OCEAN OBSERVATION IN AFRICA

Prof AFFIAN Kouadio

Chair of GOOS-AFRICA

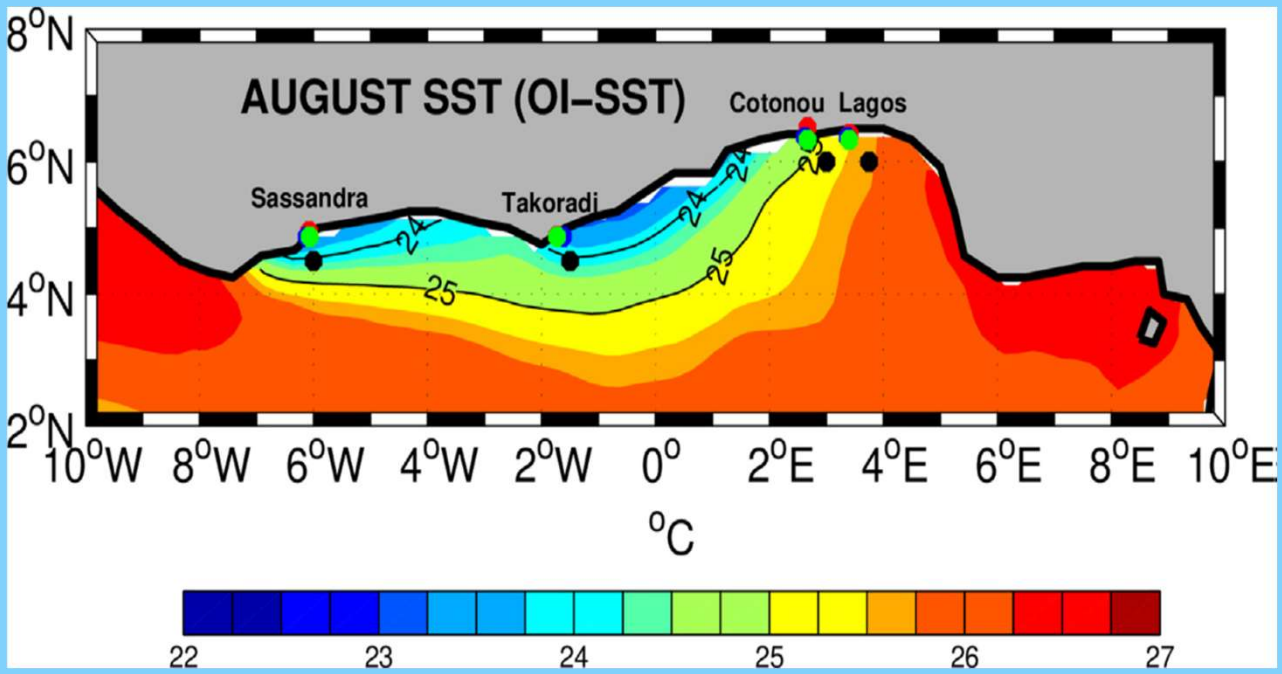
Content

- Progress and achievement
- Challenges and opportunities
- Future plans
- Conclusion

Progress and achievement: GCLME, CCLME, Mediterannean sea, BCLME, Red sea, western idian sea

- very few long-term in-situ ocean time series
- Regular observations of the oceans resulting from seasonal to interannual time scales are sparse
- Ocean data and information are completely based on research programs, usually within restricted areas
- Ocean observations survey in Africa show that many countries have their national network but the data are not shared with the neighbouring countries.

Progress and achievement (GCLME)



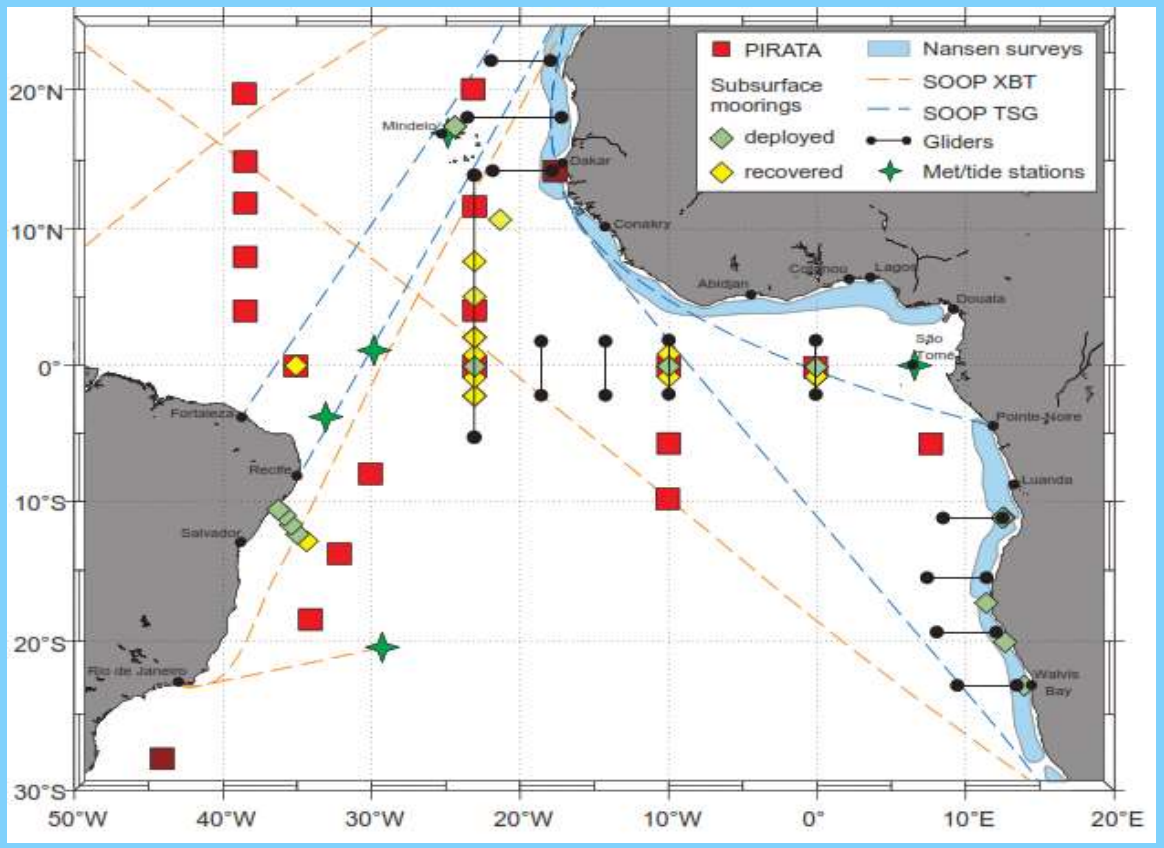
GLOSS stations:

