

Space-based Monitoring in Support of Environmental Assessment at Synoptic Scales

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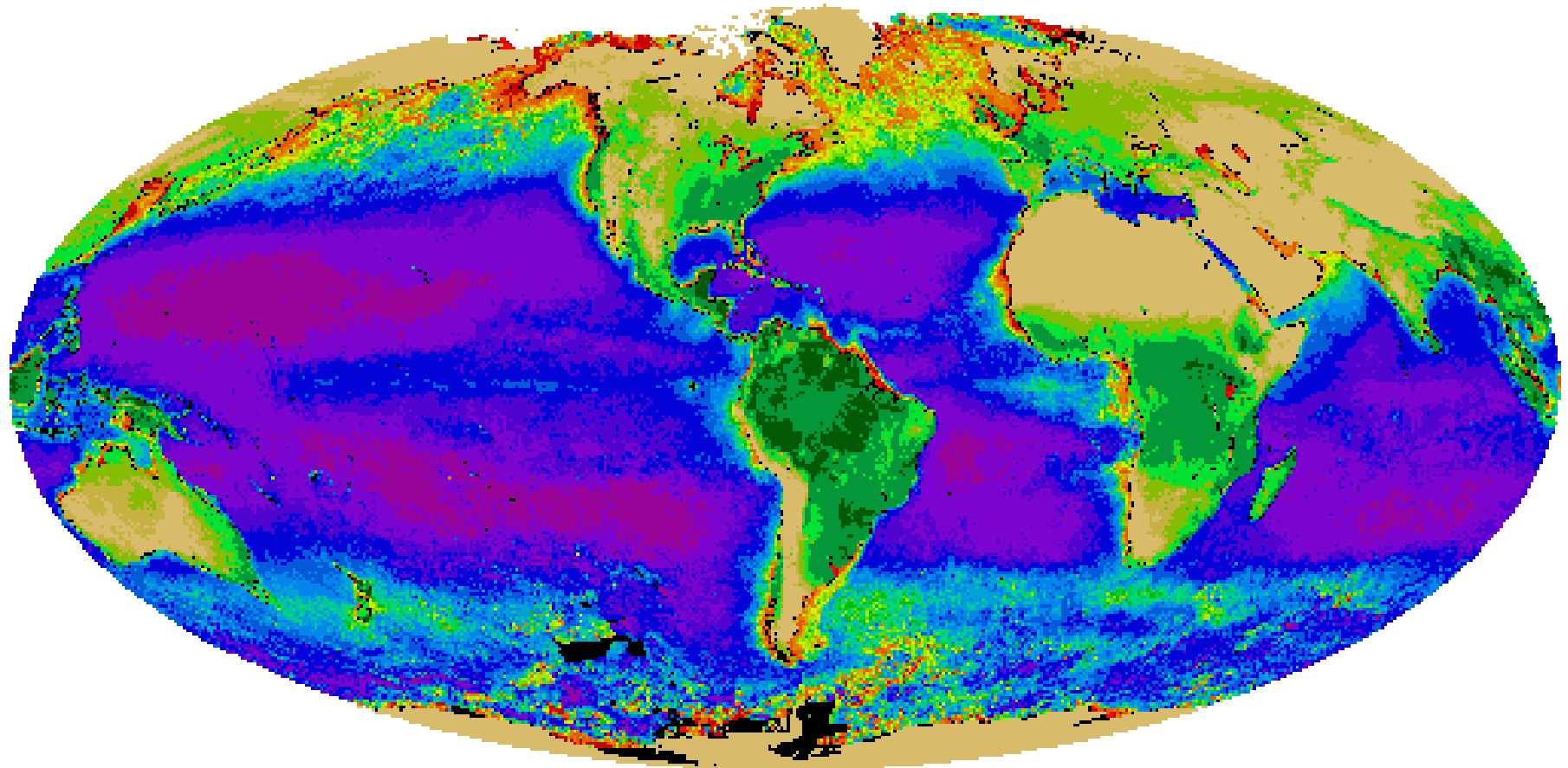
Background

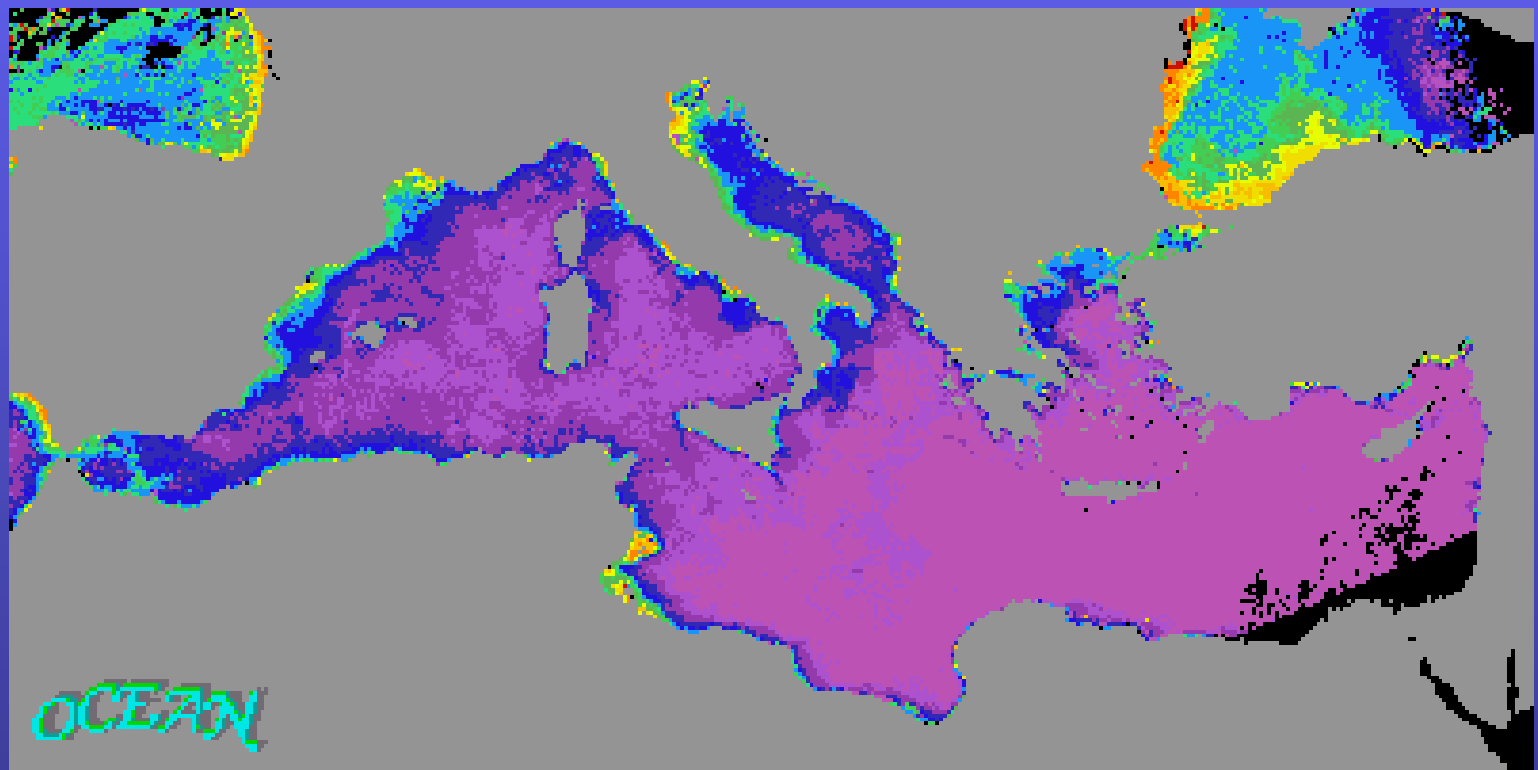
There is a need to characterize the environmental status of coastal / shelf seas.

