



Global Sea Level Observing System

Report to the OOPC
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Thanks to:

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(GLOSS Technical Secretary)

GLOSS

- **Established by IOC in mid-1980s**
- **Goal:**
 - **Development of GLOSS Core Network of 300 sea level stations for range of ocean/climate science and practical applications.**
 - **Global select set of gauges spaced 500-1000 km apart. Geographically balanced. Open ocean locations. Best technology -- high quality and long term.**
- **GLOSS Implementation Plan, 1997 -- 270 stations (more than climate)**
- **OOPC/CLIVAR Global Sea Level Workshop Report, 1998 -- 199 stations for climate**
- **Report on the Status of the GLOSS Programme and a Proposal for Taking the Programme Forward, 2003**



Applications of Tide Gauge Data



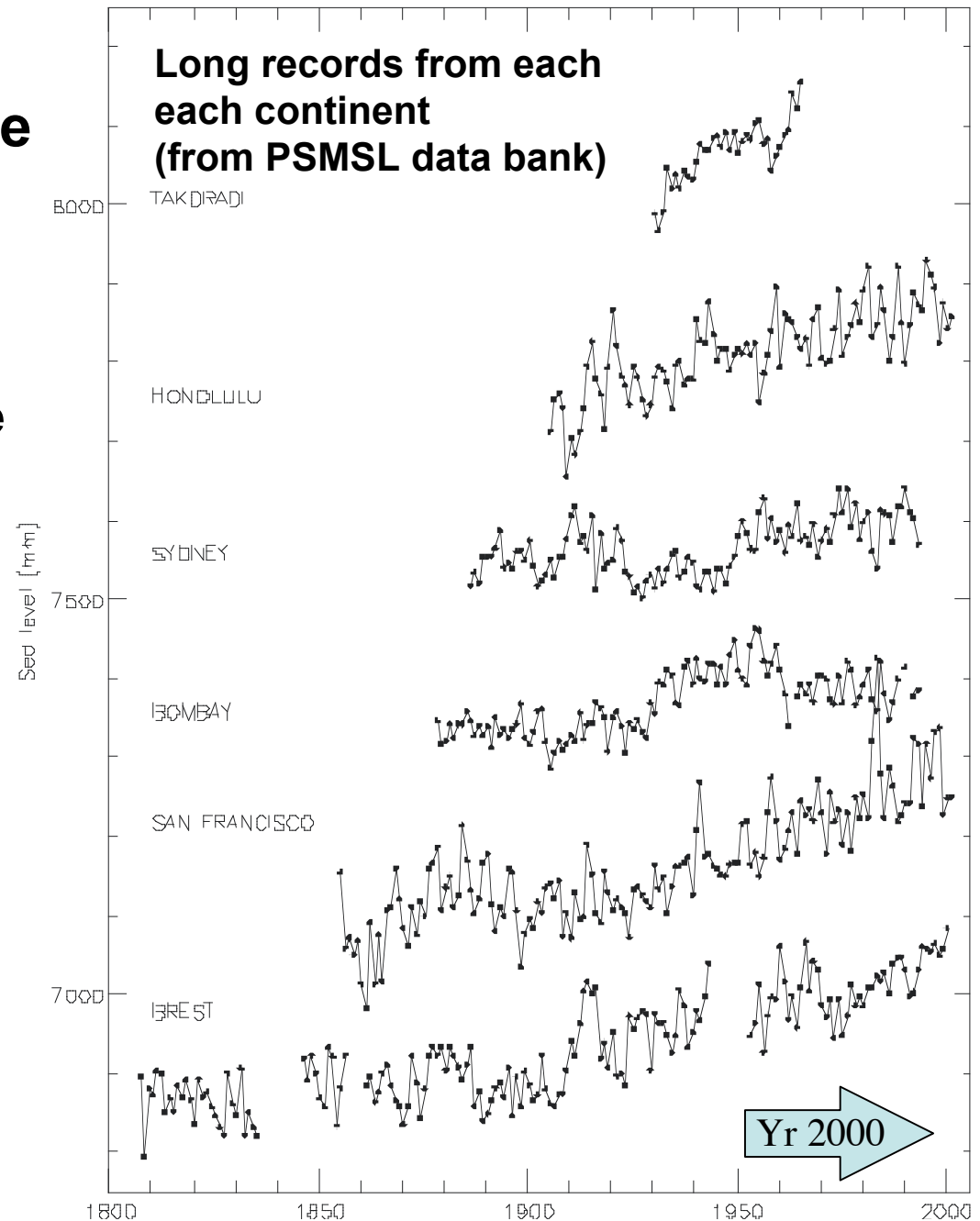
