IS SEA LEVEL RISING ALONG AFRICAN COASTS?

IODE 50th Anniversary,
International conference

21-22 March 2011, Liege, Belgium

Angora AMAN , P. WOODWORTH and C. MAGORI

CONTENTS

- INTRODUCTION
- ODINAFRICA –III INITIATIVE
- SEA LEVEL VARIATIONS ALONG AFRICAN COASTS.
- CONCLUSIONS

- **INTRODUCTION**

-Why measure the sea level? How to monitor it?

- Changes in Sea Level during the last century

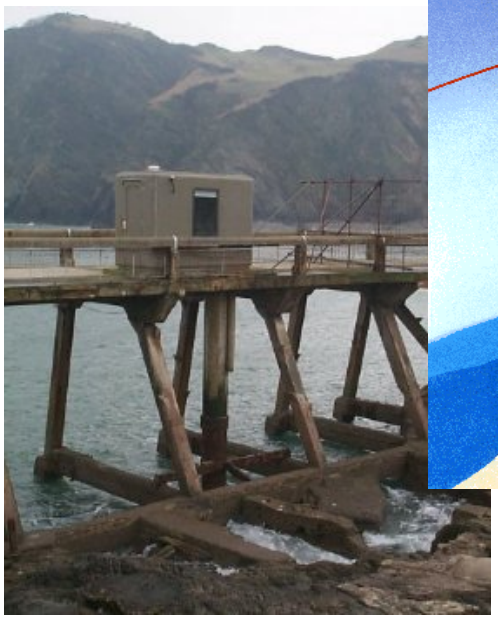
Why Measure the Sea Level?

- Scientific research – e.g. to measure long term changes in global sea level consequence of climate change and ocean circulation
- Practical applications – e.g. to predict flood risks in coastal regions - ships movements in ports-
tidal analysis and prediction – coastal erosion

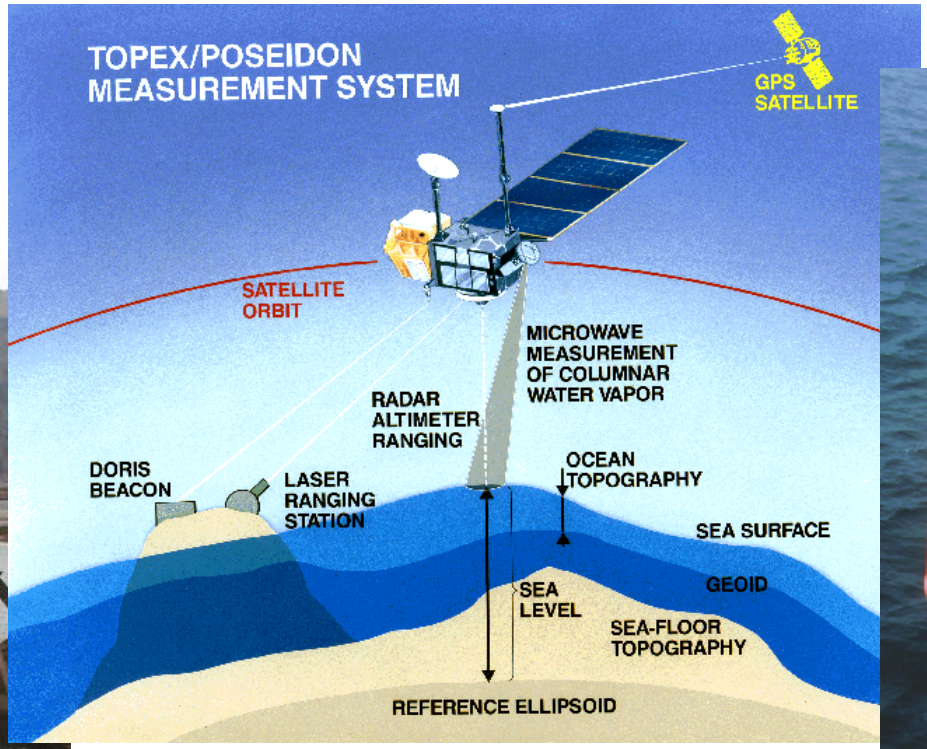
How to Monitor the Sea Level?

