missing	24 h	Missing	3 h	7 h	Missing	Missing
Marine biology (open ocean)	Wind vector over sea surface (horizontal)	4 km	50 km	24 h	48 h	3 h	7 h	2 m/s	5 m/s

6. For the coastal applications, the satellite data dissemination methods to GRAs and the national GOOS communities need to be well designed. The direct broadcasting of high-resolution satellite images (i.e., sea surface temperature) are now functioning in the operational satellites and a part of the R&D satellites (i.e., ocean color). However, the key parameters (i.e., vector winds, surface waves) for the safety and efficiency of marine operations are not broadcasted. Discussions on the "ALTERNATIVE DISSEMINATION METHODS" should also concern ongoing formations of the coastal regional GOOS framework, i.e., GRAs.