Acoustic Gauge in Australia

- Altimeter calibration
- Continuity and low cost. The altimeter record may have gaps in future and we need the GLOSS network as a backup
- Long mean sea level (MSL) records needed for climate change studies (e.g. for IPCC)
- Long records of higher frequency climate variability and change (e.g. ENSO, changes in storm surge statistics)
- Many coastal applications (e.g., navigation, engineering, coastal zone management)
- Higher frequency sampling important in straits and other areas -- ocean circulation (e.g. Drake Passage)

Global Sea Level Change

Most records show evidence for rising sea levels during the past century

IPCC concluded that there has been a global rise of approximately 10-20 cm during the past 100 years



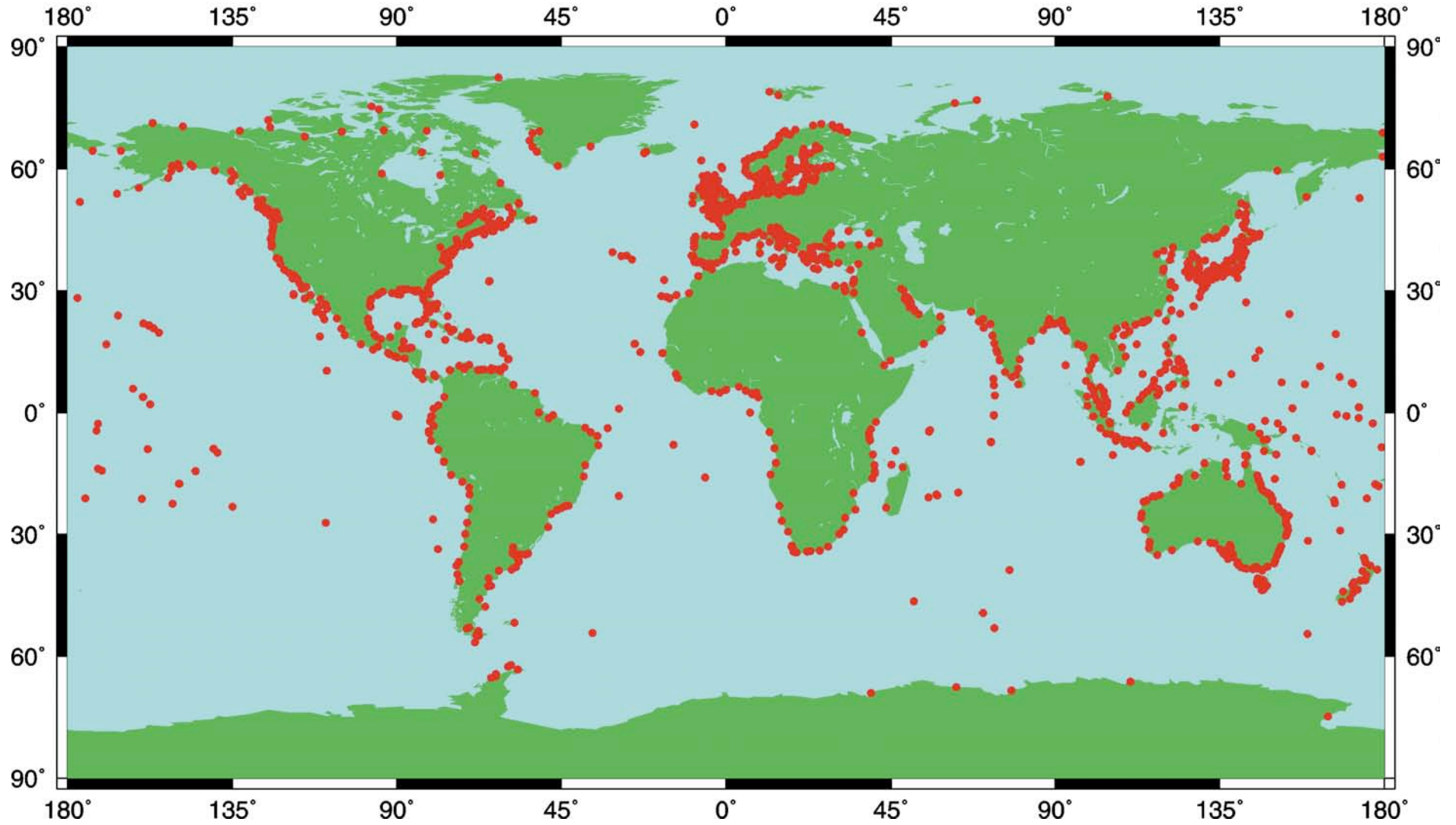
THERE ARE 4 GLOSS DATA STREAMS, 3 DATA CENTRES

