Global Sea Level Observing System (GLOSS)

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Why Measure Sea Level?

- Practical applications e.g define vertical datums, safe navigation, constrain models, predict flood risks
- Coastal management e.g. sea level used to understand past and future changes in shelf and ocean conditions

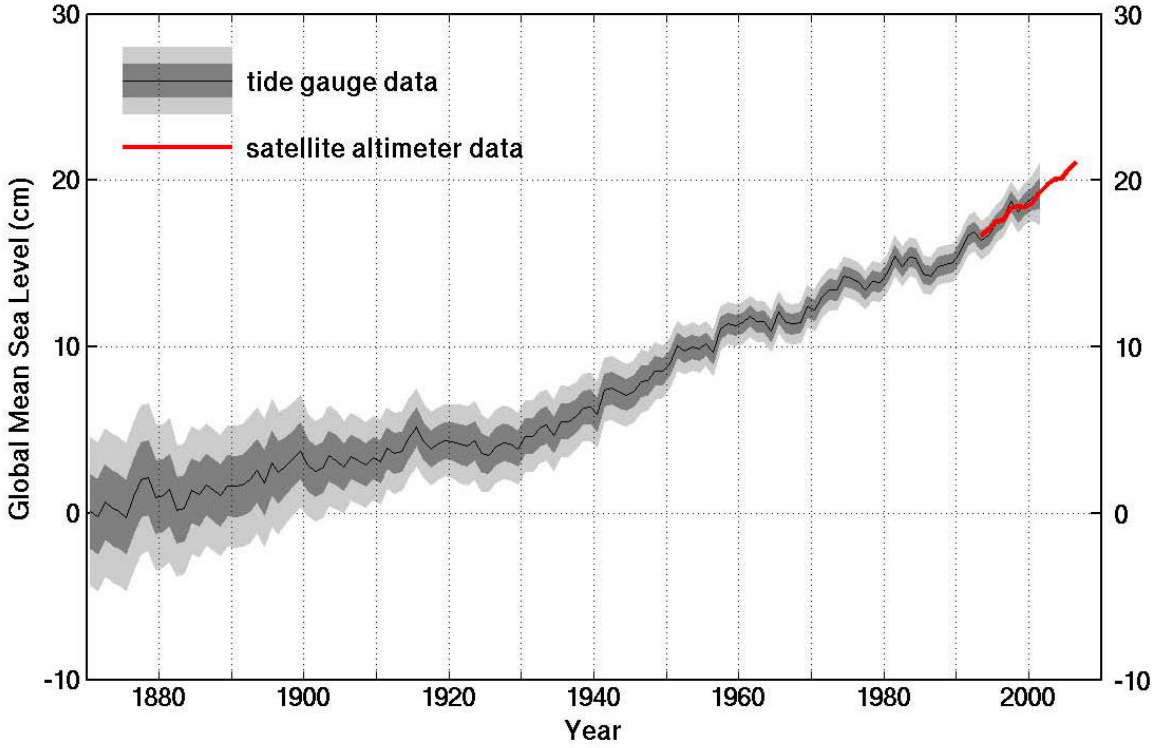
Maldives

(curtesesy Yann Arthus Bertrand/Earth from Above/UNESCO)

Time-Scales and Causes of Sea Level Change

- Seconds to minutes: waves, tsunamis
- Hours to days: tides and surges
- Seasonal: surface heating and freshwater input
- Interannual: ENSO, NAO
- Long term trends: climate variability and change, vertical crustal movement (e.g. GIA)

Long Sea Level Records Underpin Plots Such As …



Global averaged sea levels from 1870 to 2006 as inferred from tide-gauge data (black, with 66% and 95% confidence limits given in dark and light shading) and satellite altimeter data (red).
(curtsey John Church and Neil White, CSIRO)

What is GLOSS?

- Established by IOC in mid-1980s to improve quantity and quality of sea level data sent to PSMSL and other sea level centres.

- Original aim: Develop GLOSS Core Network of 300 sea level stations for practical and ocean/climate science applications.

- Global array of gauges spaced 500-1000 km apart. Geographically balanced. Open ocean locations. Best technology.

What Data Streams Does GLOSS Generate?

