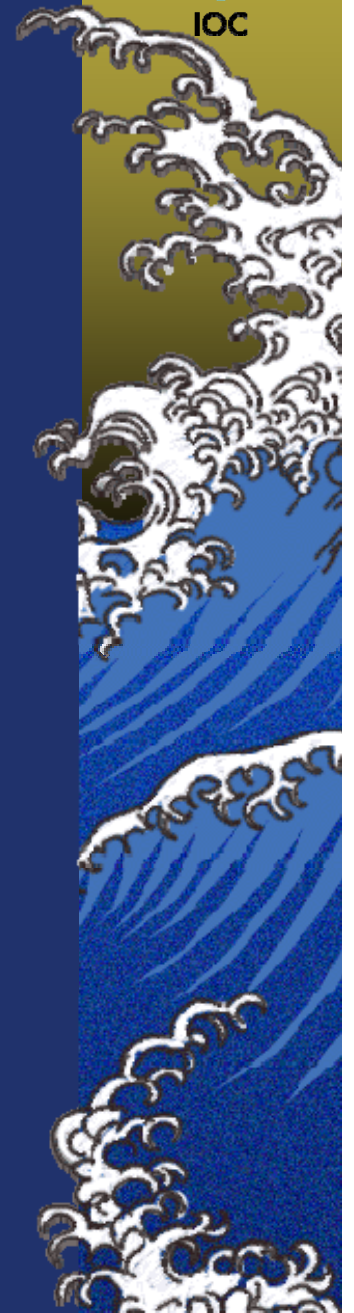




Building the Indian Ocean Tsunami Warning and Mitigation System : Lessons Learnt

ITU/OASIS Workshop on Public Warning
19-20 October 2006, Geneva, Switzerland

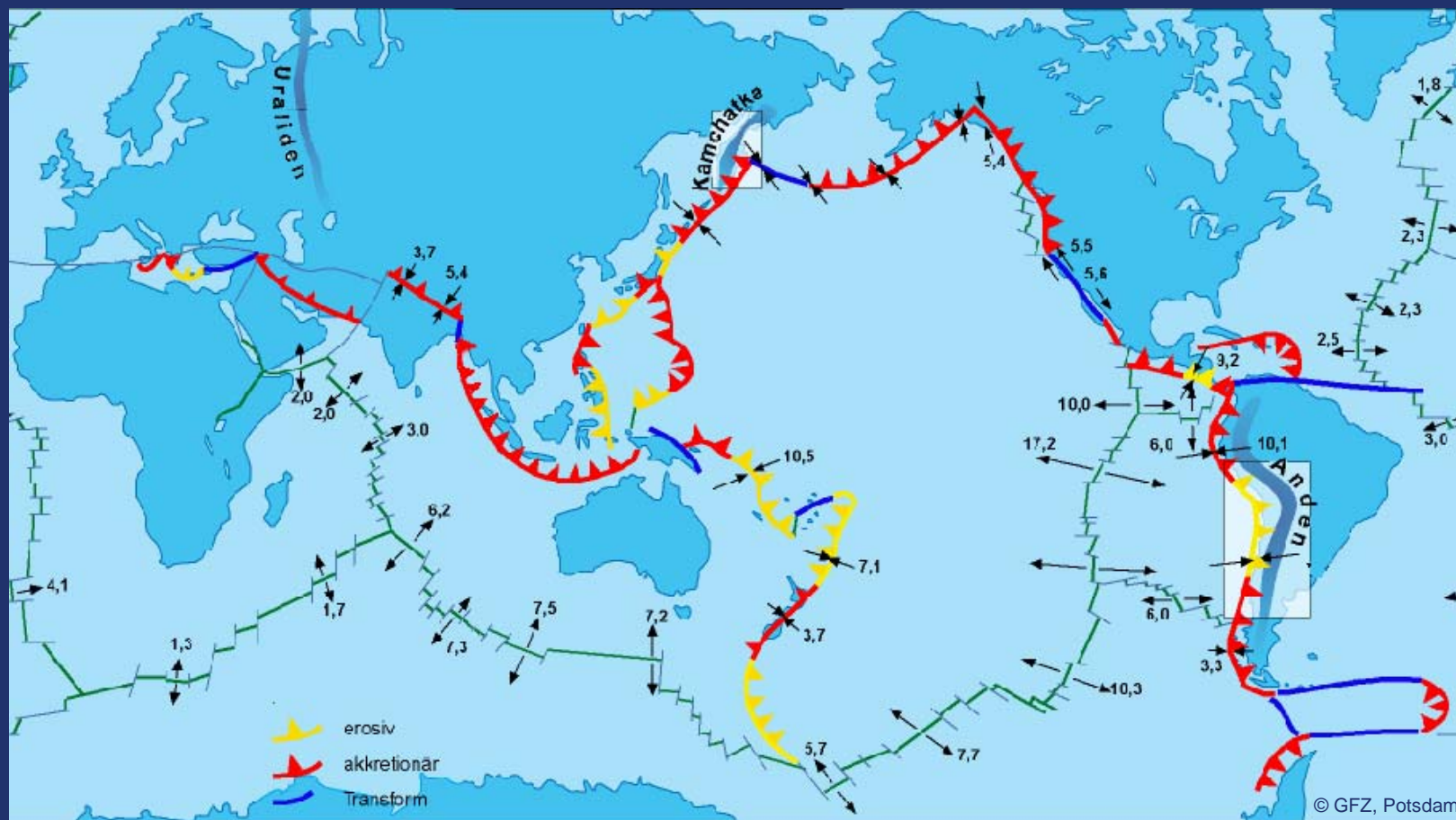
Dr. Peter Koltermann, Head Tsunami Unit IOC, UNESCO



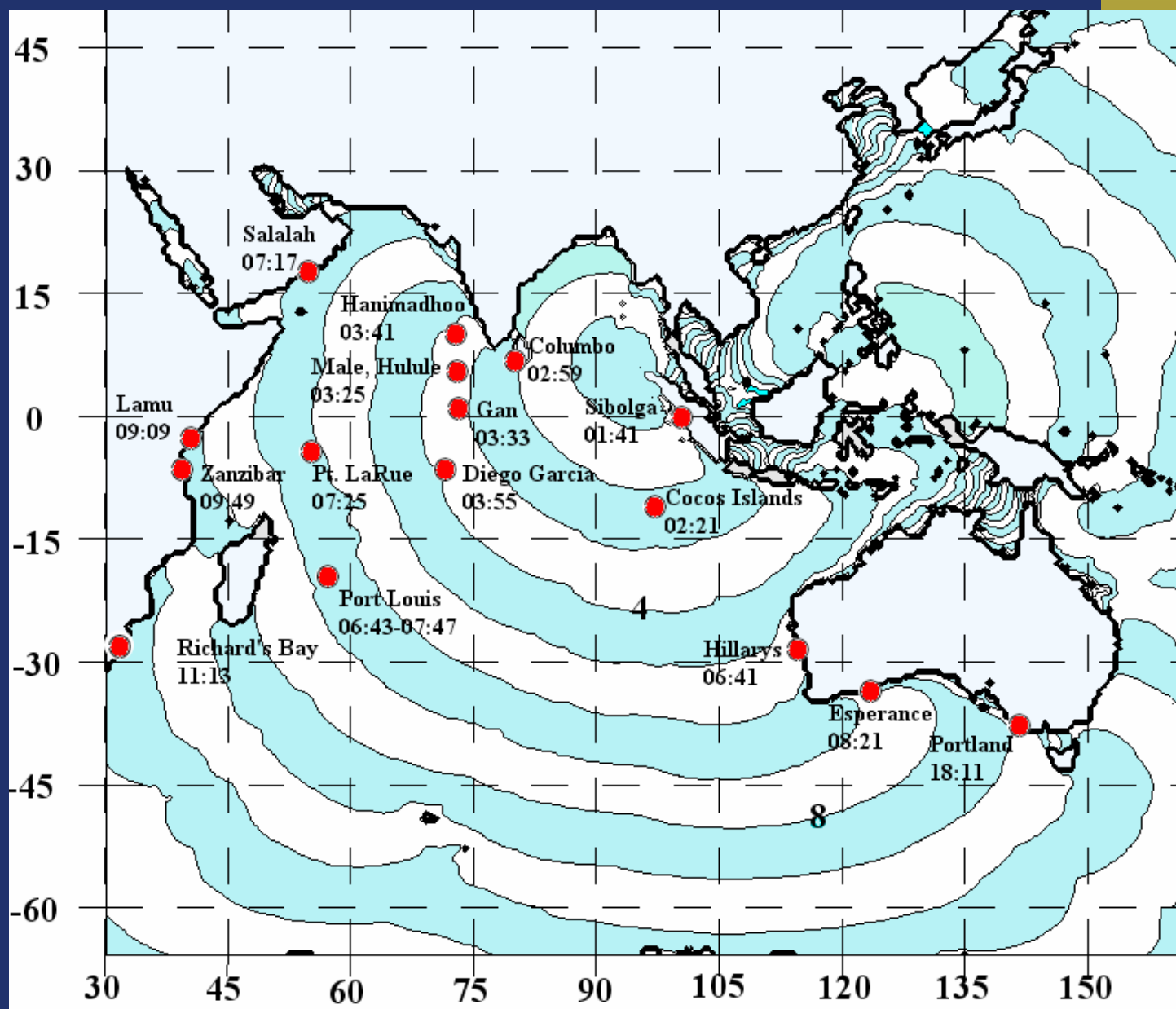
The threat and major source for tsunamis



