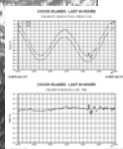


# Joint Meeting of the:

## ICG/PTWS Working Group 2\*

## ICG/IOTWS Working Group 2\*

\*Sea Level Measurement, Data Collection & Exchange



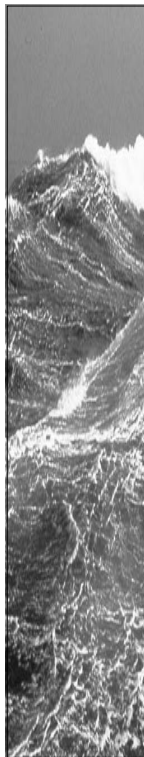
Australian Bureau of Meteorology

1-2 May 2006



## Objectives

- Review ToRs and membership
- Coordinate and share expertise on general sea level data requirements and network design principles
- Review sea level measurement technologies
- Agree data exchange protocols and standards
- Review data display tools, etc
- Discuss ocean basin specific issues in respective working groups
- Agree mechanisms to coordinate individual WG/ocean basin activities

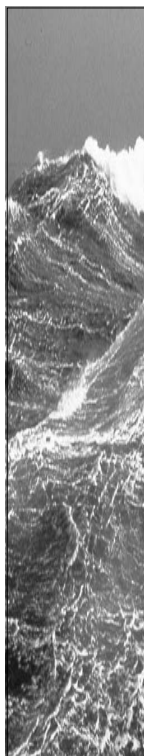


## Terms of Reference – ICG PTWS WG2

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- Review and report on existing arrangements with regard to sea-level data collection and exchange
- Ongoing review and monitoring of status of Pacific Ocean sea level networks related to tsunami observation.
- Coordinate plans for sea-level observing sensitivity tests to understand the optimal, effective PTWS sea-level network and associated technologies.
- Liaise with other sea level measurement, data collection and exchange working groups from other ocean basins, as well as other working groups within ICG/PTWS to coordinate and ensure efficient and effective sea level observations for tsunami warning.

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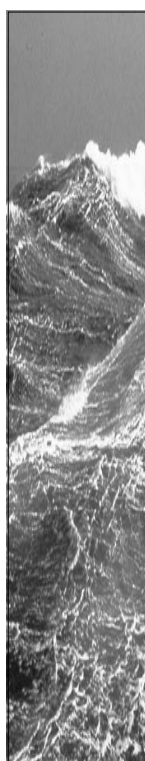
## Terms of Reference – ICG PTWS WG2

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- Liaise with CBS/WMO/JCOMM and relevant Expert Teams to develop a more effective data representation and code form for the exchange of sea-level data (standards, metadata requirements)
- Review and report on various means of transmitting sea-level data to warning centres and to conduct test of latency (timeliness) of GTS transmissions.

**Recommendation:** ICG/PTWS accepts revisions to WG2  
Terms-of-Reference

4

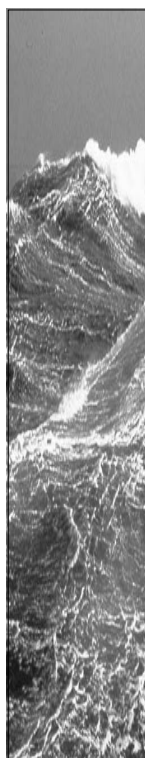


## Members

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- Australia (Chair, Bailey)
- New Zealand
- United States
- Japan
- Russia
- Malaysia
- Chile?
- Canada?
- Chair, ICG/IOPTWS WG2
- Chair, International Tsunameter Partnership
- GLOSS representative

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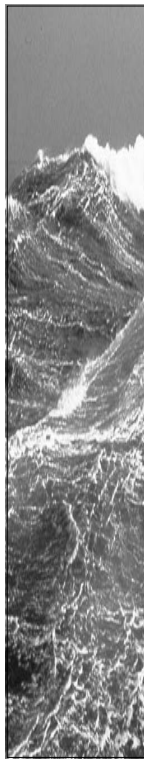


## Data Requirements

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- Operational Tsunami Detection & Warning
  - o Verification
  - o Including “all clear”
- Modelling & Forecasting
  - o Warning
  - o Hazard & vulnerability assessment
  - o Historical data and metadata
- Post Event Analysis
  - o Defining terms – run-up, amplitude, arrival time (initial vs maximum), period, inundation distance, etc
  - o Data archiving and access
- Longer-Term Scientific Understanding & Forecasting of Tsunami

