



**INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
(of UNESCO)**

**Sixth Session of the Intergovernmental Coordination Group for the Indian Ocean Tsunami
Warning and Mitigation System
(ICG/IOTWS-VI)
Hyderabad, 7-9 April 2009**

Agenda Item 4.5

**REPORT OF INTERSESSIONAL MEETING OF ICG/IOTWS WORKING GROUP 5
ON: “A SYSTEM OF INTEROPERABLE ADVISORY AND WARNING CENTRES”**

This document contains the report of the intersessional meeting of the ICG/IOTWS Working Group 5, held in Melbourne, Australia 25 - 26 February 2009. The ICG is requested to consider, comment and eventually endorse the recommendations made by the Working Group.



INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION

ICG/IOTWS SECRETARIAT

Report of Interessional Meeting of ICG/IOTWS Working Group 5 on: “A System of Interoperable Advisory and Warning Centres”

**Bureau of Meteorology, Melbourne, Australia
25th – 226th February 2009**

REPORT

1. Registration

The participants completed the registration list, a copy of which is provided in Annex 1

2. Opening and Session Organisation

2.1 Welcome from WG5 Chair and ICG/IOTWS Secretariat

The chair of WG5, Mr Geoff Crane, opened the meeting and welcomed the participants to the Australian Bureau of Meteorology's offices in Melbourne.

Mr Tony Elliott welcomed the participants on behalf of UNESCO IOC and thanked the Bureau of Meteorology for hosting the meeting. He recalled the outcomes of the inaugural meeting of the RTWP Coordination Group (RCG) in Bali in November 2008, which requested WG5 to consider and decide on tsunami warning issues of regional interest.

Mr Elliott also welcomed members of the IOWave09 Task Team who would be holding a meeting on the second day of the WG5 meeting.

2.2 Agenda and Timetable

Dr Shailesh Nayak (India) requested that time be found to discuss the transition process from the Interim Advisory Service (IAS) to the RTWP service. He was concerned that several RTWPs were already at or approaching Service Level 3 capability, which exceeded the capability of the IAS yet the information was not available to NTWCs.

Mr Rick Bailey (Australia) noted that the immediate goal for RTWPs was to attain Service Level 2 after demonstrating that Service Level 1 was at least on a par with the IAS. This meeting was critical for making progress and agreeing on interoperable procedures and details on formats for information exchange.

Dr Peter Koltermann (UNESCO IOC) noted that the RTWP deliverables needed to be discussed. A checklist for RTWPs should be defined and the process needed to be transparent to reassure NTWCs. The IOTWS has a leading role on this and this advantage needed to be used.

It was agreed to discuss these matters later in the agenda (new agenda item 6). The meeting agenda is attached as Annex 2.

3. Review of Terms of Reference

Mr Crane introduced this item. He listed the Terms of Reference for WG5 and reaffirmed that much progress had been made to achieving the group's objectives. There were no further comments from the participants.

4. Review of Workplan

Mr Crane noted that the RCG had been established and had held its first meeting.

Dr Nayak reminded the meeting that it had been agreed at ICG/IOTWS-V in Putrajaya that JMA and PTWC should review the performance of the RTWPs.

Dr Koltermann noted that this was a delicate issue that needed to be addressed by the ICG. Who "signed off" on RTWP performance? This needed to be ratified by a responsible organisation and needed to be transparent so that all NTWCs could have confidence.

Dr Nayak and Mr Bailey noted that the criteria had been established at the second meeting of the WG5 RTWP Task Team held in Hyderabad.

A discussion followed on the transition process and on the regional coverage of the RTWPs. The RTWP Implementation Plan envisaged that the transition process would be complete when at least 2 RTWPs are operating at Service Level 2. Whilst for some RTWPs "regional" may not mean the whole basin, the objective is to ensure that all Indian Ocean rim countries are covered by an RTWP and that there are no gaps.

It was noted that not all RTWPs determine forecast point information (used to determine threat potential) in the same way. It was agreed that WG4 should be asked to conduct an intercomparison to compare differences in scenario output for the different techniques and models.

Recommendation: WG4 to undertake an intercomparison of forecasts from systems in use at RTWPs by comparing simulated scenarios.