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© GFZ, Potsdam



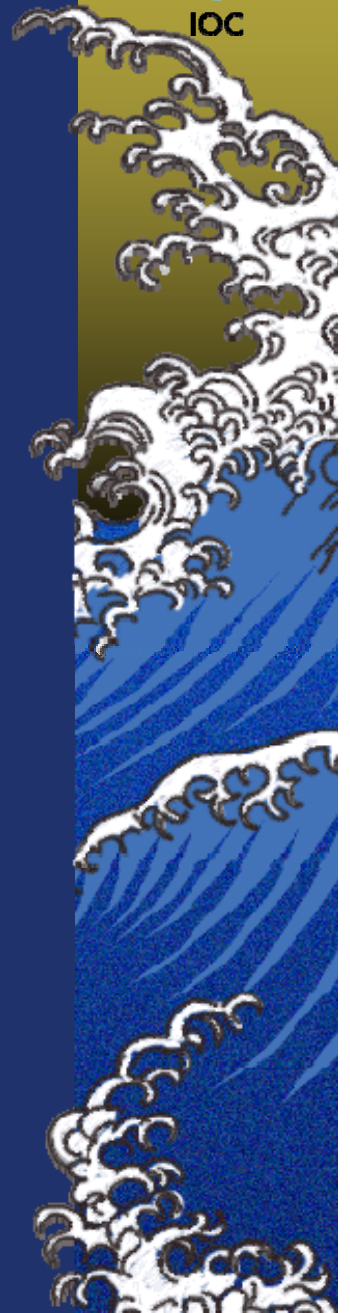


IOC co-ordinates Tsunami Warning Systems globally as an end-to-end system

IOC's mandate is to be there **before** marine disasters strike

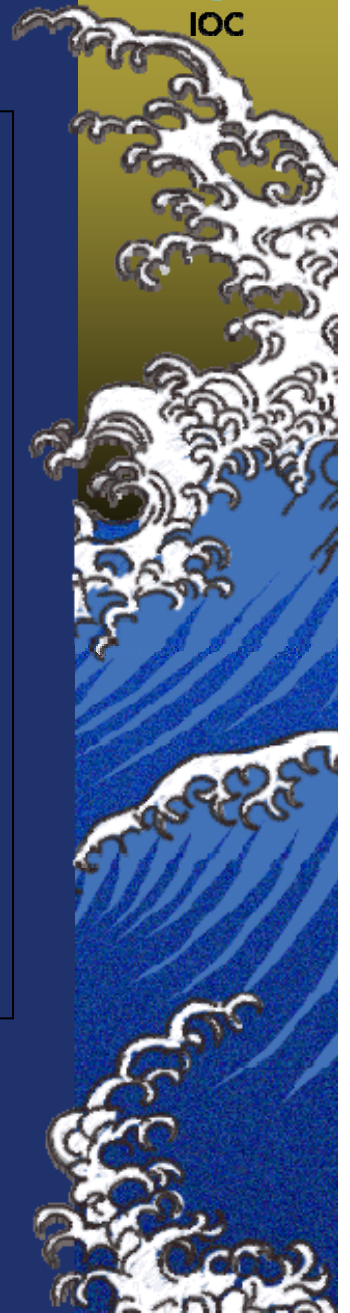
Tsunami Early Warning System

- O upstream
detection, verification, prediction of tsunami wave, dissemination of tsunami information, international, intergovernmental
- O downstream
issue national warnings, initiate national warning command chain, prepare and implement standardized reaction





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★ ***1965: IOC established the ICG/ITSU International Coordination Group for the Tsunami Warning System in the Pacific (TWSP) -> successful & operational Tsunami Warning & Mitigation system***

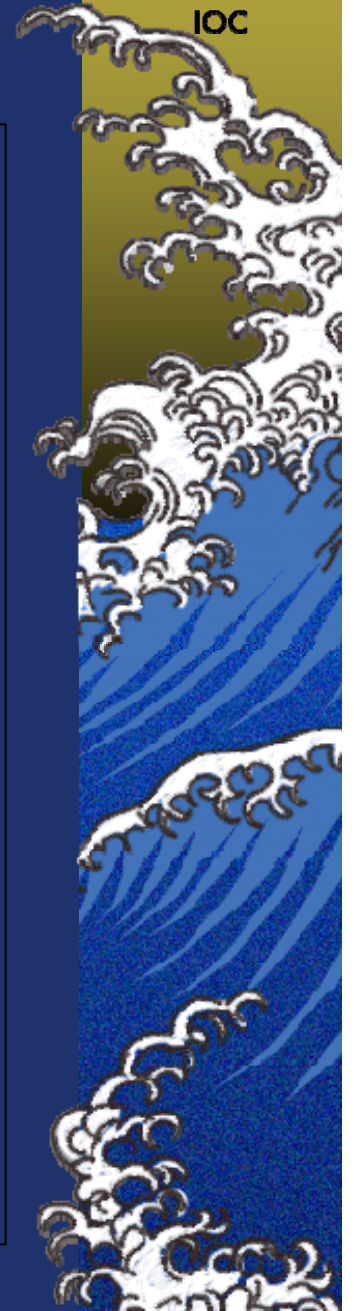
IOC ICG/PTWS



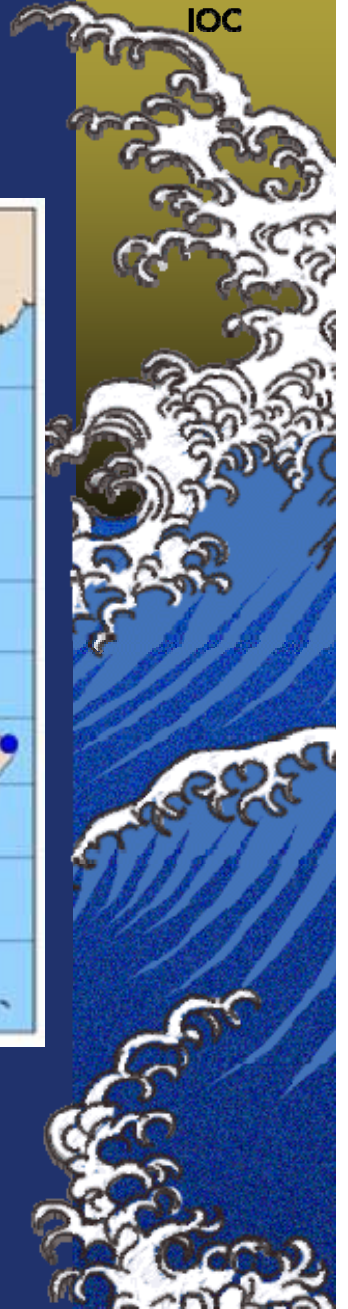
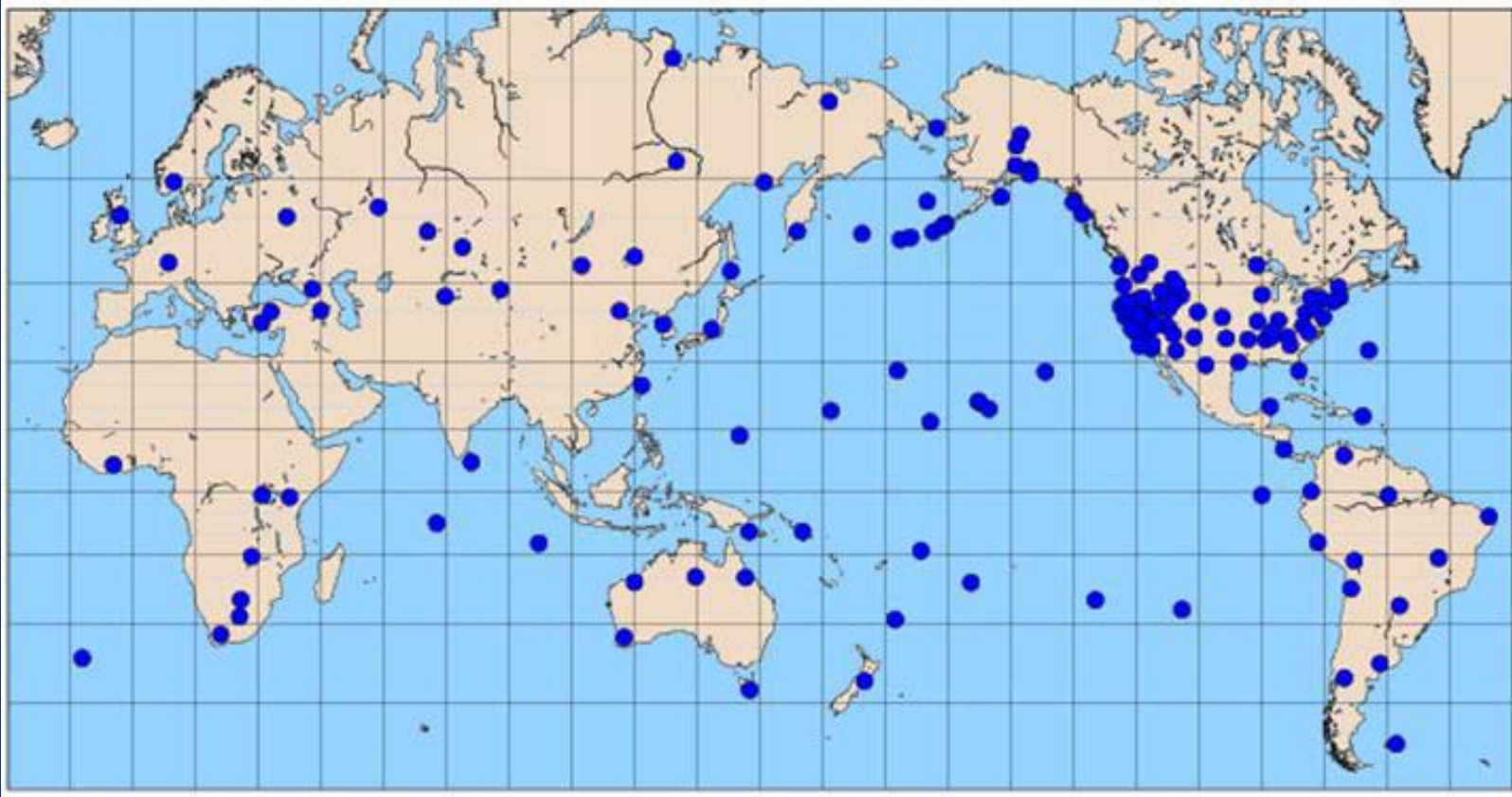
28 member States (2005):

