



World Meteorological Organization

Working together in weather, climate and water

**WMO**

**Tropical Cyclone**

**Early Warning System**

**Koji Kuroiwa**

**Tropical Cyclone Programme**  
**World Meteorological Organization**

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*The 2nd Expert Group Meeting on the Great East Japan Earthquake, December 2011, Tokyo*



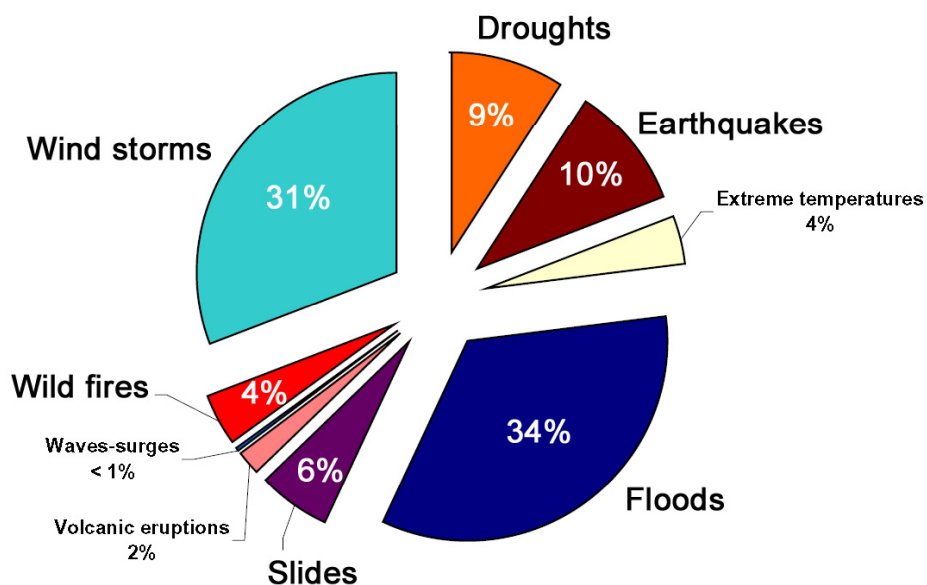
# Outline of the Presentation

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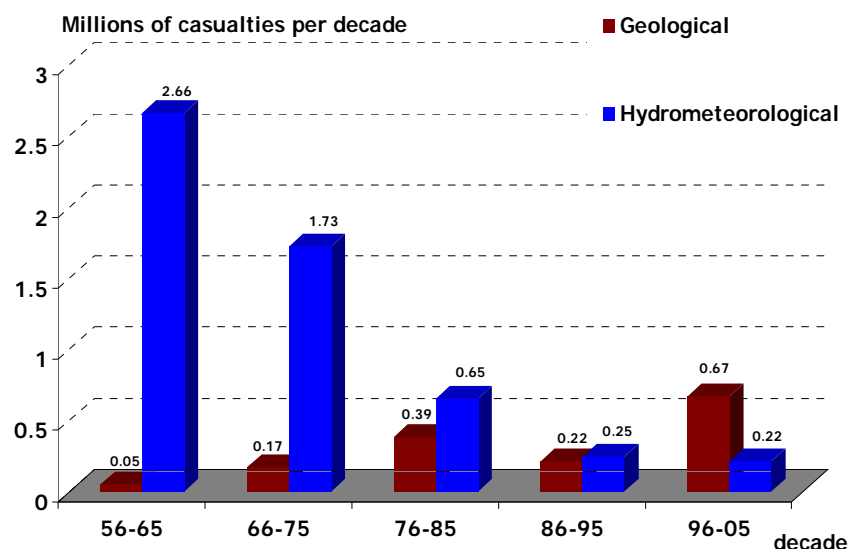
- **Overview of the WMO Tropical Cyclone Programme (TCP) and the Early Warning System**
- **Priority issues to be addressed**
- **New aspect of TCP - multi-hazard approach**



# Statistics of Natural Disasters



**Distribution of natural disaster  
(World; 1974 – 2003)**



**Trends in disaster-related loss of life  
(Five decades)**

(Source: EM-DAT, OFDA/CRED International Disaster Database)



