

OPAG-WWRP

WWRP Progress Report

(submitted by Gilbert Brunet and David Parsons)

Purpose of Document and Major Decision(s) Requested

The purpose of this document is to provide a progress report highlighting the activities and future plans of Working Groups within the WWRP including:

- i. Nowcasting Research,
- ii. Mesoscale Weather Forecasting Research,
- iii. Tropical Meteorology,
- iv. Societal and Economic Research and Applications,
- v. Verification Research (Joint with WGNE)

Sections are also devoted to management issues, strategic planning and possible concepts for future directions. The CAS Management Group is advised that key aspects of the WWRP, such as THORPEX and the major field and modelling campaigns are dealt with in other sections.

The Management Group is requested to:

- i. Approve the proposal in Section 3.1 from the Joint Verification Working Group that the chair be given a fixed term and a co-chair be added to the structure of the committee.
- ii. Encourage, support and provide recommendations on the activities and future plans of a reconstituted WWRP/SERA Working Group as described in Section 3.2.
- iii. Be aware that an examination of the structure, activities, and future direction of the WWRP Tropical Meteorological Research Working Group is ongoing as described in Section 3.3 and comment on as appropriate.
- iv. Note that the evolving role of mesoscale modeling among members and research challenges may have implications for how mesoscale research is organized within the WWRP (See section 3.4) and comment as appropriate.
- v. Ensure that the WWRP Working Groups and joint projects are a major element of the Technical Conference planned for Seoul in November 2009.
- vi. Provide feedback on the outcomes of the WWRP JSC (section 4) and the strategic planning and activities of the WWRP (section 4) and, in particular, on future directions of the programme.

Summary of Activity

1. INTRODUCTION

The activities of World Weather Research Programme (WWRP) lie at the intersection of challenging scientific research and society's need for improved prediction of high-impact weather. Thus, WWRP contributes to both advancing knowledge of the barriers that currently limit our ability to improve the accuracy and lead-time of high-impact weather forecasts and the development, testing and implementation of strategies designed to reduce those barriers and improve prediction. The activities of the WWRP cover the broad range of time-scales associated with society's need for weather information from minutes to hours with the Working Group on Nowcasting, through hours to several days with the Working Group on Mesoscale Weather Forecasting Research (MWFR) and out to 14 days with the THORPEX program. The WWRP also includes a special focus on tropical prediction within its Working Group on Tropical Meteorological Research (TMR) in recognition of both member needs for mitigation of weather hazards and the scientific challenges of tropical systems. Since weather and climate face many of the same challenges in advancing predictive skill, many areas of collaboration between the World Climate Research Programme (WCRP) and WWRP has been identified. The future collaborative effort between the weather and climate communities will be integrated in the long range strategic plan of WWRP. Since shortcomings in how weather prediction information is communicated and acted upon by society can limit the benefits of improved prediction, the WWRP also includes a Working Group on Societal and Economic Research and Applications (SERA). The WWRP contributes to the future of weather prediction for high impact events with a vision for the next generation forecast system and is thus a major contribution to the WMO Natural Disaster Reduction and Mitigation Programme.

2. STRUCTURE OF THE WWRP

The Structure of the OPAG-WWRP is described in the diagram below and consists of five Working Groups and the THORPEX programme. The Joint Science Committee (JSC) is chaired by Dr. Gilbert Brunet of Environment Canada and the membership of this committee includes at least one representative of each of the working groups and of the THORPEX programme as well as representative selected on the basis of geographical and scientific considerations. Each working group currently has a chair. The THORPEX programme has an internal scientific and management structure, which is described under MG3 Doc 4.2.

In addition to the WWRP Working Groups and the THORPEX programme, Dr David Parsons leads the World Weather Research Division (WWRD) that provides significant financial and secretariat support for several other activities. In general, while these activities provide reports to the WWRP JSC, the broken line indicates that these projects do not report to the JSC of the WWRP alone. These activities are described elsewhere in the CAS management report.