Australia, Canada, Chile, China, Colombia, Cook Islands, Costa Rica, Democratic, People's Republic of Korea, Ecuador, El Salvador, Fiji, France, Guatemala, Indonesia, Japan, Mexico, New Zealand, Nicaragua, Peru, Philippines, Republic of Korea, Russian Federation, Singapore, Thailand, United States, Samoa.

- *Successful Operational Tsunami Warning System > 40 yrs*
- *Successful international scientific program*
- *Pacific Basin monitoring of seismicity and sea levels*
- *Direct humanitarian aim*
- *Mitigate tsunami effects - save lives/property*

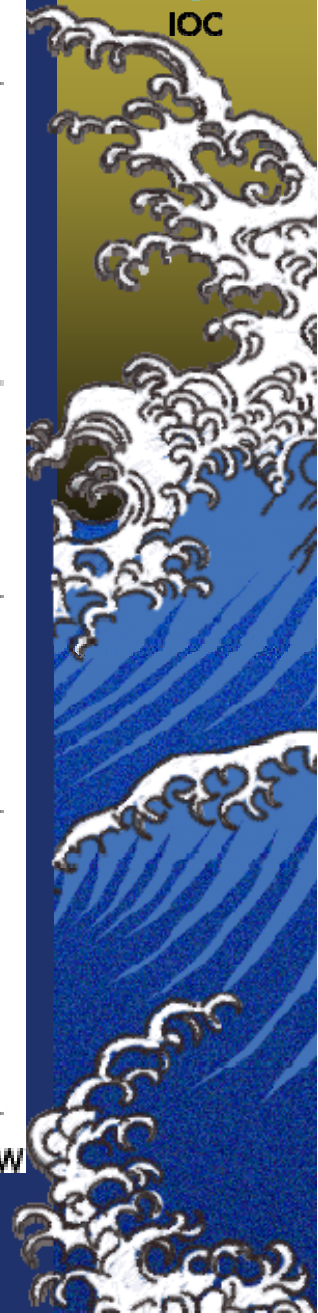
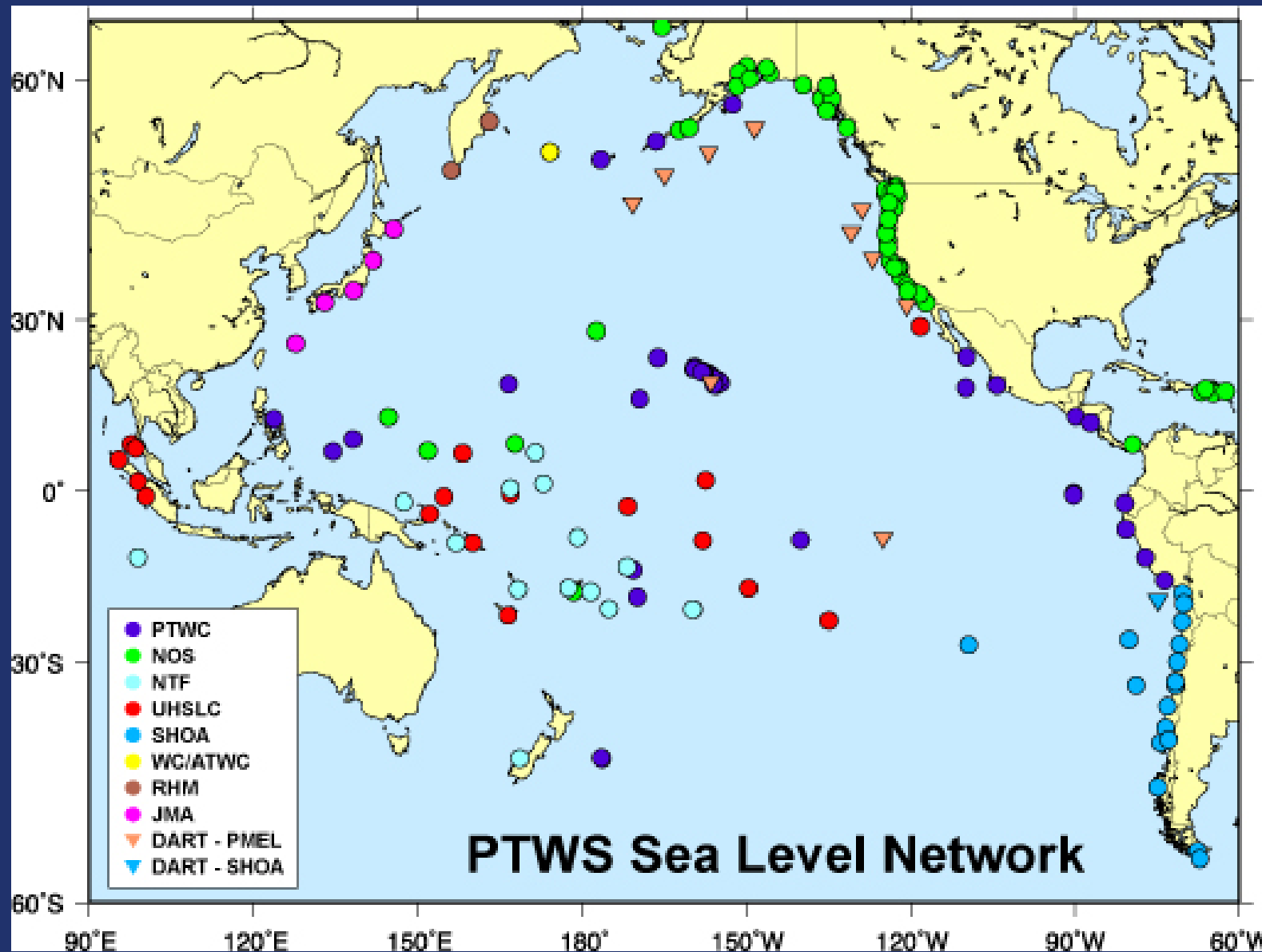


PTWS seismic network





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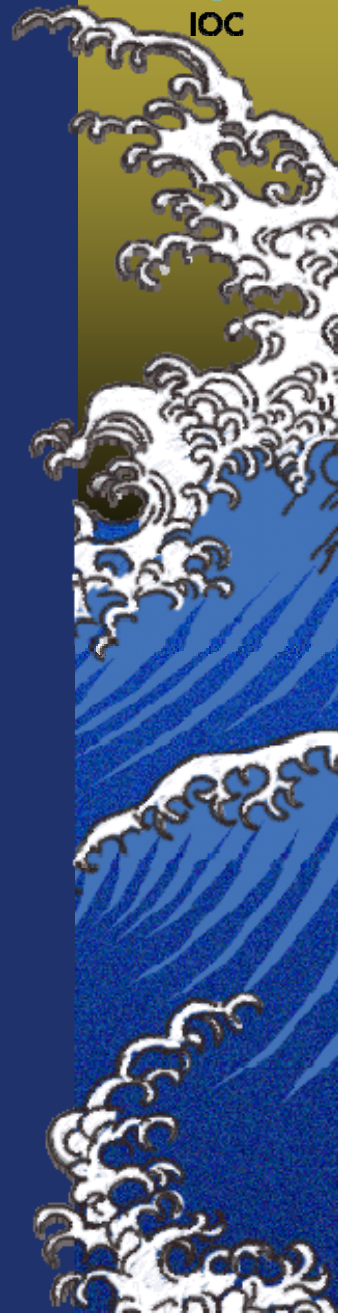