- Satellite radar altimetry
- Tide gauges
- In the deep ocean: bottom pressures obtained from sea bed
devices

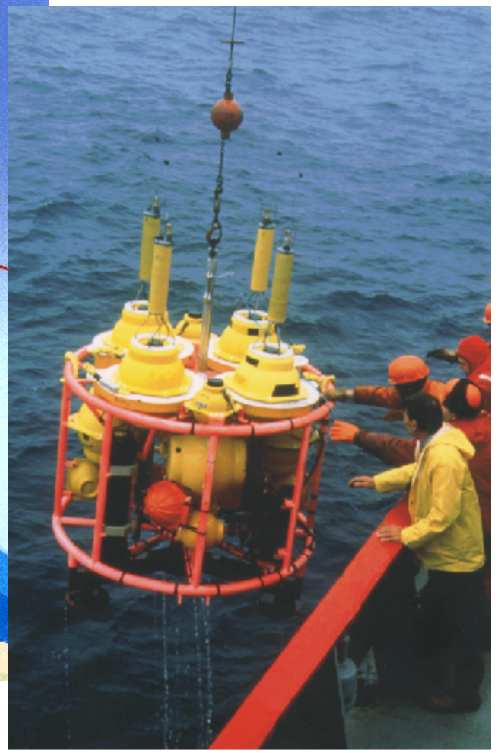
Measuring Sea Level Changes



Tide Gauge (float)