In some regions this is now becoming a legislative obligation with the definition of “environmental objectives” e.g. European Marine Strategy Framework Directive

These assessments also provide an “environmental baseline” of water quality which can be used in assessing impact resulting from specific events

Coastal Zone Color Scanner (CZCS) Global Climatology (Nov. 1978~Jun. 1986)

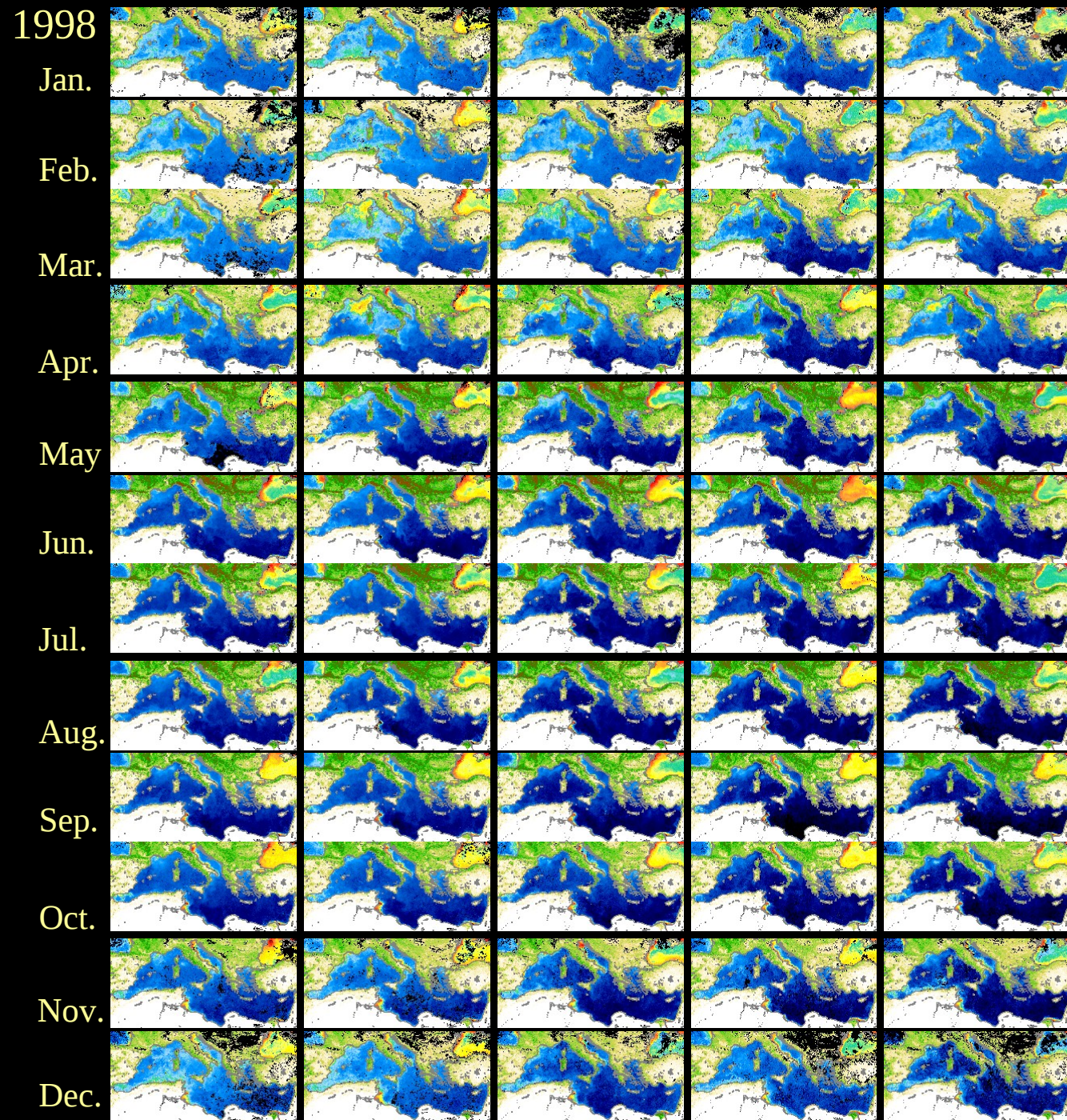




.05 .08 .12 .2 .3 .5 .8 1.3 2 3 4 6 10 mg/m^3



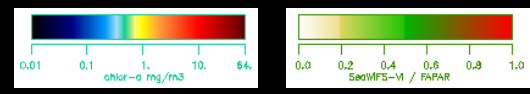
Ave. Pigments from CZCS, Jun 1979



2002

Ecosystem variability

using satellite-derived surface chlorophyll a concentration





Optically complex coastal waters

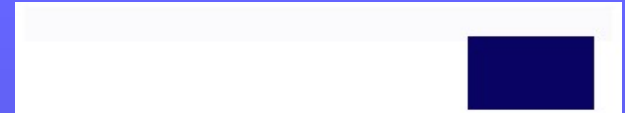
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Who uses this information?