-Guinea: Conakry
-Cote d'Ivoire: Abidjan from 1951
-Ghana: Takoradi (ODINAFRICA,2006)
- Nigeria: Lagos
-Cameroon: Port Sonara (ODINAFRICA,2008)
-Congo: Pointe Noire (ODINAFRICA, 2007)
- Sao Tome (off)

Additional stations

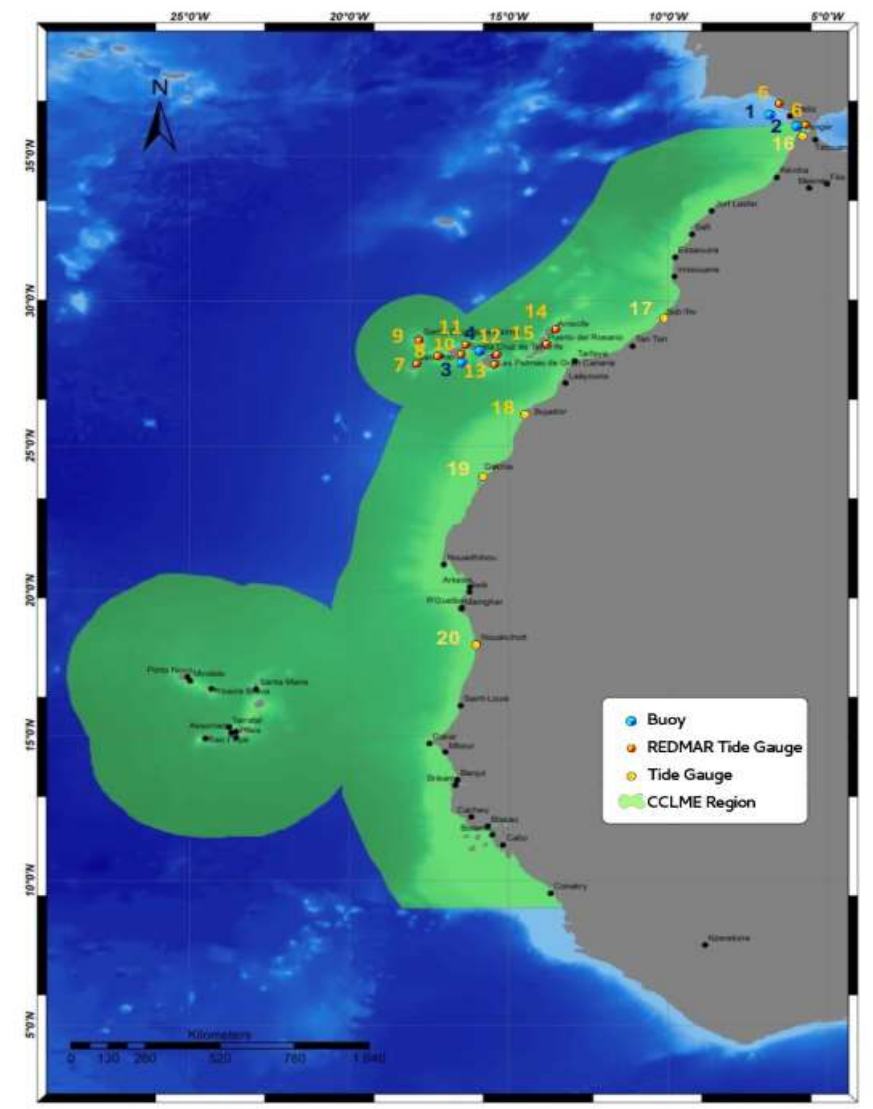
-Cote d'Ivoire: San Pedro from 1986, Abidjan (2012)
-Benin: Cotonou (2011)
-Ghana: Tema (historical data)

Port Sonara, Takoradi and Lagos stations



Key elements of the present tropical Atlantic observing system: ***PIRATA network of oceanographic- meteorological buoys****; fisheries and oceanographic survey regions from the EAF-Nansen Programme; Surveys Ship Of Opportunity Program (SOOP) Expendable Bathythermograph*