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## Data Requirements

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- **#1 Priority:**

- Operational Tsunami Detection & Warning

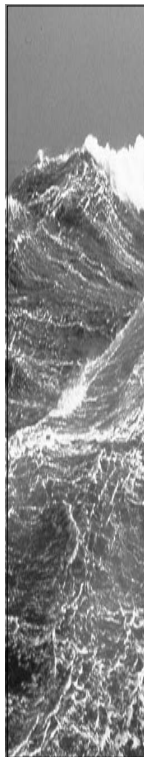
- o Verification
  - o Including “all clear”

- **#2 Priority:**

- Modelling & Forecasting

- o Warning
  - o Hazard & vulnerability assessment
  - o Historical data and metadata

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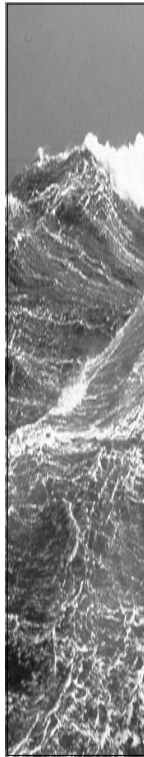


## Network Design Principles

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- Sampling interval
- Accuracy/resolution
- Frequency of transmission
- Spatial density
- Data loss thresholds
- Optimal siting (open ocean vs coastal vs island vs harbour)

8

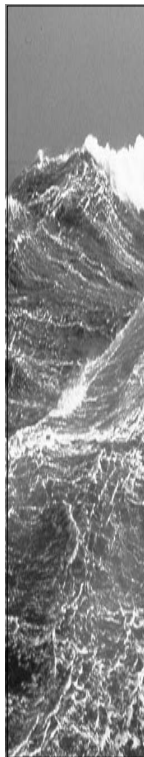


## Network Design Principles

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- No one solution fits all requirements!
  - o Need minimum set of specs for interoperability
  - o Take account of different regional requirements
  - o Set optimal targets (e.g. 1-2 Hz sampling)
- Minimum wave ?
  - o 10cm in deep water,
  - o 20 to 30cm at coastal sites,
- Uncertainty?
  - o Deep Ocean – 0.5 to 1cm
  - o Coastal – 1 to 2cm (not absolute)
- Data density in different regions?

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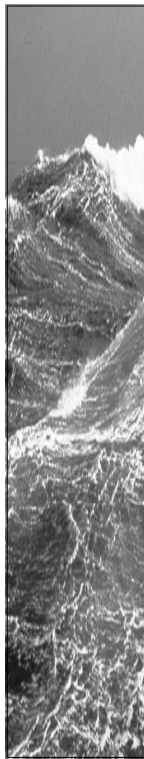


## Network Design Principles

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- **Action:** Joint WG to coordinate development of network design principles by ICG/IOTWS-III in Bali in July 2006 (Chair, Australia)
- **Action:** Seek further input from modelling working groups on data requirements for warning and forecasting
- **Recommendation:** Include feedback from post event analyses into ongoing review of network design

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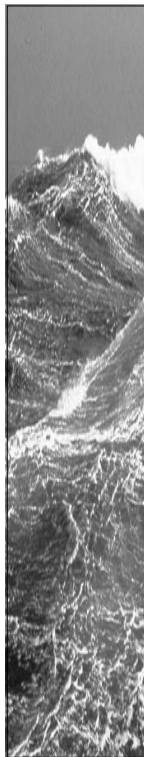


## Network Design Principles

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- GLOSS tide gauge network
  - o Core tide gauge network for tsunami detection, but only subset
  - o **Recommendation:** Wherever possible tide gauge stations should conform to GLOSS standards, but noting requirements for tsunami detection are less stringent
- **Recommendation:** Installation of multi-purpose observing sites facilitates the long-term sustainability of the observing network