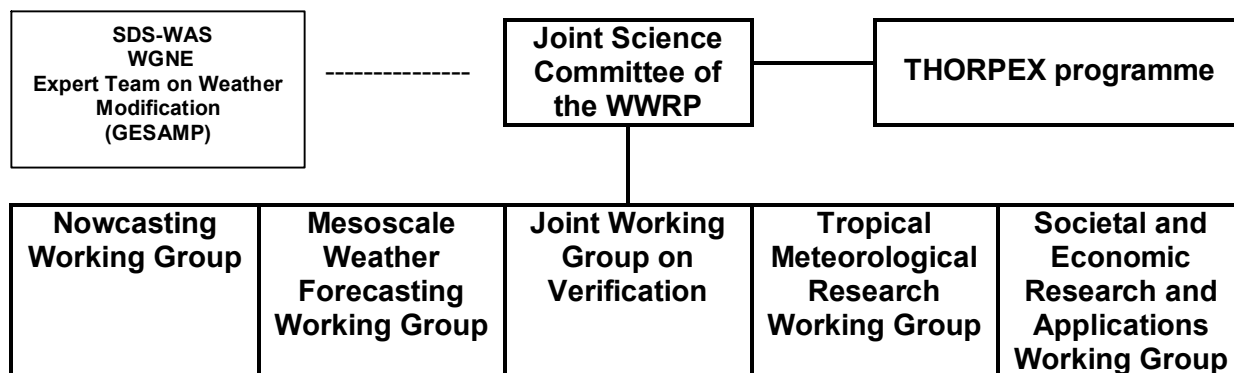
Within the WMO Secretariat, the plans for the coming year is that the WWRP will supported by the following staff:

- i) Part-time staff David Burrige and Jim Caughey have extensive experience in the management of numerical weather prediction activities and support the THORPEX programme, including the links of THORPEX to GEO;
- ii) Nanette Lomarda and approximately two-thirds of Slobodan Nickovic staff time will support the activities of the WWRP in the coming year. Nanette Lomarda's expertise is tropical meteorology, although she provides day-to-day support for aspects of all the working groups. Slobodan Nickovic has a broad background in numerical weather prediction including the incorporation of aerosol into numerical

weather prediction models. His time supporting the WWRP is primarily spent with aspects of the SDS-WAS.

- iii) The Secretariat support for WWRP is overseen by David Parsons as Chief of the WWRD. His research and management background spans across several working groups and THORPEX. He reports to Dr. Len Barrie, the Director of the Atmospheric Research and Environment Branch and co-Director of the Research Department.

Structure of the WWRP



3. ISSUES WITH STRUCTURE AND ACTIVITIES OF THE WWRP

The CAS Management Committee should be aware of several matters with the structure of the WWRP.

3.1 Minor change in the leadership of the Joint Working Group on Verification

One issue is that the Joint Working Group on Verification is Dr. Barbara Brown of the National Center for Atmospheric Research in the USA. Dr. Brown and the committee has proposed i) Dr Beth Ebert of the Bureau of Meteorology Research Centre become a co-chair of the committee to help cope with workload, ii) the chair be given a fixed term of 3 years, and iii) the co-chair provide continuity by taking over for the chair after the chair serves out this fixed term. Dr. Ebert is internationally recognized for here work on precipitation verification and satellite estimates of rainfall. We recommend that this change be accepted and be discussed with the chairs and committee members of the Working Groups to see if such an arrangement be considered as a model for the other working groups.

3.2 Development of a WWRP-wide Societal and Economic Research and Applications Working Group

Another issue concerns the Societal and Economic Research and Applications (SERA) Working Group. The charge and governance of this Working Group was modified significantly by a decision made at CAS XIV that meant the Working Group was to undertake research and application efforts for the entire spectrum on WWRP activities. Prior to the CAS decision, the working group reported to the management structure of the THORPEX programme and was focused on the societal and economic aspects associated with prediction on the time-scale of global prediction.

The first step in affecting this change was to appoint a new Chair for the Working Group, Brian Mills, who replaced Dr. Jeff Lazo of the National Center for Atmospheric Research. Brian Mills is employed by Environment Canada and based out of the University of Waterloo with the Adaptation and Impacts Research Group. His research is presently focused on

understanding the sensitivity and adaptability of transportation to weather, climate and climate change and the value of weather information in decision-making. This appointment was made this summer and Brian attended the WWRP JSC meeting in July and the Working Group meeting of THORPEX in September in order to become familiar with the full extent of the WWRP activities. The proposal for the structure of the SERA Working Group is shown in Figure 4.1.1.

Figure 4.1.1: Proposed SERA Working Group Structure



The working group would consist of 8 to 10 members with expertise in:

1. Social, economic or decision scientists (i.e., from agriculture, anthropology, applied health, communications, economics, geography, management sciences, sociology, psychology, or similar disciplines) with experience in applying social science methods and techniques to weather or climate-related issues
2. Representatives of private, public or non-government sector organization that engage users in the development, application, and beneficial use of weather and related information, products and services
3. Representatives of a user or community of users that benefits directly or indirectly from weather and related information, products and services.