CANARY CURRENT LME



MEDITERRANEAN LME

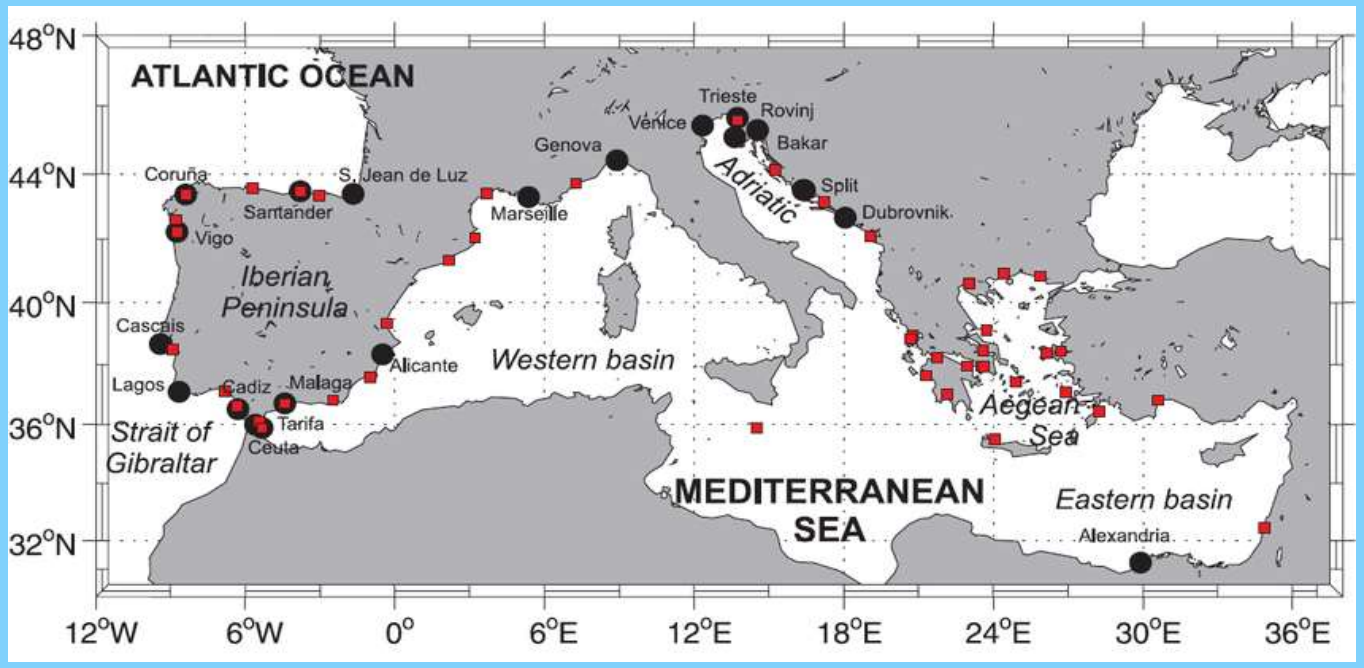
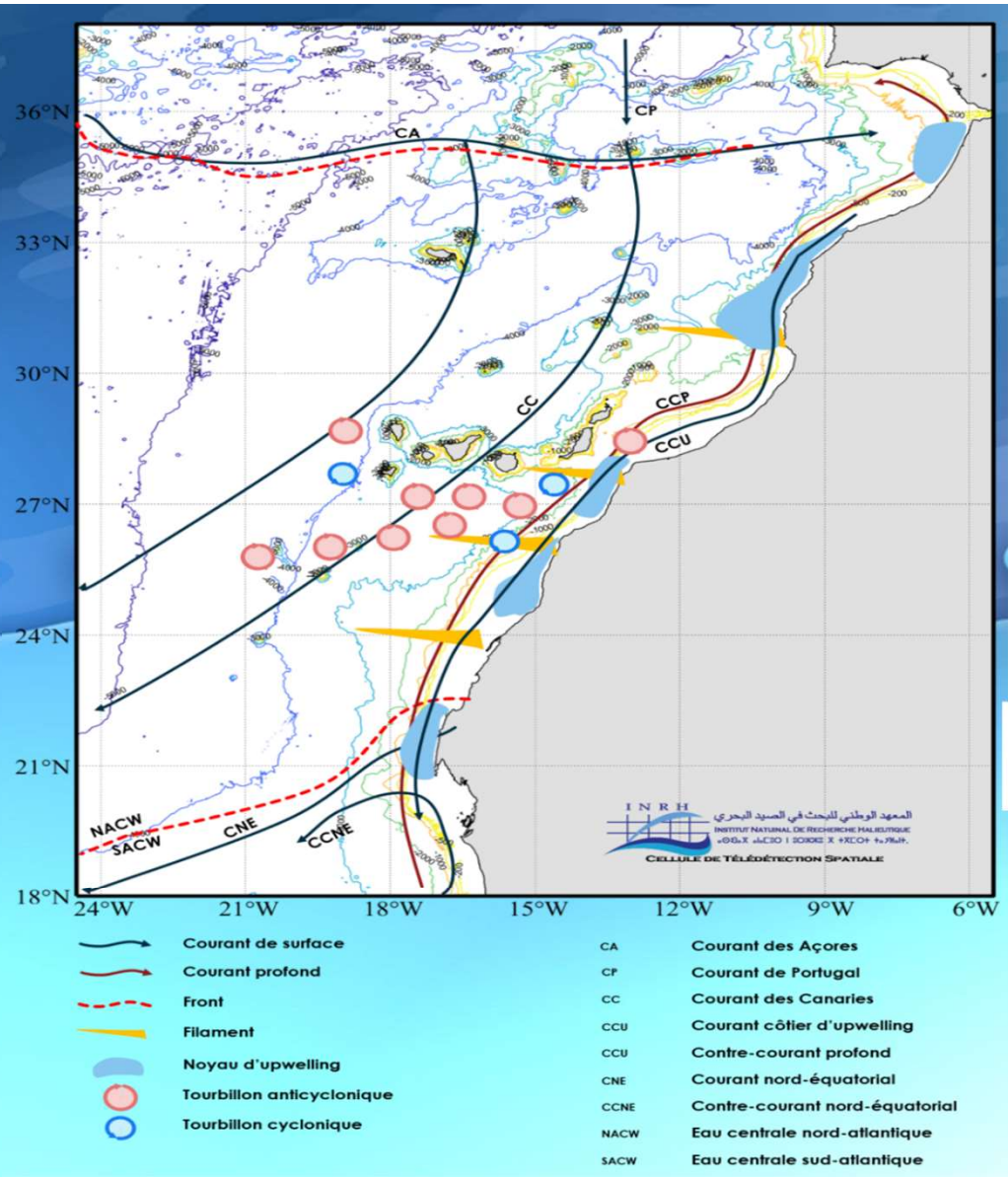
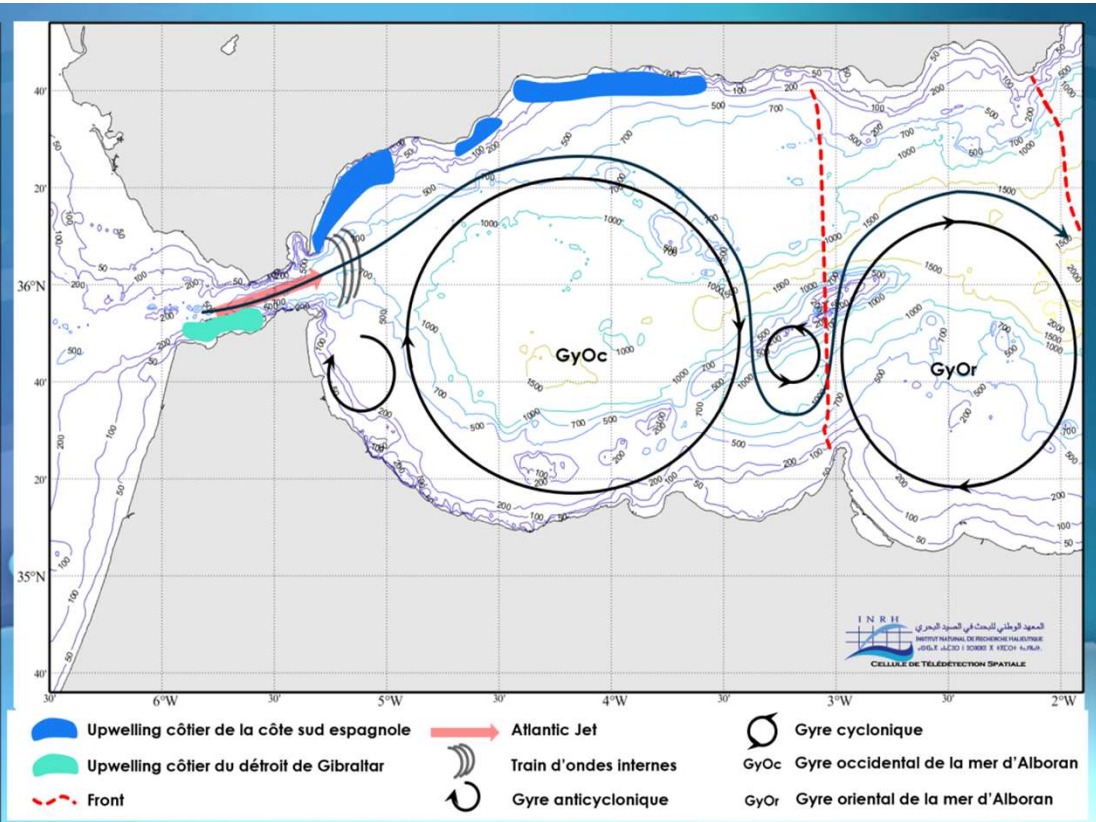


