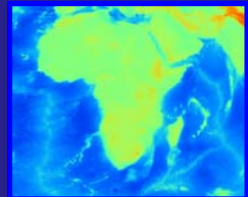
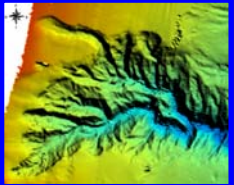
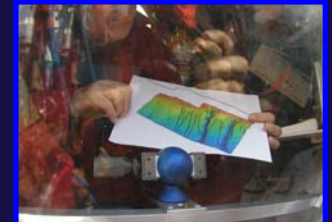
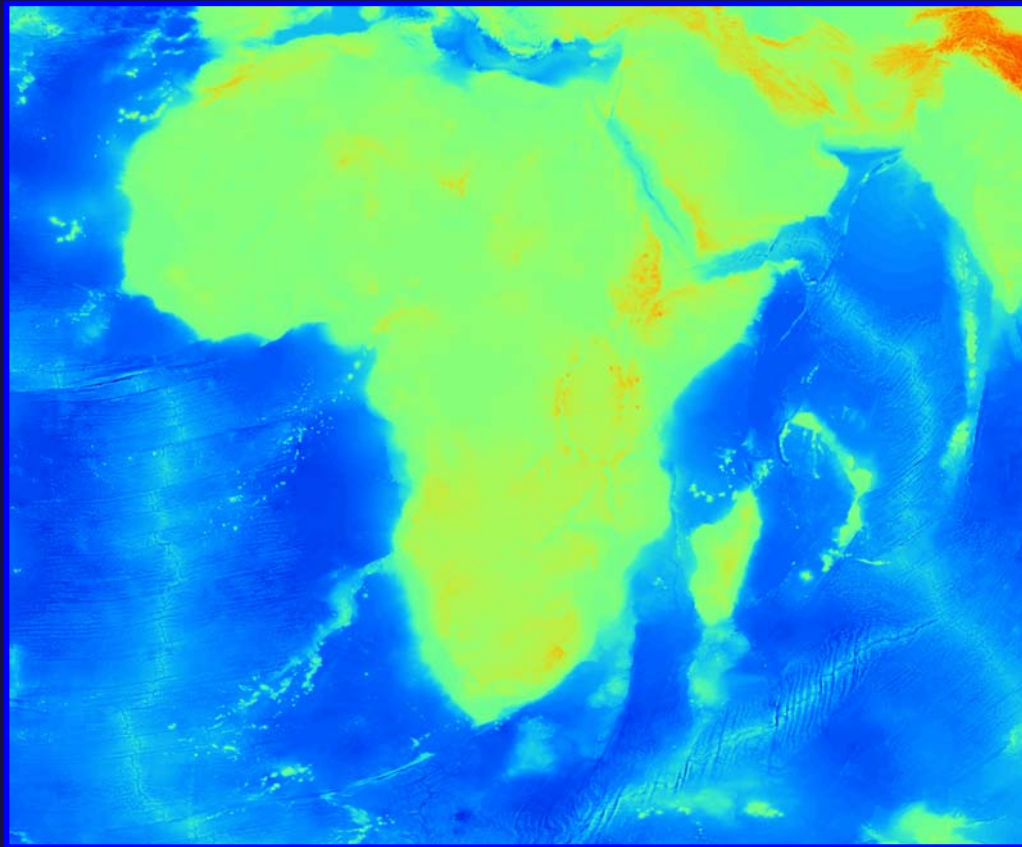




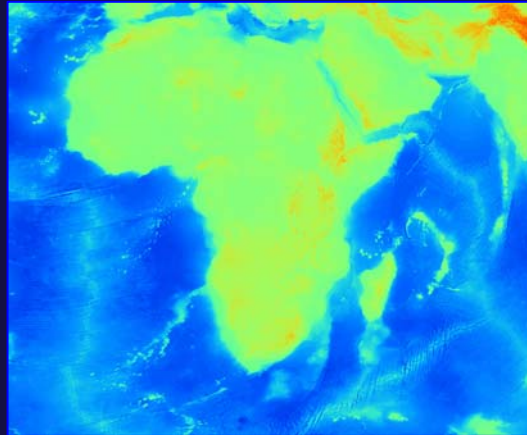
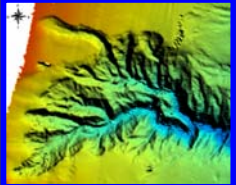
# The African Marine Atlas

ICAN 5 - Oostende, Belgium, 31 Aug - 2 Sep 2011

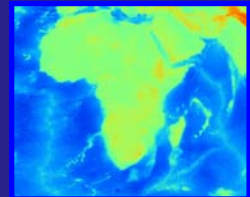
Mika Odido, Lucy Scott



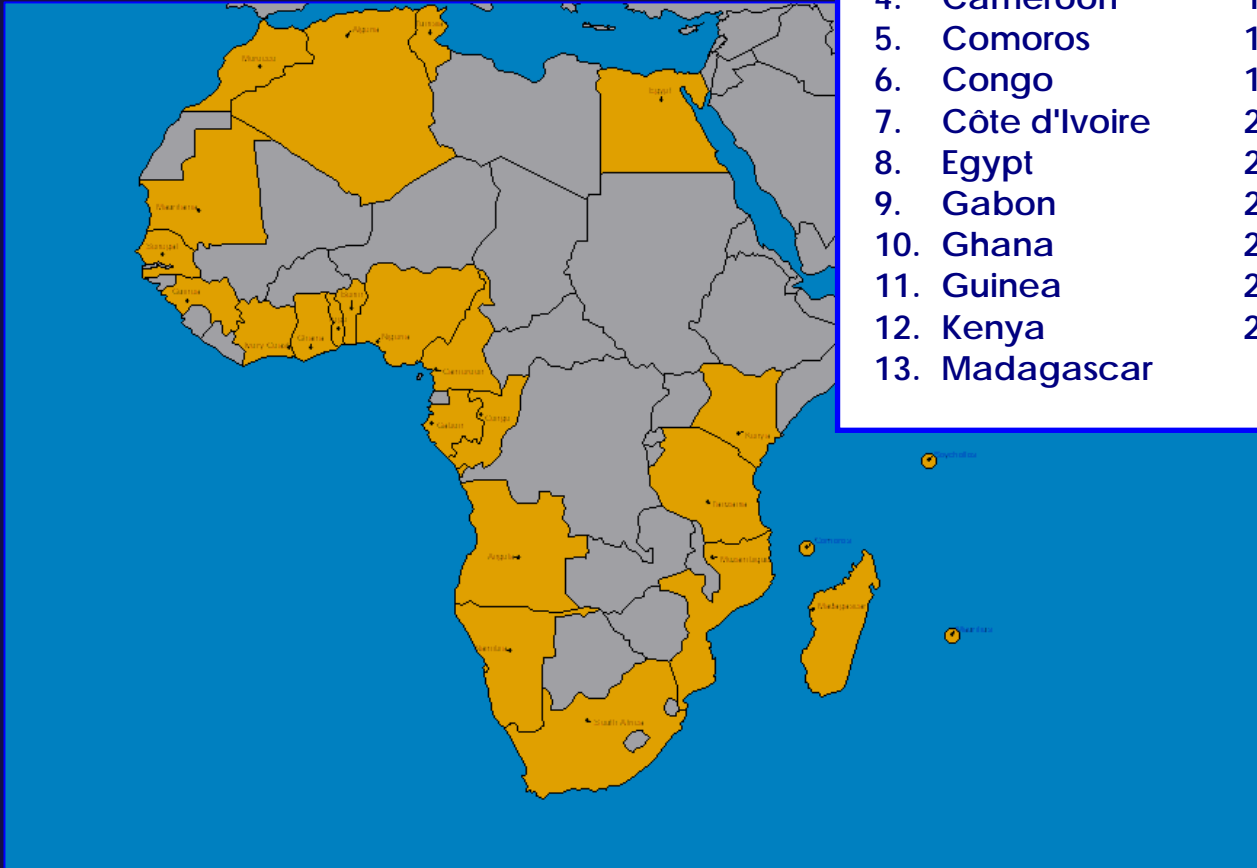
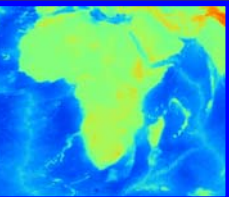
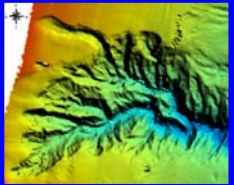
# The African Marine Atlas