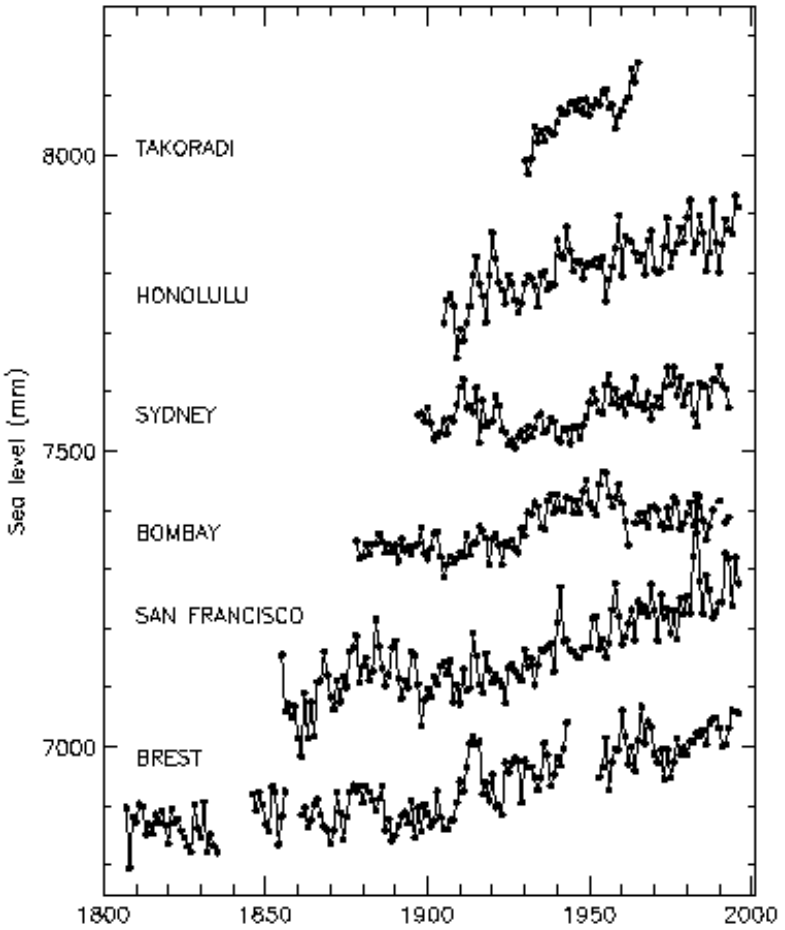


Altimeter System



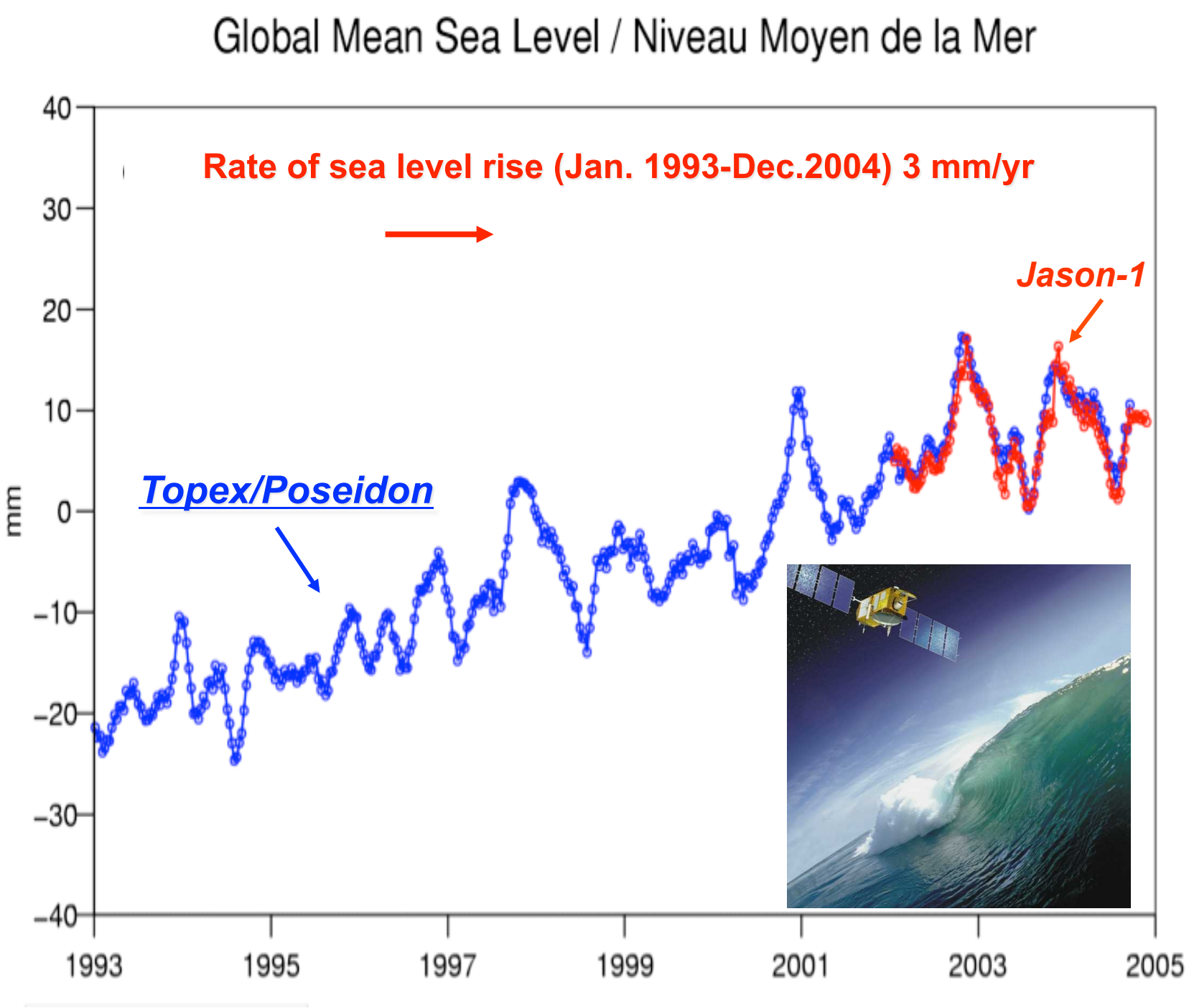
Bottom Pressure Gauge

Changes in Last 100 Years

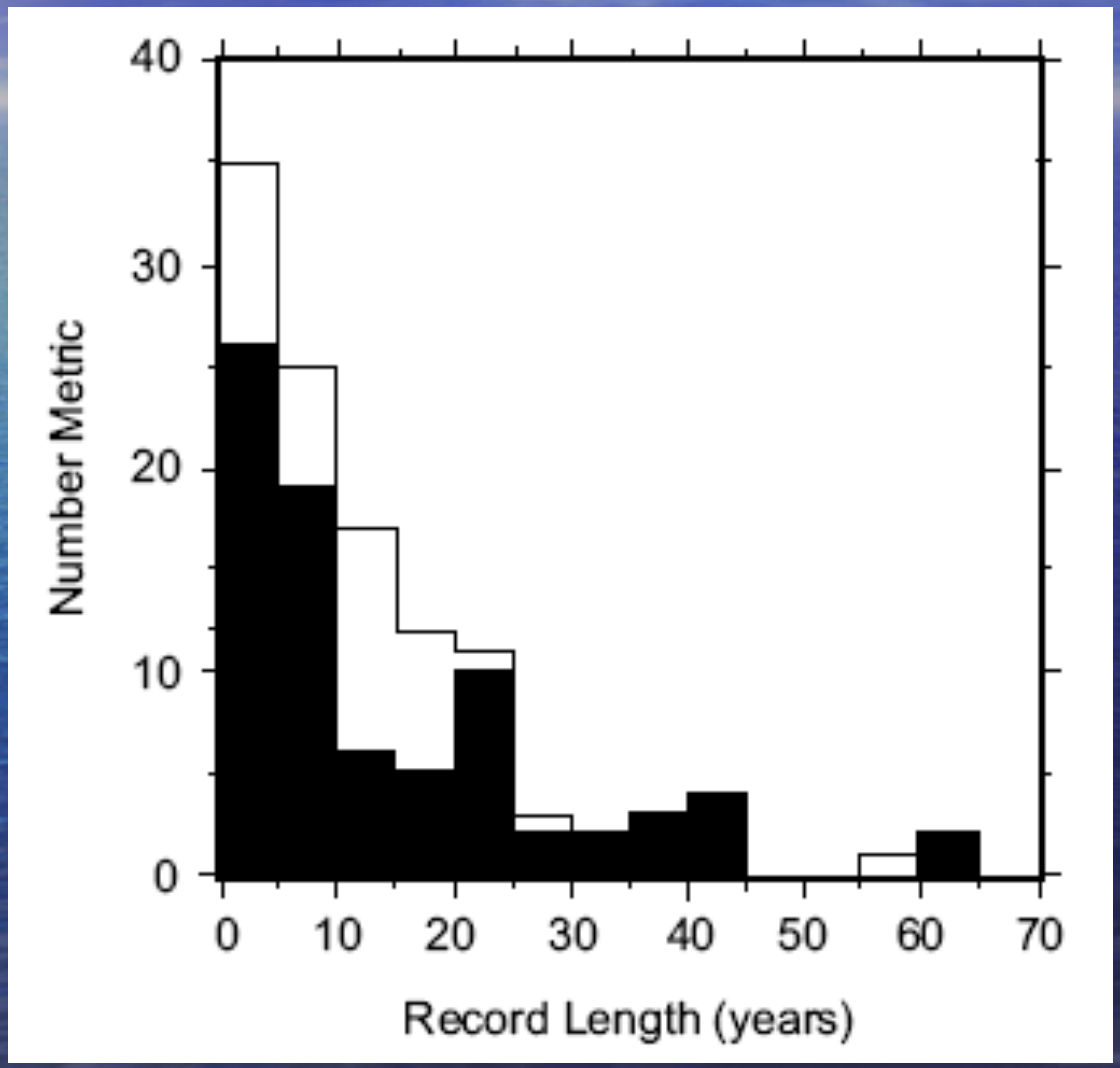


Past 100 years

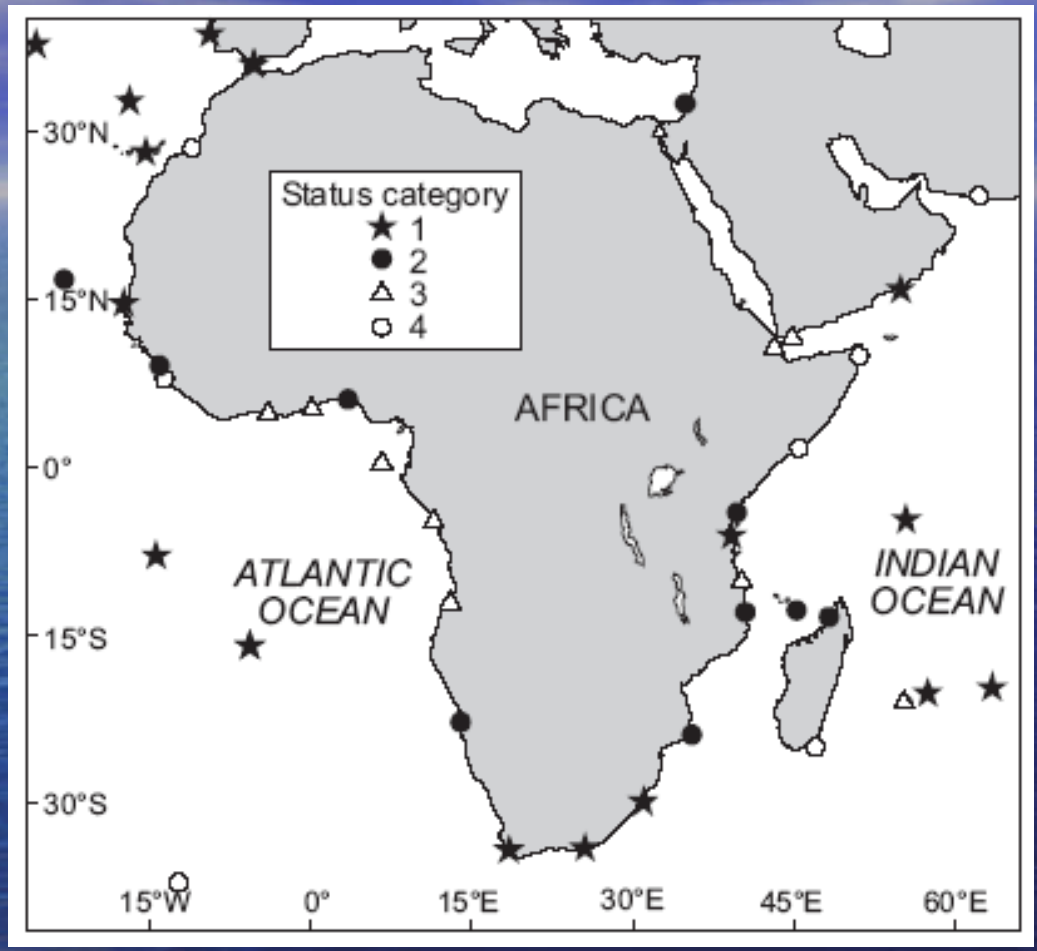
- **Most PSMSL records show evidence for rising sea levels during the past century**
- **IPCC Third Assessment Report concluded that there has been a global rise of approximately 10-20 cm during the past 100 years**