Dr Nayak commented that there was a need to check Performance Indicators for the detection of non-tectonic tsunamis, such those generated by seabed slips. Mr Crane noted this was difficult to measure, but also noted that provisions for such events are included in Australia's SOPs and there was a need to continuously monitor sea level equipment for tsunamis, as the seabed slips cannot be detected using seismic information alone. This was further justification for deep ocean tsunameters.

5. National Reports

Australia

Mr Crane provided an update on the status of the Joint Australian Tsunami Warning Centre (JATWC), which is jointly operated by the Bureau of Meteorology and Geoscience Australia. He explained that warning thresholds and criteria used by Australia, including cancellation criteria, are determined from model forecast scenarios and verified by sea level observations. The "envelope" method was explained,

which uses multiple adjacent scenarios to capture uncertainties in earthquake rupture characteristics used to force the model. Model output also shows a transformation of a tsunami wave as it crosses the continental shelf, sometimes producing a hump at the shelf break, which needs to be considered in the way wave heights are used to determine forecast point information for threat thresholds. Green's Law is used to calculate wave heights at water's edge from offshore information.

Mr Crane explained the zoning method the JATWC uses to determine threat along the Australian coast. Warning levels for each coastal zone include No Threat (<0.3m), Marine and Immediate Foreshore Threat (0.3 – 1.0m), Major Land Inundation Threat (>1m). Threat levels are based on wave amplitude thresholds at the water's edge, which have been agreed in consultation with emergency response authorities.

Dr Spiro Spiliopoulos (Australia) gave a presentation on the seismic component of the JATWC. The Bureau of Meteorology is notified of all events above magnitude 6.5. Geoscience Australia has conducted an analysis of seismic events to look at the difference between actual event and alert time, and difference in location compared to USGS. The comparisons were to USGS' first estimate, as this is the operational imperative. JATWC Earthquake Bulletins have been exchanged with other RTWPs and the IAS since July 2008.

Australia is continuing to work towards developing full RTWP capability for the Indian Ocean basin by the end of 2009 for implementation in 2010.

India

Mr Srinivasa Kumar presented an update of the status of the Indian Tsunami Early Warning Centre (ITEWC). He described ITEWC's Service Level 1 operations in relation to the RTWP Performance Indicators. He provided a detailed intercomparison of earthquake magnitude, location and depth as determined by INCOIS, JATWC, GEOFON, USGS and PTWC.

Mr Kumar went on to describe the development of Service Level 2 capability at ITEWC, particularly the tsunami propagation and inundation modelling that has been undertaken for India. ITEWC have also calculated tsunami profiles at 30m water depth for about 1800 coastal forecast points for 50km segments of the coastline around the Indian Ocean. Wave heights at water's edge are calculated using Green's Law. He went on to describe coastal inundation model and 3D visualisation software used by ITEWC.

Mr Kumar described the development work ITEWC are undertaking towards Service Level 3 capability. Finally, he listed a number of topics for discussion, including the possible need to revisit performance criteria, standardised formats for collating information, intercomparison of model results, finalisation of coastal forecast points for Service Level 2, procedures for validation of Service Level 2 operations, and exchange of SOPs between RTWPs.

Indonesia

Dr Fauzi gave an update on recent progress of the Indonesian Tsunami Early Warning System (InaTEWS). InaTEWS has issued 21 warnings since January 2007. Dr Fauzi provided details of a number of case studies to demonstrate the InaTEWS capability. He provided a detailed timeline for the 4th January 2009 West Papua event.

Dr Fauzi recalled the inauguration of InaTEWS in November 2008 and gave an overview of the operations room layout and equipment, including how seismic and sea level data are integrated. He gave a description of the InaTEWS Decision Support System (DSS) and described the flow of information from InaTEWS to the public, both nationally and internationally.

InaTEWS use coastal segmentations for Indonesia based on administrative regions for 3 levels of warnings: >3m major tsunami; 0.5-3m tsunami; <0.5m advisory.

Dr Koltermann enquired about the coverage of RANET in West Papua. Dr Fauzi replied that the service works well with a high gain antenna.

Mr Bailey enquired about the area of coverage of the DSS. Dr Fauzi replied that it would cover the whole Indian Ocean by November 2009.

Thailand

Air Vice Marshall Pakdivat gave a presentation on Thailand's National Disaster Warning Centre (NDWC). The NDWC is a multi-hazard warning centre. It will be relocating to a new building in August 2009.