A project of the:  
Ocean Data and Information Network For Africa  
(ODINAFRICA),  
funded by the:  
Government of Flanders and the:  
Intergovernmental Oceanographic Commission  
(IOC of UNESCO)'s IODE



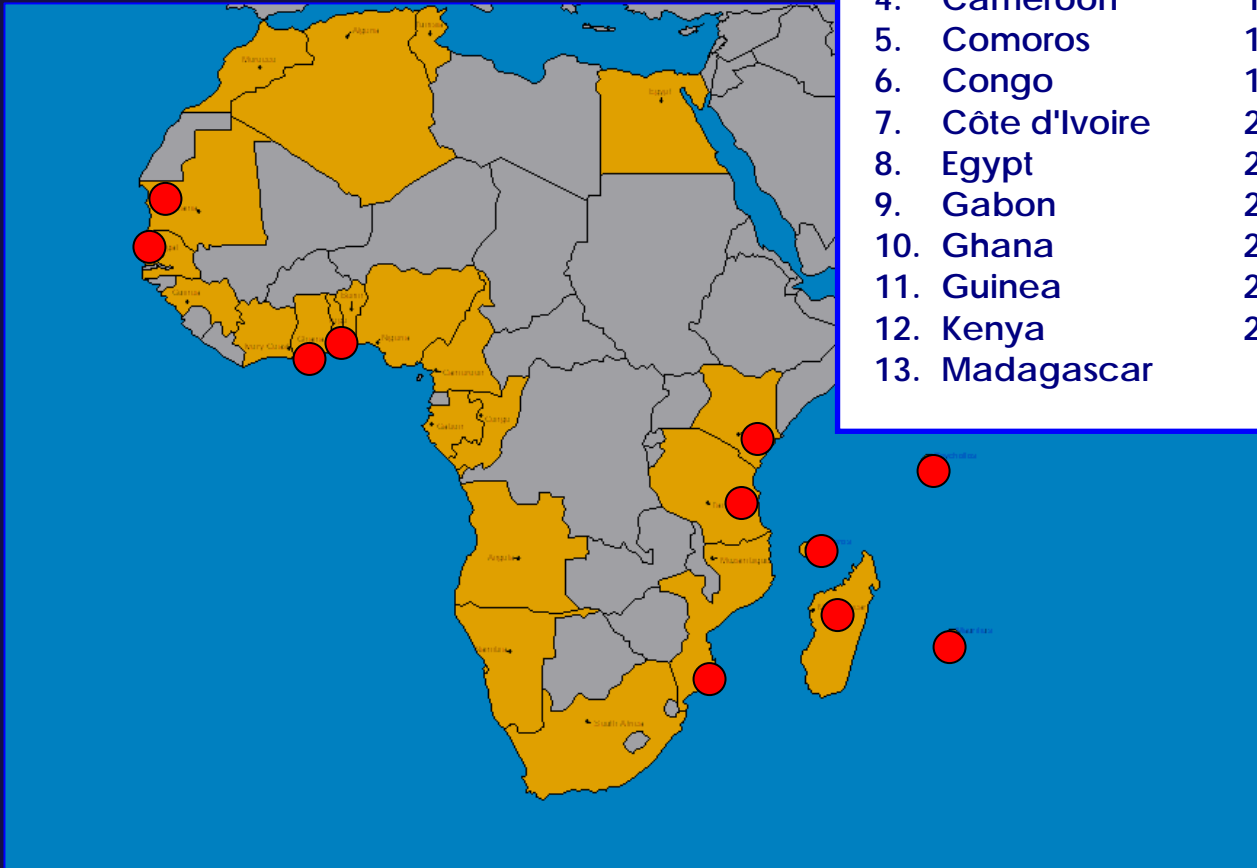
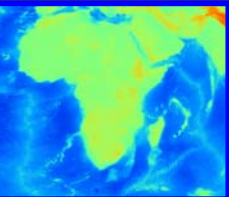
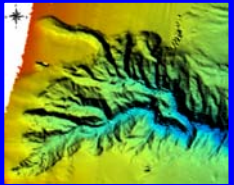
# Ocean Data and Information Network for Africa (ODINAFRICA)



1. Algeria
2. Angola
3. Benin
4. Cameroon
5. Comoros
6. Congo
7. Côte d'Ivoire
8. Egypt
9. Gabon
10. Ghana
11. Guinea
12. Kenya
13. Madagascar
14. Mauritania
15. Mauritius
16. Morocco
17. Mozambique
18. Namibia
19. Nigeria
20. Senegal
21. Seychelles
22. South Africa
23. Tanzania
24. Togo
25. Tunisia

Over 40 institutions in 25 countries  
National Oceanographic Data Centres (NODCs)

# Ocean Data and Information Network for Africa (ODINAFRICA)



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23. Tanzania
24. Togo
25. Tunisia

African Marine Atlas - participating NODCs ●  
Primary international partners: UNEP, ACEP



