

# **Oceanographic information provided by ESA missions**

CGMS is informed about the ocean related parameters provided or planned by ESA missions: ERS, Envisat, Explorer and GMES Space program.

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### **1.- INTRODUCTION**

The IOC strategy for Remote Sensing (see CGMS-XXXI paper prepared by EOC) recalls the World Summit on Sustainable Development Implementation plan for widespread use of remote sensing from space as a tool. To this end, IOC member states need to make remote sensing a new focus for IOC's capacity building efforts.

### **2.- REQUIREMENTS**

IOC, UNEP, WMO and ICSU sponsored GOOS have designed a global ocean module and a coastal module, and defined present satellite data requirements. The marine biology and surface parameters for coastal applications need to have high spatial resolution.

The GOOS Regional Alliances are formed by agreement between participating countries, national organizations, and/or international bodies. Direct broadcasting to GRAs of key parameters such as vector winds or surface waves is still not implemented.

### **3.- ERS OCEAN DATA**

The status of the ERS mission is to be found in paper CGMS-XXXIII-ESA-WP-01. The most complete information about the ERS mission, system, instruments, its products, user services and latest news can be found at <http://earth.esa.int/ers/> .

The ERS-1 satellite, being designed originally as an oceanographic mission, provided many useful parameters from its sensors:

SAR Synthetic Aperture Radar  
RA Radar Altimeter & Microwave sounder  
ATSR Along Track Scanner radiometer  
AMI Wind Scatterometer

The ERS-2 satellite, still in operations, adds also:

GOME Global Ozone Monitoring Experiment.

Parameter	Instrument	Resolution Km	Observation cycle days (*)	Delay avail. (**) hours	Comment
SST	ATSR	1	35		
Wind speed	RA	7	35	3	
Wind vector	AMI wind	50	35	3	Incompatible with SAR operations
Ocean topography	RA	7	35		Resolution is along-track
Wave Height	RA	7	35	3	Resolution is along-track
Wave direction	SAR-wave	200	35	3	5x5 km imagettes
Wave period	SAR wave	200	35	3	5x5 km imagettes
Sea-ice cover	RA/AMI wind	7/25	35		
Sea ice thickness	RA	7	35	1 month	to be derived from the data product by users
Geoid	RA	4	35	6 month	ocean
Ozone total column	GOME	320	35	3	Pixel 320x40 km

- Now 35 days, but ERS-1 had many cycles.
- \*\* There is a Fast Delivery service of 3 hours for selected products.
- Others may vary.

There is no direct broadcasting to users; only to ESA stations.

#### 4.- ENVISAT OCEAN DATA

The status of the Envisat mission is to be found in paper CGMS-XXXIII-ESA-WP-01. The most complete information about the Envisat mission, system, instruments, its products, user services and latest news can be found at <http://envisat.esa.int/>

The Envisat satellite is dedicated to environment monitoring, including the ocean. It provides many useful parameters from its sensors:

ASAR: Advanced Synthetic Aperture Radar

RA-2 and MWR: Advanced Radar Altimeter & Microwave sounder

AATSR: Advanced Along Track Scanner radiometer

MERIS: Medium resolution Imaging Spectrometer

SCIAMACHY: Scanning Imaging Absorption Spectrometer Atmospheric Chartography

GOMOS: Global Ozone Monitoring by Occultation of Stars

MIPAS: Michelson Interferometric Passive Atmospheric Sounder

Parameter	Instrument	Resolution Hor/Ver km	Observation cycle days	Delay avail. (**) hours	Comment
SST	AATSR	1	35	3	
Wind speed	RA	7	35	3	
Ocean chlorophyll	MERIS	0.3	35		
Ocean topography	RA-2	7	35		Resolution is along-track
Wave height	RA-2	7	35	3	Resolution is along-track
Wave direction	ASAR-wave	100	35	3	5x5 km imaggettes
Wave period	ASAR wave	100	35	3	5x5 km imaggettes
Sea-ice cover	RA-2	7	35		Resolution is along-track
Sea ice thickness	RA-2	7	35	1 month	to be derived from the data product by users
Geoid	RA-2	7	35		Ocean. Resolution is along-track
Ozone total column & profile	GOMOS, MIPAS, Schiamachy	300/1 300/3 500/3 320	35	3 - 3	
Aerosols	GOMOS Schiamachy	300/1 320	35		
Ocean yellow substance absorbance	MERIS	0.3	35		
PAR	MERIS	0.3	35		

\*\* There is a Fast Delivery service of 3 hours for selected products. Others may vary. Some products can be retrieved from a pwd protected ftp server. See CGMS-XXXII-ESA-WP-03 for details.

The High Bit Rate ASAR and MERIS data are selectively acquired by ESA and National stations. There is no direct broadcast service to users. There is a dissemination service using commercial telecom satellites as relay.

## 5.- FUTURE OCEAN DATA

The status of the Explorers mission is to be found in paper CGMS-XXXIII-ESA-WP-02. The most complete information about the Explorers mission can be found at <http://www.estec.esa.nl/explorer/>

The four missions under implementation are:

GOCE (Gravity and steady-state Ocean Circulation Explorer)  
 ADM-Aeolus (Atmospheric Dynamics Mission)  
 Cryosat (Polar ice sheets, sea-ice and continental glacier variation Monitoring)\*  
 SMOS (Soil Moisture and Ocean Salinity)

The parameters of direct relevance to Oceanography are:

Parameter	Instrument	Resolution Km	Observation cycle days	Delay avail. Hours	Comment
Salinity	SMOS	200	23 (3 days sub cycle)		
Absolute Ocean topography	GOCE geoid +RA-2	7	35	3	to be derived by user using both products
Sea-ice cover	CRYOSAT	0.3	369 (30 day subcycle)		
Sea ice thickness	CRYOSAT	0.3	369 (30 day subcycle)		
Geoid	GOCE	100			

\* Cryosat is planned for launch in October 2005.

Other Explorer missions approved, SWARM (magnetic field) and EarthCARE (clouds and aerosols) are not of immediate relevance to Oceanography.

ESA is actually defining the contents and arrangements of the missions that will encompass the GMES (Global Monitoring or the Environment and Security) Space Program. They are aimed to provide data for operational services to cover a number of sectors. This includes the following payloads:

- Imaging radar C-band interferometric mission, relevant to: water pollution, ocean surveillance, costal zone management and ice monitoring.
- An optical sensor suite operating at medium (250 m) to low (1000 m) spatial resolution, ranging from VIS to thermal IR part of the spectrum. It provides continuity to MERIS, AATSR and VGT sensors.
- A radar altimeter to provide continuity to ERS-1 and ERS-2.