Dr Fauzi asks about the criteria for activating the Thai warning sirens. AVM Pakdivat replied that is depended on the warning level and explained NDWC's SOPs for operating the warning sirens.

Asian Disaster Preparedness Centre (ADPC)

The ADPC could not attend the meeting; however, it provided a written report. The ADPC continues to develop RTWP Service Level 2 service capability to provide tsunami advisories to a number of Indian Ocean countries through bilateral arrangements.

6. Review of Transition Process from IAS to RTWP (new agenda item)

The extra agenda items requested by Dr Nayak were discussed at this point. Dr Nayak opened the discussion on the transition process by enquiring how it will take place and whether PTWC will enhance their service to Level 3.

Mr Geoff Crane explained that earthquake parameters were the first criteria for RTWPs. Dr Nayak noted that PTWC gives advisories dependent on earthquake magnitude.

Dr Koltermann noted that JMA had no plans to enhance their service. PTWC may for the Pacific, but not for the Indian Ocean.

Dr Nayak wanted to discuss how NTWCs could make use of the extra services offered by RTWPs in the short term. The IAS does not offer Service Level 2, only Service Level 1. India has Service Level 2 information available. IAS shadowing is due to take place over two years, and that means any extra service from India would not be available for another one year.

Dr Koltermann noted that the IAS doesn't want to stay engaged in the IO any longer than is necessary, but would stay as long as required. He enquired if it was the intention to provide advisories only for those areas predicted to be affected by a tsunami, rather than ocean wide?

Dr Nayak responded that we needed to agree first that this must be done, then as long as PTWC and JMA agree, we could start to implement this. It wouldn't be easy, but we had to start somewhere.

Mr Bailey noted the evaluation process in the RTWP Implementation Plan was agreed by the ICG. It is the role and responsibility of the ICG to oversee this process and agree when RTWPs have been implemented and IAS transition complete.

Dr Ray Canterford (Australia) enquired about the problem of working with NTWCs. Mr Elliott replied that during the transition stage, RTWPs are not supposed to go public with their bulletins, but share them only with the other RTWPs and the IAS.

Mr Charles Ngunjiri (Kenya) felt that this was an important issue and should be addressed. If the RTWPs were able to provide Service Level 2 products, then the NTWCs should be able to receive these.

The possibilities for early enhancement to the IAS in the Indian Ocean were discussed. There was broad discussion on the "shadow" service, and the possible inclusion of NTWCs in the circulation list during the shadowing period transition phase.

Dr Nayak felt that the Service Level 2 products should go out to NTWCs and that they should be able to make an educated judgement on their use.

Mr Bailey was concerned that RTWP products should be evaluated before being made available to operational NTWC users, but noted the added benefits and more detailed information being developed under Service Level 2 and the need to implement this as soon as possible.

Dr Koltermann suggested that experimental watches could go out to a group of NTWCs and that this group be asked to provide feedback for a trial evaluation period.

It was agreed that a recommendation would be made to the ICG to include a group of NTWCs in the circulation list for experimental Service Level 2 products during the transition process. It was further agreed that an evaluation form would be designed to facilitate feedback from the NTWCs participating in the trial evaluation period.

Recommendation:	NTWCs to be invited to participate in a trial evaluation of experimental RTWP Service Level 2 products during the transition process and provide feedback to WG5.
Action:	WG5 to design and distribute feedback forms for NTWCs participating in trial

7. RTWP Coordination Group (RCG) Report

Mr Srinivas Kumar, vice-chair RCG, gave a report on the inaugural meeting of the RCG held in Bali in November 2008. He provided the background to the establishment of the RCG and listed the Terms of Reference and the membership of the group. He advised that the RCG had assessed its role to be that of a Task Team, as its main purpose was to provide technical advice to the ICG through WG5. The group should be able to draw upon all technical expertise, but that policy decisions should be made by

the Member States of the ICG. WG5 should therefore recommend to the ICG/IOTWS that the RTWP Coordination Group should be renamed as RTWP Task Team.

Mr Kumar went on to outline the main outcomes of the RCG meeting, which are available in the report of the meeting. Watch products and formats, distribution of trial products were discussed and the requirement for the exchange of SOPs and Users' Guides between RTWPs and the IAS providers. Dr Fauzi (Indonesia) had been elected as chair of the RCG and Mr Srinivasa Kumar (India) was elected as vice-chair.