The key application areas include water/hydrology, energy, public safety/disaster mitigation, health, agriculture, and transportation. Key social science research topics include: i) Understanding the use of weather information in decision making, ii) Estimation of the economic (societal) value of weather information, iii) Development of user-relevant verification methods, iv) Communication of weather forecast uncertainty, and v) Development of decision support systems and tools. The atmospheric science input to the committee would be through the expert liaisons from WWRP, THORPEX-TIGGE and verification. The successful ongoing or past WWRP SERA endeavours (e.g., MAP D-PHASE, SDS-WAS, Nowcasting FDPs) would be recognized in formulating membership from the application areas. We intend to have the membership set before 1 January 2009.

The Working Group would have email discussion groups to generate and maintain community interest in a manner similar to what was successfully done for the THORPEX Predictability and Dynamical Process Working Group. The Working Group would also be involved in the formulation of demonstration projects, where necessary, to attack specific research problems or applications.

3.3 Examination of the Structure and Activities of the Tropical Meteorological Research Working Group

Unlike the other Working Groups of the WWRP, the Tropical Meteorology Research Working Group has a different structure in that the group consists of two panels (Monsoon and Tropical Cyclone Panels). Also, Expert Teams exist within these two panels: The Monsoon Panel has Expert Teams on Severe Monsoon Weather and on Climate Impacts on Monsoon Weather, while the Tropical Cyclone Panel has Expert Teams on Land Fall Processes, Observation Processes and Prediction and Climate Impacts on Tropical Cyclones. This large structure is due, in part, to the fact that this Working Group use to be a programme.

Due to the differences in structure and history of this Working Group, the Chair of the WWRP JSC, the Secretariat and working group and panel members are discussing the future direction of the Tropical Meteorology Working Group including whether this substructure is necessary. *This examination is ongoing and will be incorporated into the WWRP strategic planning and will be reported upon in the future.* However, several aspects are already clear:

- i) Relative to other Working Groups the ratio of committees to active projects is higher for the TMRWG, however, the cost of maintaining the Expert Teams of the TMRWG is minimal for the WWRP as these groups activities typically take place via email;
- ii) The needs of members to improved the prediction and response to high impact weather justify the TMRWG focus on monsoon and tropical cyclones;
- iii) The quadrennial scientific meetings organized by the tropical cyclone and monsoon panels are important community venues for research and training that extend to research advances to members from developing nations;
- iv) Collaboration between the THORPEX T-PARC effort and the TMRWG TCS-08 experiment should continue. Stronger collaborations is needed between TMRWG and other aspects of WWRP (e.g, TIGGE, YOTC, SERA, high resolution mesoscale modelling) and between the TMRWG and WCRP efforts in monsoon and tropical cyclone research;
- v) The priority topic of the Monsoon Panel on high impact weather within the monsoon system will continue and will likely lead to specific RDPs and FDPs that will focus on members from developing nations.

Very preliminary results are that TIGGE provides a better prediction of heavy rainfall over the Asian monsoon region than any individual modelling system within TIGGE.

3.4 Mesoscale Weather Forecasting Research

Several aspects of the strategic planning process indicate that research into mesoscale weather forecasting is at important cross roads.

- An explosive growth has occurred in the use of mesoscale models is taking by NHMSs of WMO members. Nearly half the members of the WMO now undertake some form of operational numerical weather prediction on the mesoscale.

- Significant societal benefits at urban and regional scale are expected from high resolution mesoscale modelling as indicated by efforts such as SDS-WAS, the UCAR Africa Initiative associated with African THORPEX effort and Beijing 2008 Olympics RDP.
- The plans of the Mesoscale Weather Forecasting Working Group, Joint Working Group on Verification and the Tropical Cyclone Panel all outline research activities to support the fundamental shift of the community to models that resolve cloud systems by utilizing horizontal grids of order 1 km. Thus, the mesoscale community is already dealing with the paradigm change in prediction that will be faced by the climate and global prediction community.
- The plans of the TIGGE LAM (Limited Area Modelling) focus on how to design mesoscale ensemble systems since uncertainty occurs both on the lateral boundary conditions, in model physics and in the initial conditions within the high resolution domain. The coupling of TIGGE to TIGGE LAM itself has significant potential for societal benefits and in many ways is reminiscent of what was undertaken for MAP D-PHASE.