- 1. Delayed mode, quality controlled Mean Sea Level (MSL) data to the PSMSL**
- 2. Delayed mode, quality controlled higher-frequency data (e.g. hourly heights) to a GLOSS Data Centre (PSMSL or UHSLC)**
- 3. Fast data to GLOSS Fast Centre at UHSLC**
- 4. GPS data to Tide GAuge (TIGA) Centre of the International GPS Service at Potsdam initiated by IGS/PSMSL in 2001.**

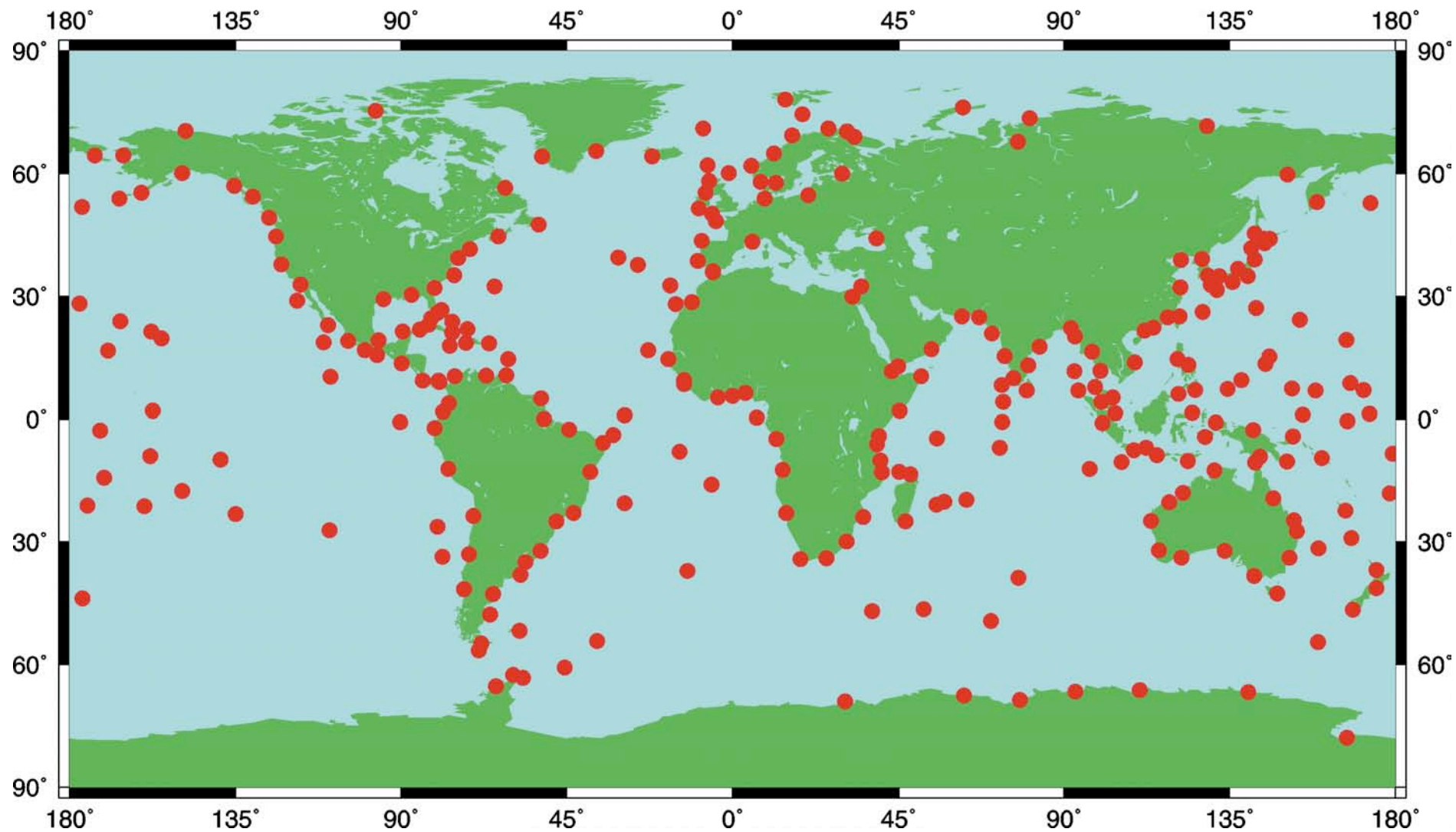
Since the 1997 Implementation Plan, the main new GLOSS development has been the demand for Fast data