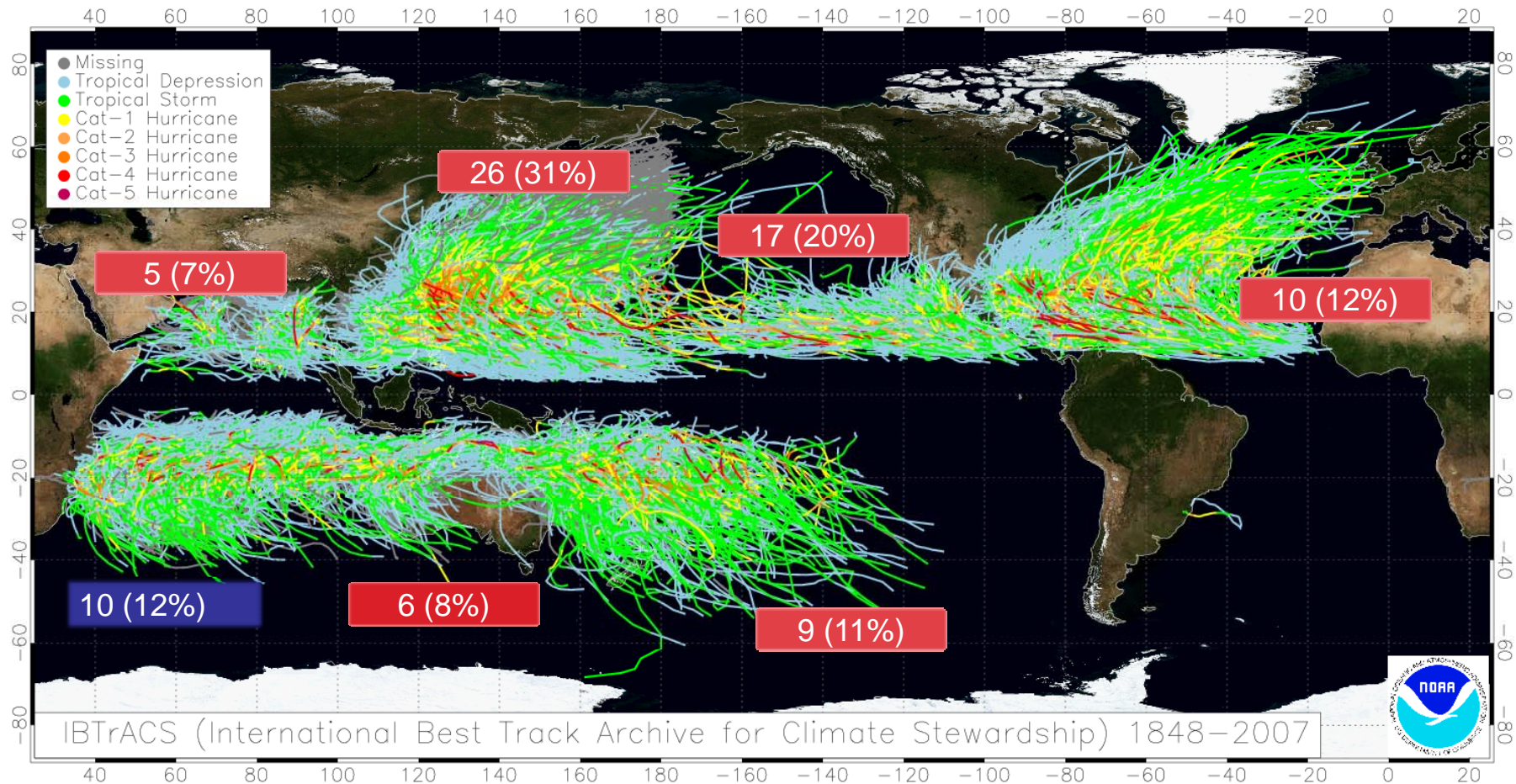
# WMO Tropical Cyclone Programme (TCP)

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- **Tropical Cyclone Programme (TCP)** is a *scientific programme of WMO coordinating regional TC Early Warning Systems and TC Regional Committees. Its origin dates back to 1972.*
  
- **Primary objective** is to *help establish national and regionally coordinated systems to minimize the loss of life and property caused by tropical cyclones.*
  
- **Scope of activity** embraces;
  - *Meteorology*
  - *Hydrology*
  - *Disaster Risk Reduction*



