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комиссия

# Enhancing Regional Capabilities for Coastal Hazards Forecasting and Data Portal Systems

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IOC of UNESCO

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# Outline

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- Goals/Objectives:  
**to support scientific/technical development for enhancing regional capabilities for coastal hazards forecasting**
- Funding sources :  
Korea Ministry of Land, Transport, and Maritime Affairs
- Implementing partners :  
(target region for the 1<sup>st</sup> phase: **North Indian Ocean**)  
Indian Institute of Technology Delhi (IIT D), India



# Modus Operandi

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## Based on the results of Storm Surge Symposium (2007, Seoul)

- Recommendations for technical development, capacity building

## Contribution to / Integration within UNESCO/IOC workplans

- UNESCO Science Main Line Action 2, 34 C/5:
  - Oceans and coastal zones: improving governance and fostering intergovernmental cooperation through ocean sciences and services
- IOC Medium-Term Strategy 2008-2013
  - (HLO 1) Prevention and reduction of the impacts of natural hazards
  - (HLO 2) Mitigation of the impacts and adaptation to climate change and variability

## Link with the activities of expert groups

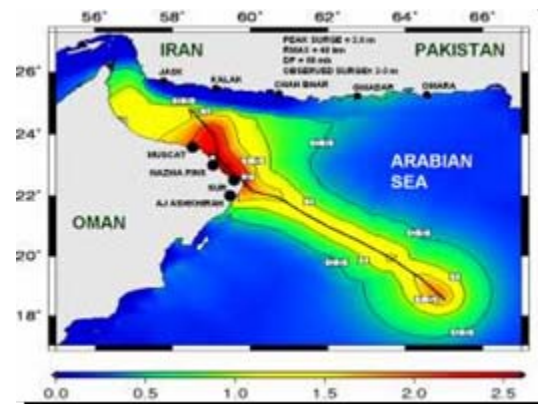
- **ETWS** (\*JCOMM intersessional workplan)
- IOC Integrated Coastal Area Management (ICAM)



# 2009 Activity: IIT-D workshop

## Advisory workshop on enhancing forecasting capabilities for North Indian Ocean Storm Surges (14-17 July 2009, New Delhi)

- Performance review for the currently operating storm surge model (IIT-D model) in India, Bangladesh, Myanmar, Pakistan, Sri Lanka, Thailand and Oman
- Recommendations for regional SS prediction system improvement  
→ **3-year workplan for upgrading IIT-D model predictability**
- Establishment of scientific advisory committee & regional working group



# 2009 Activity: Teams

<http://www.jcomm.info/SSindia>

## Scientific Advisory Committee

- Kevin Horsburgh (UK) - leader
- Val Swail (Canada, chair JCOMM ETWS)
- Donald Resio (USA)
- Hans de Vries (The Netherlands)
- Joannes Westerink (USA)
- Boram Lee (IOC of UNESCO) - project coordinator

## IIT-Delhi working group

- Shishir Dube – leader
- Prasad Bhaskaran
- Indu Jain
- Tad Murty
- A. D. Rao



# IIT-D workshop results: Recommendations

<http://www.jcomm.info/SSindia>

## Required Data: Meteorological and Boundary Input

Recommendation	By whom	Priority
<b>Free data exchange in real-time</b>	All concerned parties	High
<b>Bathymetry</b> with 100 m horizontal resolution over the continental shelf with updates preferably every 5 years. More frequent updates (may be 3 years) in the river delta regions such as Meghna, Hooghly, Ayeyarawady, etc. – considering plans for developing higher resolution models	National Hydrographic Agencies of the NIO region	High
Optimum network of <b>tide gauges in the vulnerable coastal areas</b> with 1-min. average data. (more tide gauges at the head of Bay of Bengal – 2 in Bangladesh, 3 in Myanmar)	Survey of India (for Indian coast) and concerned Government Authorities (for Bangladesh and Myanmar)	High
Aircraft reconnaissance and dropsonde <b>during cyclone events</b> for Improved estimation / forecasting of parameters associated with TC (pressure drop and radius of max. sustained winds)	IMD (currently included in plan)	High
Improved coastal surface and upper-air observations.	IMD (currently included in plan)	High
Enhancement of <b>Coastal Doppler weather radar network</b>	IMD (ongoing)	High
Enhanced network of <b>coastal HF Radar for waves and currents</b>	INCOIS, IMD	High
Enhanced network of moored and drifting buoys (monitoring air pressure, winds, waves, SST)	INCOIS, IMD	Medium
Satellite data for ocean winds, SST, waves, SSHA, etc.	India Ministry of Space	Medium
Tide gauges away from the coast on the continental shelf	INCOIS	Low