# The African Marine Atlas

**1. Improve access to data**  
(online Atlas product)

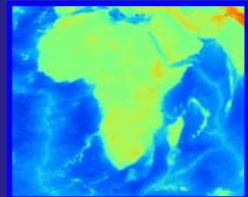
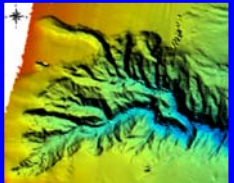
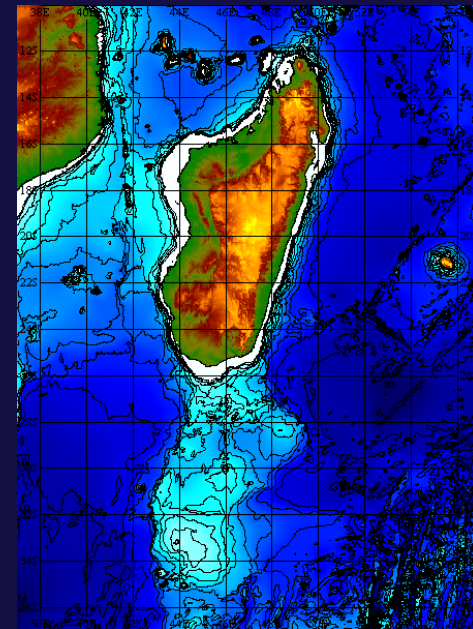
**2. Increase capacity to use data**  
(training courses, work programmes)

## The Project

A project that aims to source, collect and format marine geospatial datasets and make them available to marine scientists and managers while building capacity for marine data management.

## The Products

A digital GIS atlas, and atlas products, containing a broad spectrum of informative marine geo-information about the African coasts and oceans.

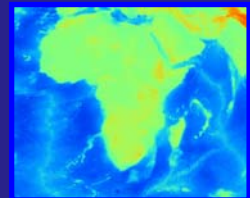
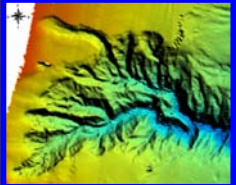


# Further objectives

⇒ improve data flows into the national oceanographic data and information centres in the participating countries,

⇒ develop data and information products required for integrated management of the coastal areas of Africa, and

⇒ increase the delivery of services to end users.





# The African Marine Atlas

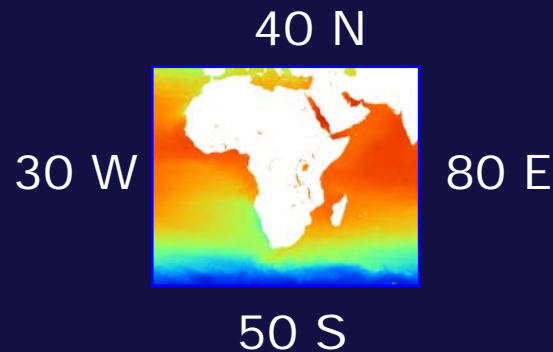
## Technical Scope:

**Five Themes: Geosphere, Hydrosphere, Atmosphere, Biosphere, Human environment**

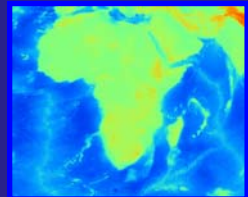
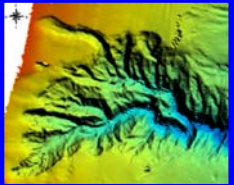
**The atlas incorporates data sets that are relevant in any way to coastal / marine sciences or management (initial list of over 200 data categories)**

**Existing geo-referenced datasets available in the public domain (but tailored to meet specific user requirements).**

**Continental Africa and island states:**



**Transboundary data sets**



# African Marine Atlas – links, partners and contributors

## GLOBAL

CoML

GEO/GOOS/GEOS

International Coastal Atlas Network

NOAA

USGS

UNEP

IOC/UNESCO

GBIF

OBIS

## AFRICAN

AfrOBIS

NEPAD

ODINAFRICA Sea level data facility

AMIS

GeoNetCast-Africa

ODINAFRICA

GOOS-Africa

ChloroGIN

**African Marine Atlas**

## REGIONAL

ReCoMap

COI

Clearing House Mechanism – East Africa

ASCLME

SWIOFP

SST

AMESD

Regional Atlases

WIO-LaB

WIOMSA

ACEP

Regional Project databases and products

## NATIONAL

Institutions

NGOs

National IOC coastal modelling projects

Universities

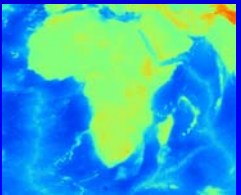
State of the Environment reports

Government departments

National Oceanographic Data Centres

Earth observation networks (SAEON)

National Databases and products

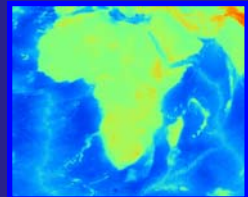
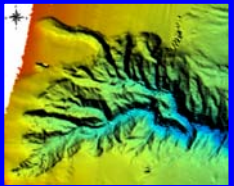




# The African Marine Atlas

## The Team:

**ODINAFRICA National Data Centre Managers from 12 countries and two regional partners, the African Coelacanth Ecosystem Programme (ACEP) and the United Nations Environment Programme (UNEP).**



## **GEOSPHERE & ATMOSPHERE**

- Chief Editor Dr. Desiderius C.P. MASALU, University of Dar Es Salaam; Institute of Marine Sciences. *Tanzania*
- Editors Mr. Selorm Dzako ABABIO, Dept. of Oceanography & Fisheries; University of Ghana. *Ghana*  
Mr. Mohamudally BEEBEEJAUN, Mauritius Meteorological Services. *Mauritius*  
Mr. Anis DIALLO, Centre de Recherches 'Ocanographiques de Dakar- Thiaroye (CRODT). *Senegal*

## **HYDROSPHERE**

- Chief Editor Mr. Emmanuel Kwame DOVLO, Directorate Of Fisheries; Marine Fisheries Research Division. *Ghana*
- Editors Ms. Clousa MAUEUA, Instituto Nacional de Hidrografia e Navegaao (INAHINA). *Mozambique*  
Mr. Josef WEDEINGE, National Marine Information and Research Centre (NatMIRC). *Namibia*  
Mr. Bambaye Ould HAMADY, Dpartement Ressources Vivantes et Environnement; Institut Mauritanien de Recherches Ocanographiques. *Mauritania*

## **BIOSPHERE**

- Chief Editor Ms. Lucy SCOTT, African Coelacanth Ecosystem Programme (ACEP), South African Institute for Aquatic Biodiversity (SAIAB). *South Africa*
- Editors Mr. Zacharie SOHOU, Centre Beninois de la Recherche Scientifique et Technique (CBRST), Centre de Recherches Halieutiques et Oceanologiques du Benin (CRHOB/CNDO). *Benin*  
Mr. A.K. ARMAH; Department of Fisheries and Oceanography; University of Ghana/Legon. *Ghana*
- Intern Ms Meaghen McCord, African Coelacanth Ecosystem Programme (ACEP), South African Institute for Aquatic Biodiversity (SAIAB). *South Africa*