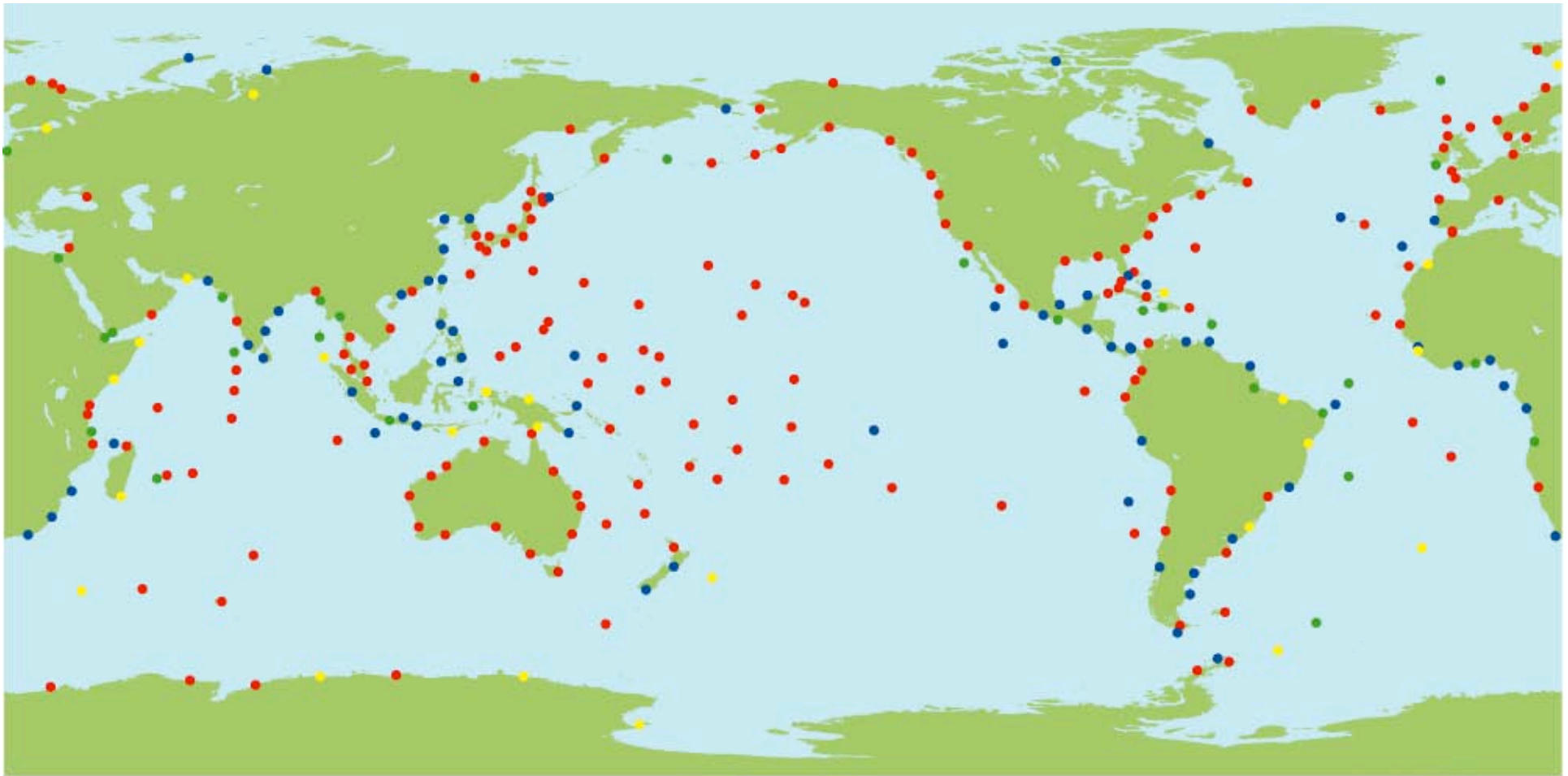
- Operational assimilation of data into deep ocean models in GODAE ('Fast' = 2 days).
- Operational assimilation into coastal models e.g. storm surge, upwelling applications (Coastal GOOS) ('Fast' = few hours)
- Satellite altimeter calibration ('Fast' = 1 week)
- Better tide gauge operations as faults can be identified and fixed sooner ('Fast' = 1 day). The need for Fast data coincides with the need for general GLOSS modernisation.