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Establishment of an Indian Ocean Tsunami Warning System

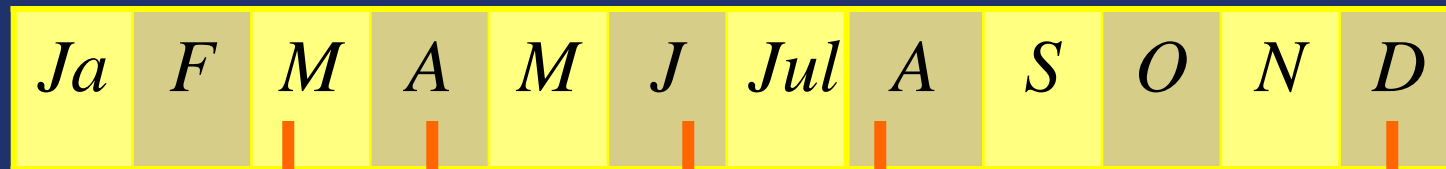
- ▶ *March & April 2005: In the aftermath of greatest tsunami in recorded history on Dec 26th 2004, IOC held two International Coordination meetings on the development of an IOTWS in Paris and Mauritius*





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Time schedule and milestones in 2005



Implementation Interim System IOC-JMA-PTWC

18-20 National Assessment Missions
IOC/ISDR/WMO/ADRC/JMA/UNESCAP

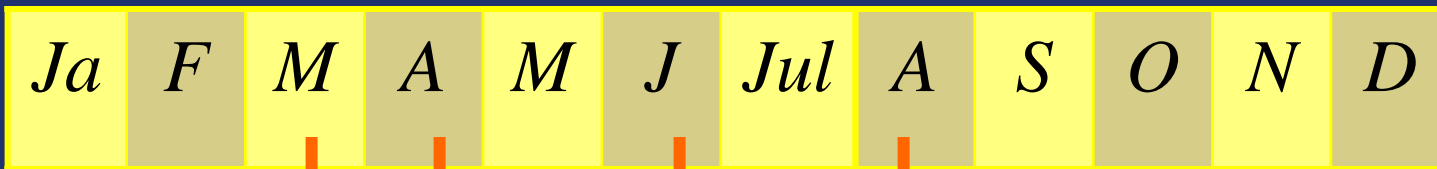
Sea level stations being deployed

- March 3-8: UNESCO/IOC 1st Regional Technical Coordination Meeting, Paris
- April 14-16: UNESCO/IOC 2nd Regional Coordination Meeting, Mauritius
- June 21: IOC General Assembly, Paris: Formal establishment of ICG/IOTWS
- August 3-5: ICG/IOTWS-I, Perth: focus on technical aspects
- December 14-16: ICG/IOTWS-II, Hyderabad: recommendations & commitments



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Time schedule and milestones for 2006



Initial IOTWS established



Core Regional System build up



IOTWS Implementation Plan



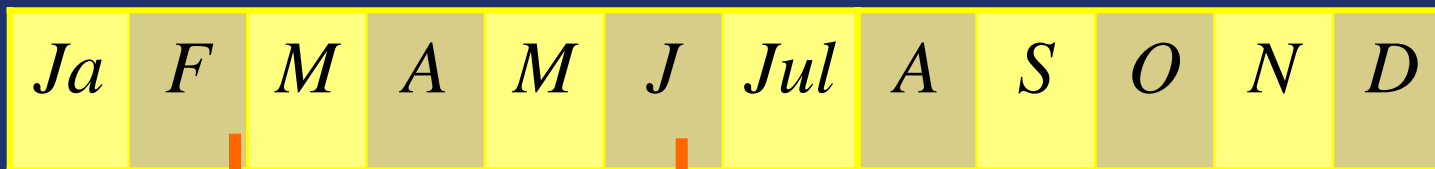
Focus on National Plans

- March 27: IOTWS Roundtable, in the margin of EWC-III, Bonn, Germany
- April 22-24: WMO meeting on Multi-hazard, Geneva, Switzerland
- June 21-29: IOC Executive Council: Report to Member States on ICG/IOTWS
- July 31-August 2: ICG/IOTWS-III, Bali: IOTWS Implementation Plan adopted



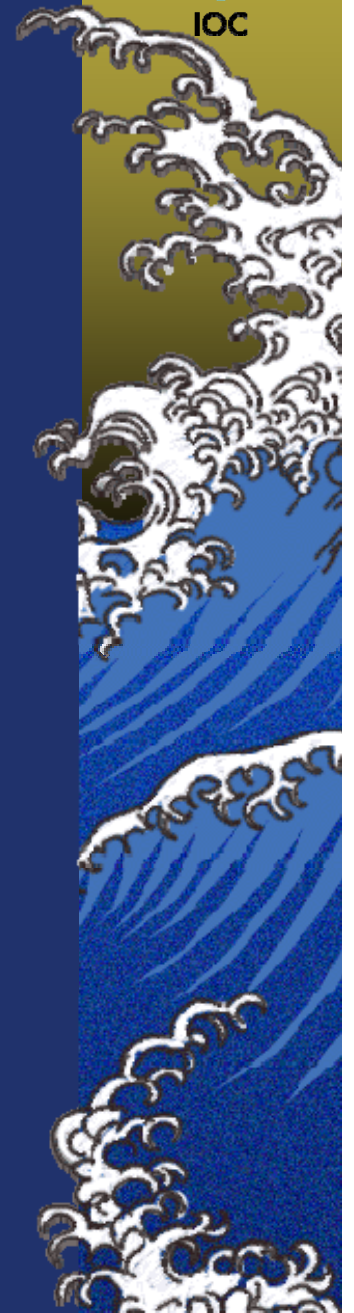
IOC

Time schedule and milestones for 2007



Continued focus on implementing national plans

- End of February : ICG/IOTWS-IV in Kenya
- June : IOC General Assembly: Report to IOC Member States on the progress of the establishment of an IOTWS



Since July 2006 an Initial IOTWSystem is in place

Based on Existing:

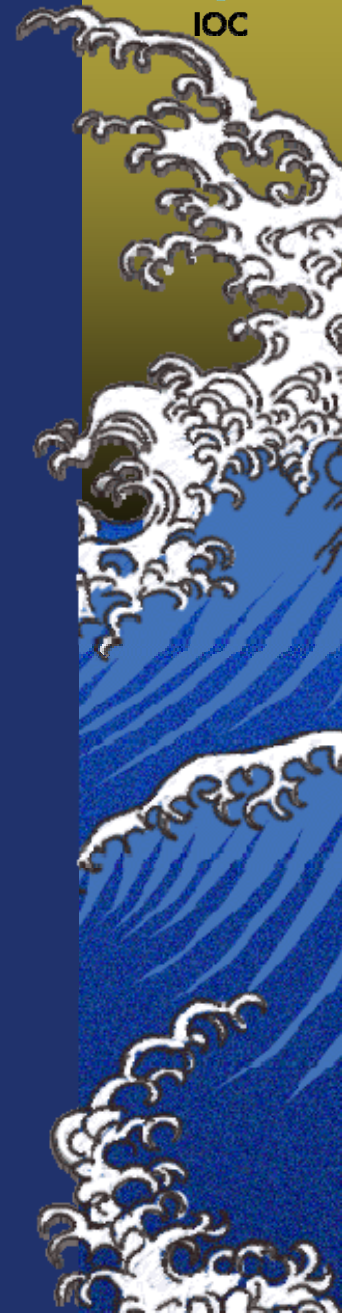
- 26(29) National 24x7 Information Centres slowly evolving into a
- Network of Tsunami Warning Centres in charge of National Plans

Need to improve Regional Instrumental Networks:

- Improved Seismographic network (faster and more accurate) detection of earthquakes
- Real-time (1-5min transmission interval) network of sea-level stations near tsunami source zones