Global Mean Sea Level / Niveau Moyen de la Mer
Rate of sea level rise (Jan. 1993-Dec.2004) 3 mm/yr
Jason-1
Topex/Poseidon
mm
40
30
20
10
0
-10
-20
-30
-40
1993
1995
1997
1999
2001
2003
2005

Histogram of number of records lengths of stations from Continental Africa (Woodworth et al; 2007)



Map of GLOSS Core Network stations in Africa (2006)



1: recent data

2-3: historic but no recent data exist

4: No historic or recent data at all



ODINAFRICA –III INITIATIVE (2004-2008)

Ocean Data and Information Network for Africa -III

- Government of Flanders (Belgium) and IOC of UNESCO support

- Bringing together marine related institutions from 25 members states of the IOC from Africa

ODINAFRICA -III Objectives : reinforce GLOSS Network in Africa

- Upgrade and expand African network for in-situ measurements and monitoring of ocean variables
- Provide near real-time observations of ocean variables.
- Build adequate capacity for collection, analysis and management of sea-state variables through training and procurement of equipment

INSTALLATION

- Nouakchott (4 - 6 December, 2006)

Takoradi, Ghana
12-16 December 2006

View of the sensors and aerials installation

Tide gauge cabinet view

Limbe, Cameroon (17-23 June 2008)

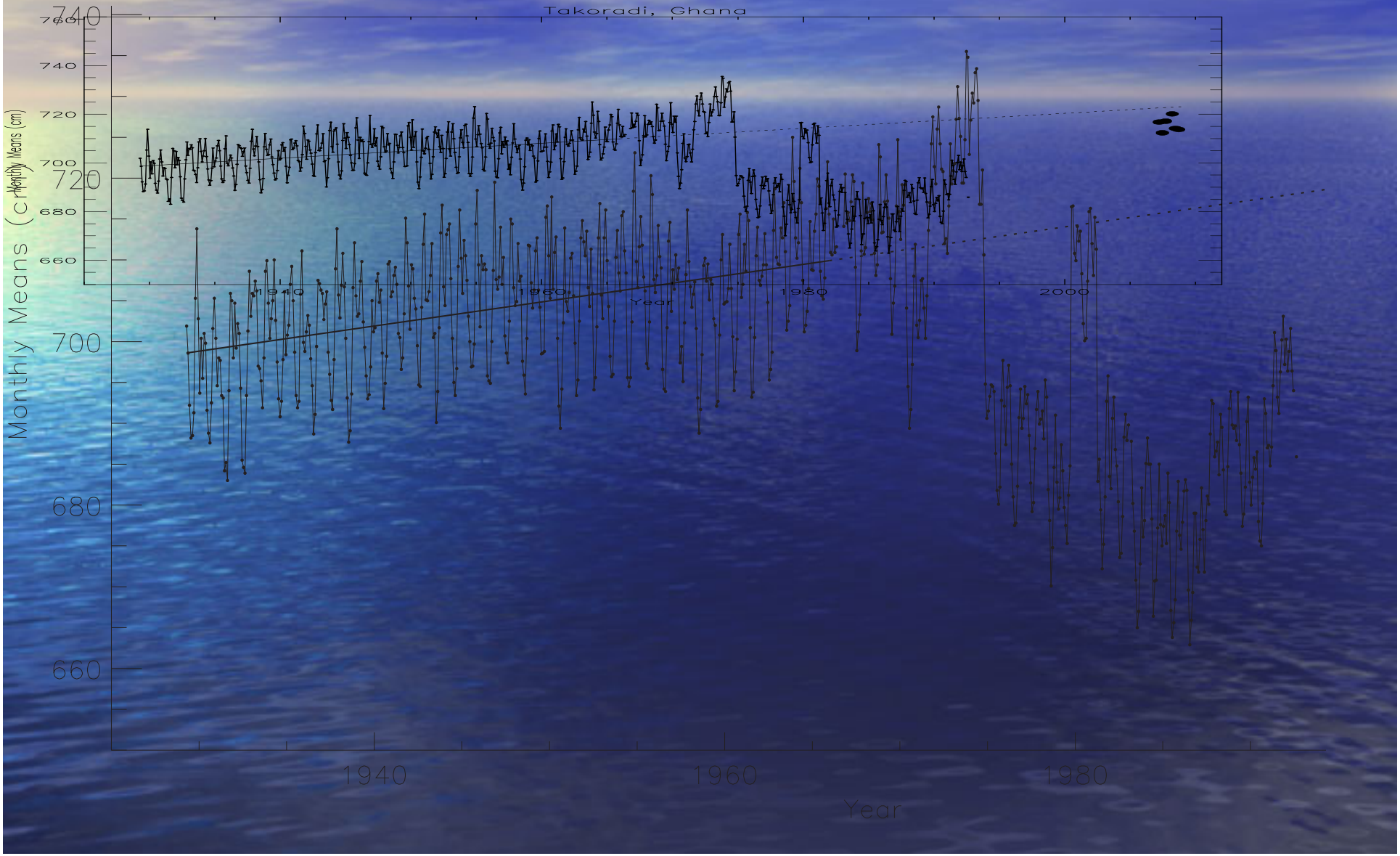
Construction of support for TG - TG installed