Distribution of PSMSL Stations (all records -- GLOSS+)



GLOSS Core Network -- 290 Stations





GLOSS Status, October 2002

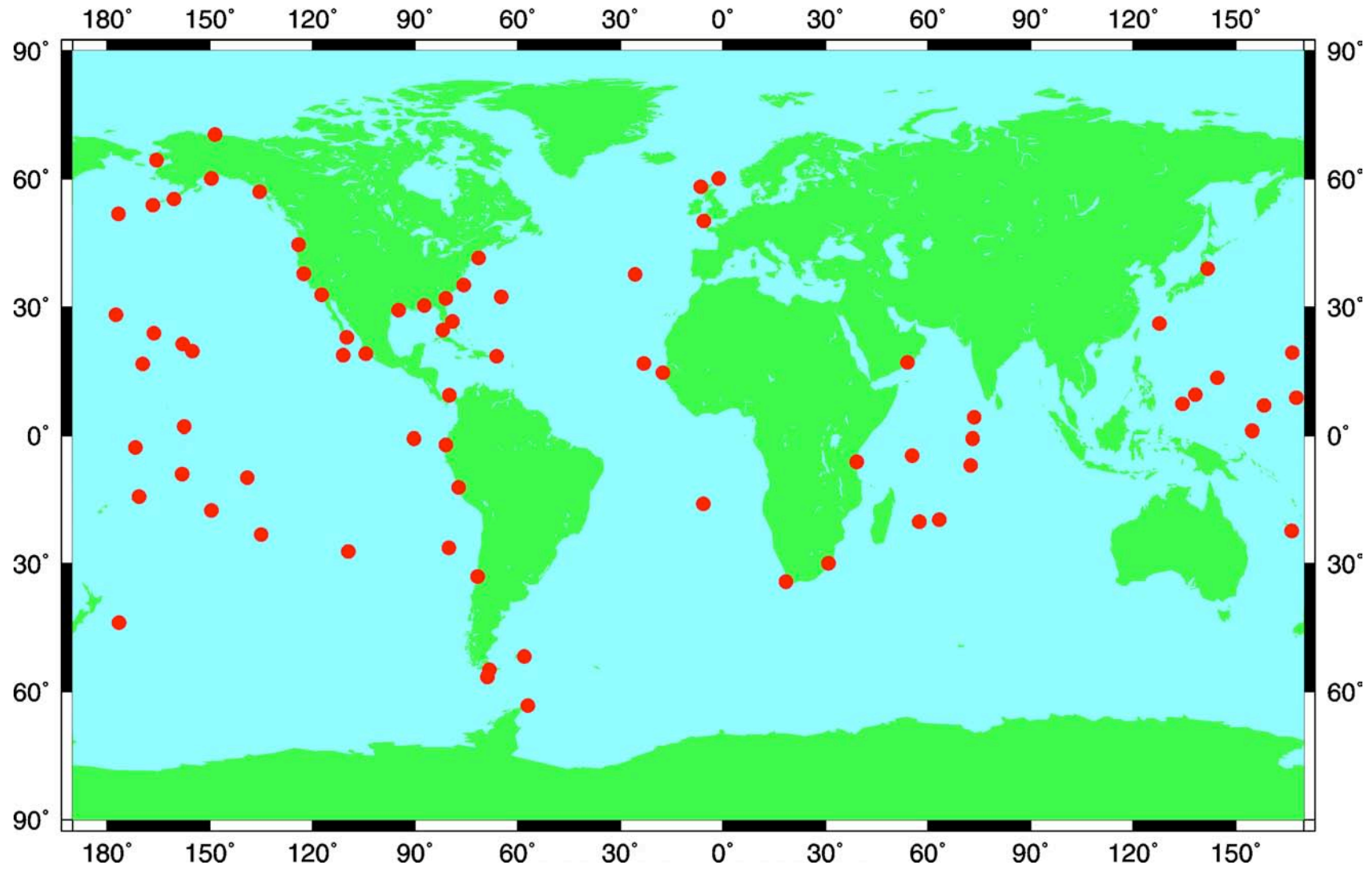
JCOM OPS

- 168 ● Category 1 : "Operational" stations for which the latest data is 1998 or later.
- 69 ● Category 2 : "Probably operational" stations for which the latest data is within the period 1988-1997.