Mr Elliott informed the meeting that Kenya and Oman had agreed to be members of the RCG as NTWC representatives. Sri Lanka had also been asked to be a member, but the Secretariat has not received a formal response yet.

Recommendation:	RTWP Coordination Group to be renamed as RTWP Task Team
Action:	RTWPs and IAS to exchange their SOPs.
Action:	WG5 provide guidelines to NTWCs to help them develop SOPs to utilise future RTWP services

8. Summary of RTWP EQ Bulletins since Aug 08

Mr Elliott gave a presentation summarising the earthquake bulletins that had been issued by RTWPs (ITEWC, InaTEWS, JATWC) since August 2008.

Inconsistencies were observed in email addresses used by the RTWPs, message format and content were different between RTWPs, and some RTWPs were reporting earthquakes on land. There were some discrepancies between RTWPs and the IAS for an earthquake located close to the coastline of West Papua on 3 January 2009, when two relatively large earthquakes occurred at the same location only hours apart.

For operational comparison of earthquake bulletins and performance monitoring, WG5 decided it was more appropriate in future to compare RTWP real-time solutions with USGS real-time solutions, not final analyses. It was recognised that rapid, automatic solutions, with sometimes less accuracy, are required for near-source warnings (local tsunami).

It was noted that in some cases PTWC bulletins arrived sooner over the ITIC bulletin board than directly from PTWC. This was thought to be due to the length and position on mailing lists. Thresholds for reporting were also inconsistent between RTWPs. In particular, InaTEWS threshold was very low leading to a considerable number of bulletins. It was agreed that the threshold of reporting of earthquakes would be set to $\geq M6.0$.

Action:	RTWPs to confirm send and receive email addresses (including back-up) to the Secretariat and Secretariat to circulate updated lists to the RTWPs.
Action:	RTWPs to exchange Earthquake Bulletins for earthquakes with magnitude $\geq M6.0$ using an agreed format.
Action:	Secretariat to continue logging earthquake bulletins

9. Interoperability

Coastal Forecast Points

Discussion initially focused on the definition of coastal forecast points. At the moment India generates forecast points every 50km, but can produce every 10km and take averages. Indonesia and Australia use coastal segments. Indonesia's segments may contain several forecast points and maximum wave height is selected. Indonesian segments are about 50km whereas Australia's are between 100 and 400 km. Dr Nayak noted that India has a forecast point for each of the core sea level gauge sites (approximately 60). It takes the nearest grid point to the 30m contour.

Dr Diana Greenslade (Australia) noted it was common forecasting practice to have different models, but that it was also important to share information on techniques and the water depth of the forecast points used by each RTWP.

Mr Ken Jarrott (Australia) felt that it would be useful to have a common grid, but that using the tide gauge network as forecast points would be better.

It was generally agreed by the WG that it is not possible or desirable to have common grids for different models, but forecast values at tide gauge locations are required in addition to any agreed model forecast points to enable real-time and post event verification.

Dr Koltermann considered that WG5 needed to give guidance to Member States on what was achievable. He suggested that a template should be circulated to the Member States asking them what they wanted in terms of coastal forecast points. The commonalities should be listed, such as lat, long, GLOSS tide gauge identifier, water depth etc.

India had generated approximately 1800 forecast points covering the Indian Ocean. Australia had begun examining about 100 points, concentrating on locations of major communities. Dr Nayak felt that individual national administrative boundaries could be superimposed and that prioritisation should be given by boundaries.

Mr Crane noted that inundation modelling on a broad scale is a long way off and is a national responsibility for NTWCs, not RTWPs (unless specified in a bilateral arrangement between a country and a RTWP).

Mr Bailey suggested that more specific threat levels beyond threat/no threat advisories are not the role of RTWPs. This is up to the NTWCs to decide on a country-by-country basis, in consultation with relevant national response authorities, as NTWCs are responsible for providing warnings to their communities.

Mr Ngunjiri felt that if there were a bilateral agreement then it should be possible for an RTWP to provide special advice.

Mr Crane suggested setting the common criteria for products from RTWPs that are available publicly. This raised the issue of information in the public domain available to the media.

Mr Kumar foresaw two lines of activity. National activities are one thing, but for Regional, we should all agree on forecast points, thresholds, threat levels etc.