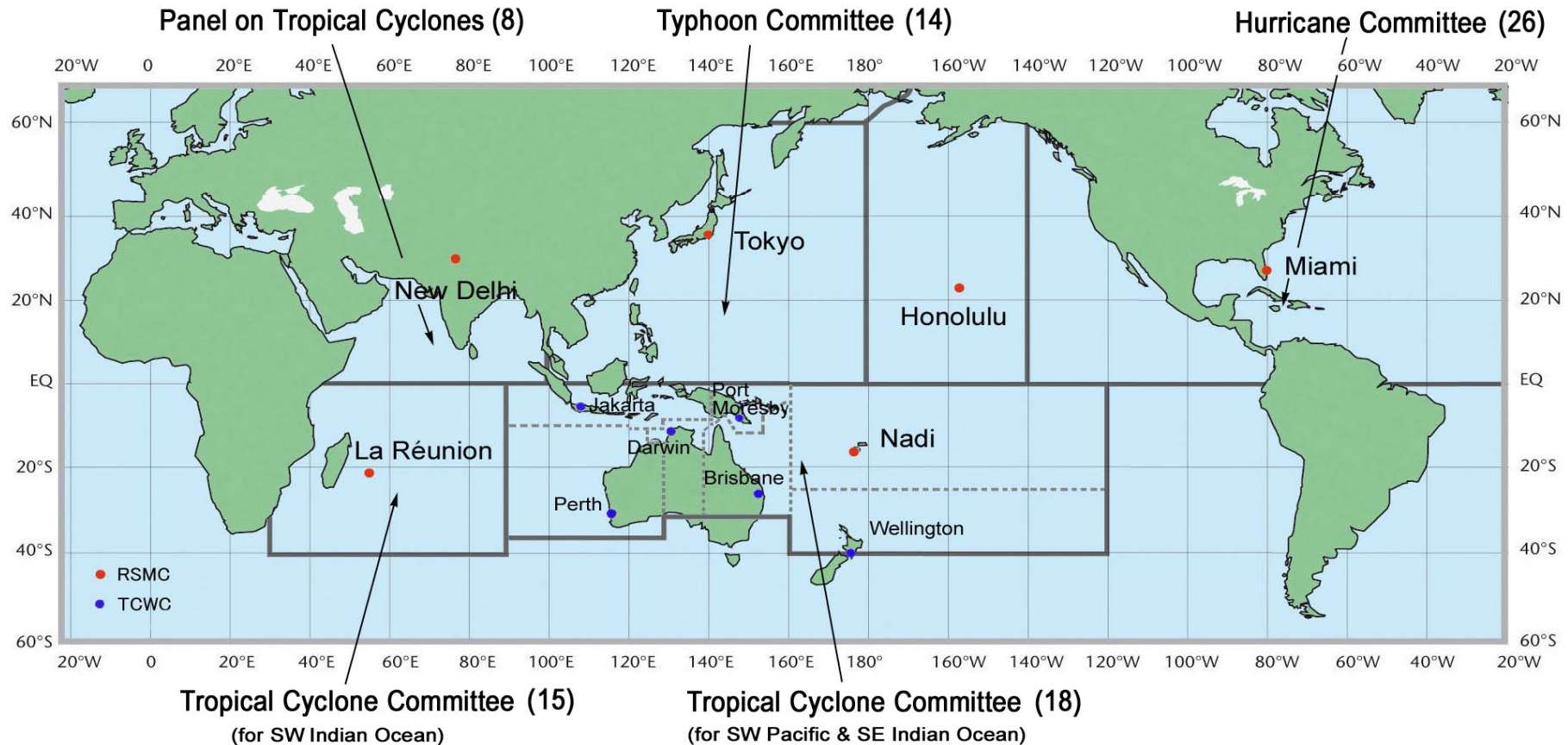
# Global View of Tropical Cyclone Occurrences



Tropical cyclone tracks (1848-2007) and regional TC frequency and its proportion (%) to the global (1968-1990).