Figure : Tide-gauge stations in the Mediterranean with records longer than 35 years (black dots). Study area also shown (rectangle according to Marcos and Tsimplis (2008)



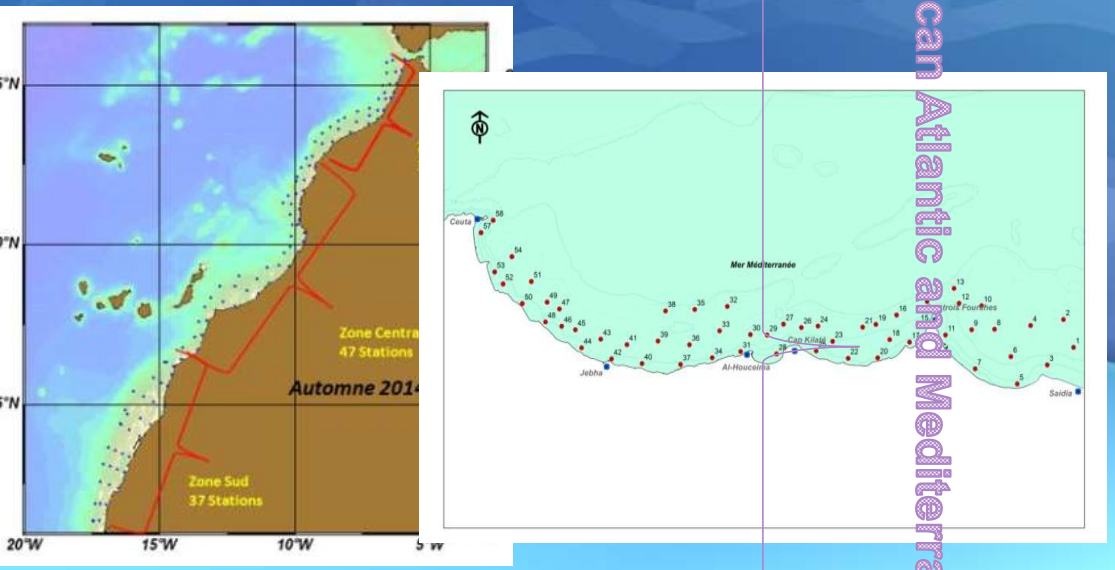


Source INRH

www.inrh.ma

In Situ Ocean Observation

(Temp, Sal, Density, O2, Current, Nutrients, Ch'a', Phytoplancton, Zooplanctoon,…



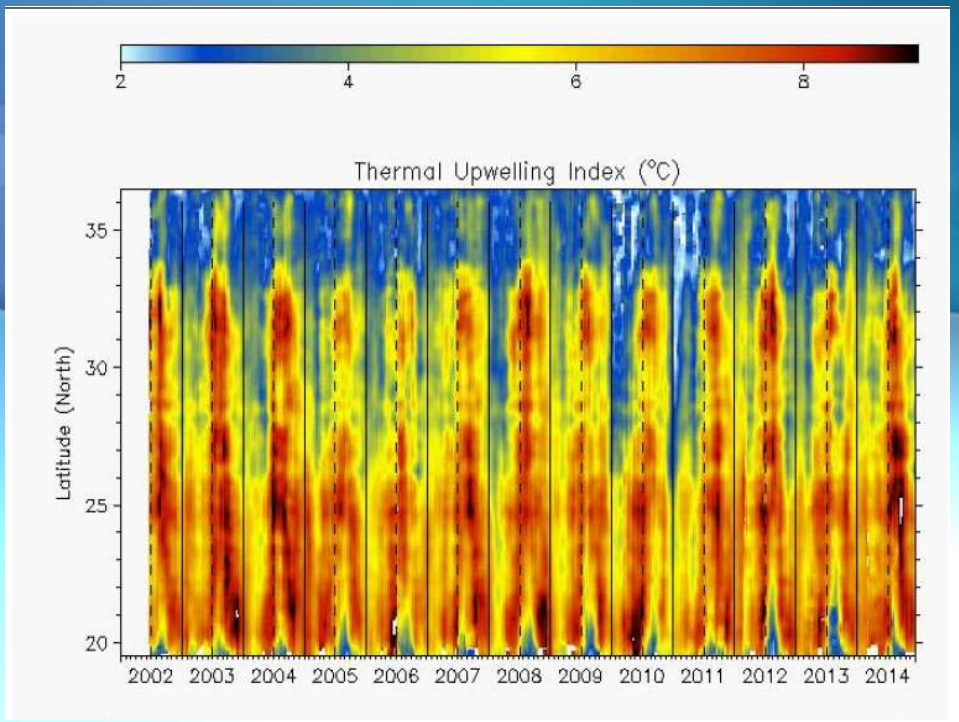
Moroccan Atlantic and Mediterranean coasts