Status of the African sea level network (august 2008)

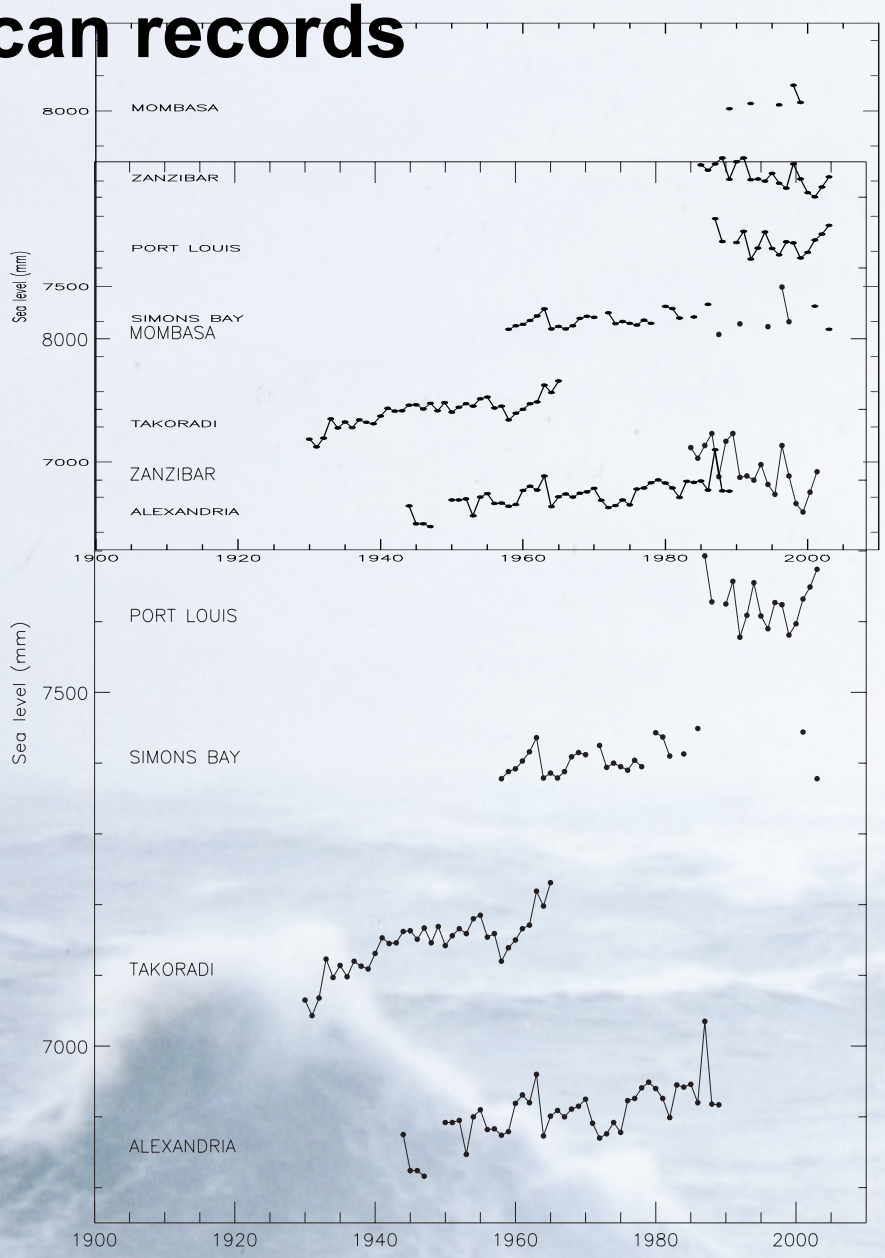
SEA LEVEL VARIATIONS ALONG AFRICAN COASTS