# TC Regional Warning Centres and TC Regional Committees



**Regional Specialized Meteorological Centres (RSMCs; red), Tropical Cyclone Warning Centres (TCWCs; blue) and TC Regional Committees (No. of members in bracket)**

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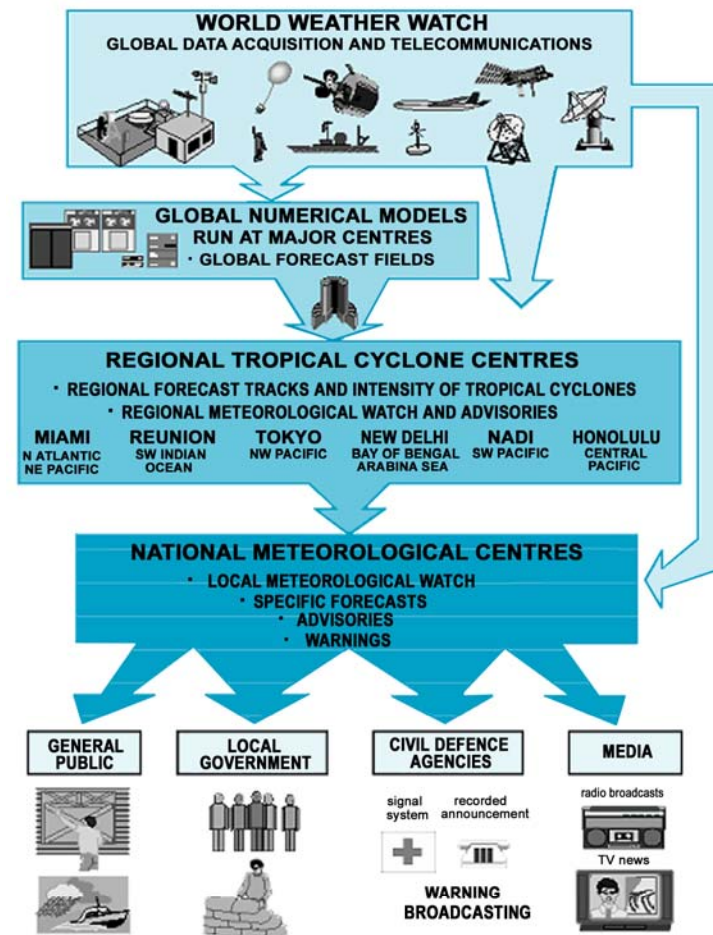


# Tropical Cyclone Warning Service

## Cascading Warning Process

- Data from **Global Observation System** to TC Regional Centres and to Numerical Weather Prediction (NWP) Centres;
- **NWP Centres** to provide NWP products of TC track and intensity forecasts;
- **Regional Centres** to make analyses & forecast and prepare regional advisories for NMCs;
- **NMCs** to issue alerts, advisories and warnings and to liaise with Disaster Management Offices.

## GLOBAL NETWORK OF TROPICAL CYCLONE EARLY WARNING SYSTEM





# Tropical Cyclone Warning Service (cont'd)

- Tropical Cyclone Early Warning System functions 24/7 primarily on a **regional basis** within the framework of TC Regional Committees.
- Rules and procedures are established by the **regional operational plans** maintained by the Committees (led by RSMCs).
- Early Warning Systems are improved as needed through the regional action plans developed by the Committees at their **annual/biennial sessions**.