Source INRH

Example of the Coastal Upwelling Index along the Moroccan Atlantic coast

Remote Sensing Products

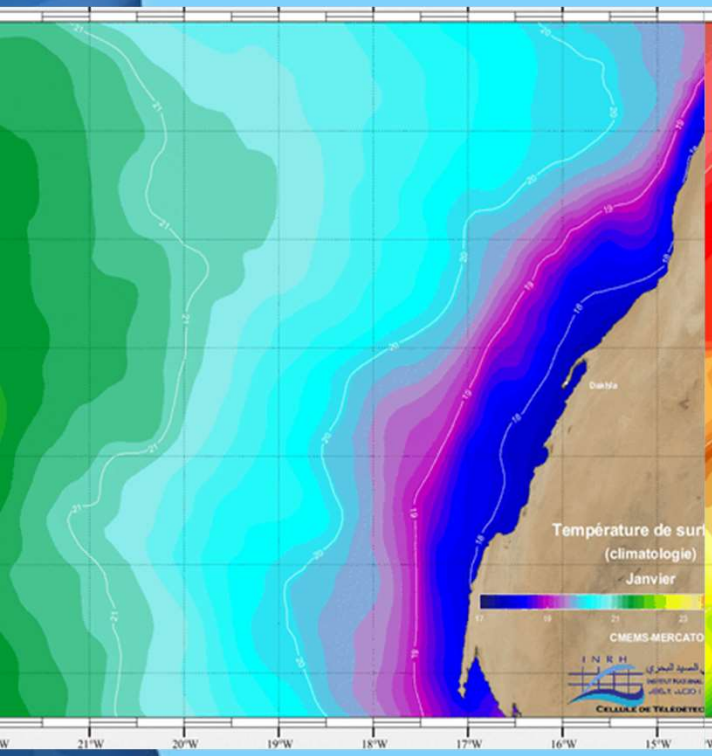
(SST, SSS, SLH, MLD,…)