- Governmental and inter-governmental organisations responsible for **state of the environment reporting (SoE)**
- In Europe these are the European Environment Agency, European Commission - DG ENV, the Marine Conventions and national environment agencies

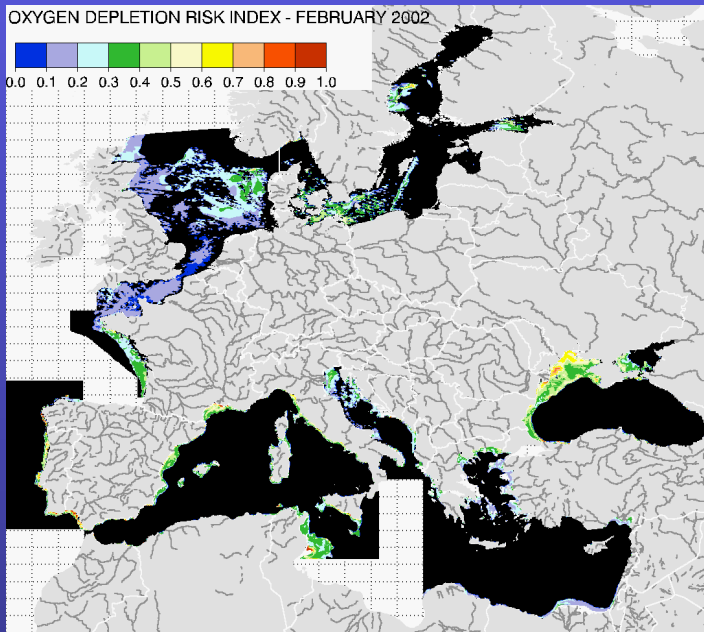


What do they want?

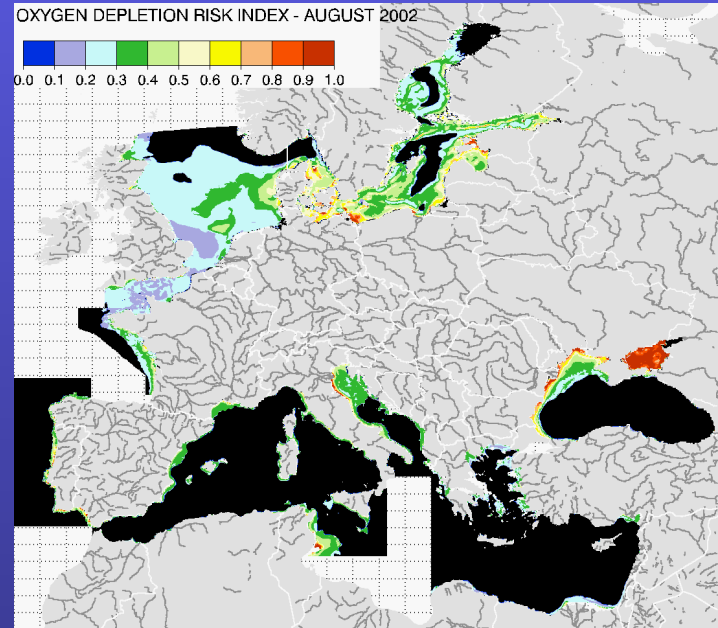
- Data at synoptic regional scale
- But intercomparable between region
- Delayed-time reanalyzed datasets
- Real-time data required to monitoring specific “events”
- Uncertainty of products (spatial)
- Require primary biological and geophysical variables linked to water quality (chlorophyll, turbidity, growing season, bloom occurrence .)