Mr Chris Ryan (Australia) enquired how to define the section of coast and the minimum height at which countries are going to take action. There had to be a threshold to issue this watch, and all needed to agree on this.

It was agreed that RTWPs will provide threat/no threat advice, based on agreed thresholds for defined coastal segments, and the associated forecast point information (details to be determined) for NTWCs to utilise for tailoring national warnings (under bilateral arrangements with RTWPs as required).

Mr Kumar summarised the details as follows:

- Agree on 50km zones around Indian Ocean, 7-10 grid points per section: Action Srinivas Kumar to distribute Indian zones to other RTWPs
- For each forecast point interpolate from 30m (or whatever depth used) to coast using Greens Law. Each RTWP to use its own models and grids. Need one value from each RTWP – estimated wave height at 1m depth for each zone.
- Arrival time of first and maximum tsunami waves
- Common threshold for threat/no threat: 0.5m at 1m water depth

The Tsunami National Contacts (TNC) should be asked for their required forecast points and their national threat level thresholds. Priority should be given to forecast points close to population centres.

Forecasts would also be provided for coastal sea level and deep ocean tsunameter gauges, but this would be for exchange between RTWPs, and not available publicly.

Action:	RTWPs to exchange information on methodologies for defining, providing and recalibrating coastal forecasts (using observations) in coastal segments.
Action:	India to distribute information on 50km coastal forecast segments
Action:	Australia to circulate its policy for handling “orphan threat zones” along coastlines.

For forecast points, it was agreed that the following information would be made publicly available via RTWP web sites:

- A 1 page bulletin including threat/no threat information based on agreed coastal segments (based on Indian 50km zones) and threshold (0.5m amplitude at 1m depth) for major national zones (to be determined; e.g. east coast of India).
- Graphical presentation of threat/no threat areas and first wave arrival times (no height information).
- Sitreps – where tsunami waves and/or impacts have been observed (no specific height information, only broad indications, such as small, medium, large, etc)

It was further agreed that the following information would be exchanged between RTWPs:

- Forecast heights and arrival times for coastal sea level gauges and deep ocean tsunameters
- Forecast wave height at the 1m depth for each 50km segment–to be put on a webpage

- Recalibrated forecasts after receipt of observations
- Arrival times for first and max tsunami wave
- Graphical presentation of threat/no threat areas with first arrival travel times, directivity based on model scenarios.
- Sitreps – observed water level, observed impact information.

Dr Fauzi gave a presentation on Common Alert Protocol (CAP) on behalf of DLR, Germany. Mr Crane noted that the Bureau of Meteorology is considering using CAP within 3 years, as it is a WMO standard. Dr Koltermann suggested that CAP was not suitable for small island states with low internet bandwidth.

Mr Crane summarised that CAP was something for the future, which needed to be monitored.

RTWP Bulletin and Watch Formats

It was agreed there would be two forms of advice issued by the RTWPs:

1st message should be earthquake bulletin with tsunamigenic potential.

2nd message should be a tsunami watch with more detailed information on coastal areas under potential threat. Updated as required.

It was agreed the RTWP tsunami bulletins and watches needed to include the following information:

Level 1 Service

Earthquake Bulletin (issued within 5 to 10 minutes of earthquake)

Format:

Header – origin agency
 Bulletin No.
 Time of Issue (UTC);
 Hypocenter Location (Lat, Long, Depth); Region location;
 Magnitude (Mw, Mwp, Mw(mB)); Origin Time (UTC); Detection Time (UTC);
 Tsunamigenic potential (same as IAS); No of stations; Azimuth gap;
 Method (manual or auto)
 Time of Receipt by the Tsunami Warning Focal Points (feedback for evaluation)

Level 2 Service

Tsunami Watch (issued within 15 to 30 minutes of earthquake bulletin and updated at least hourly)

Format:

Header – origin agency
 Watch No.
 Time of Issue (UTC);
 Threat advice and first arrival time for national sub-regions based on common threshold (0.5m amplitude at 1m depth)
 Threat advice for individual 50km coastal segments (India to circulate) based on same common threshold
 Amplitudes and arrival times for first and max tsunami waves for each segment
 Forecast heights and arrival times for tide gauge and tsunameter locations

Earthquake information (magnitude, location and depth, region location)
Sitreps (reports of tsunami observations – e.g. tide gauge and tsunameter observed amplitudes, qualified anecdotal information on impacts)

Action:	Watch and bulletin content and format information to be further developed and distributed to WG5 members before ICG VI (Kumar and Fauzi)
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10. Update of IOTWS Implementation Plan

Mr Elliott requested the Working Group to provide information on NTWC and RTWP progress to update the IOTWS Implementation Plan. A template had already been circulated to all Working Group chairs to facilitate this and a number of RTWP countries had committed to assisting the Secretariat in updating the RTWP section of the plan.