# IIT-D workshop results: Recommendations

<http://www.jcomm.info/SSindia>

## Required Data: Hydrological Input & Local Specific

Recommendation	By whom	Priority
<b>Area weighted rainfall</b> in the river catchment along with station data	NMHSs in the NIO region	Low
<b>Depth-area-duration</b> of rainfall	NMHSs in the NIO region	Low
Enhancement of existing river gauge network for <b>River runoff</b>	NMHSs in the NIO region (Hydrological services)	Low
<b>Coastal geomorphology</b>	Survey of India (for Indian coast) and concerned Government Authorities in the NIO region	High
Preparation of <b>storm surge data dossier</b> including all post-event survey data.	INCOIS, NMHSs in the NIO region	High
<b>On-shore topography</b> with a resolution of 5 m in horizontal and 0.5 m in vertical with updates preferably every 10 years.	National Survey agencies, NMHSs in the NIO region	Medium
Crest gauges and possibility of using chemically treated ribbons for mapping the extent of horizontal inundation as well as depth.	NMHSs in the NIO region	Medium
Information about the <b>land use data</b> (including coastal infrastructure, roads)	NMHSs in the NIO region	Low



# IIT-D workshop results: Recommendations

<http://www.jcomm.info/SSindia>

## Future actions

Recommendation	By whom	Priority
<b>Assimilation of Remote sensing</b> (satellite and Radar) and in-situ (buoy and Ship) based data	RSMC (Delhi)	High
<b>Improvement in mesoscale NWP</b> modelling (MM5, WRF, etc.) and <b>nowcasting</b>	IMD	Medium
Looking in to the possibilities for further improvement in the <b>Multi-Model Ensemble for the track prediction</b>	IMD	Medium
<b>Quantitative Precipitation Forecast</b> (QPF)	NMHS of the region	Low
Calibration/validation of the Jelesnianski and Taylor (1973) <b>wind model</b> parameters on additional NIO storms	IIT Delhi	Low
Investigations of the <b>drag coefficient parameterization</b> of stress and scatterometer wind evaluation in hurricane winds & tropical rains	IIT Delhi	Low
Inverting <b>SAR</b> waves into bathymetry	IIT Delhi	Low
<b>Continue training on IIT-D model development and operation</b> , in collaboration with ongoing programmes by WMO and IOC	IIIT Delhi in collaboration with WMO-IOC JCOMM	High

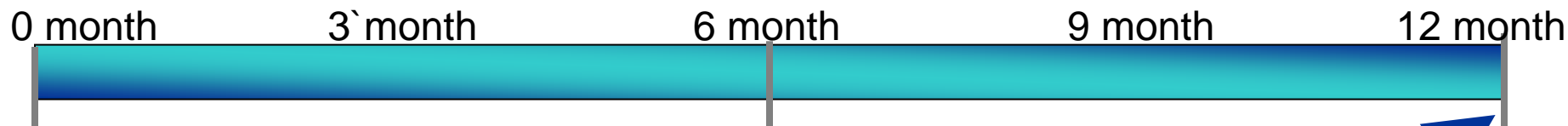




# IIT-D workshop results: Workplan

<http://www.jcomm.info/SSindia>

## YEAR 1:



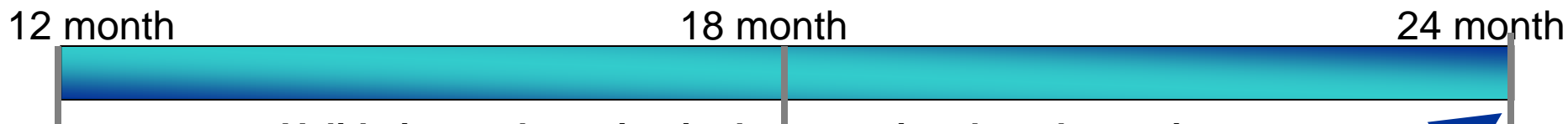
- Enhanced model in operational mode with
  - (i) tide-surge interaction and
  - (ii) contribution of wave-set up
- Report on benefits of probabilistic SS forecasting



# IIT-D workshop results: Workplan

<http://www.jcomm.info/SSindia>

## YEAR 2:



- Upgraded operational wind wave model to predict the damaging swell events (e.g. Kallakadal)
- Quantification of contribution to TWLE from topographic Rossby waves / shelf waves, and recommendation for model enhancement, if required



# IIT-D workshop results: Workplan

<http://www.jcomm.info/SSindia>

## YEAR 3:



- Quantification of contribution to TWLE from edge waves, and recommendations for model enhancement, if required
- Clarification of whether the IIT-D model is capable of simulating the water levels generated by mesoscale forcing, and its operational implication in nowcasting
- Preliminary results from the inundation modelling and recommendations for future development



# Plan: 2<sup>nd</sup> IIT-D workshop

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- February 2011, New Delhi
- Objectives/expected outcome:
  - to review progress of the IIT-D model upgrade against the 3-year workplan, and revise workplans if necessary;
  - to demonstrate the enhanced model's performance in hindcast/operational mode;
  - to share the improved technology with scientific and operational agencies in the North Indian Ocean (NIO) region;
  - to discuss and decide on the future course of action in view of related projects and programmes on storm surges.
- Expected participants:
  - Scientific Advisory Committee members
  - IIT-Delhi Working Group
  - Invited experts on Indian SS modelling and operation
  - Participants from the agencies in NIO region



# Questions, Comments...

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## Thank You