## **HUMAN ENVIRONMENT**

- Chief Editor Mr. Mwangi THEURI, UNEP/Nairobi Convention Clearinghouse Mechanism and Information Sharing System. Synergy with ODINAFRICA (of IOC/UNESCO), *Division of Early Warning and Assessment, United Nations Environment Programme (UNEP)*
- Editors Mr. Richard JASMIN, Seychelles Fishing Authority (SFA). *Seychelles*  
Mr. Harrison ON'GANDA, Kenya Marine and Fisheries Research Institute (KMFRI). *Kenya*

## **BASE MAP**

- Chief Editor Dr. Murray BROWN; IOC/IODE Consultant. *USA*

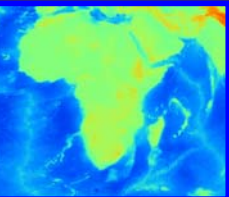
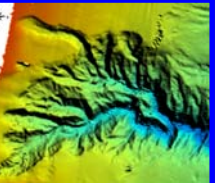
# Methods



(1) **Data mining** to gather global, continental and national data according to an agreed-upon scope of topics, geographic limits and temporal considerations;

(2) **Conversion** of the collected datasets into GIS-compatible forms and products; compilation of climatologies and seasonal surfaces (adding value to raw data);

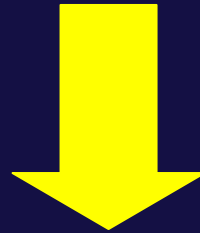
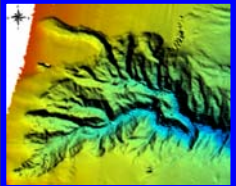
(3) **Documentation and compilation** of the data sets into map and data elements for the atlas.





# Products and end users

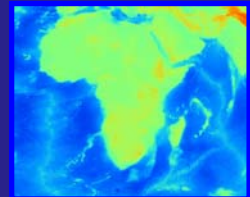
1. **Static website (spatial data clearinghouse)**
  2. **Dynamic Web Mapserver sites (interactive maps)**
- **Beginning with most important data sets**
  - **Meaningful data products at continental and transboundary scale**



**Policy-makers**

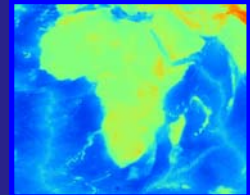
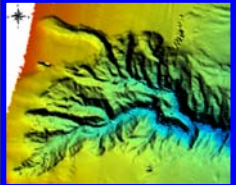
**Managers**

**Scientists**





# Product 1: Static website (spatial data clearinghouse)



## Atlas Themes

**GEOSPHERE**

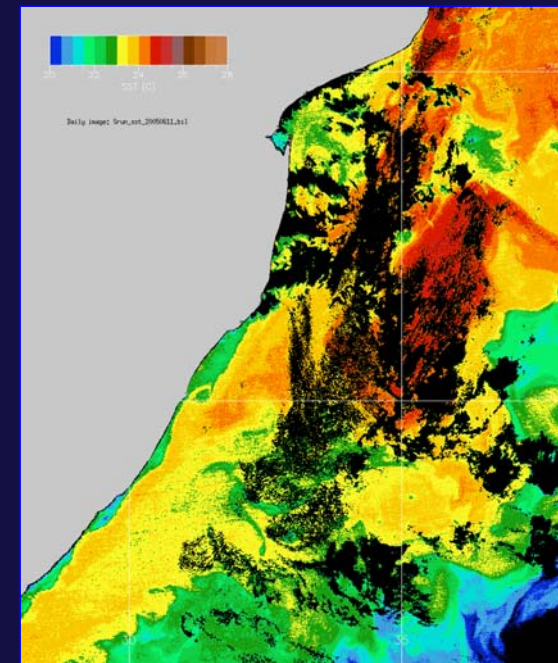
**HYDROSPHERE**

**ATMOSPHERE**

**BIOSPHERE**

**HUMAN ENVIRONMENT**

**BASE MAP**



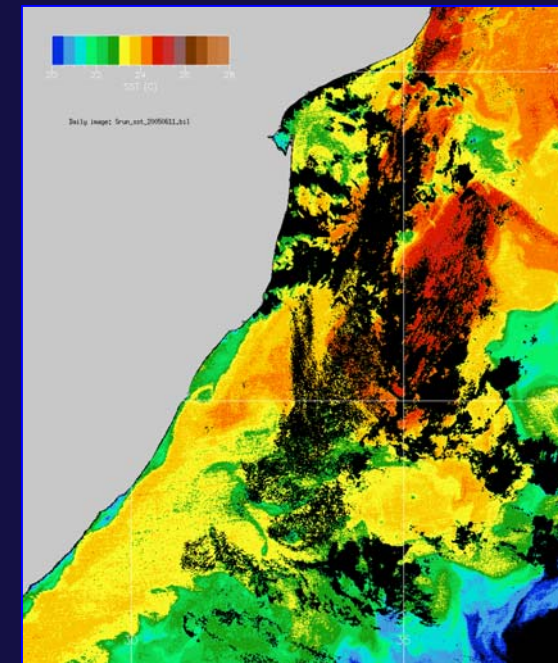


# Product 1: Static website (spatial data clearinghouse)

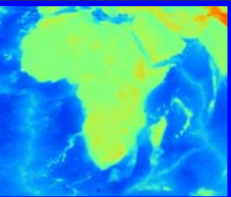
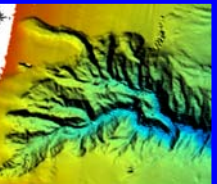
>800 unique data sets, each one:

- described briefly
- JPG image provided of the data
- Link to source, citation
- Downloadable zip file:  
(actual data, data image and metadata in original form)