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## Technologies

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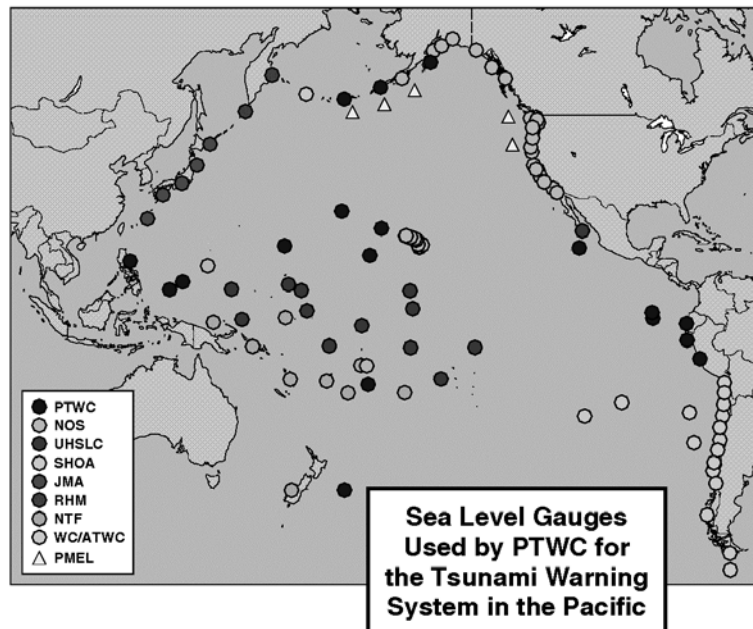
- Tide gauges
  - o Multiple roles (climate, tsunami, tides)
  - o Alternative technologies now being trialled
  - o **Action:** Need to coordinate and communicate outcomes from evaluations of existing and new technologies (e.g. radar)
- Deep-ocean buoys
  - o US plans
  - o New manufacturers
  - o International Tsunameter Partnership
- Other
  - o HF radar, altimeters, run-up gauges, cameras, accelerometers on ships, GPS buoys, fibre-optic cables, etc
  - o Need ongoing review of new developments

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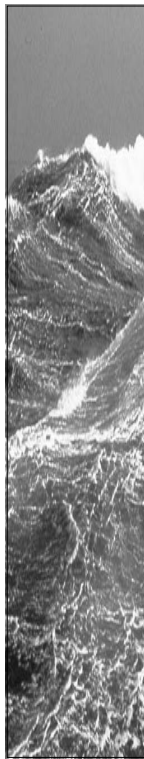
## Pacific Specific!

- National Status Reports
  - US
  - New Zealand
  - Australia
  - Russia
  - Japan
  - Malaysia (and on behalf of ASEAN countries)