Oxygen Risk Index

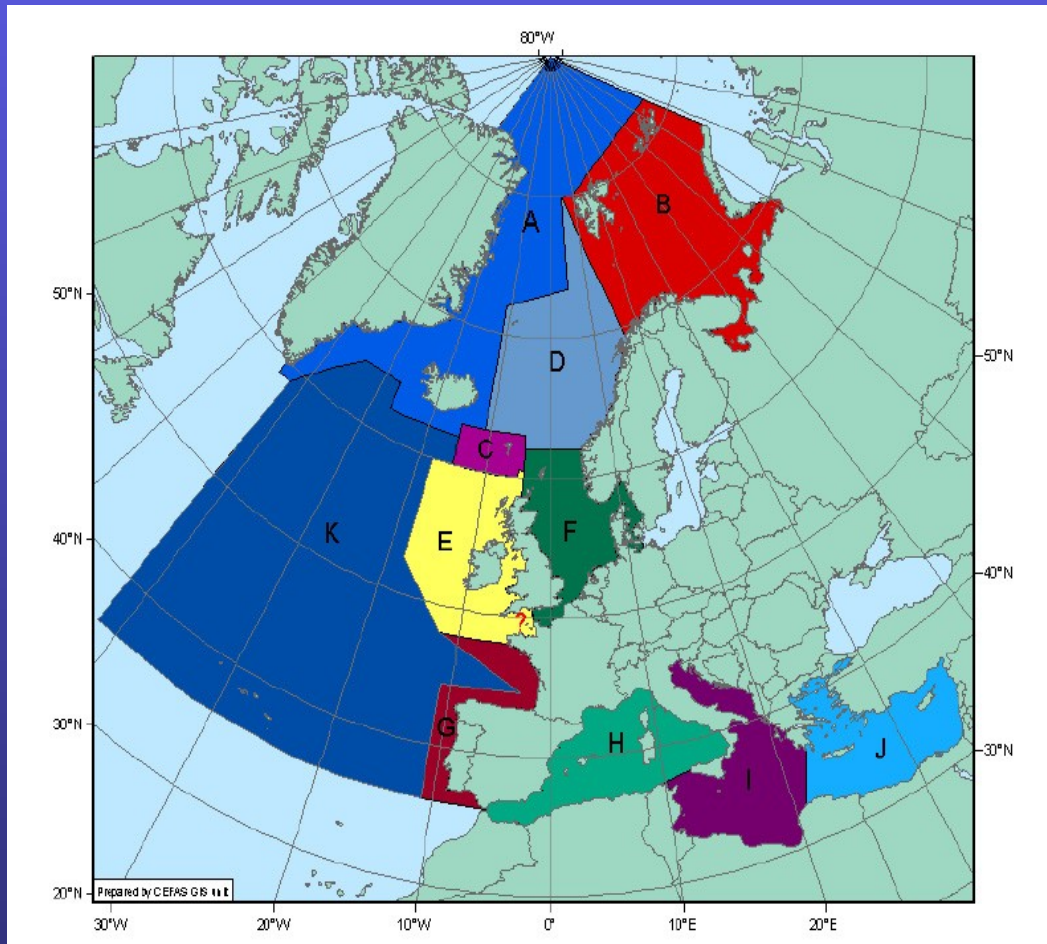
February

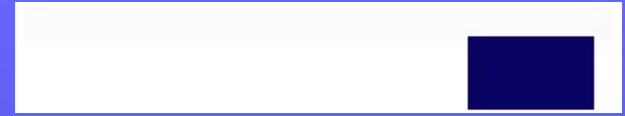


August

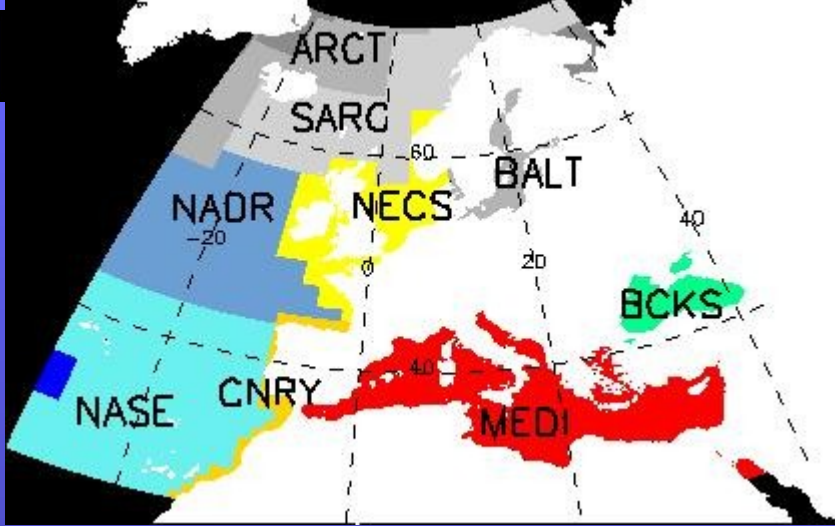


Regional Approach *MSFD Ecoregions*





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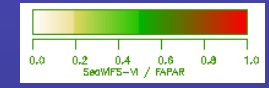
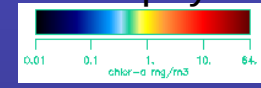
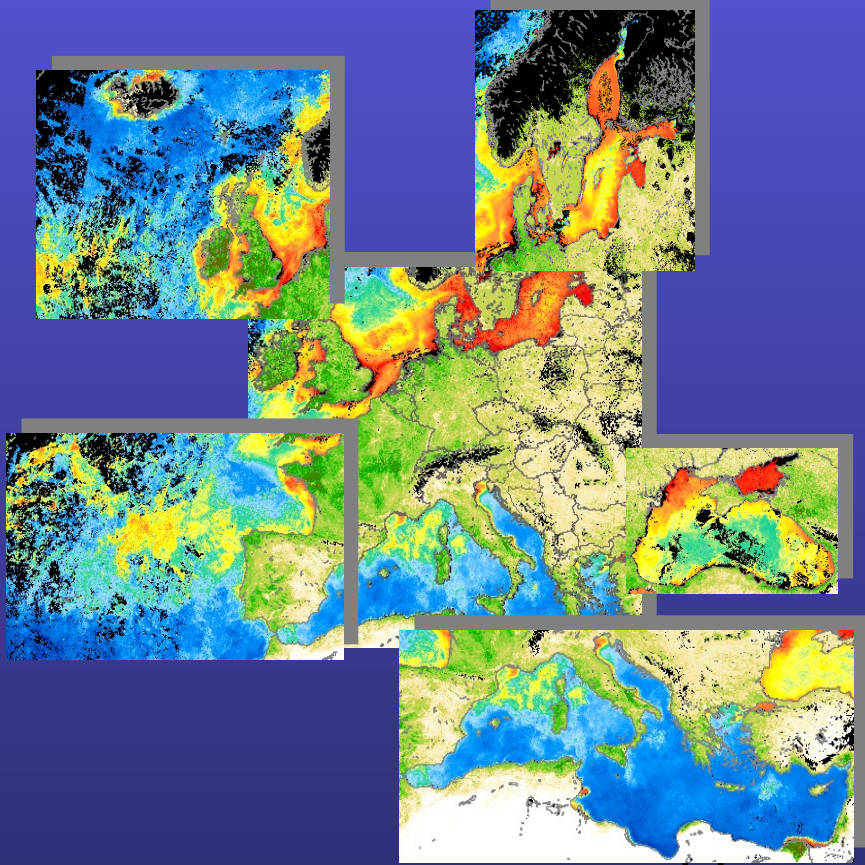


European Oceanic Domain

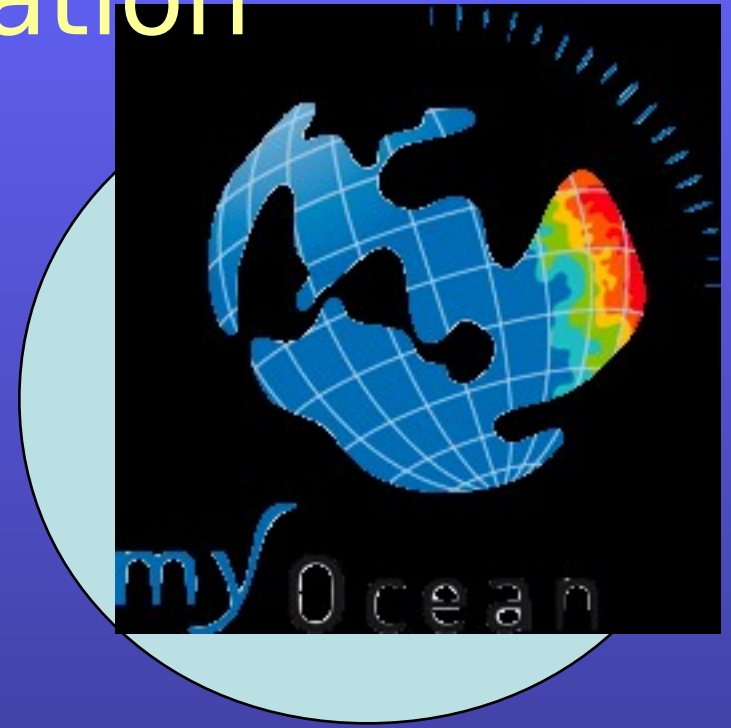
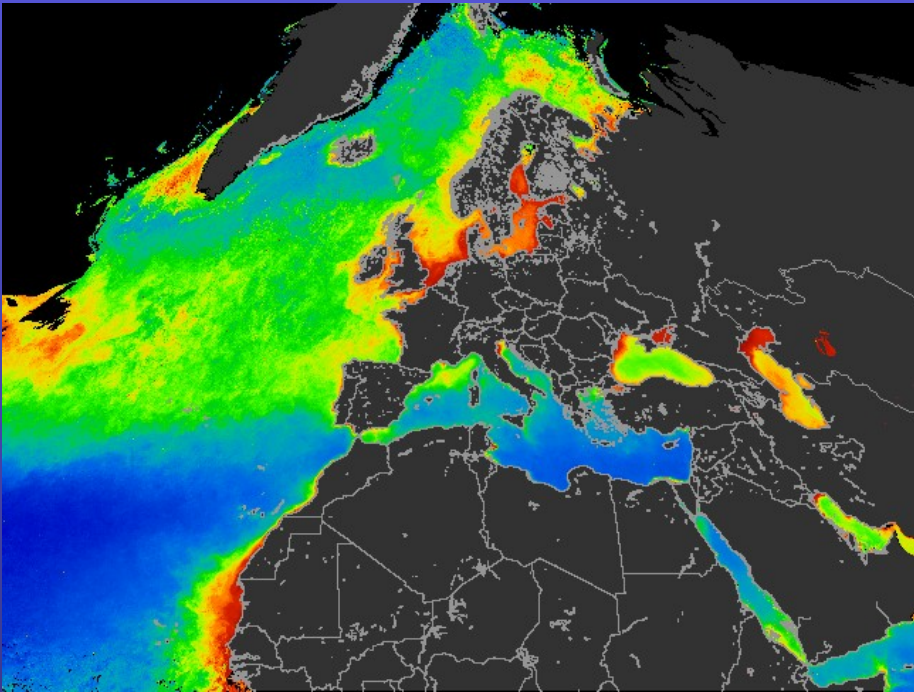
SARC+NADR+NASE+CNRY+
NECS+BALT+MEDI+BCKS
4.3% of the global ocean