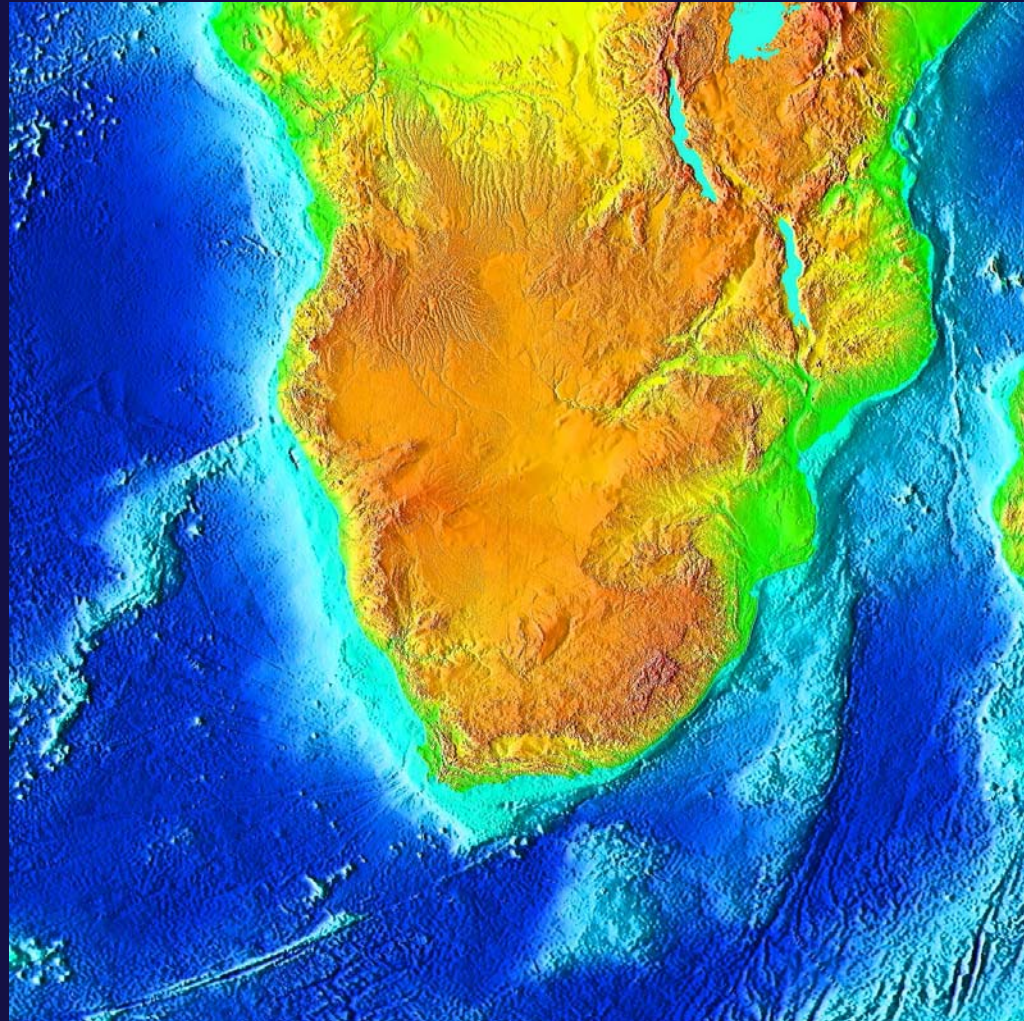
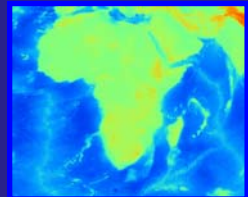
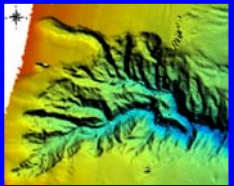
Atlas Themes	Individual Data Products
GEOSPHERE	19
HYDROSPHERE	445
ATMOSPHERE	96
BIOSPHERE	231
HUMAN ENVIRONMENT	27
BASE MAP	61



<http://iodeweb2.vliz.be/omap/OMAP/index.htm>



# Themes & data sets





# 1. Geosphere Theme

## Soils

- Basic types

## Sediments

- Thickness
- Texture
- Chemical composition (including pollutants)

## Minerals

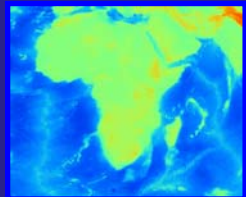
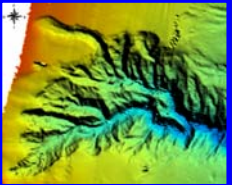
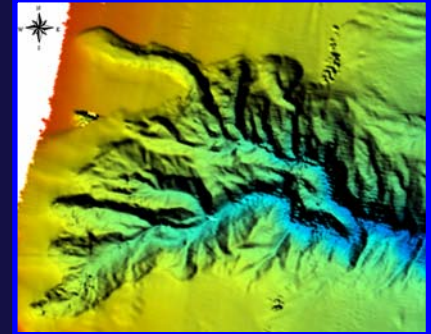
- Resource potential
- Active sites

## Geohazards

- Faults & plate boundaries
- Historic events
- Historic impacts
- Geotechnical problem areas (slumping etc.)

## Beaches & Dunes

- Distribution
- Erosion





## 2. Hydrosphere Theme

### Historical surveys

- Cruises & stations
- Moorings
- Existing atlases and products

### Physical oceanography

- Salinity, temperature, density distributions
- In-situ observations & analyses (V)
  - Satellite observations & analyses

### Currents

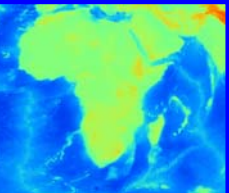
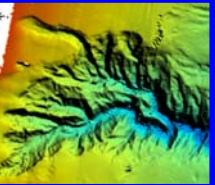
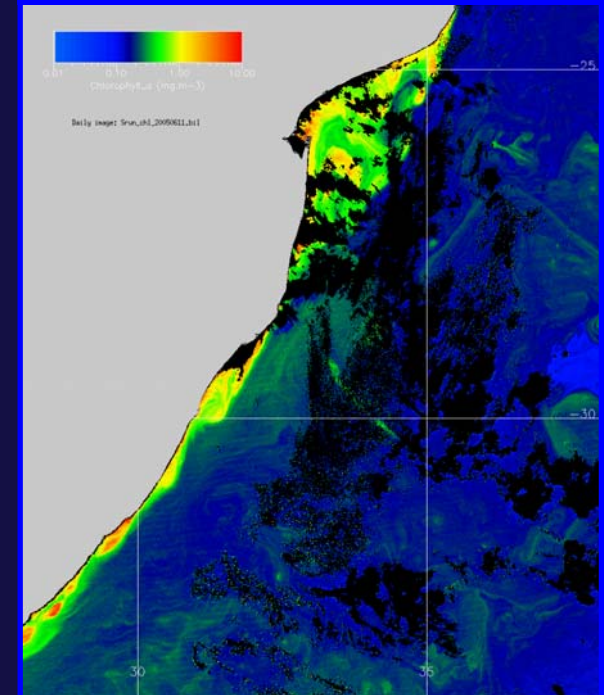
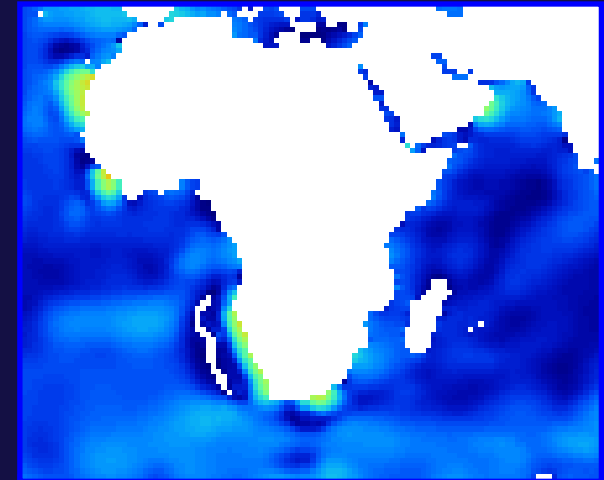
- Traditional
  - » Ship based
  - » Moorings
- Operational
  - » Drifters & floats
  - » Satellites