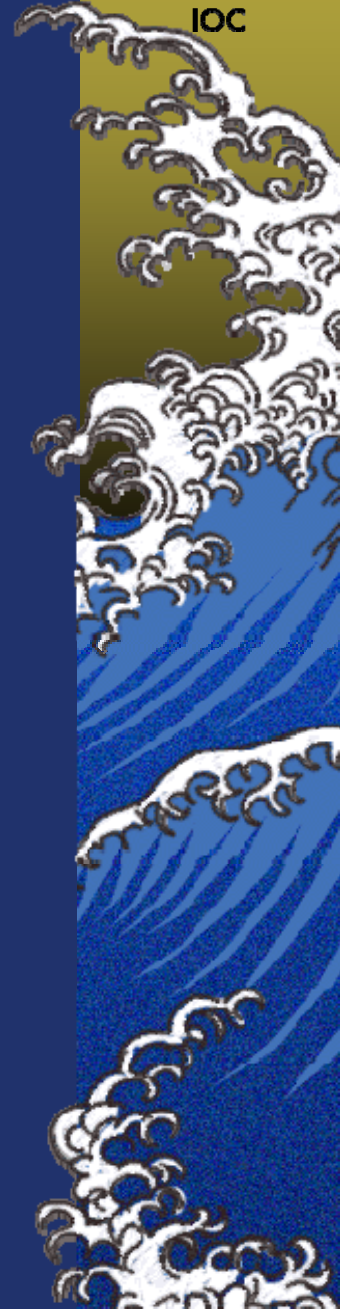
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System Constraints



- ▶ *Culturally very heterogeneous regions*
 - ▶ *Language, custom, attitude*
 - ▶ *Language dominance*
 - ▶ *Solutions imposed*
 - ▶ *Stakeholders involvement entitles to a*
 - ▶ *Bottom-up approach*





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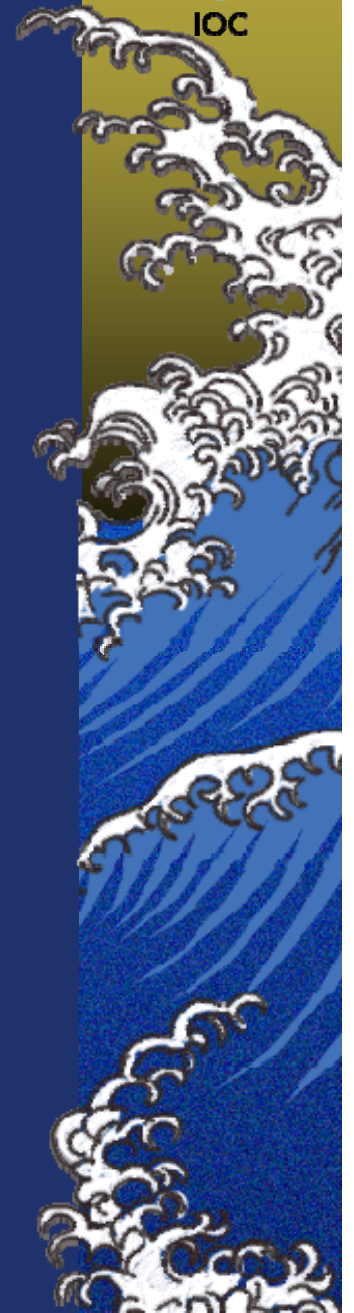
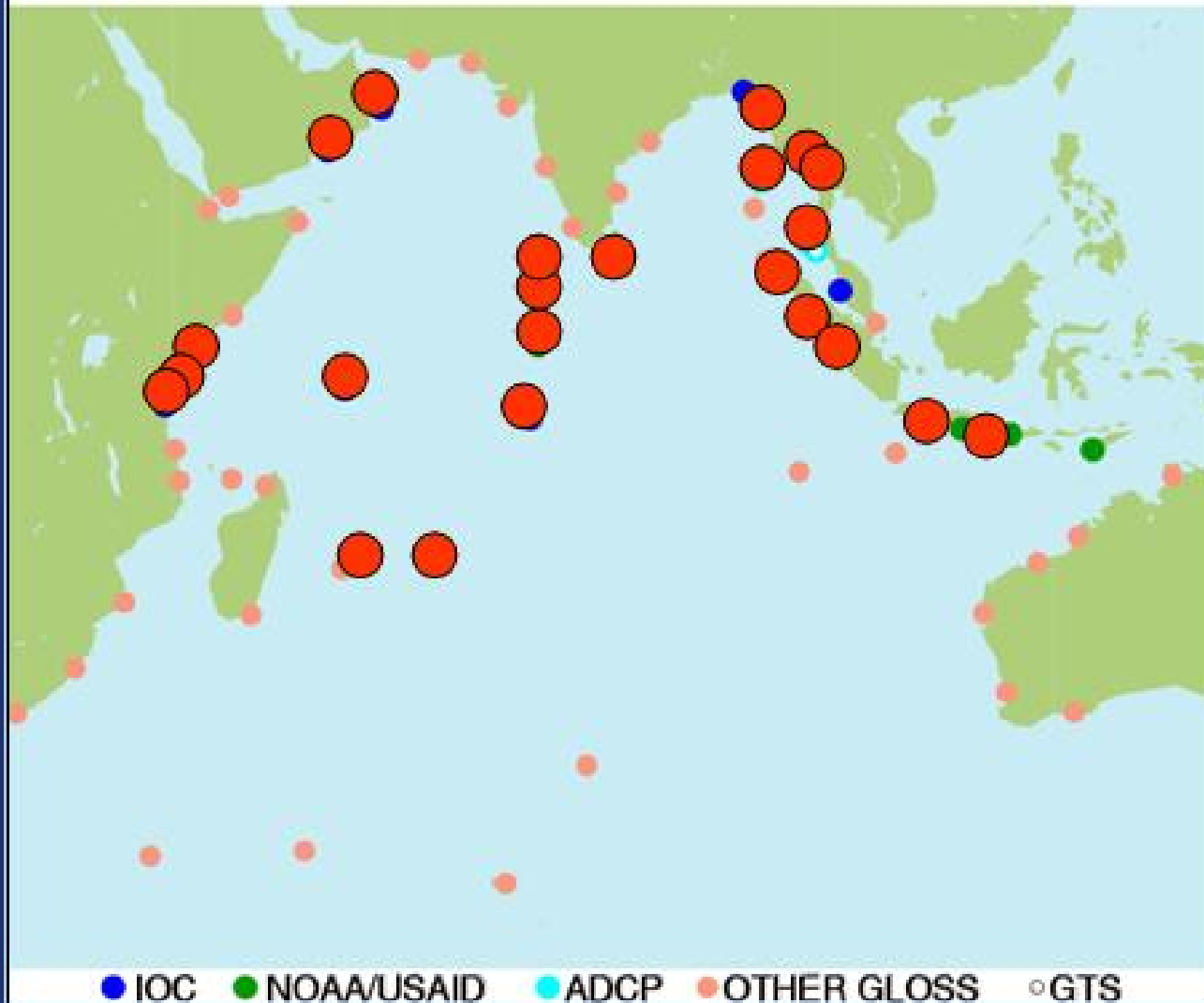


28 new real time sea level stations



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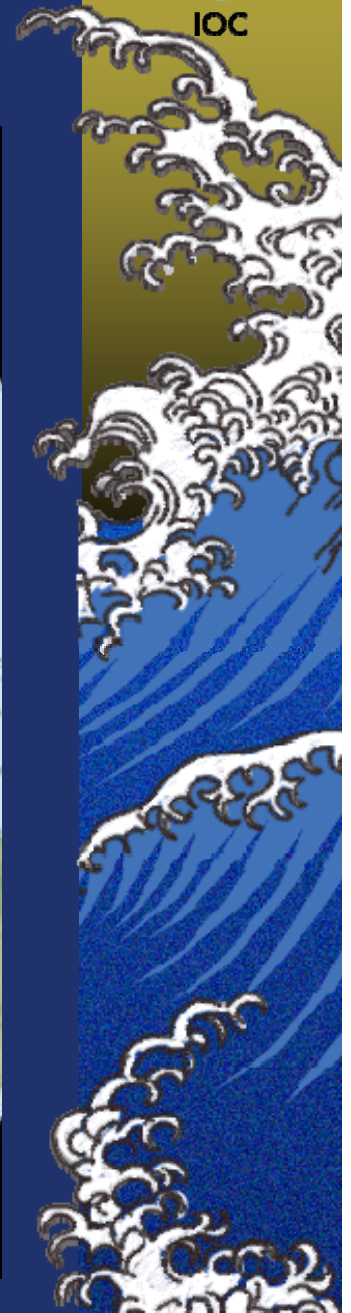
UHSLC IOTWS real-time sea level station status (upgrade & installation)