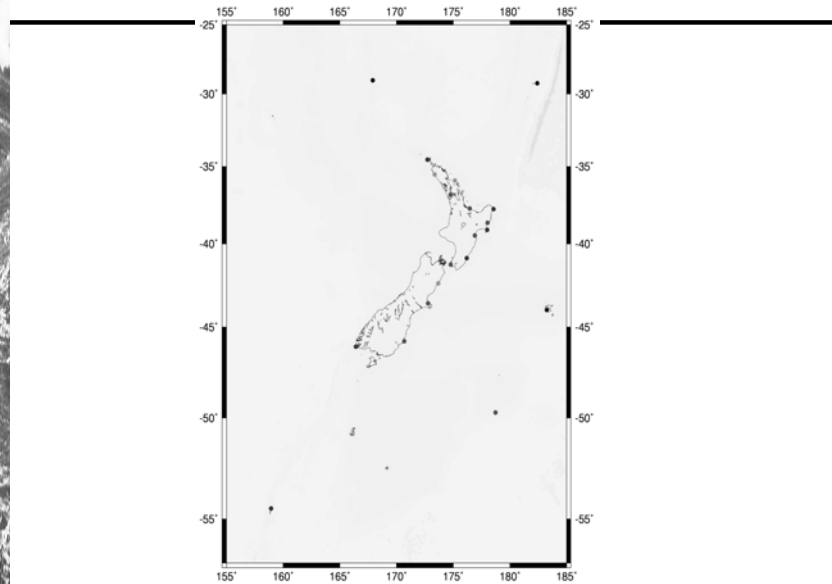
13



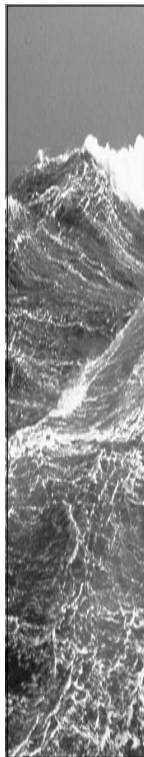
14



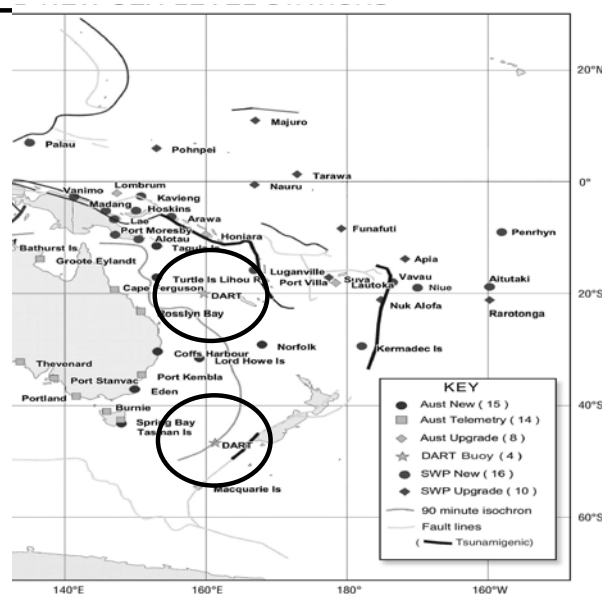
## NZ Proposed Sea Level Network



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## Australia's Proposed Sea Level Network



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## Identified Key Tide Gauge Stations