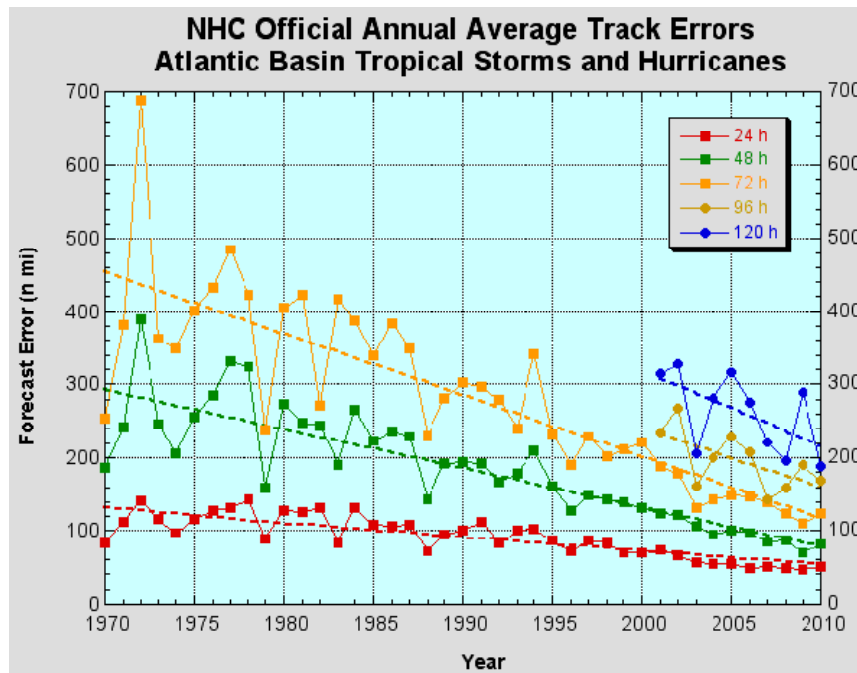






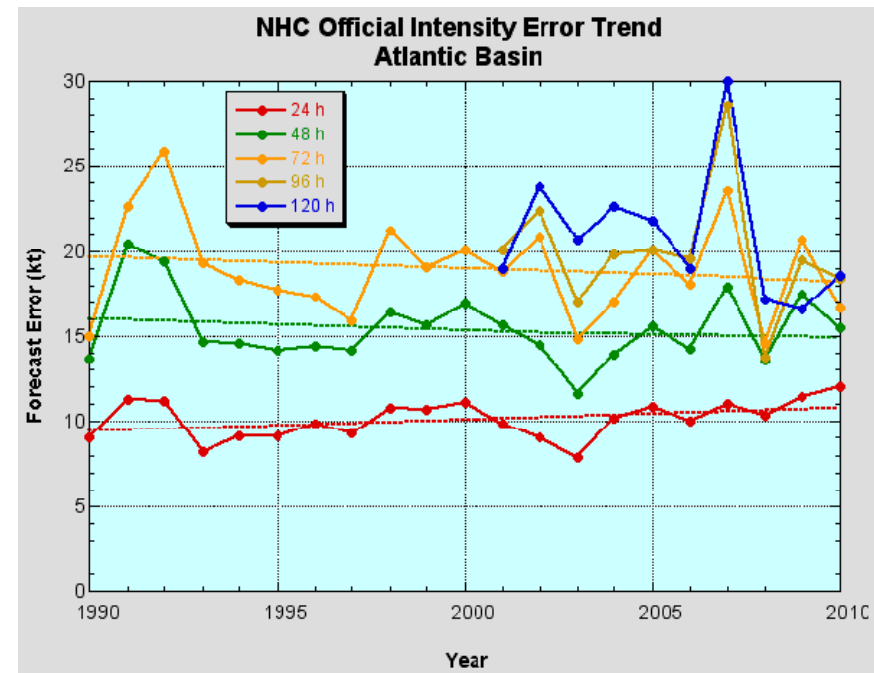
# Challenging Issues for TCP (1)

- Track forecast has been improved, while intensity forecast still is a serious challenge.