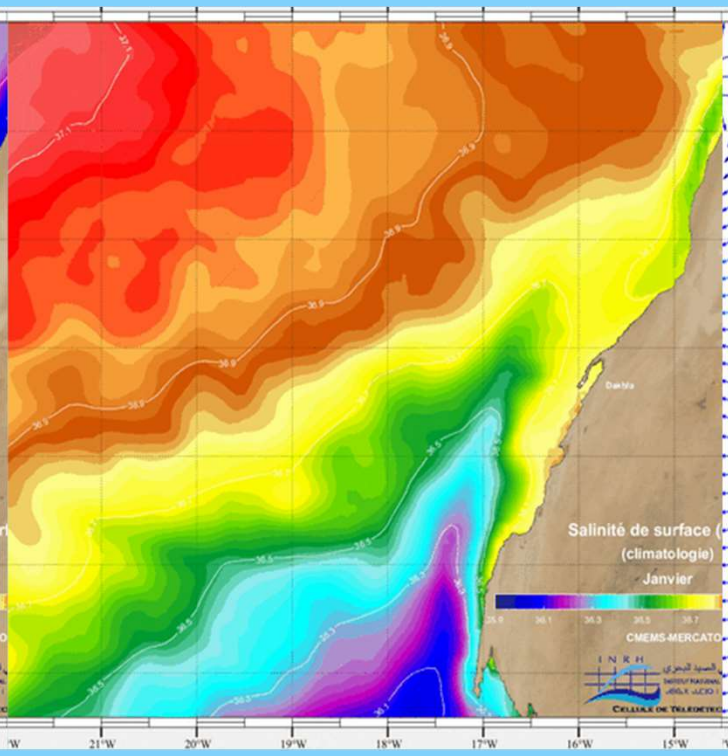
Benazzouz *et al.*, CSR, 2014

Moroccan Atlantic Coast

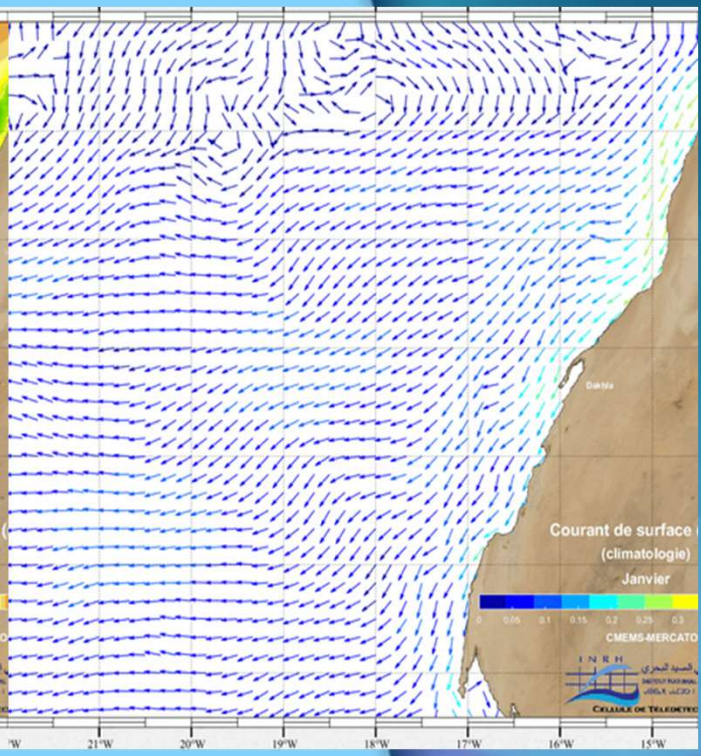
Monthly Surface Temperature



Monthly Surface Salinity



Monthly Surface Current

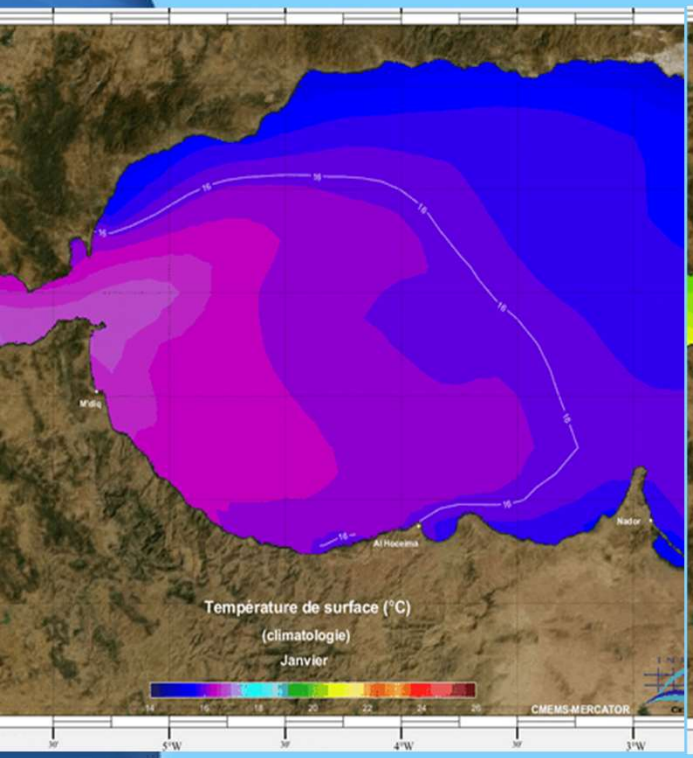


Period 1993-2019

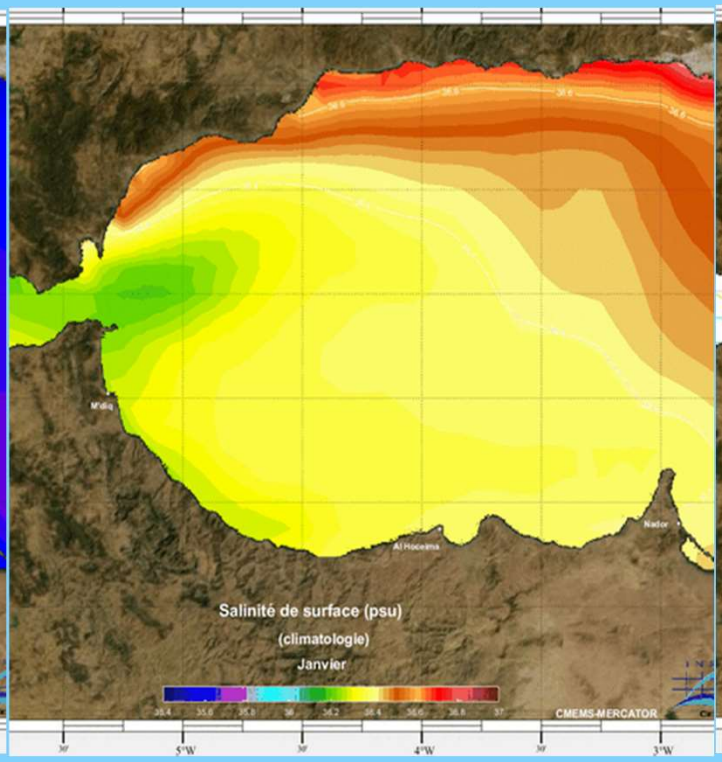
Source INRH

Moroccan Mediterranean Coast

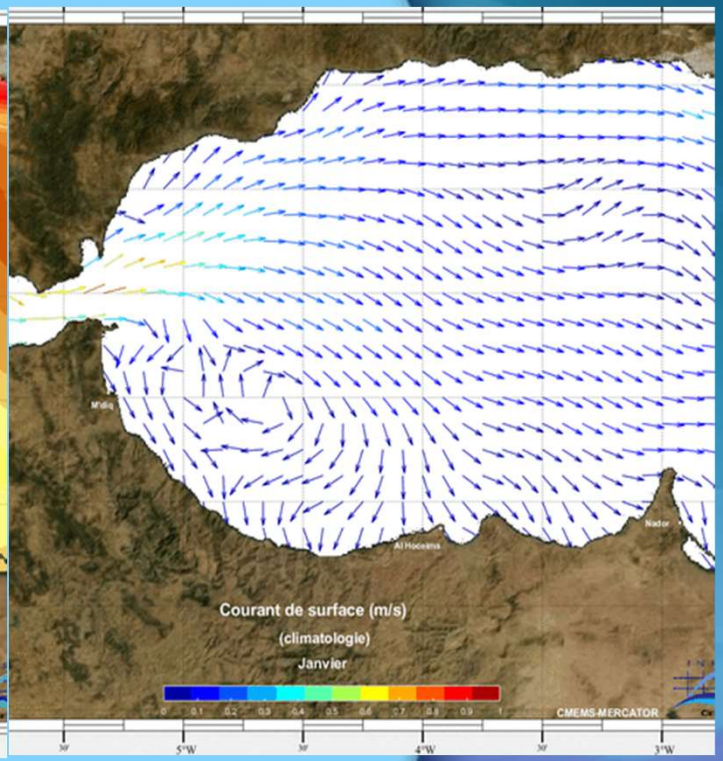
Monthly Surface Temperature



Monthly Surface Salinity



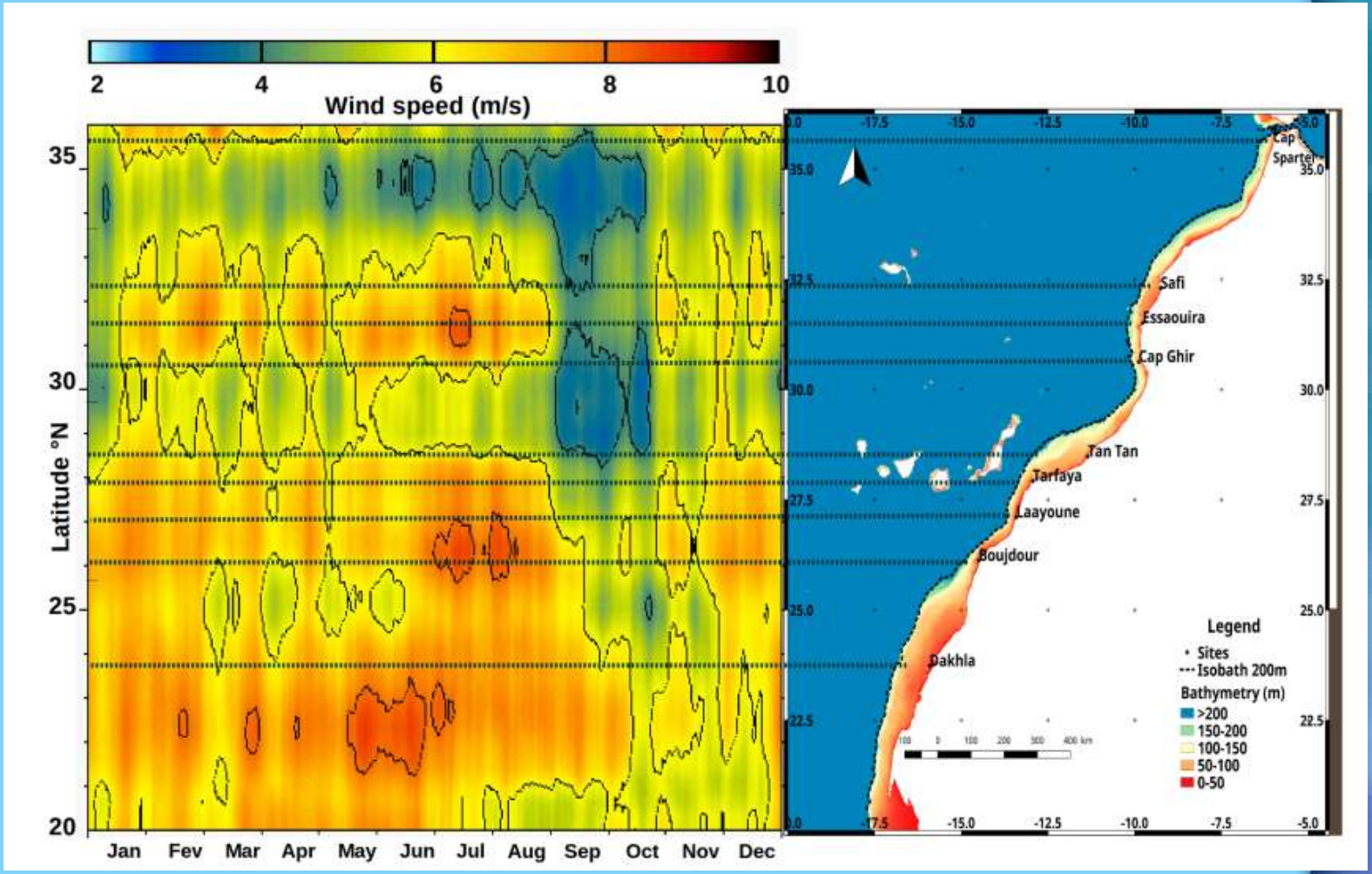
Monthly Surface Current



Period 1993-2019

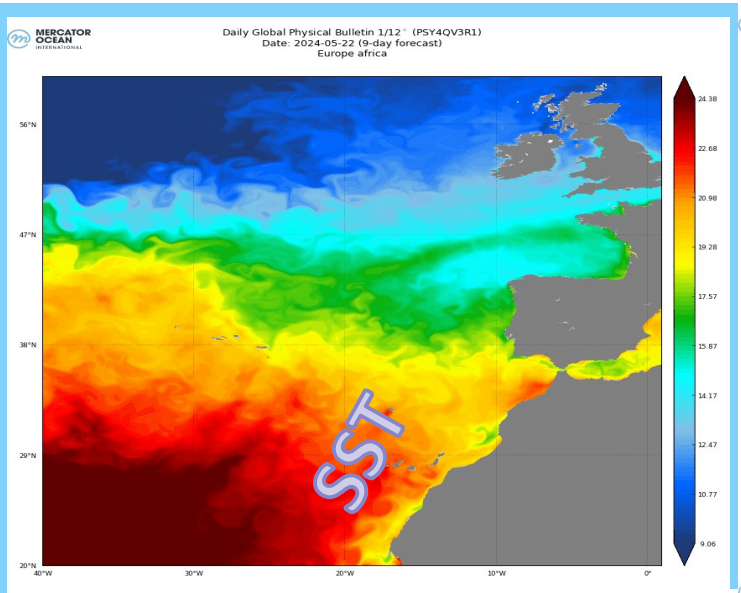
Source

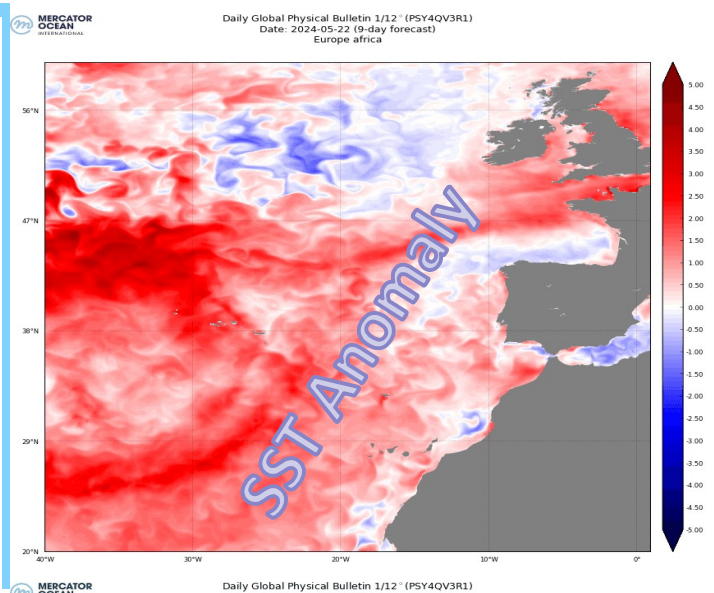
Wind speed

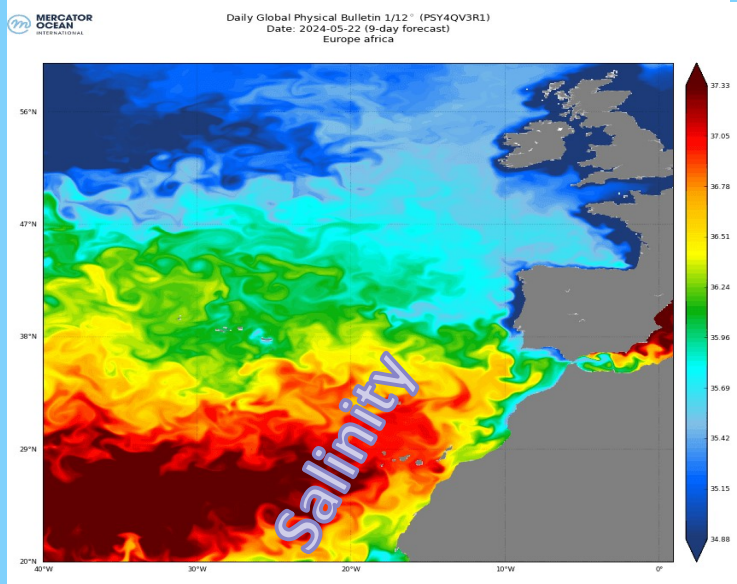


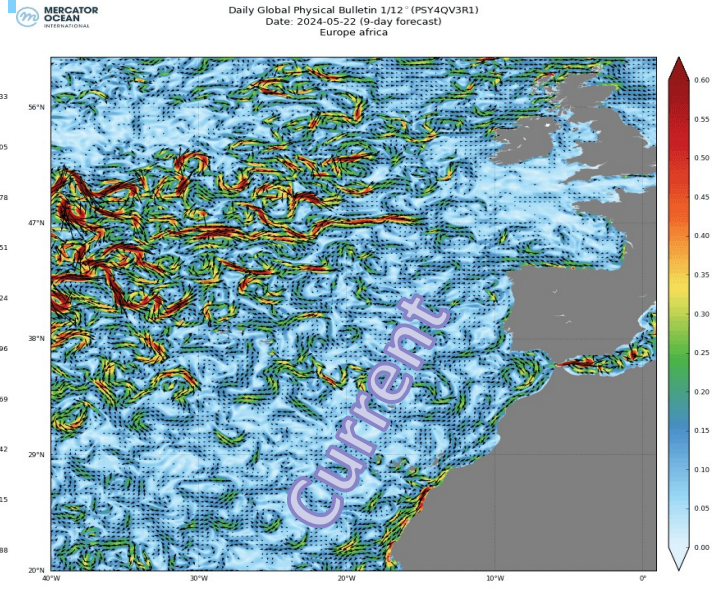
Benazzouz *et al*., JMSE, 2021

Example of ocean prediction parameters



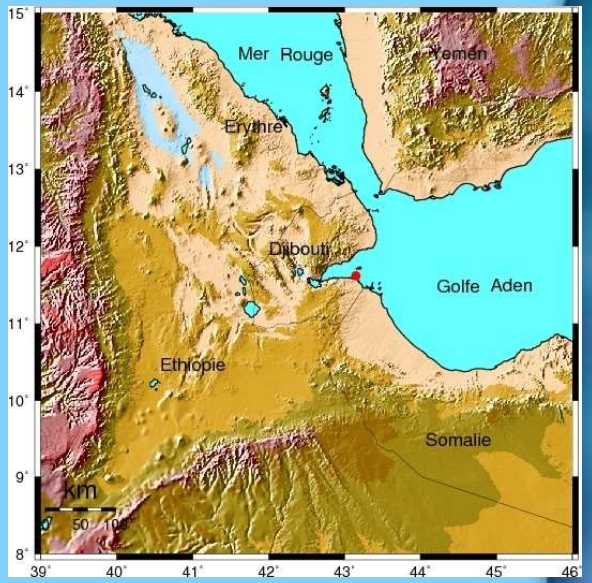






RED SEA REGION

GLOSS stations:
-Suez
- Djibouti
(ODINAFRICA,2007)



Additional stations:

-8 stations installed by Suez Canal Authority

-Port Sudan, Sudan (1961-1997), maintained by Survey Department

North West Indian Ocean

GLOSS operational stations

-Kenya: Lamu, from 1996;
Mombasa: from 1986 (many gaps)
- Tanzania: Zanzibar, Mtwara
- Seychelles: Pointe La Rue

Other stations

-Kenya: Kilifi, Shimuni and extra Lamu
- Tanzania: Dar Es Salaam and historical data in Tanga
- Seychelles: historical data from Port Victoria and Praslin
- Somalia: short time series Mogadishu and Kismayo (1988)

South West Indian Ocean

GLOSS stations operational