Historical monthly mean sea levels from Takoradi (Ghana) together with recent seasonal mean values (Woodworth et al., 2009)

1930-1965 rate: 3.1 mm/yr



Annual MSL time-series for are medium-length African records



Mombasa

Zanzibar

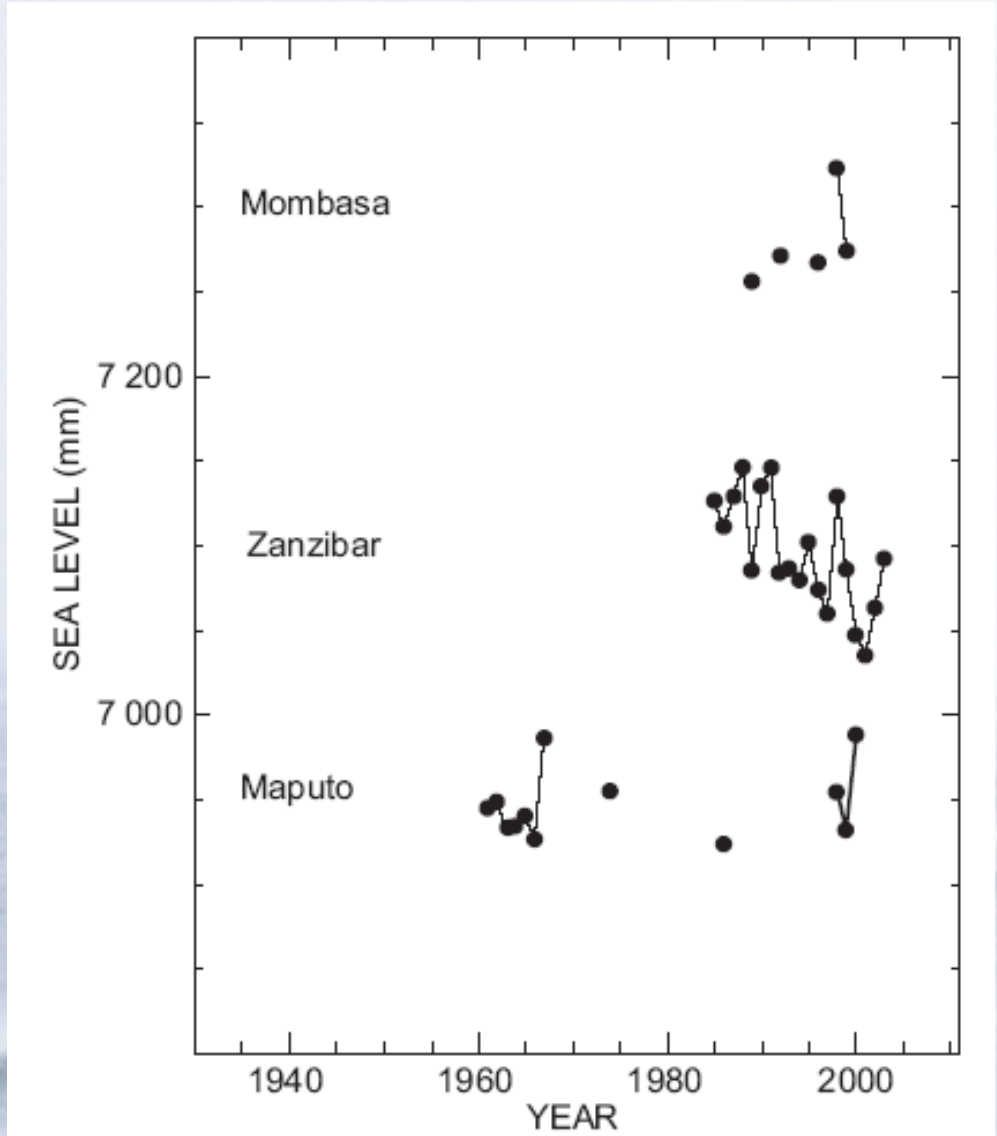
Port Louis

Simons Bay

Takoradi

Alexandria

Annual MSL time-series for three medium-length records in East Africa

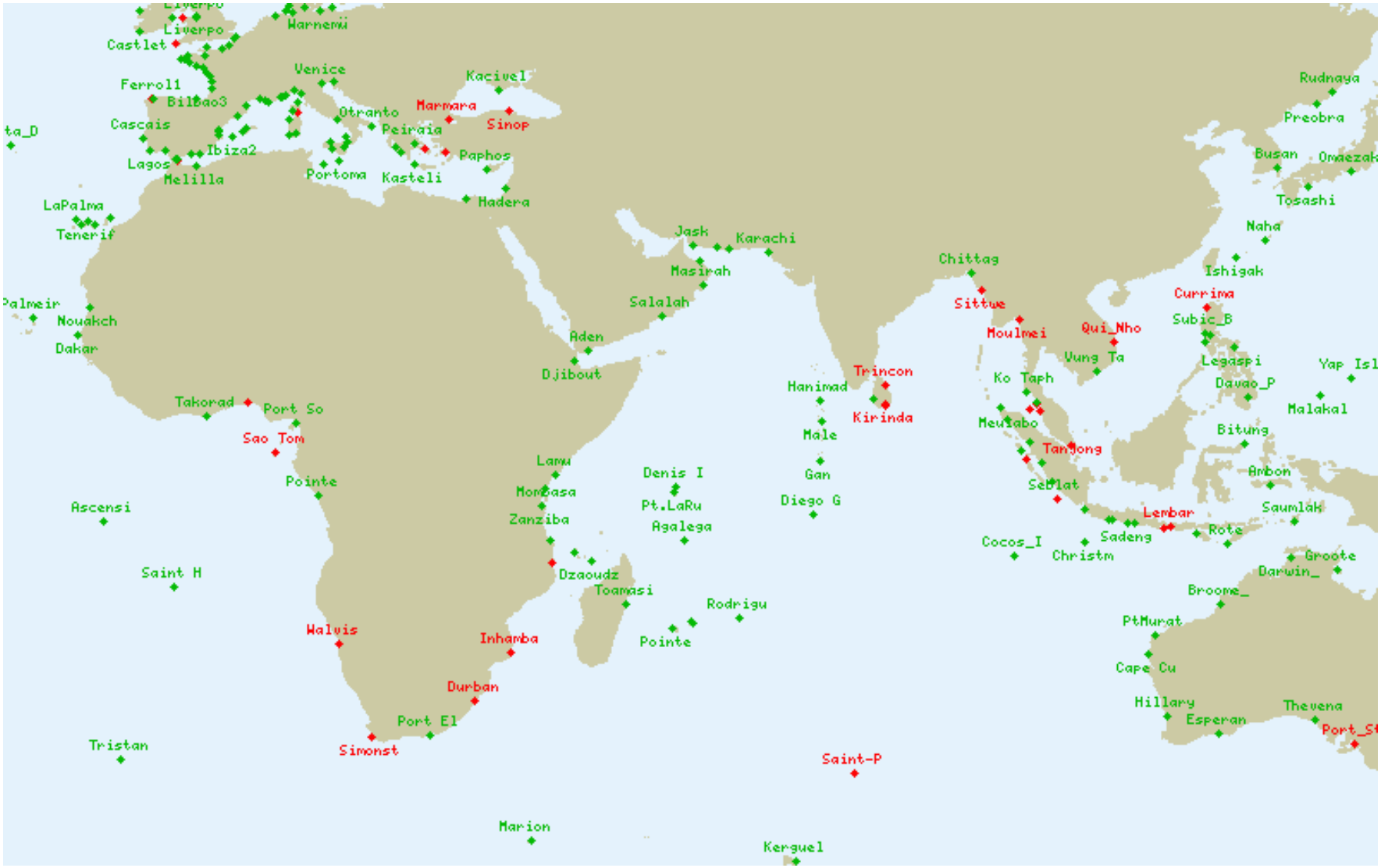


ODINAFRICA Sea Level Facility

Roles of the sea level data facility hosted at the IODE Project Office, Oostende

- Data capture via GTS and archive in relational data base
- Web-display (plots and raw data provision) of tide gauge operator alert in case of equipment mal function
- Semi automatic data quality control
- Communication with technical consultant

Tsunami Sea Level Station Monitoring Facility



IODE International Oceanographic Data and Information Exchange

VLIZ

CONCLUSIONS

- Has Global Sea Level risen during the 20th century along African Coasts?

- Yes, but the trends are due to the vertical land movements. The Takoradi value is larger than the typically 1.7 mm/yr one might be expected from other studies of 20th century sea level change.

- Difficult to answer: African Sea Level Dataset is limited in size and quality. Some times there is a gap of several years between data sets.

- 50 years of continuous data are required if a long term is to be calculated (African continuous data records are less 20 years)

CONCLUSIONS

ODINAFRICA III has contributed significantly to the reinforcement of GLOSS Network in Africa since 2006.

- A total of 22 sea level stations have been installed/ upgraded by ODINAFRICA and other partners
- ODINAFRICA sea level facility exists at IODE project office
- All the new stations participate GLOSS Network and they contribute to the understanding of Global Climate change.

THE END