11. Preparation for ICG/IOTWS-VI

A number of recommendations would be made to ICG/IOTWS-VI and these are listed in Section 11.

Mr Elliott explained that nominations for the positions of chair and vice chair of WGs should be made at ICG/IOTWS-VI. According to the IOC Rules of Procedure, the terms for the chairs and vice chairs are 2 years. A maximum of 2 consecutive terms can be served. The working group recognised the contribution of the chair, Mr Geoff Crane, and requested that he remain in position for another term. This matter was referred to the Steering Group for consideration. The vice chair, Mr Charles Ngunjiri, had served 1 term only and was therefore eligible for re-nomination.

12. Review of Recommendations and Action Items

Recommendations to ICG/IOTWS-VI:

- RCG to be renamed to RTWP Task Team (reporting to WG5)
- Experimental products from RTWPs be offered to NTWCs in trial mode during the transition period from the IAS to the RTWP service. Participating NTWCs to provide feedback to the RTWPs.
- ICG to request WG4 to undertake an intercomparison of forecasts from systems in use at RTWPs by comparing simulated scenarios

Actions:

- WG5 to design and distribute feedback forms for NTWCs participating in the experimental dissemination of RTWP products.
- RTWPs and IAS providers to exchange SOPs.
- WG5 to provide guidelines to NTWCs to help them develop SOPs to utilise future RTWP services
- RTWPs to exchange information on methodologies for defining, providing and recalibrating coastal forecasts (using observations) in coastal segments.
- India to distribute information on 50km coastal forecast segments
- Australia to circulate its policy for handling “orphan threat zones” along coastlines.

- RTWPs to confirm send and receive email addresses (including back-up) to Secretariat and then Secretariat to circulate updated lists to RTWPs.
- RTWPs to exchange Earthquake Bulletins for earthquakes with magnitude $\geq M6.0$ using the agreed format.
- Secretariat to continue logging earthquake bulletins.
- Watch and bulletin content and format information to be further developed and distributed to WG5 members before ICG VI

13. Date and Venue for Next Meeting of WG5

It was decided to hold an informal meeting of WG5 on Monday 6th April, the day prior to ICG/IOTWS-VI.

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UNESCO IOC

Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWS)

**Working Group 5 – System for Interoperable Advisory and Warning Centres Intersessional Meeting
and
IOWave09 Task Team Meeting**

**Bureau of Meteorology, Melbourne, Australia
25 - 26 February 2009**

AGENDA

Item	Topic
1.	Registration
2.	Opening and Session Organisation: (i) Welcome from chair of WG5 and ICG/IOTWS Secretariat (ii) Review of Agenda and Timetable
3.	Review of Terms of Reference
4.	Review of workplan and accomplishments since last intersessional meeting
5.	National Reports
6.	Review of Transition Process from IAS to RTWP
7.	Report of inaugural meeting of RTWP Coordination Group
8.	Summary of RTWP Earthquake Bulletins since August 2008
9.	Interoperability Issues: (i) Templates for earthquake parameters and tsunami height information (ii) Watch formats (iii) Watch products (RCG/WG5). Includes forecast point definitions, threat levels and thresholds. (iv) Information Exchange formats, access (via ftp, GTS), and usage (v) SOPs for NTWCs (vi) Innovative ways to use model products
10.	Update of IOTWS Implementation Plan: Based on National Reports and other inputs from Member States
11.	Preparation for ICG/IOTWS-VI in Thailand, April 2009: (i) Recommendations to ICG (ii) Nominations for WG5 Chair and Vice Chair
12.	Review of Action Items and Recommendations
13.	Date and Venue for Next Meeting of WG5
14.	IOWave09 Task Team meeting
15.	Date and Venue for Next Meeting of IOWave09 Task Team
16.	Close of Meeting