### Sea level

- Tide gauges – tides and mesoscale
- Satellites - mesoscale

### Waves

- Satellite
- Buoys





## Chemical oceanography

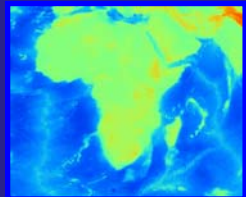
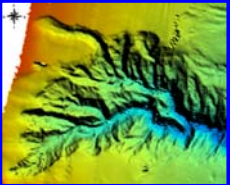
- Major nutrients & oxygen
  - Station maps
  - Climatological analyses
- **Micronutrients**
- “Water quality”
  - Low O<sub>2</sub>
  - H<sub>2</sub>S events
  - Major oil spills

## Optical oceanography

- **Compilation of statistics for standard measurements**
- **Particulates, detritus, scattering**

## Limnology

- **Drainage basins**
- Major rivers & estuaries
  - Locations
  - Hydrographs (/w extreme)
  - Impacted ocean shelf areas
- Coastal wetlands & lagoons
  - Locations
  - Seasonal levels & extremes





# 3. Biosphere Theme

## Biological oceanography

- Phytoplankton
- Chlorophyll
- Zooplankton

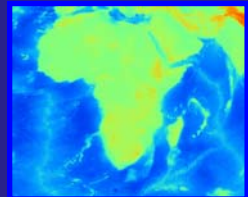
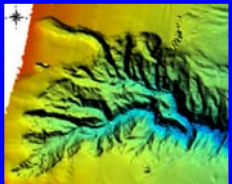
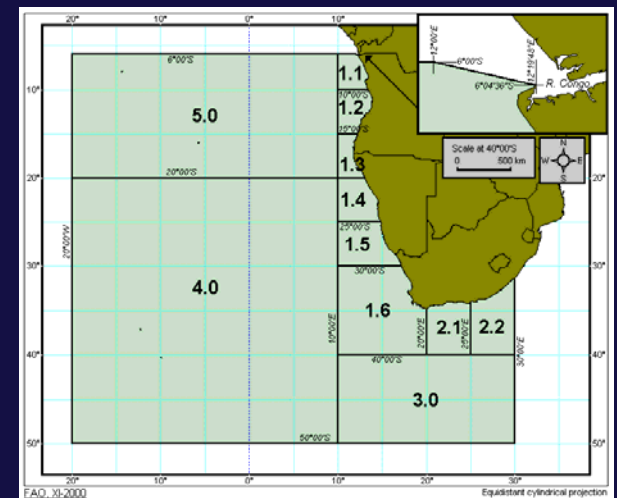
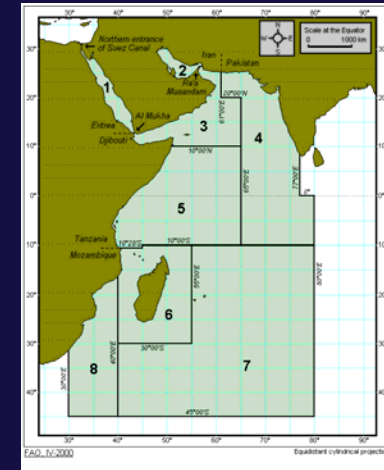
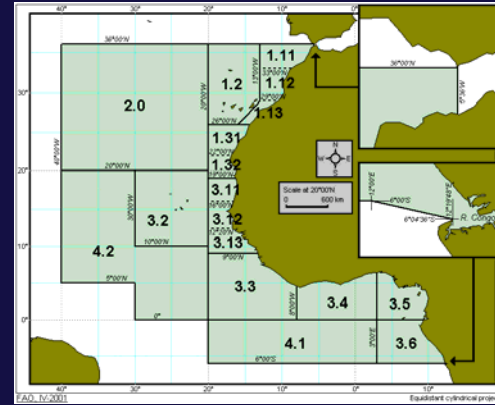
## Marine/coastal plants

- Algae and kelp
- Mangroves and seagrasses

## Terrestrial and coastal vegetation

## Fisheries data (FAO – to country level)

- Species distributions
- Critical habitats
- Fishing areas and landing sites
- Catch statistics





# 3. Biosphere Theme

## Biological oceanography

- Phytoplankton
- Chlorophyll
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## Marine/coastal plants

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## Terrestrial and coastal vegetation

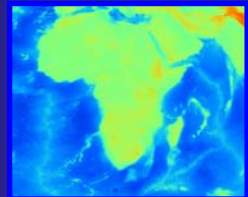
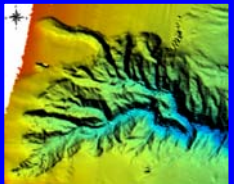
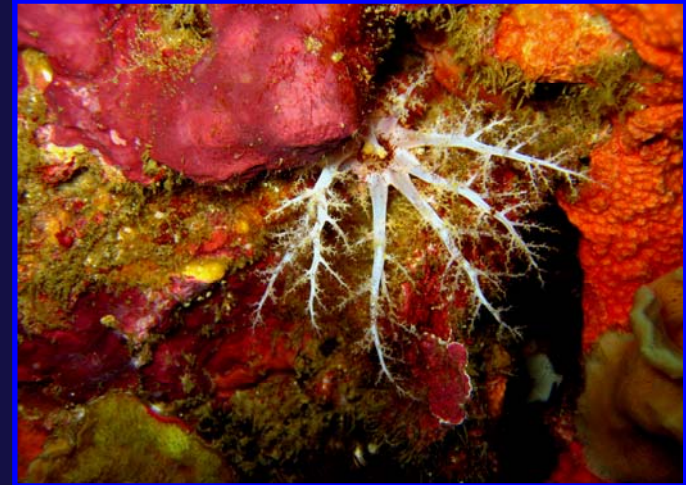
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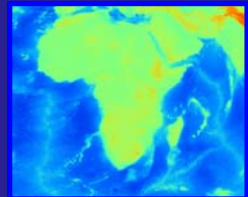
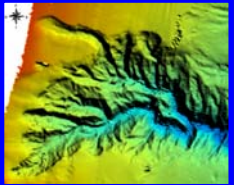
## Species distributions

- Corals
- Fishes
- Invertebrates
- Mammals
- Birds

## Protected areas



# 4. Atmosphere Theme



## Weather

- Synoptic weather patterns
- Extreme event paths, frequencies and impacts
- Maximum storm conditions

## Climate

- Temperature
- Precipitation
- Winds



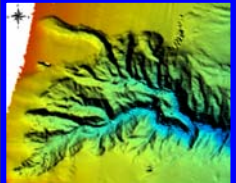


# 5. Human Environment Theme



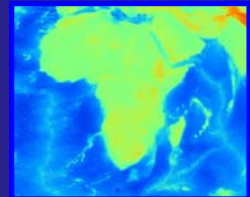
## Land

- Countries
- States/internal divisions



## Marine

- EEZ boundaries
- Treaty lines
- Military activity zones
- Offshore dumping areas
- Major shipping routes
- IMO regular activity zones (distance limits)
- IMO special activity zones
- Navigational fairways & anchorages
- Pipelines
- Cables
- Minerals leases & platforms