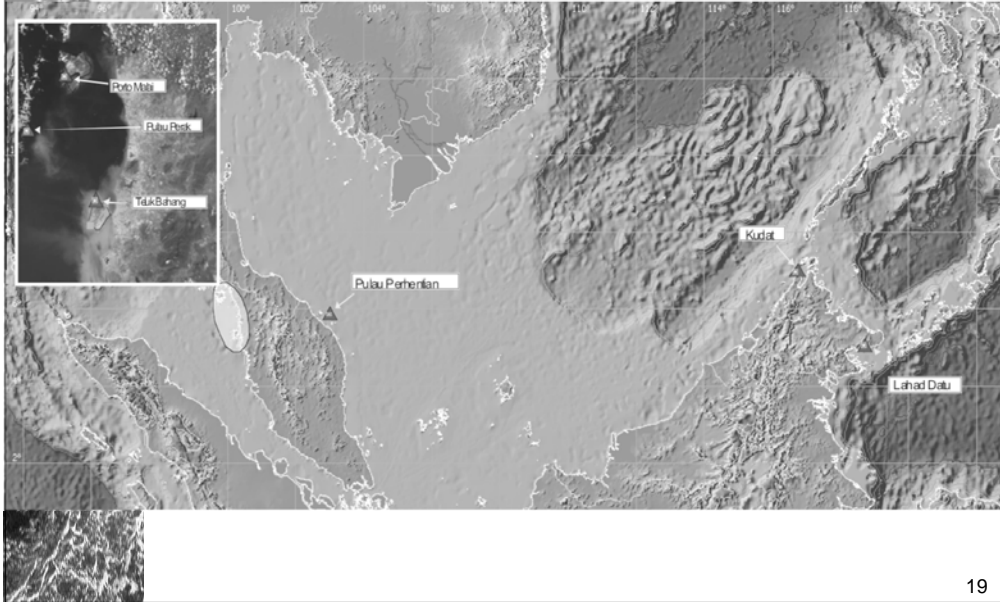
17

## Identified DEEP Ocean BUOY key stations



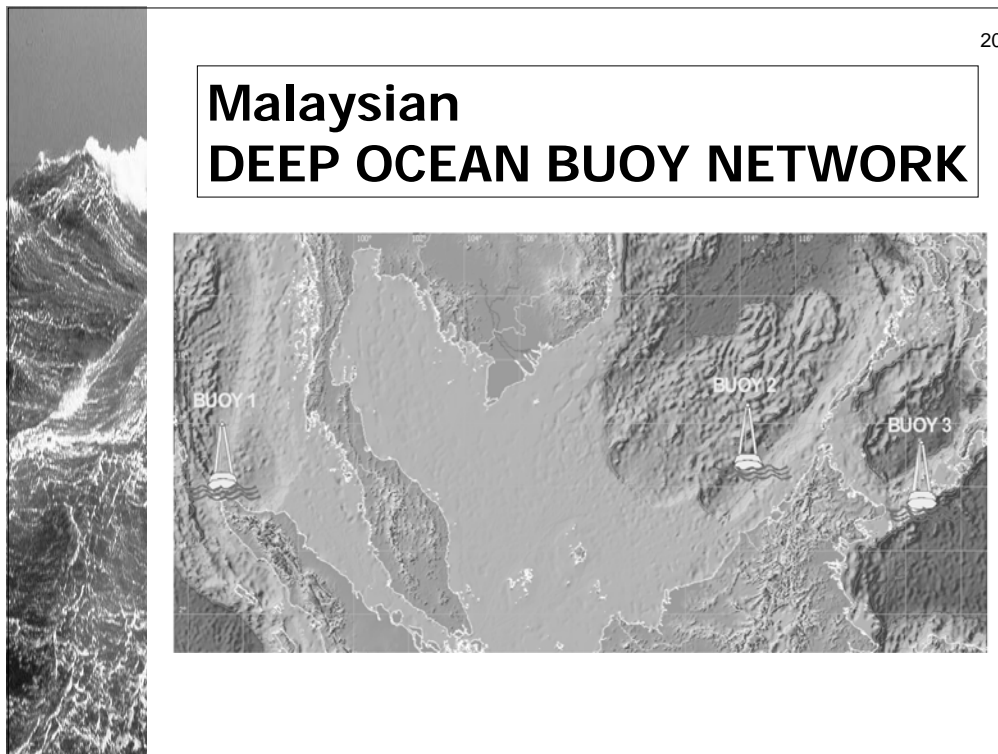
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## Malaysian TIDAL GAUGE NETWORK



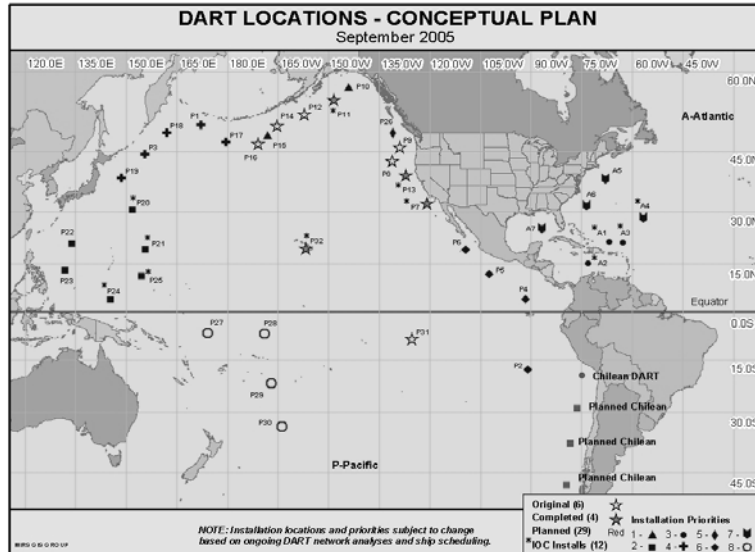
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## Malaysian DEEP OCEAN BUOY NETWORK



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## US Deep-Ocean Buoy Plans



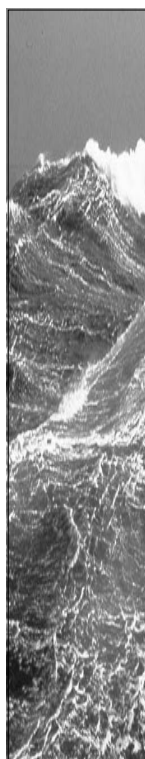
21

## Regional Coordination

- Australia/US discussions on deployment of “DART” buoys in SW Pacific Ocean
- SW Pacific
  - o Pacific Island Countries Tsunami Workshop
- Australia/New Zealand discussions on coordinating tide gauge installations



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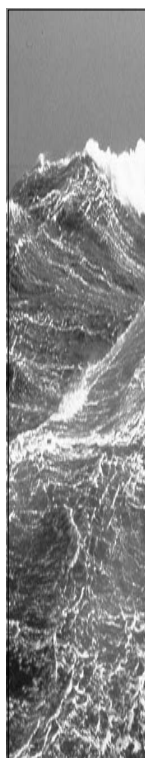


## Sea Level Network Implementation Coordination

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- **Action:** Develop template by end of May 2006 for nations to provide status information and plans for national programs (Australia) by end of July 2006 to facilitate status monitoring, maintenance and development of sea level network
- **Action:** Coordinate this activity with ITIC with view to ongoing maintenance and access to database (Chair)