Primary production:
3.2 GtC.yr⁻¹ (7%)

Export production:
0.9 GtC.yr⁻¹ (9%)
Chlorophyll a / FAPAR



“Regionalisation”



- Tailored assimilation in models
- Regional algorithms
- Regional users/applications



The JRC hosts a thematic portal for a pan-European Environmental Marine Information System - EMIS

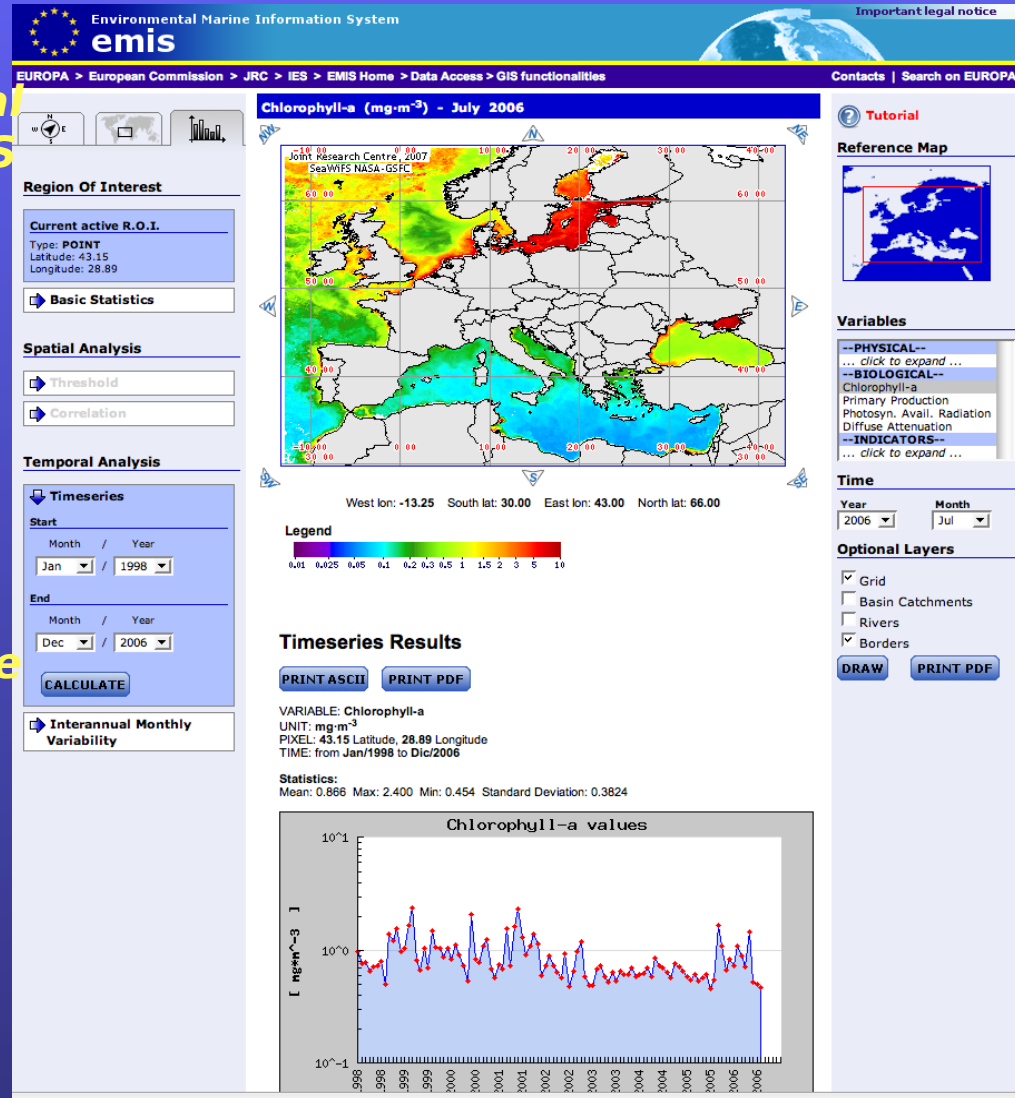
EMIS provides background information on physical and biological properties that can be used in the evaluation of the eutrophication status of coastal waters.

These include synoptic maps of phytoplankton biomass (chlorophyll) and sensitive marine areas with risk of oxygen depletion.

EMIS now includes a decadal time-series of products derived from satellite and modelled datasets

This information is of use, for example, in the definition of the HELCOM indicator fact sheets.