## Population

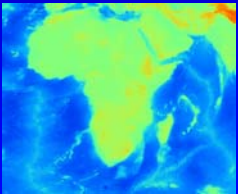
- Municipal population & densities
- Rural population & densities

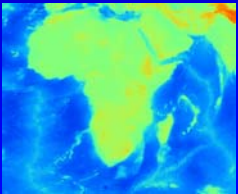
## Infrastructure

- Roads
- Ports & coastal engineering structures
- Railroads
- Bridges
- Airports
- Energy transmission
- Information transmission

## Industry & commerce

- Factories and production facilities
- Discharges
  - Industrial
  - Sewerage
  - General non-point sources
- Coastal agriculture
- Coastal forestry
- Mariculture
- Coastal mining





## Tourism

- Tourist targets
  - Local/national cultural & historical
  - UNESCO cultural & historical
  - Ecological resources of note (see also Protected Areas)
- Hotels & resorts
- Diving, sportfishing & surfing locations/areas

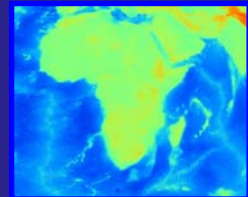
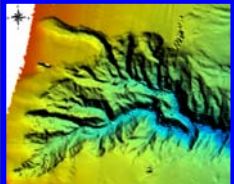
## Socio-economic data

- Employment/unemployment levels
- Income levels
- Employment sectors

# Product 2. African Marine Atlas WebMapServer



- Demonstration site developed
- Selection of themes
- Training and working meetings (2)
- Training exercise and a prototype
- Current display: [www.africanmarineatlas.net](http://www.africanmarineatlas.net)



**African Marine Atlas**

Home

UNESCO IODE ODINAFRICA UNEP

**Main Menu**

- Home
- Go to the Atlas
- About AMA...
- What's in AMA...
- The layers...
- How to use AMA...
- Who's who in AMA

**About AMA**

Written by Pissarens Peter  
Thursday, 18 October 2007

The African Marine Atlas developed by the **Ocean Data and Information Network for Africa (ODINAFRICA)** was officially launched on 23 February 2007 at the IOC Project Office for International Oceanographic Data and Information Exchange (IODE) in Ostend, Belgium.

The African Marine Atlas provides substantial maps, images, data and information to coastal resource managers, planners and decision-makers from various administrative institutions and specialized agencies in Africa. The Atlas will be of immense benefit to national institutions and a variety of users such as environmentalists, local administrators, park managers, scientific community, fishing cooperatives, tourists, hotel keepers, teachers, NGOs, the general public and any other interested persons. It has over 600 downloadable data products derived from the fields of marine geosphere, hydrosphere, atmosphere, biosphere, geopolitical and the human socio-economic dimensions.

The Atlas indicates areas of intense use along the coastline requiring careful management and provides potential foresight on likely consequences of specific decisions. Further, the Atlas indicates gaps in knowledge and information base, where additional efforts may be directed. The Atlas will also act in other ways as a guide to recreational opportunities and tourist attractions.

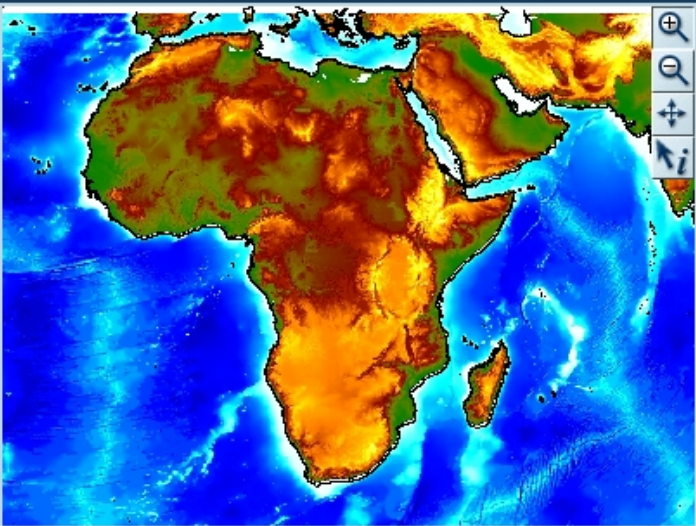
In developing the Atlas, the main objective was to **collate available geospatial datasets and information on the marine environment and to summarize it into an African Marine Atlas suite.**

The website is one of a set of Marine Atlas products that will include web data services, web mapping and an Atlas publication when completed.

The Atlas was realized through intensive work between May 2006 and February 2007 by a team of 16 marine scientists and GIS experts from NODC's in Benin, Ghana, Kenya, Mauritania, Mauritius, Mozambique, Namibia, Senegal, Seychelles, South Africa, and Tanzania. International ocean data experts provided key inputs in data analysis. It is based on an extensive survey of coastal and marine data needs undertaken in early 2006 in all the countries participating in ODINAFRICA.



# African Marine Atlas



Map Options | Query results



Available maps

ama.map

Available layers

- World Vector Shoreline 1:250K
- Graticules - 2 degrees
- Graticules - 10 degrees
- Area of Interest Frame
- Geological Provinces of Africa
- Deep Sea Drilling Sites
- Ocean Drilling Program Sites
- Earthquake Zones
- Significant Earthquake Sites
- Tsunami Event Sites

Select background

GEBCO Pseudo-Color Basemap

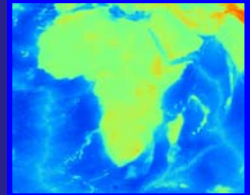
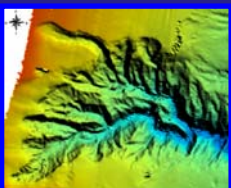
Legend

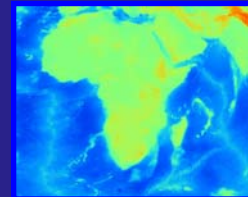
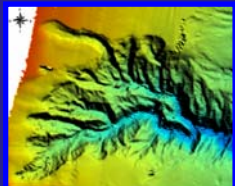
World Vector Shoreline 1:250K