- 28 ● Category 3 : "Historical" stations for which the latest data is earlier than 1988.
- 25 ● Category 4 : Stations for which no PSMSL data exist.
- 290 (29 no working tide gauge at all)



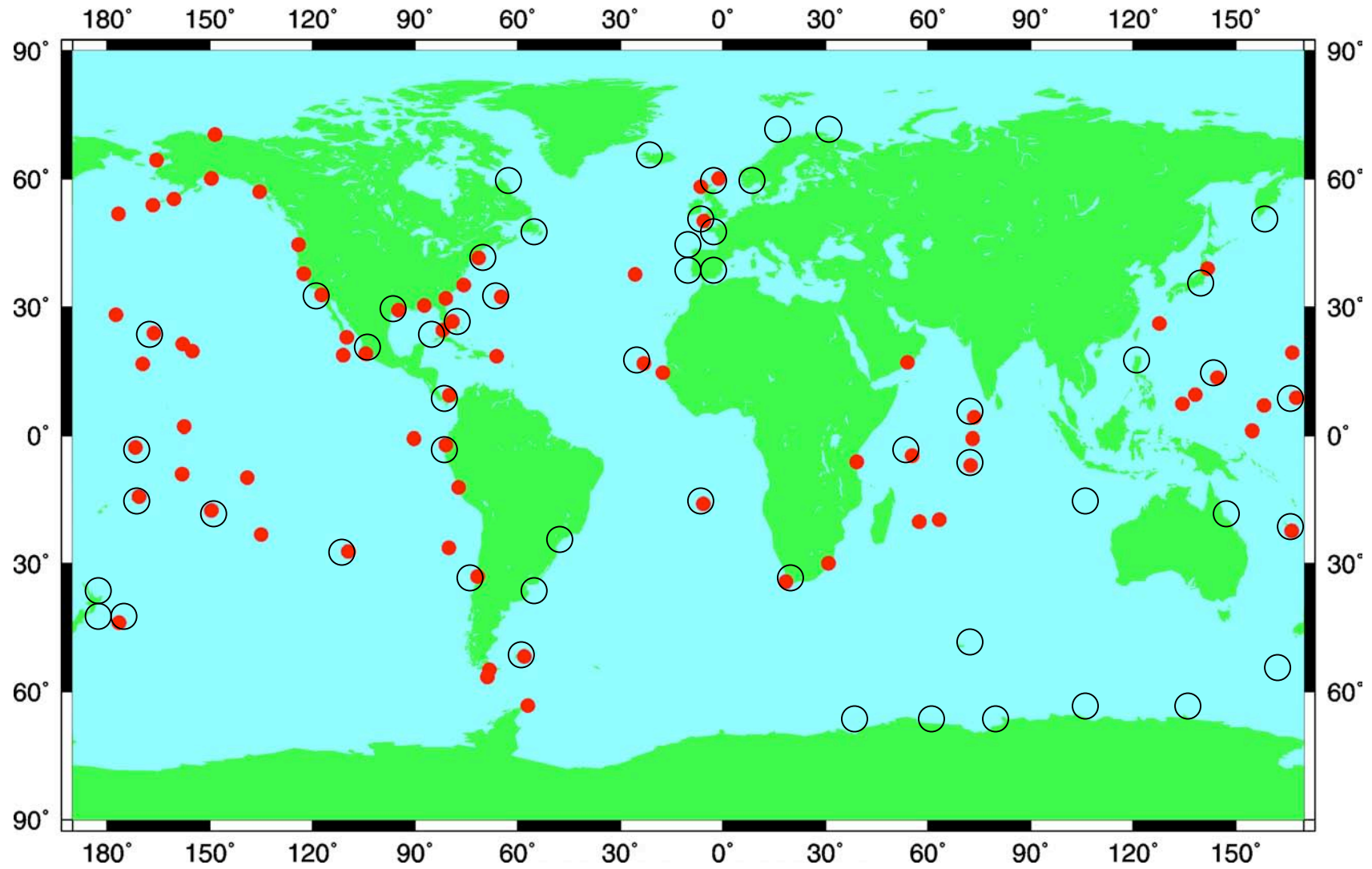
[Need to adjust color pallet -- [blue-is-good, red-is-bad]