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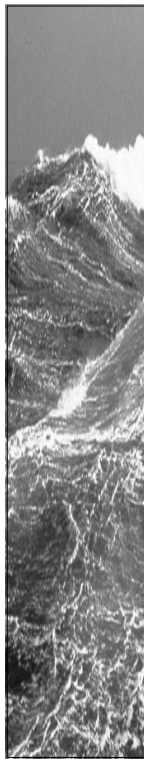
## Data Exchange, Display & Archival

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### Formats

- Historically non-standardisation of formats, etc.
- **Recommendation: Globally adopt CREX Code**
- Joint WG to review tables, metadata
  - o Draft revisions end of June for joint review
  - o Table ICG/IOTWS-III in Bali end of July
  - o Members:
    - Australia
    - New Zealand
    - Japan
    - Russia
    - PTWC
    - ITIC

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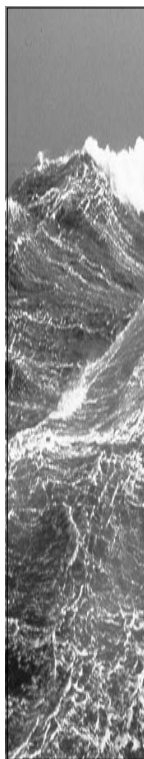
## Data Exchange, Display & Archival

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### Satellite Data Transmission

- Need to consider the capability of some satellite communication systems is limited

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## Data Exchange, Display & Archival

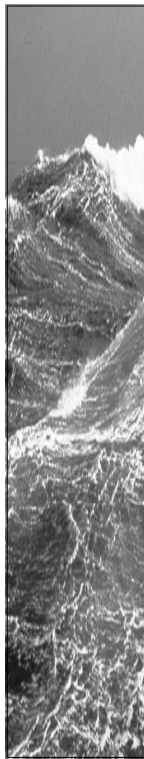
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### Formats

Sea Level Metadata Web Service Demonstrator Project

- o Oostend, Belgium, 28-29 March 2006
- o IODE, IOC, PTWC, .....

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## Data Exchange, Display & Archival

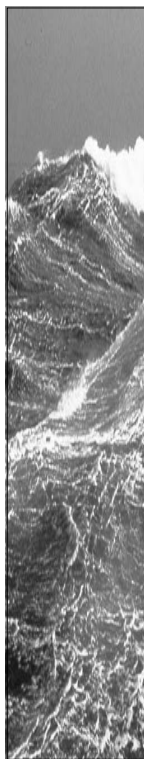
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### Archival

Noted US efforts to archive real-time, historical, and event data at World Data Centre SEG.

- **Action: ICG/IOTWS WG2 and ICG/PTWS WG2 coordinate efforts within basins to provide data to WDC (Chairs)**

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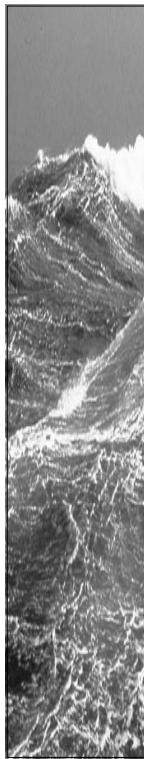
## Data Exchange, Display & Archival

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### Display

- Tide/Watertool
  - o PTWC

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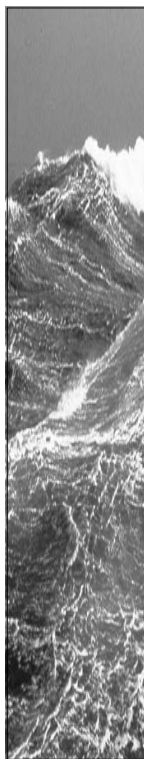


## Coordination

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- **Recommendation:** ICG/PTWS WG Chairs participate on Medium Term Strategy WG to ensure coordination on status and developments in respective areas
- **Recommendation:** Chair of ICG/IOTWS WG2 member of ICG/PTWS WG2 to help coordinate between basins and identify joint issues.
- **Recommendation:** Respective ICG/PTWS and IOTWS WG2 chairs (or their representatives) to participate in GLOSS meetings to facilitate coordination of requirements

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## Coordination

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- **Recommendation:** The ICG/PTWS WG2 reviewed the ToR's and recommends the ICG/PTWS endorses the concept of an International Tsunameter Partnership to ensure the interoperability of deep-ocean measurements and coordination of deployment opportunities
- **Recommendation:** ICG/PTWS WG2 continue during inter-sessional period and meet prior to next ICG/PTWS to ensure coordination and ongoing focus on Pacific Ocean issues by members in the region.

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