Agreed upgrade of the Seismographic network

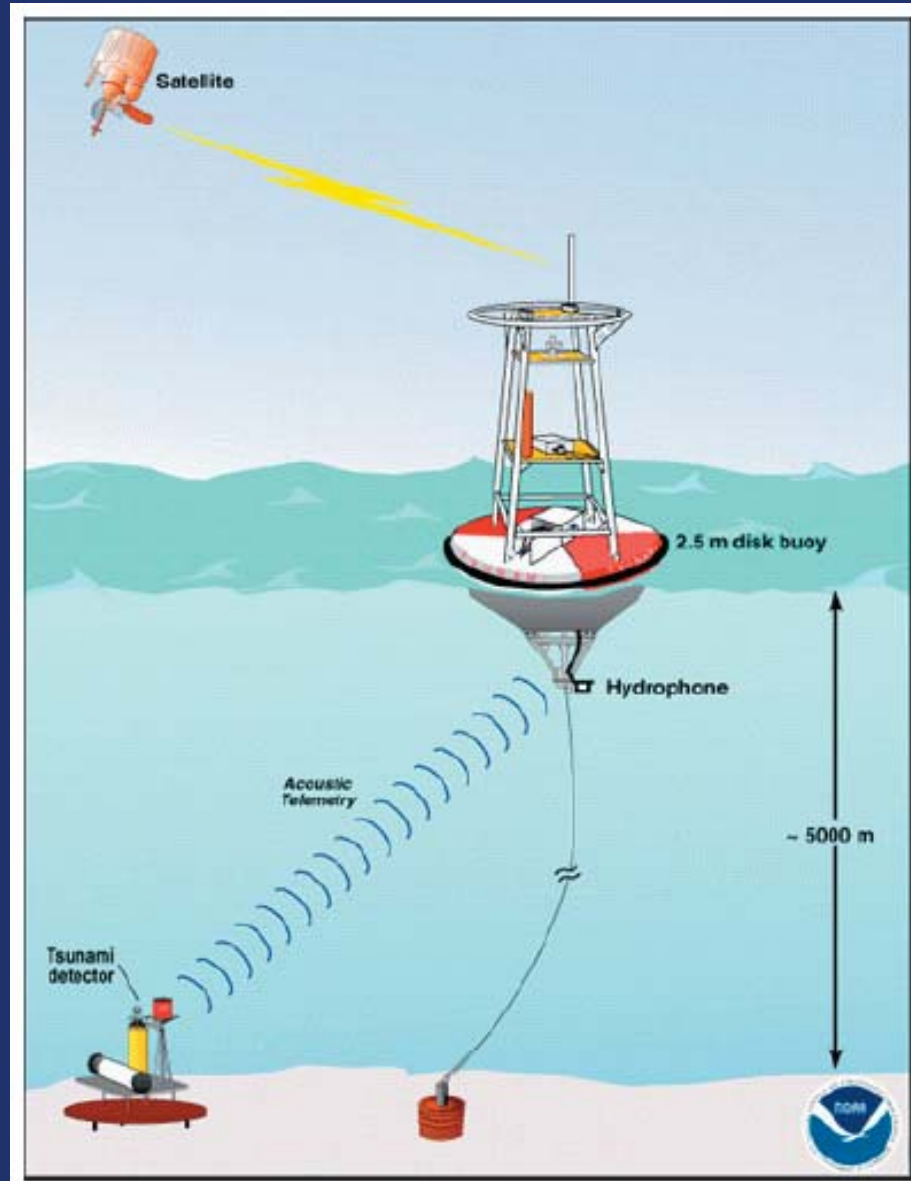


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IOC ICG/ITSU





3 DART-like systems
deployed



**Assessment of Capacity Building
Requirements
for an Effective and Durable
Tsunami Warning and Mitigation System
in the Indian Ocean**



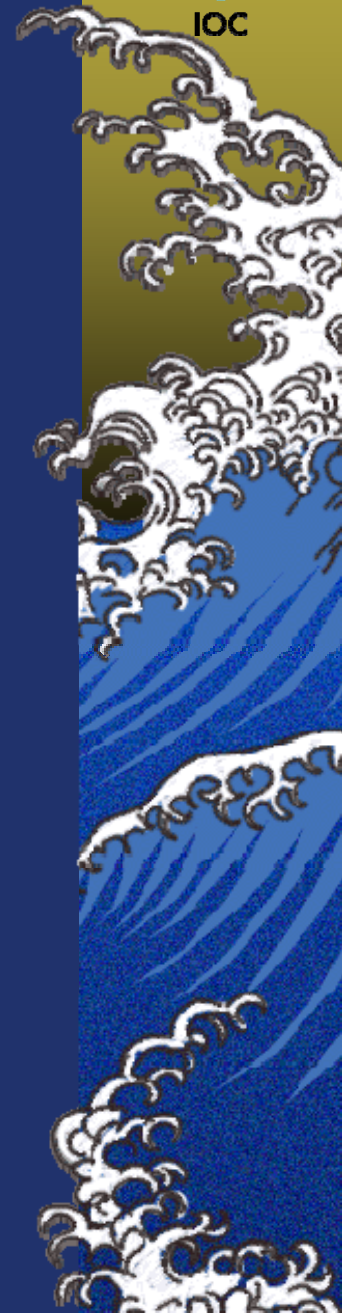
**Consolidated Report
for Countries Affected by the
26 December 2004 Tsunami**

IOC/INF-1219

UNESCO



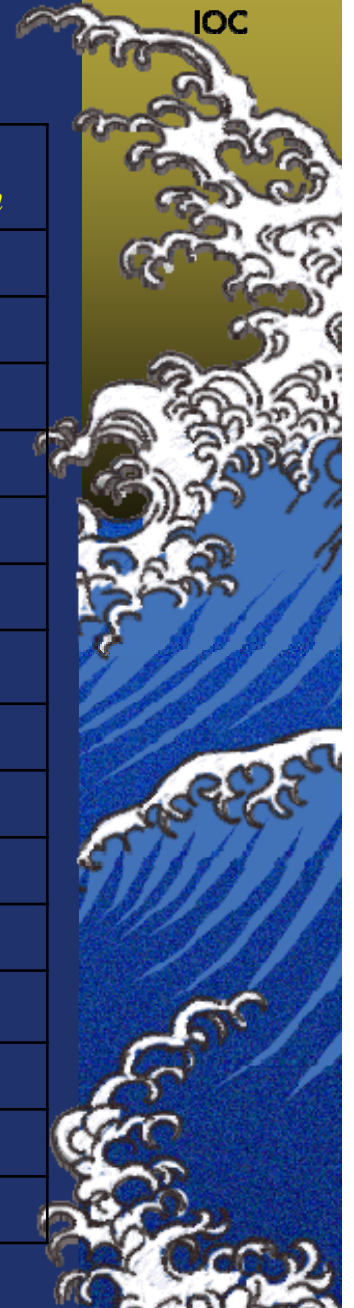
IOC



IOTWS: National Assessment and Plans



	<i>Nat.Asses</i>	<i>Nat. Plan</i>		<i>Nat.Asses</i>	<i>Nat. Plan</i>
AUSTRALIA	<i>Not required</i>	<i>Available</i>	MYANMAR	<i>Done</i>	<i>Required</i>
BANGLADESH	<i>Done</i>	<i>Required</i>	OMAN	<i>Done</i>	<i>Required</i>
COMORES	<i>Done</i>	<i>Required</i>	PAKISTAN	<i>Done</i>	<i>Required</i>
DJIBOUTI	2006	<i>Required</i>	SEYCHELLES	<i>Done</i>	<i>Required</i>
FRANCE	<i>Not required</i>	<i>Available</i>	SINGAPORE	<i>Not required</i>	<i>Available</i>
INDIA	<i>Not required</i>	<i>Available</i>	SOMALIA	<i>Done</i>	<i>Required</i>
INDONESIA	<i>Done</i>	<i>Available</i>	S. AFRICA	2006	<i>Required</i>
IRAN	<i>Done</i>	<i>Required</i>	SRI LANKA	<i>Done</i>	<i>Required</i>
KENYA	<i>Done</i>	<i>Required</i>	TANZANIA	<i>Done</i>	<i>Required</i>
MADAGASCAR	<i>Done</i>	<i>Required</i>	THAILAND	<i>Done</i>	<i>Required</i>
MALAYSIA	<i>Done</i>	<i>Available</i>	TIMOR (EAST)	2006	<i>Required</i>
MALDIVES	2006	<i>Required</i>	UAE	<i>Not requested</i>	
MAURITIUS	<i>Done</i>	<i>Required</i>	UK	<i>Not required</i>	
MOZAMBIQUE	<i>Done</i>	<i>Required</i>	YEMEN	<i>Done</i>	<i>Required</i>





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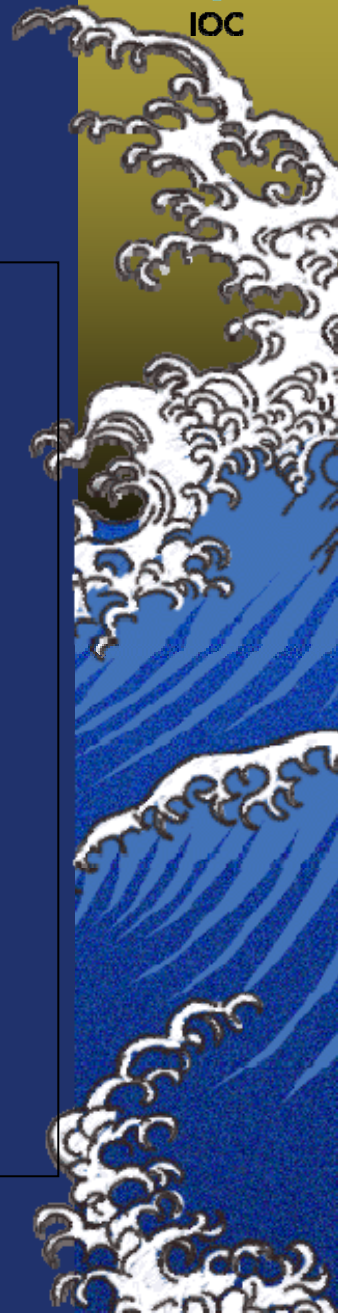