These points suggest that some enhanced coordination is needed in regard to the research within the WMO and the transfer of research advances to operations is an area that could greatly benefit members. One possibility to meet these needs is a “named programme” for mesoscale research with a fixed lifetime in the model of the THORPEX programme. The possibility for trust fund support is larger than for THORPEX as more members undertake mesoscale modelling. How the coordination will be done for the mesoscale research activities will be discussed in the strategic planning process.

4. WWRP JOINT SCIENCE COMMITTEE

The second meeting of the WWRP Joint Science Committee (WWRP-JSC) met in July 2008 to focus on strategic planning, current status and future activities. The outcomes of these activities are included in the Annex 1 for your information and comments.

One outcome of the meeting was revision to the writing assignments for the strategic plan. The plan will cover both the scientific vision and the implementation of this vision. The plan will include specific tasks for implementation, perhaps in an appendix to status of the Strategic Plan is as follows:

1. Environment Canada is supporting Dr Pierre Dubreuil, who has extensive experience with the WMO and numerical weather prediction, to assist in the coordination of the drafting of the strategic plan.
2. The current outline of the strategic plan is attached in Annex 2.
3. The deadline for submitting materials for the strategic plan was mid-October. Most authors have complied with this deadline through writing appropriate sections or providing materials that will be useful for completing a draft. The first draft will be available for members of the JSC and WWRP Working Groups by the end of December 2008.
4. After internal and external review, a final version available to be presented in the document package for the CAS XV in Korea so that the CAS will be able to approve the plan and the CAS resolutions will be able to represent the new strategic vision for the implementation of the WWRP.

5. SUMMARY OF ACTIVITIES

This section presents a review of the activities of the work groups of WWRP since the last CAS Management meeting. Note that THORPEX is discussed in Sec. 4.2 and the major campaigns and other projects are discussed in Section 4.3. Thus, the activities discussed here are dealt with very briefly.

5.1 Nowcasting Working Group

The highlight activities over the past year include:

- A Working Group meeting in Helsinki in July 2008 to discuss status, plans and contributions to the WWRP Strategic Plan
- The Beijing 2008 Forecast Demonstration Project was held in August and September 2008. The project is discussed in detail in Section 4.3. The highlights of this multi-year effort include operational transfer of research techniques, what we believe to be the first nowcasting ensemble system, a SERA project that is investigating the benefits of nowcasting to users and the public, a real-time in-depth verification system and strong progress to a numerical model and radar system mix. During the Olympics, eight events were delayed due to nowcasting systems.
- A training course on nowcasting in Viet Nam as an extension of the Palm Cove 2007 training effort.

Plans for the future include:

- Forecast Demonstration Projects being planned
 - Shanghai Multi-hazard Early Warning System with JONAS
 - Winter nowcasting with BC 2008 Olympics
 - Satellite nowcasting for Africa for High Impact Weather (early stages)
- WMO Symposium on Nowcasting in Whistler, Canada (special session for B08FDP) 30 August – 4 Sep 2009
- Publication of results and experience sharing with MAP D-PHASE
- Final Science review 4th Beijing 08 FDP Workshop
- Possible 2009 --- WMO International Training Workshop

5.2 Working Group on Mesoscale Weather Forecasting Research

The highlight activities over the past year include:

- Working Group met in Tokyo in March 2008 to discuss status, plans and contributions to the WWRP Strategic Plan
- European Coordinated Experiment (June 2007 through November 2007)
 - MAP-D (Demonstration) PHASE -- WWRP FDP included strong SERA link with hydrological users. An article for BAMS has been submitted. In some ways, MAP-D PHASE has made the best link with users, including hydrological services.

- COPS – A basis science WWRP RDP focusing on convection initiation and evolution in orography. The analysis continues. The COPS and MAP D-Phase provide a strong effort on prediction of convection in orography
- Beijing 08 -- RDP on Mesoscale Ensemble Prediction took place in August 2008. The effort included regional and high resolution (cloud system resolving) models from the international research and operational communities for continental warm season convection.
- Priorities clearly highlighted with a focus on regional models with sufficiently high resolution to resolve convective systems.

Plans for the future include:

- Planning for attacking future problems through testbeds or intercomparison cases associated with high impact events and/or past
- A RDP or FDP focused on mesoscale ensemble prediction is planned for Shanghai MHEWS.
- A workshops are planned for Shanghai MHEWS in December 2008 to develop the mesoscale RDP (joint with verification) and for Beijing 08 in March 2008 to present results from this project.
- The Working Group is involved in the upcoming 2009 WMO Workshop on Data Assimilation.