- Mozambique: Pemba and Inhambane (2005)
- South Africa: Durban, Port Elizabeth
-Mauritius: Port Louis (1986) upgraded in 2006 and Rodrigues
-France: Dzaoudzi (OTT tide gauge data: 1985-1995 replaced by radar tide gauge), Pointe des Galets (1979-1986)

Additional stations

-Madagascar: Tamatave (historical data from Nosy Be, Tulear and Fort Dauphin)

Coverage: Around RSA EEZ and beyond

Equipment

- Automatic Weather Station
- Integrated Ecosystem Programme
- Realtime Bouys
- Themistor Strings
- UTR SST
- Current Meter Moorings
- SAMBA Current Meter Mooring
- Southern Ocean Current Mooring
- Current Meter Old Positions
- Vemco Positioning System (VPS)

Physical Oceanography

Sea surface height
Sea surface temperature
Subsurface temperature
Surface currents
Subsurface currents
Sea surface salinity
Subsurface salinity
Ocean bottom pressure

Atmospheric Variables

Wind speed and direction
Humidity
Atmospheric pressure
Air Temperature

Bio-Chemical

Bio(geo)chemistry

Oxygen
Nutrients
Dissolved Inorganic carbon
Stable carbon isotopes
Dissolved organic carbon
pH

Biology and Ecosystems

Phytoplankton biomass and diversity
Zooplankton biomass and diversity
Fish abundance and distribution
Marine turtles, seabirds, mammals abundance and distribution

Equipment/Instruments used

- CTD-O (Conductivity-Temperature-Depth-Oxygen profiler)
- Argo Floats
- Underwater Temperature Recorder (UTRs)
- Nutrients Autoanalyser
- Salinometer
- Bongo Nets
- Continuous Plankton Recorder