Map Size: 400 x 300

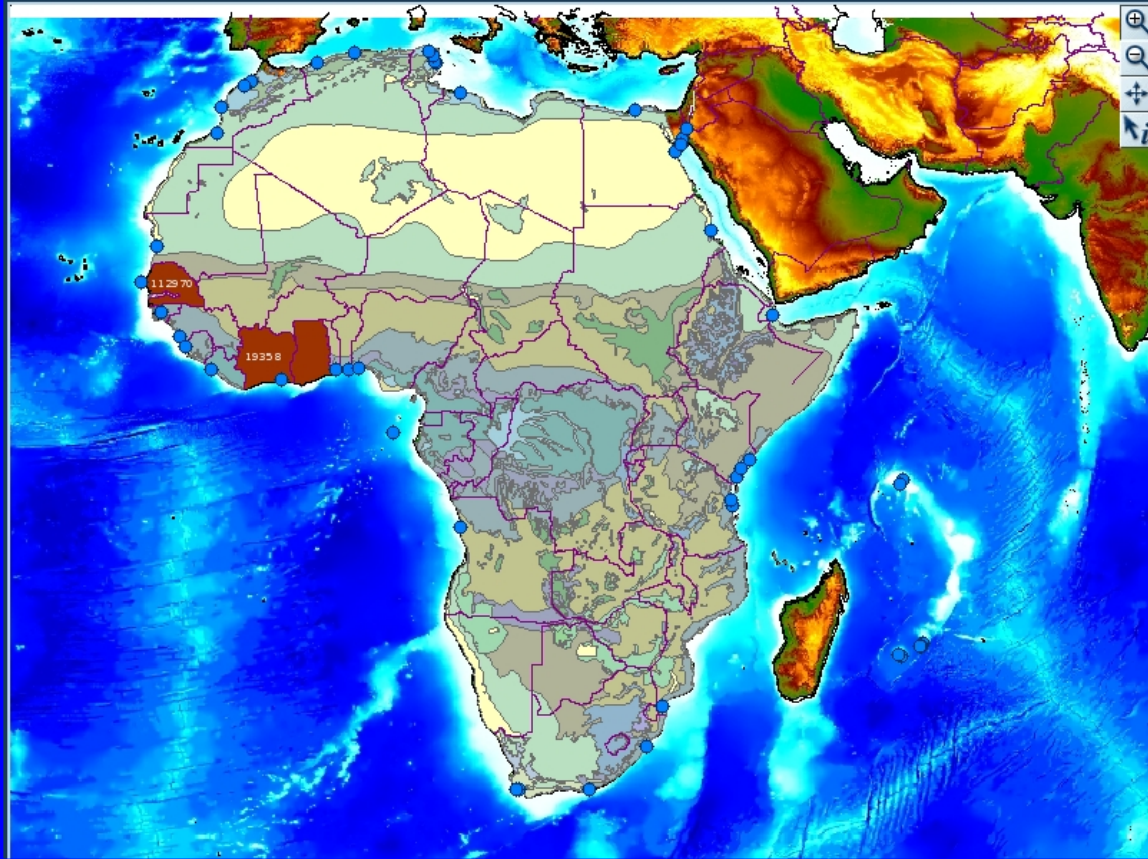
0 1100 2200 3300 4400 km

Disable Rosa





# African Marine Atlas



Map Options Query results

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ama.map

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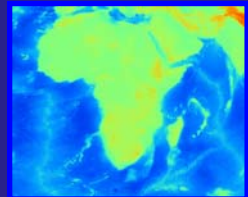
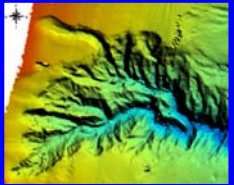
Legend

- Coastal hotels 5\*
- Country boundaries
- National catch *Sardinella aurita*
- Afro-alpine
- Anthropic landscapes
- Arid-fertile savanna
- Desert
- Dry forest and thicket
- Fynbos
- Hydromorphic grassland
- Moist-infertile savanna
- Montane forest
- Mopane savanna
- Mossy forest



# Challenges

- **Expectations of an online data atlas were very varied**
- **Metadata management**
- **Standards: choosing data formats and standard legends**
- **Selecting appropriate data of interest and meaning at continental scale**
- **Logistics of working together from several countries**
- **Remote access to servers**
- **Access to the Internet from countries**
- **Biological data: specific permission had to be requested and recorded, data citations were complex**

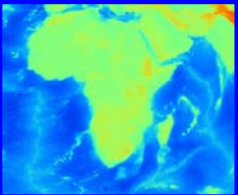
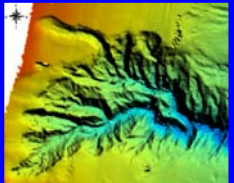


# Considerations: standards and interoperability

- We have implemented a WMS, need to describe and serve searchable metadata.

Should use global standards to allow virtual integration with other data providers. Adoption of OGC and ISO standards will facilitate data exchange with other data portals.

We aim to adopt recommendations and best practices of ICAN.



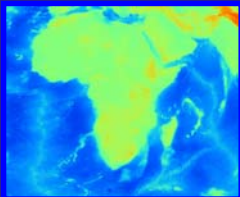
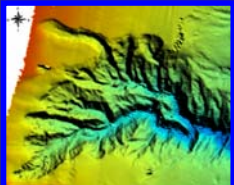
# Considerations: scales and applications

The AMA should develop functionality at more scales

Different management & research challenges need data at appropriate scale, including National and case-study scale.

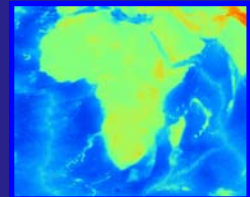
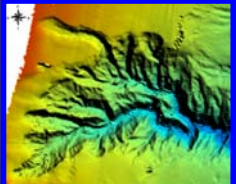
Managers and decision-makers need information products that address a particular issue.

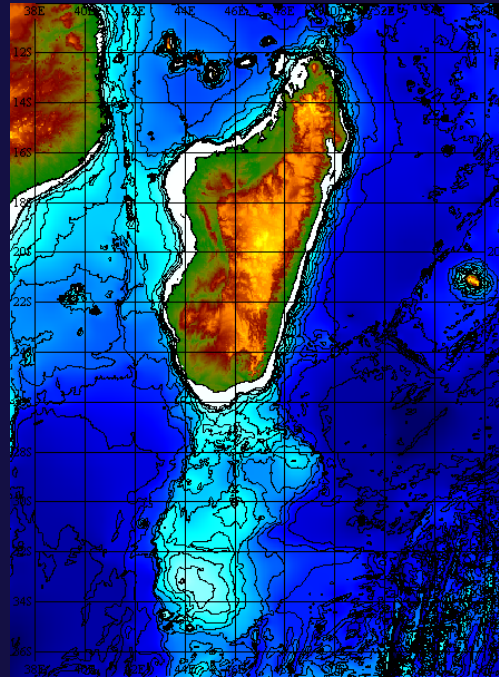
The development of National, sub-regional and local products will facilitate this - additional languages, thematic focus areas, regional and local institutional partners.



# Considerations: thematic focal areas

- Requirements of end-users must drive new AMA developments
- Integrated coastal data products (current and future projects of regional institutions) can be incorporated
- Some proposals for the future from the ODINAFRICA WP4 meeting:
  1. Rates of shoreline erosion
  2. Coastal flooding prediction guides
  3. Storm surge prediction models
  4. Climate prediction models
  5. Critical/sensitive habitats (mangroves, coral reefs etc.)
  6. Productivity of coastal oceans
  7. Biodiversity Status (Assessment) of coastal and offshore waters
  8. Tide data (near real-time and locally sensitive)
  9. Bathymetric Charts of inshore waters





<http://www.africanmarineatlas.net>

<http://omap.africanmarineatlas.net>

### Acknowledgements

IOC/UNESCO, UNEP, ACEP, ASCLME