1. Delayed mode: QC'd mean sea levels to PSMSL

2. Delayed mode: QC'd higher-frequency data (e.g. hourly) to GLOSS Data Centre (PSMSL, UHSLC)

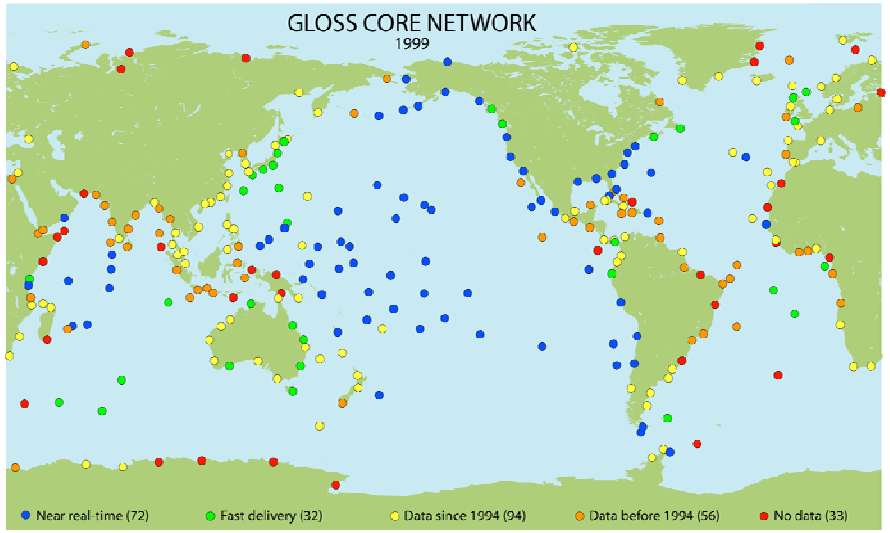
3. Near real time: High frequency data to UHSLC and International Tsunami Warning Centers

4. GPS data to TIGA Centre at Potsdam (Germany) initiated by IGS/PSMSL in 2001.

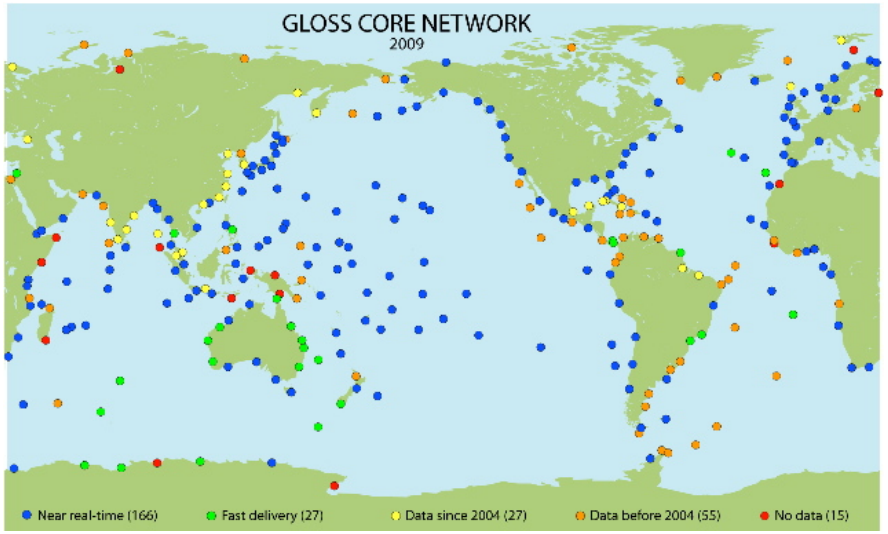
GLOSS Also Provides ...

1. Coordination mechanism for global sea level observations (e.g. GLOSS Group of Experts)
2. Global data standards and archiving facilities, QC of data
3. Technical manuals and training material
4. Technical advice and special workshops on technical issues
5. Training courses on analysis and uses of sea level observations
6. Hardware (e.g. tide gauges, GPS, transmitters)

GLOSS Core Network Status
Developments between 1999 and 2009



• Primary element of GLOSS is the GLOSS Core Network (GCN) of approximately 300 sea level stations in nearly 90 countries.