GLOSS Real Time Stations (April 2003) -- 73 stations



GLOSS Stations with GPS/DORIS (September 2002)

55 stations



May 2003

Report on the Status of the GLOSS Programme and a Proposal for Taking the Programme Forward

The Report was produced because:

- JCOMM Observation Coordination Group asked each element to develop a performance metric for the integrated observing system**
- GLOSS Experts felt that a review of GLOSS status at this time was required**
- The need for fresh investment had to be stated**
- The possibilities offered by new technologies need to be recognised**

Conclusions of the Status Report

- Some countries have made major contributions toward GLOSS status, but some have not, for a range of reasons.
 - Countries which have and have not contributed to GLOSS may be inferred from the Tables in the Report.
- To make further progress there needs to be a centrally-coordinated development activity which will fill many of the gaps, especially in Africa.
- This is an opportune time to make such an investment, given technological developments, enabling modular 'tide gauge packages' to be considered.
- The GLOSS Report contains a proposal, for an investment of approximately \$3.5M over 3 years
 - Half of \$3.5M are one-off costs for hardware. Other half are annual costs over 3 years.

Elements of the Proposal

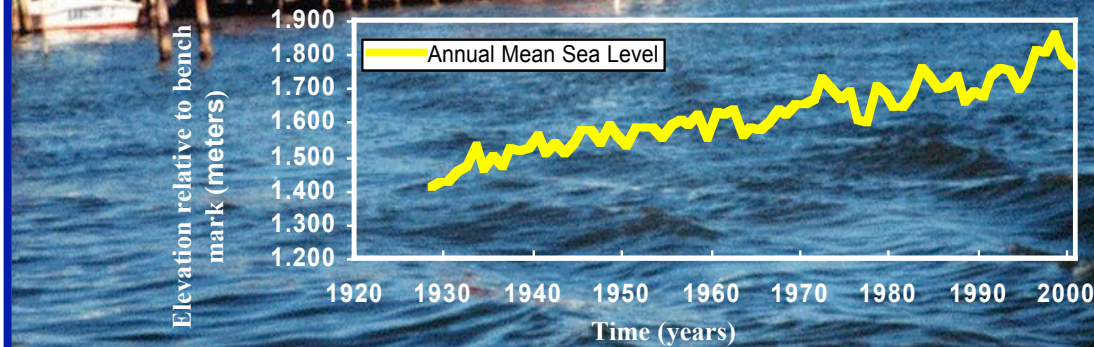
- Hardware for 92 tide gauge packages (concentration in southern hemisphere) to complete the GLOSS Core Network
- Hardware for 30 tide gauge upgrades, conversion to real-time
- Hardware for 20 GPS receivers to complete altimeter calibration and ocean circulation requirements (LTT ?)
- Installation costs
- Personnel to oversee the scientific and practical priorities, installations and maintenance over 3 years (8 people).
- Training so that countries in receipt of hardware can continue data provision after 3 years complementing existing/planned regional activities.
- Web development costs for global data distribution in near real-time

Document Long Term Trends in Sea Level Change

LOWER CHESAPEAKE BAY : Variations In Relative Annual Mean Sea Level - 1927 thru 2000

Linear Trend: +4.2mm/year

Mean sea level has risen about 300mm (1 ft.) relative to the land since 1927



Deliver routine annual reports of variations and trends in mean sea level at climate reference stations, and absolute sea level change for the global ocean.

*New project at NOAA --
Potential JCOMM+OOPC+COOP?*

Today -- approximately every 5-10 years, non-standard, research mode.
2004 -- 16 reference stations in the USA.
2006 -- 62 reference stations world-wide.
2008 -- absolute global sea level change.

Thank you