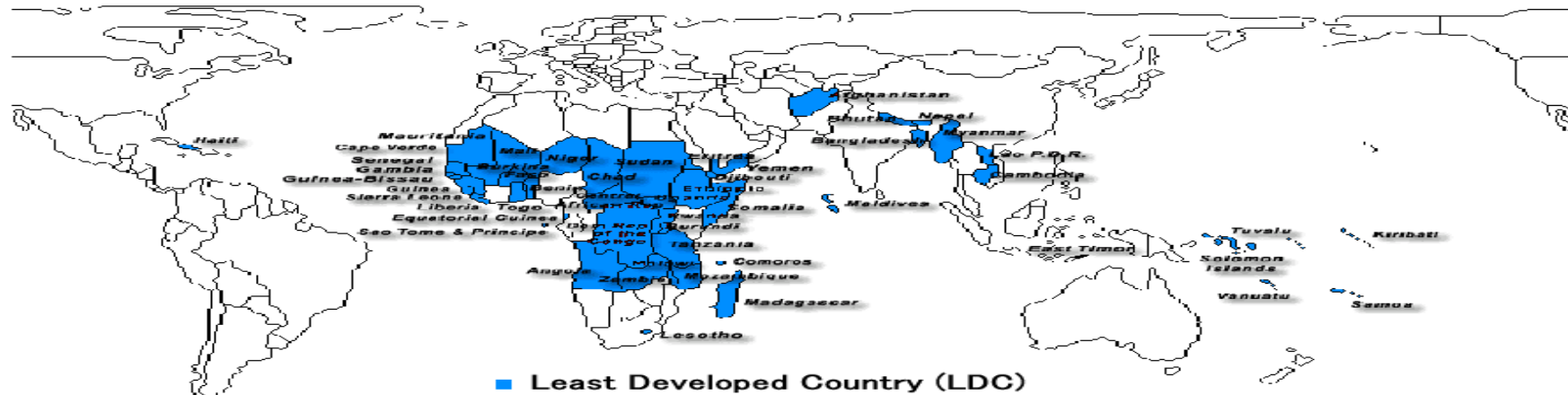
**Track Forecast Errors**

**(RSMC Miami)**



**Intensity Forecast Errors**

## Challenging Issues for TCP (2)



- Most of the members of TC Regional Committees are developing countries and LDCs/SIDSs.
- Gap is widening between developing and developed countries.

*Needs to develop human resources and communication capacity*

*→ Enhancement of capacity building activities*

*→ From GTS to WIS (WMO's new communication infrastructure)*



# New Aspect of TCP

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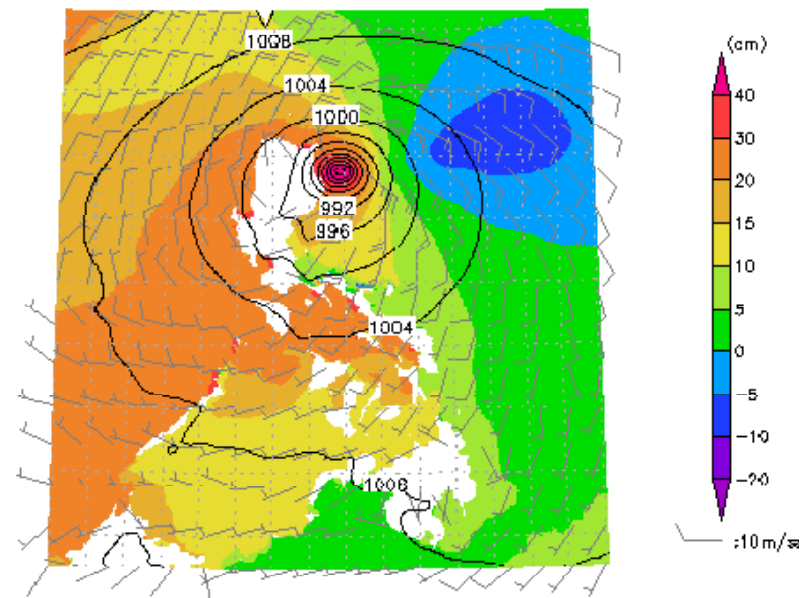
- Regional TC Committees with established 24/7 Early Warning System are now **expected to serve as platforms** for the warning systems also for other hazards.
- Tropical Cyclone Programme is now taking the **multi-hazard approach** and developing links with other WMO programmes and int'l entities, including;
  - *WMO Storm Surge Watch Scheme*
    - *JCOMM (Joint Commission on Oceanography and Marine Meteorology)*
  - *Tsunami Early Warning Systems*
    - *IOC/ICG*

# New Aspect of TCP (cont'd)

## Storm Surge Watch Scheme

- Actions were taken by all the TC Regional Bodies on the initiative of RSMCs.
- TCP and JCOMM jointly hold Storm Surge Workshop for the Members of the regions.

Philippine FT=10 valid=04Z18OCT2010





# New Aspect of TCP (cont'd)

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## Tsunami Early Warning Systems

Cooperative relationship has been developed between TC Regional Committees and Intergovernmental Coordination Groups (ICGs).

- *Panel on Tropical Cyclone and ICG for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWS)*
- *Hurricane Committee and ICG for the Tsunami and other Coastal Hazards Warning System for the Caribbean Sea and Adjacent Regions (ICG/CARIBE EWS)*



# Summary

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- **WMO Tropical Cyclone Early Warning System is established as a collaborative framework of TC Warning Centers and TC Regional Committees.**
- **Improvement of TC intensity forecast and upgrade of the warning capabilities of developing countries are major challenges.**
- **Tropical Cyclone Programme is entering a new phase through a multi-hazard approach.**



WMO OMM

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**Thank you  
for your  
attention**