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The screenshot displays the EMIS web interface. At the top, it features the JRC logo and the title 'Environmental Marine Information System emis'. The main content area is titled 'Chlorophyll-a (mg-m⁻³) - July 2006' and shows a map of the Mediterranean and Black Sea regions with a color scale from 0.01 to 10 mg-m⁻³. The interface includes several interactive panels:

- Region Of Interest:** Shows 'Current active R.O.I.' with coordinates (Type: POINT, Latitude: 43.15, Longitude: 28.89) and buttons for 'Basic Statistics'.
- Spatial Analysis:** Includes 'Threshold' and 'Correlation' options.
- Temporal Analysis:** Features a 'Timeseries' section with 'Start' (Month/Year: Jan/1998) and 'End' (Month/Year: Dec/2006) dropdowns, a 'CALCULATE' button, and an 'Interannual Monthly Variability' checkbox.
- Legend:** A color scale for Chlorophyll-a values from 0.01 to 10.
- Timeseries Results:** Includes 'PRINT ASCII' and 'PRINT PDF' buttons, and a 'Statistics' section showing Mean: 0.866, Max: 2.400, Min: 0.454, and Standard Deviation: 0.3824.
- Variables:** A list of variables including 'Chlorophyll-a', 'Primary Production', 'Photosyn. Avail.', 'Radiation', and 'Diffuse Attenuation'.
- Time:** Dropdowns for 'Year' (2006) and 'Month' (Jul).
- Optional Layers:** Checkboxes for 'Grid', 'Basin Catchments', 'Rivers', and 'Borders', along with 'DRAW' and 'PRINT PDF' buttons.

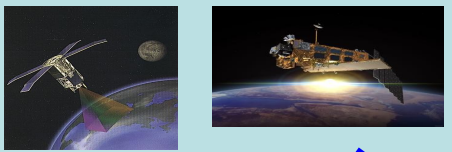


JRC ChloroGIN AMIS website

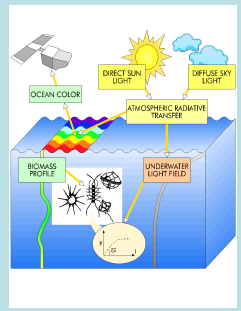
<http://amis.jrc.ec.europa.eu/>

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Satellite derived products

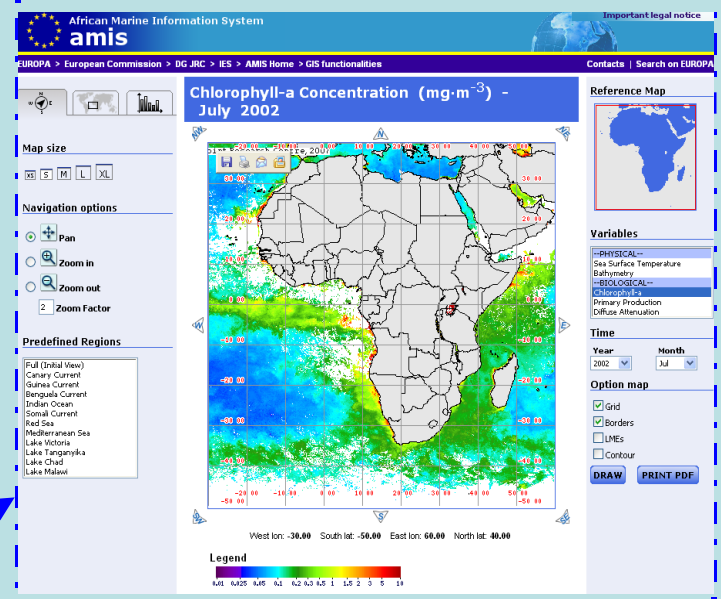


Models data



Environmental variables (e.g. Bathymetry)

GIS website



African Marine Information System
amis

EUROPA > European Commission > DG JRC > IES > AMIS Home > GIS functionalities

Chlorophyll-a Concentration (mg·m⁻³) - July 2002

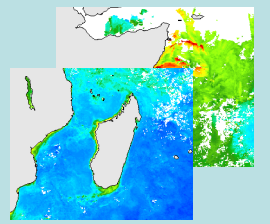
Map size: S, M, L, XL

Navigation options: Pan, Zoom in, Zoom out, Zoom Factor

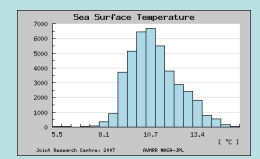
Predefined Regions: Full (Initial View), Canary Current, Guinea Current, Benguela Current, Indian Ocean, Somali Current, Red Sea, Mediterranean Sea, Lake Victoria, Lake Tanganyika, Lake Chad, Lake Malawi

Legend: 0.0, 0.25, 0.5, 0.75, 1.0, 1.25, 1.5, 2.0, 3.0, 5.0, 10.0

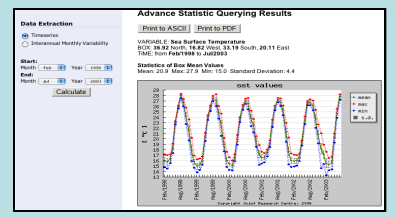
Maps Navigation



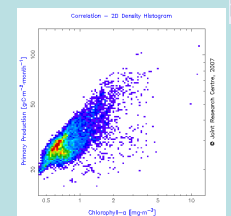
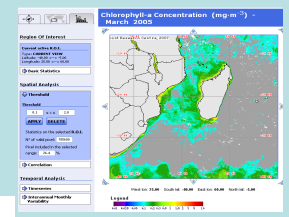
Basic Statistics