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The Challenge

- ▶ *We essentially know what is needed at the country level in 18 countries while this work will be completed in 2006 for the rest*
- ▶ *The ICG requested a comprehensive action plan as a living document, harmonized with the country level*
- ▶ *There is a need to assist with the development of National Plans*

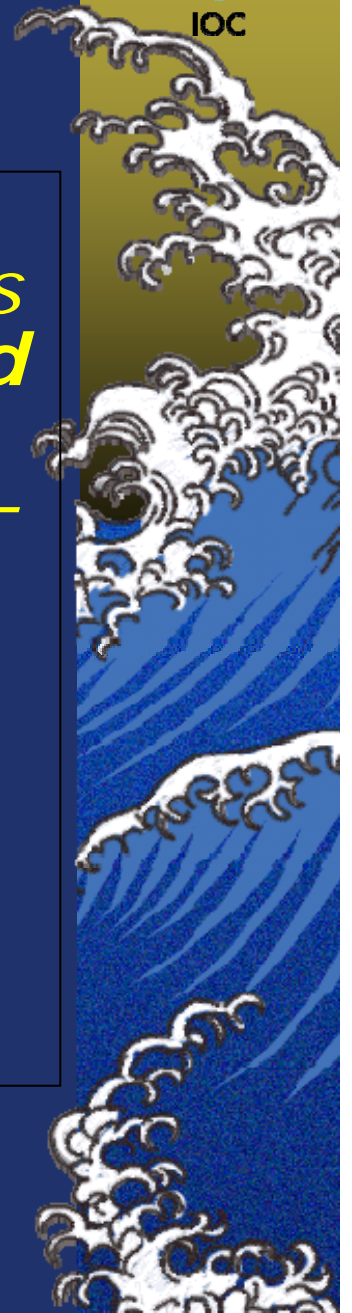




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▲ *June 21-30, 2005: the 23rd IOC General Assembly decided resolutions on the establishment of **a global and three regional** Intergovernmental Coordination Groups on TEWS (XXIII-12 to XXXIII-15) for*

- ***the Indian Ocean (ICG/IOTWS)***
- ***the Caribbean (ICG/CARTWS)***
- ***the NE Atlantic and Med (ICG/NEAMTWS)***



Three more regions to coordinate



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Oceans



Intergovernmental Coordination Group meetings



- ★ *03-05 Aug 2005: ICG/IOTWS-I, Perth*
 - ★ *21-22 Nov 2005: ICG/NEAMTWS-I, Rome*
 - ★ *14-16 Dec 2005: ICG/IOTWS-II, Hyderabad*
 - ★ *10-12 Jan 2006: ICG/CARTWS-I, Barbados*
 - ★ *May 2006: ICG/ITSU-XXI, Melbourne*
 - ★ *May 2006: ICG/NEAMTWS-II, Nice*
 - ★ *August 2006: ICG/IOTWS-III, Bali*
- and to come:*
- ★ *Jan 2007: ICG/CARTWS-II, Venezuela*
 - ★ *Feb 2007: ICG/NEAMTWS-III, Bonn*
 - ★ *Feb 2007: ICG/IOTWS-IV, Kenya*





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System Tests

Tonga Earthquake 3 May 2006:

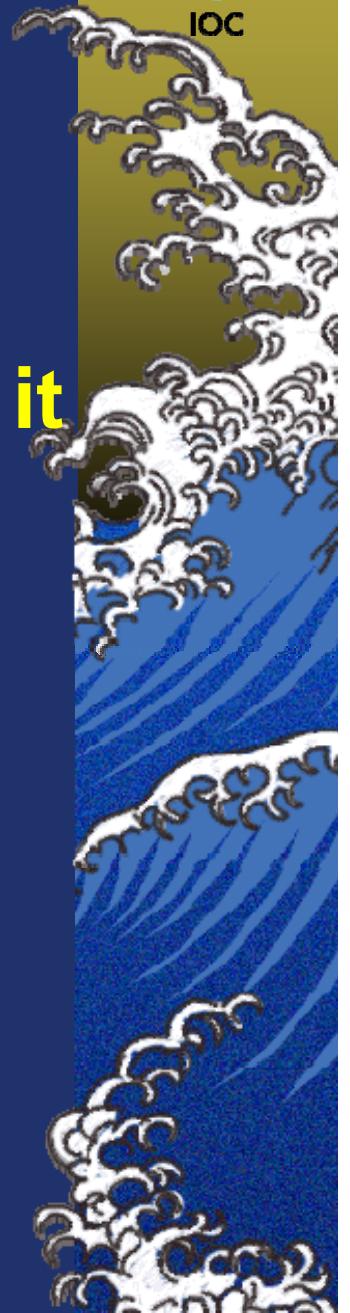
- Tsunami advisory, media turned it into warning

Merapi Vulcano 2006:

- SMS clogged satellites after 92 secs

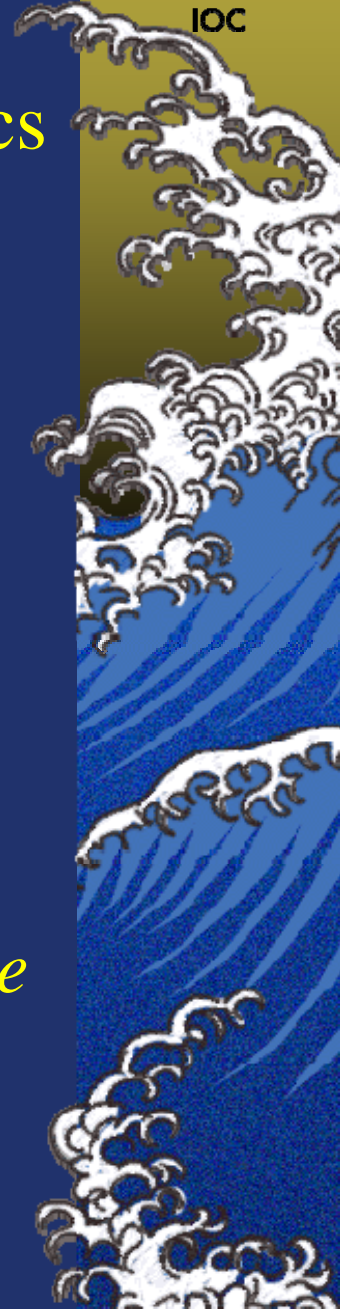
Java Tsunami 17 July 2006:

- Downstream path delayed



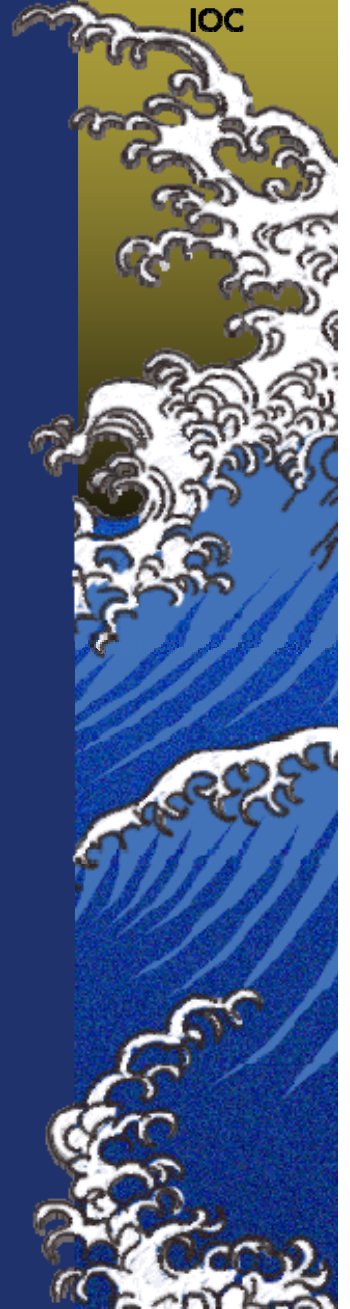
Tsunami Early Warning System Characteristics

- ▶ ***O** upstream*
 - ▶ *hi-tech instrumentation, high speed +*
 - ▶ *high quantity data links*
 - ▶ *targeted dissemination*
 - ▶ *few trained people, existing standards*
- ▶ ***O** downstream*
 - ▶ *low/no tech, broad dissemination*
 - ▶ *→ recipients are untrained common people*
 - ▶ *“the guy at the beach”*





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Needs

UPSTREAM

- **TRAINING, TRAINING**
- **Robust, standardized data streams**
- **redundence of sensors + power**
- **power independent**
- **accepted data policy**