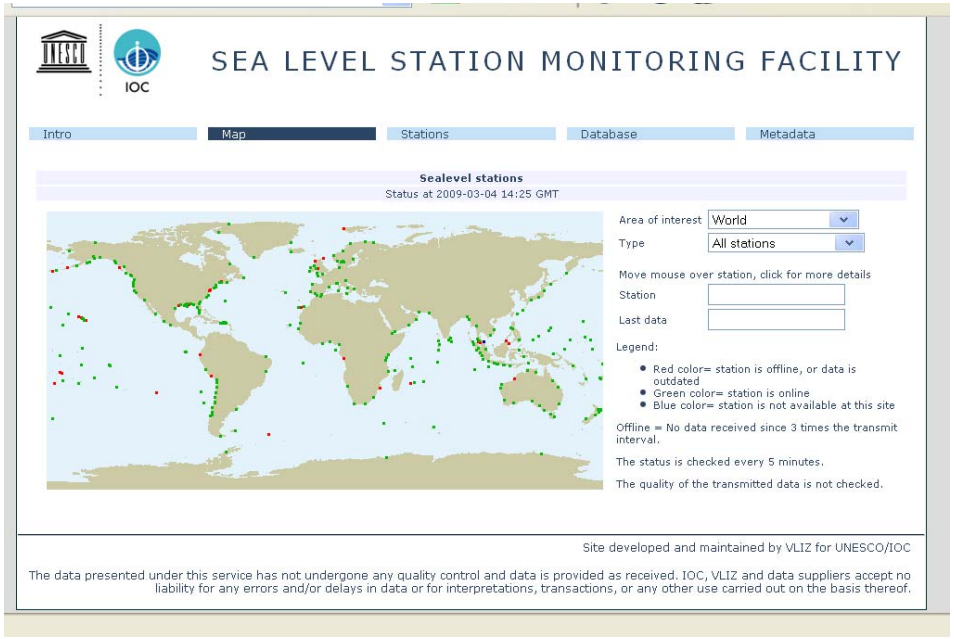
• Respectable improvement in GLOSS CN since 1999 and substantial increase in stations that provide data in near-real time - 166 stations in 2009 versus 72 stations in 1999

• in 2009 220 stations (76%) have provided data recently to GLOSS Data Centers

IOTWS Real-time Sea Level Network Status

- Nearly all GLOSS Core Network stations in Indian Ocean have been upgraded to report observations in real time on the GTS.
- Some countries continue to densify national tide gauge networks further, i.e. Indonesia, Malaysia, Oman, Kenya

Sea Level Station Monitoring Web-service



More information at:
www.ioc-sealevelmonitoring.org

- Recently developed web-based global sea level station monitoring service for viewing sea level data received in real time from different network operators through a number of different communications channels.
- Aims
  - to provide information about the operational status of global and regional networks of real time sea level stations;
  - to provide a display service for quick inspection of the raw data stream from individual stations.

- 293 real time stations are presently included on the web-site site

What is ahead for GLOSS

- Workshop on Precision Observations of Vertical Land Motion at Tide Gauges (11-12 May 2009) – aim is to develop community plan for increase the number of continuous GPS/Doris stations that are co-located with GLOSS CN tide gauges
- GLOSS GE XI (13 -15 May 2009, Paris) (http://ioc-goos.org/glossgexi) – topics will include
  - Review of updated GLOSS Implementation Plan
  - Review of draft manual on quality control of sea level data
  - Review GLOSS' role in tsunami/hazard monitoring

- Continued advocacy and assistance (as outside funding allows) with GLOSS core network development (i.e. Caribbean, Latin America and North Africa)
- Provision of sea level data via GLOSS CN and global tsunami and hazard sea level network for operational use

How Can The IHO Tidal Community Assist GLOSS?

1. Consider GLOSS requirements when upgrades are made to national SL networks (For requirements – please see Appendix 1, IOC Manual on Sea Level Observation and Analysis)

2. Encourage collaboration between tide gauge agencies and national GPS communities with aim to devlop the global network of co-located GLOSS CN stations and continuous GPS/Doris stations further

3. Encourage data exchange/provision to GLOSS Data Centers (PSMSL, UHSLC). As status maps show, problems with real time and high frequency data exchange from GLOSS CN stations in India, China, and Russia.

4. Assist where possible with capacity development (installations, maintenance and training)