Time-series



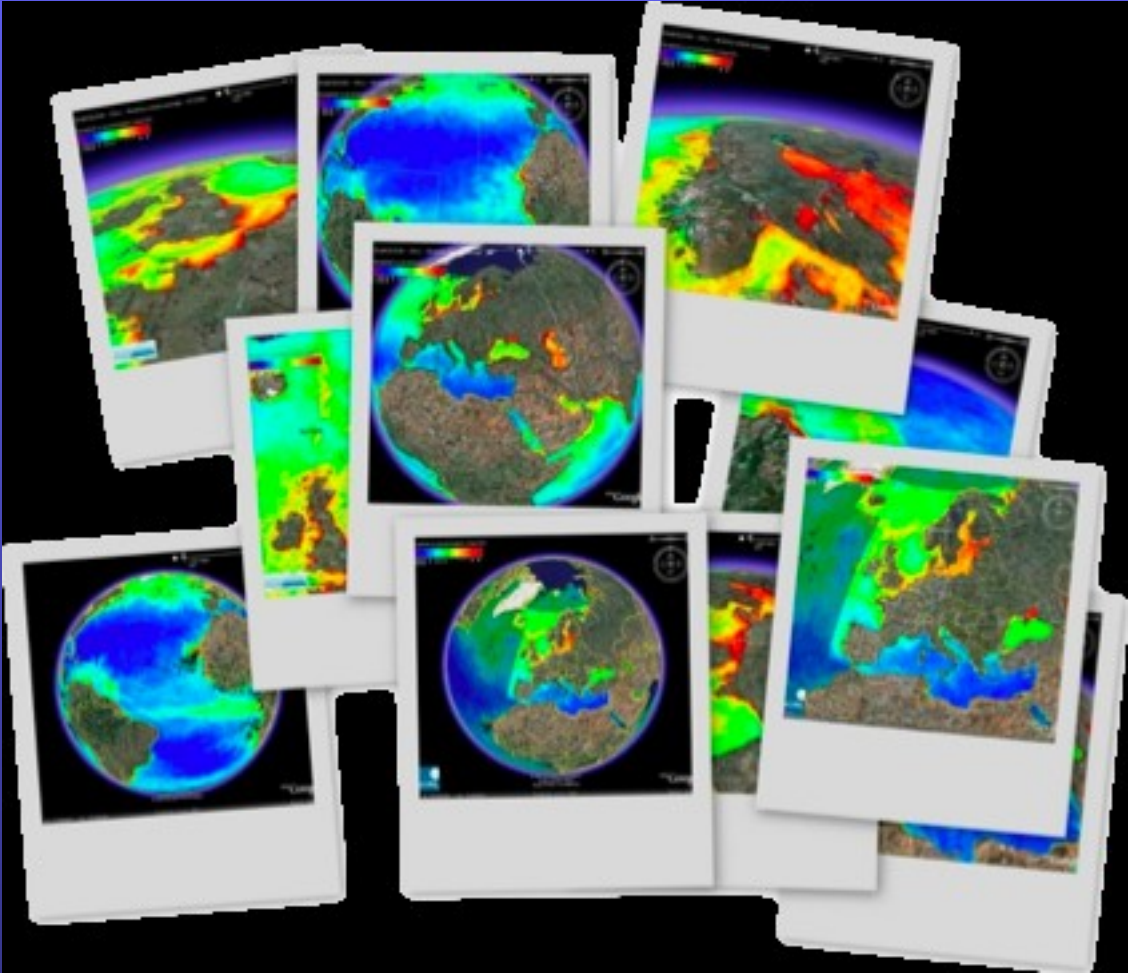
Threshold analysis

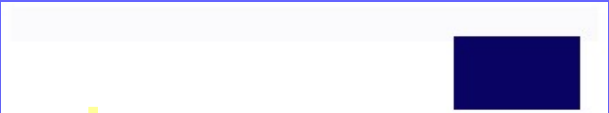


Multivariate analysis

Google Earth

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International Dimension.....

GEO

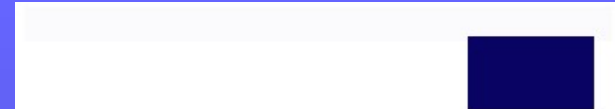
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- Coastal topics in GEO cover many different Societal Benefit Areas : Agriculture, Ecosystems, Climate, Water
- There is need for better networking to avoid duplication of efforts
- There is initial seed funding for various aspects from national agencies
- At present no roadmap for sustained long-term funding

ChloroGIN

- ChloroGIN is the Chlorophyll Globally Integrated Network
- Conceived during a IOC/GOOS/POGO/GEO sponsored workshop in Plymouth, Sept 2006
- Addresses GEO task EC-06-07
 - “Build upon existing initiatives e.g. ANTARES in South America ... to develop a global network of organization-networks for ecosystems, and coordinate activities to strengthen observing capacity in developing countries. “
- ChloroGIN aims to promote in situ measurement of chlorophyll in combination with satellite derived estimates and associated products.





ChloroGIN current Network

- The Network presently consists of three principal Regional Centres
 - Latin America, South Africa, India
- Linked by good communications to three northern centres
 - UK, EC-JRC, US
- additional Regional Center in Asia in discussion (e.g. CEARAC-NOWPAP)

ChloroGIN Network

ChloroGIN Earth - Windows Internet Explorer provided by Plymouth Marine Laboratory

http://wwwdev.chlorogin.org/world/index.php?map.x=327&map.y=156

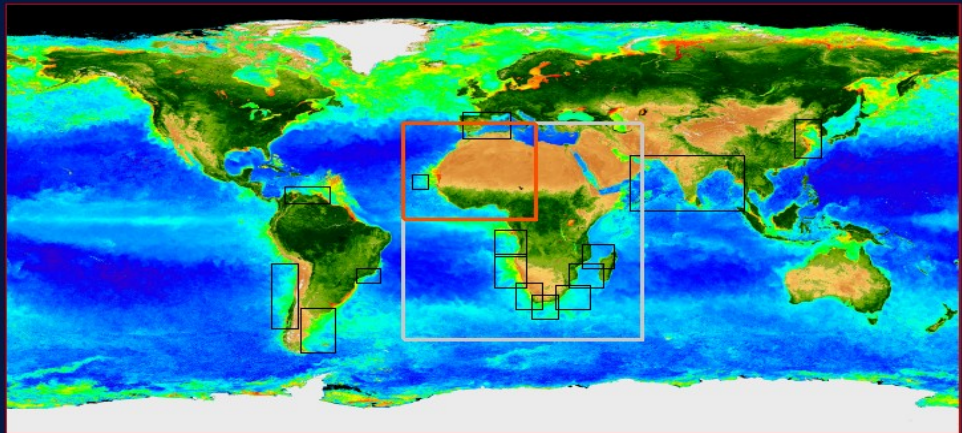
File Edit View Favorites Tools Help

PML - Home Page ChloroGIN Earth

ChloroGIN Earth

Earth Africa South America Contact Partners

The Chlorophyll Global Integrated Network (ChloroGIN) project aims to promote in situ measurement of chlorophyll in combination with satellite derived estimates. The project was initiated following recommendations of the "Plymouth Chlorophyll Meeting and Workshops (Extended Antares Network)" sponsored by GOOS, GEO, IOCCG, PML and POGO 18 - 22 Sept 2006 and was inspired by the Antares network that provides satellite coverage over Latin America



Select date: Year: 2008 Month: 05 Day: 27 Apply [Today]

Large areas		
Name:	Provider:	Boundary:
Global L3	NASA	90N -> 90S 180W -> 180E
AMIS	JRC	40N -> 50S 30W -> 60E
Cape Verde Large 4km	PML	40N -> 0N 30W -> 20E

Local areas

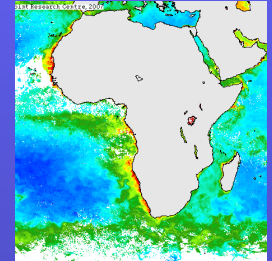
Click on the map to select an area.

Data availability for date selected is dependant on the individual data provider. Please verify that the data viewed is for the preferred date.