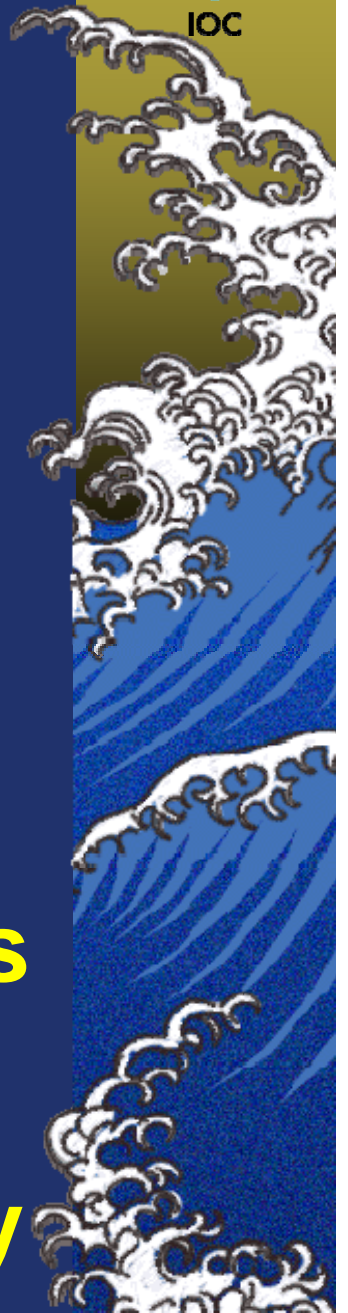


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Needs

DOWNSTREAM

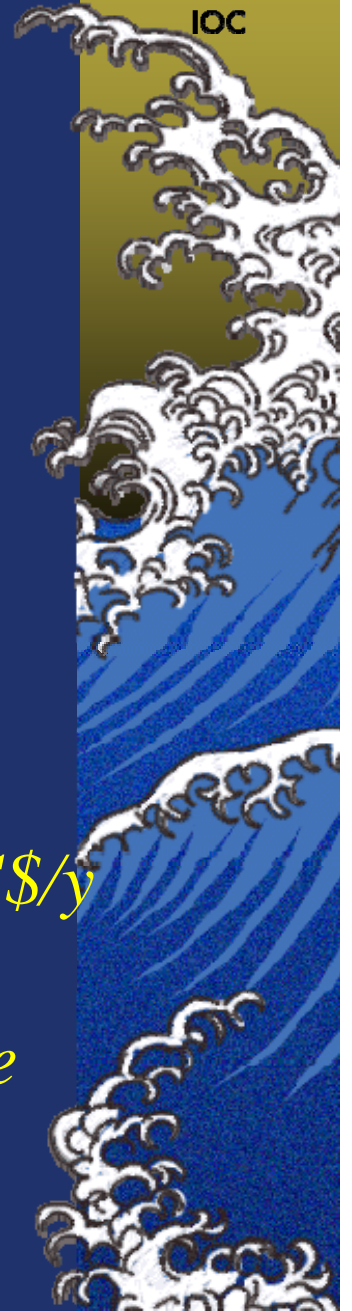
- TRAINING, TRAINING
- simple robust, technology
- power independent
- standardized simple contents
- non oral communication
- standardized simple glossary



Conclusions

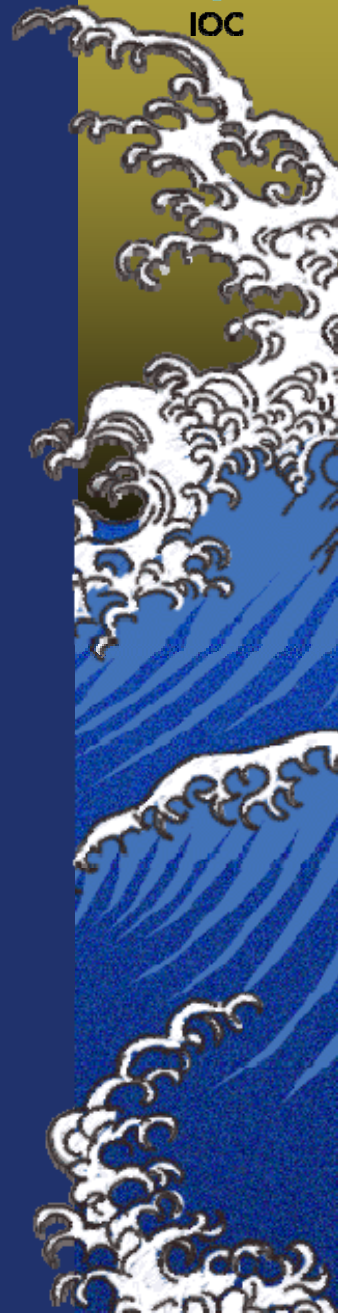


- ▶ *O standardization of means and contents*
- ▶ *O keep it simple, get it cheaper*
- ▶ *O get sustained funding*
- ▶ *O don't overload the people involved*
- ▶ *O training at a levels, again and again*
- ▶ *O upstream:*
 - ▶ *clear responsibilities, instant reaction*
 - ▶ *- 90 s off warning interval cost extra 7 MUS\$/y*
- ▶ *O downstream:*
 - ▶ *low tech, simple message, trained response*





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A perfect warning will be useless if people do not know what to do in case of an emergency

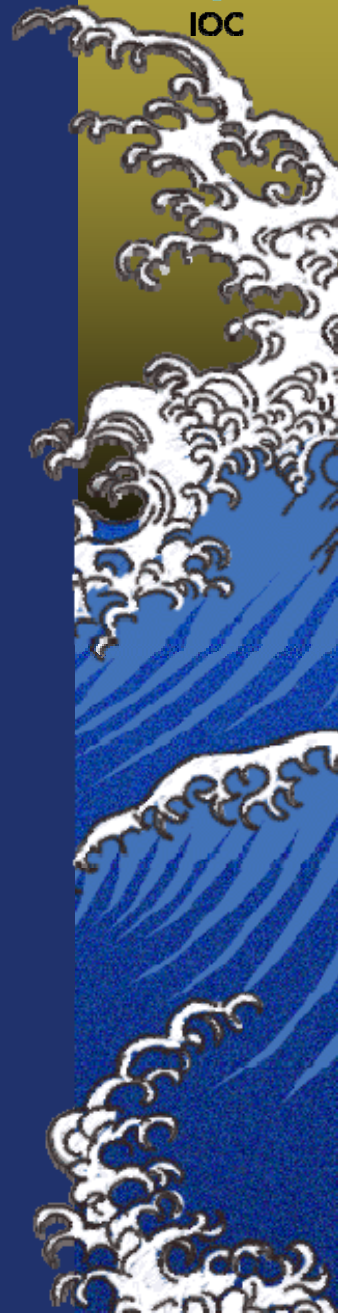
Awareness and preparedness at the country level is essential



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Beyond immediate response: **Multi-Hazard Platforms**

- ▶ *Storm – surges (IOC, WMO, JCOMM)*
- ▶ *Tropical storms (WMO, JCOMM)*
- ▶ *Improving Storm and cyclones track forecasts (IOC, WMO, JCOMM)*
- ▶ *Ice Hazard (IOC, WMO, JCOMM)*
- ▶ *Oil Spills (IOC, WMO, UNEP)*





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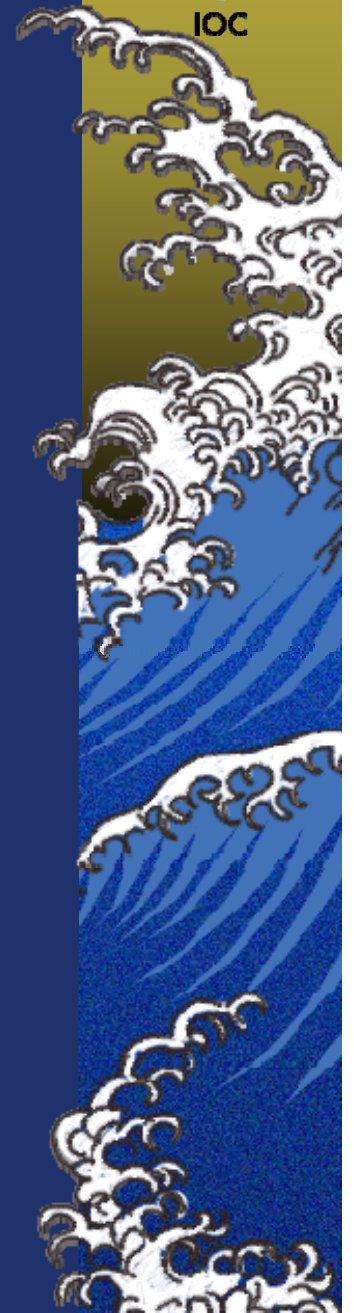
For further information see:

<http://ioc3.unesco.org/ptws>

<http://ioc3.unesco.org/icg-iii>

<http://ioc3.unesco.org/neamtws>

<http://ioc3.unesco.org/cartws>





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- ★ *Thank you*
- ★ *for your interest and attention !*

- ★ *And please keep this topic simple,*
- ★ *it is and always be operational*