- Research vessels – onboard
- High-resolution Cameras
- Geospatial tags

Challenges

- Technical/Engineering support personnel
- Calibration and servicing – costly
- Purchasing of new equipment – resources are low.
- Financial resources to undertake more in situ onboard measurements and monitoring.
- **Weak maintainance** of equipment already installed

Opportunities

- Partnnership with chinees's institutions, European institutions, NORAD, NOAA
- OPERA project : (Ocean Prediction Enhancement in the Regions of Africa) is at a very advanced stage of co-designing
- UN Decade for ocean science and sustainable develop
- AU 2063 Agenda
- 2050 Africa's Integrated Maritime Strategy (2050 AIM Strategy)
- Partnership with Chinese oceanographic institutes, NOAA, European institutions and extra budget from NORAD

FUTURE PLAN

In accordance with the resolutions of the GOOS meeting in Abidjan,

- the implementation of the GOOS-AFRICA program, as adopted by the IOC assembly, will begin shortly;
- a three-year strategic plan is being developed;
- colleagues have joined the working groups;
- a meeting with these teams took place, and clear tasks were assigned to the different working groups

CONCLUSION

- New structure of GOOS-AFRICA based on Working groups ( ) will help better implementation of
- The new structure of the GOOS-AFRICA coordination committee, adopted during the GOOS-AFRICA meeting held in Abidjan and based on working groups, will help boost the implementation of the GOOS-AFRICA program

THANK YOU