Done Internet 100%

1st Ocean Colour Training Course 2007 Africa (24 Sept.-5 Oct., Mombasa, Kenya)

A EC-JRC contribution to FP7 policy theme 4: The EU as a Global Partner
Environmental Dimensions of Development co-operation

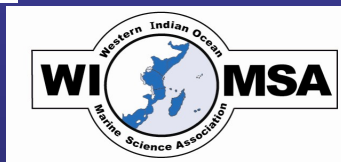


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Objectives

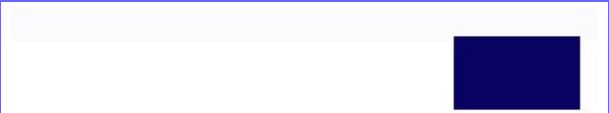
- ✓ To provide theoretical basis of satellite Ocean Colour measurements
- ✓ To promote applications of OC radiometry in Africa
 - for monitoring and managing coastal zones
 - for protecting marine ecosystems and resources



Intergovernmental Oceanographic Commission
Regional Programme Office - Perth



Course Highlights



- ✓ 18 participants selected out of 65 applications
- ✓ 11 Nations represented (Africa and Eastern Indian Ocean islands)
- ✓ 12 lecturers and application trainers from Africa and Europe
- ✓ 11 computers with both Linux and Windows configuration

Funding Initiative: DevCoCast

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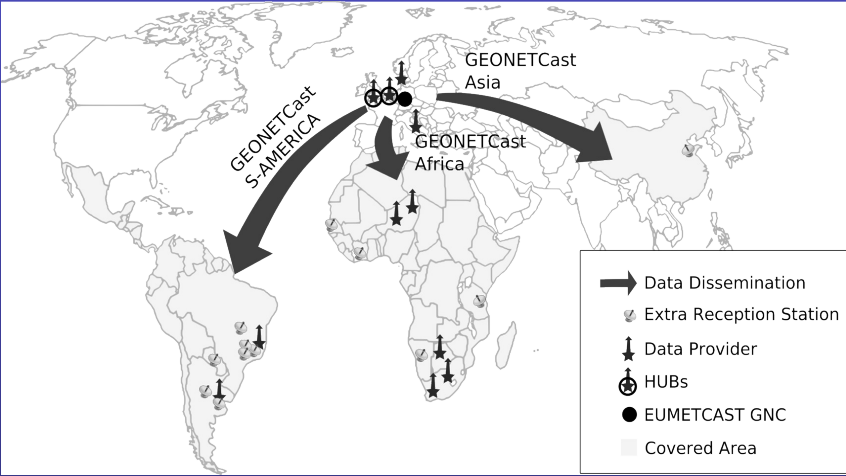
- ChloroGIN has been selected as one of the demonstration projects in the EU FP7 DevCoCast,
 - Kick-off meeting Paris (UNESCO) 14-15 May 2008

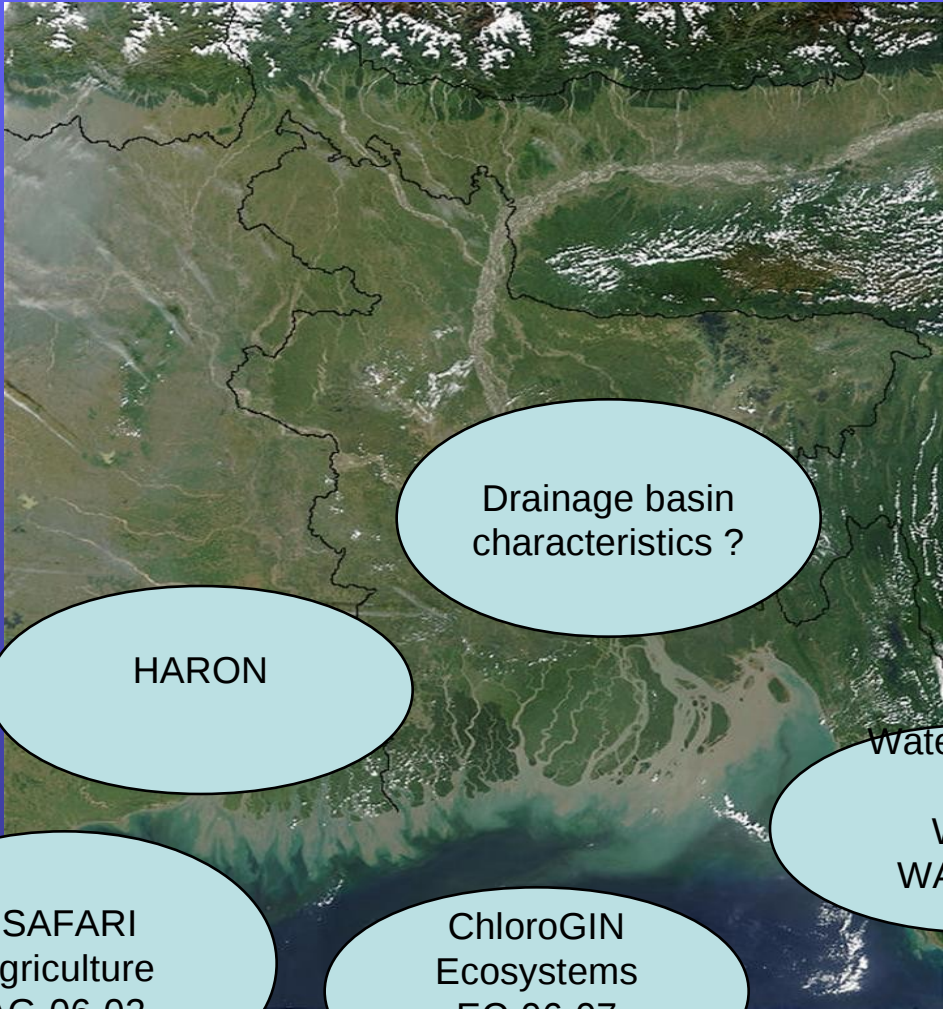
- DevCoCast will utilise the GEONETCast concept to provide processed **land and ocean** satellite data and value-added products in developing countries

Regional marine data providers (PML, JRC, MARE, DMI)

- to countries in Africa (Namibia, Tanzania, Ghana and Senegal) and South America (Brazil) and Asia (China)

- As DevCoCast develops it is hoped that additional partners will join the team. It is also expected that additional products will be provided.





Land Surface-
Virtual
Constellation

Drainage basin
characteristics ?

GlobColour
Coastal
component

HARON

Water Quality
WG
Water
WA-07-01

SAFARI
Agriculture
AG-06-02

ChloroGIN
Ecosystems
EC-06-07

Ocean Colour -
Virtual
Constellation
(Proposed)

ARGO

GCOS
ECVs