5.3 Working Group on Joint Working Group on Verification Research

The highlight activities over the past year were associated with participating in the design, implementation and execution of WWRP projects that include:

- MAP D-Phase activities including providing guidance on verification approaches, reviewing of the verification plans and developing methodologies (neighbourhood/fuzzy approaches) used in the experiment.
- Beijing 2008 FDP activities included designing the real-time forecast verification system for the project, training the forecasters in the use of these products and participating in the analysis of the results
- Beijing 2008 RDP activities of the Working Group include providing guidance on project development, participating in the testing of the verification plan and in the analysis of the results.

Other highlights include:

- The Working Group met in Boulder, Colorado, USA in April 2008 to discuss their contribution to the WWRP strategic plan.
- The Working Group designed the framework for the web site on the verification seasonal forecasting of tropical cyclones.
- Special issue on verification was completed in Meteorological Applications.
- Recommendations on verification techniques are being prepared for publication by the WMO for verification of clouds, precipitation, high-resolution deterministic models and ensemble systems.

- Verification modules were produced for EUMETCAL.
- Training sessions were undertaken in S. Africa.
- Participated in TIGGE LAM and TIGGE activities.

The future plans for the Working Group include:

- A verification Forecast Demonstration Project Participating in the planning for the proposed FDP/RDP for the Vancouver Olympics (SNOW V10) where the group has already proposed verification systems for the mesoscale and nowcast systems.
- An FDP focusing on a real-time verification of tropical cyclone forecasts is being planned for the Shanghai MHEWS project.
- An international symposium on Verification is being planned for 2009.
- A joint meeting with the Working Group on Mesoscale Weather Forecasting Research is being planned for the Shanghai MHEWS project in December 2008.
- Planned special issue on spatial verification techniques in Weather and Forecasting.

5.4 Working Group on Tropical Meteorological Research

The highlights of the Working Group include:

- The Tropical Cyclone Structure 08 Experiment was conducted during 1 August to 6 October 2008. The experiment focused on advancing the understanding and prediction of the genesis, structure and intensity of tropical cyclones. The field phase appears to be very successful.
- The Tropical Cyclone Panel made significant contributions to the goals and experimental design of T-PARC.
- WMO International Workshop on Monsoons and associated training course held at the CMA in Beijing (Oct 20-25 2008). The New Expert Team on Severe Weather within Monsoons and the Executive Committee of the Panel on Monsoon Meteorology also met during this meeting.
- The Tropical Cyclone Panel contributed to two articles in the Bulletin of the WMO and an article on TCS-08 was submitted to the Bulletin.
- A web-based intercomparison project was set up for seasonal predictions of tropical cyclone number with all major groups contributing (assistance from Joint WG on Verification).
- Participated in the regional workshop on tropical cyclones in La Réunion.

The future plans of the Working Group include:

- A Symposium on Indian Ocean Tropical Cyclones and Climate Change will be held on Oman in 2008.
- Discussions have taken place with the Nowcasting Working Group on developing a project on the use of radar products for nowcasting heavy monsoon rainfall, possibly in SE Asia.

- Very early discussions have taken place for Bay of Bengal and/or S. Indian Ocean tropical cyclone experiments.
- Several publications will occur next year including a status reports on aspects of tropical cyclones and monsoons.

Annexes:

1. Outcomes of the 2nd meeting of the WWRP-JSC, July 2008
2. Outline of the WWRP Strategic Plan

Annex1 to paragraph 4 – WWRP Joint Science Committee

1st Draft of Decisions

2nd Meeting of the JSC of the WWRP

28 July 2009

1. **Decision:** The Joint Science Committee of the WWRP (WWRP-JSC) recognized the increase in collaborations between different components of the program and noted the importance of a seamless approach for prediction by NHMSs to meet the needs of society for improved prediction. Thus, the WWRP-JSC endorsed the proposal for a combined meeting of the Working Groups for WWRP. This meeting is proposed to take place in the spring of 2009. Gilbert Brunet in his role as Chair of the WWRP-JSC and the WMO Secretariat (David Parsons) are charged with proposing dates, location and content for this combined meeting.
2. **Decision:** The WG chairs, programme leads and others proposing meetings need to send proposals for meetings and training events in 2009 with as much detail as possible (e.g., location, estimate of number of participants, date, other) to David Parsons of the WMO Secretariat as soon as possible. While we can maintain some flexibility, this increased lead-time on meeting planning is valuable.
3. **Decision:** Brian Mills in his capacity as the new Chair of the WWRP Societal and Economic Research and Application Working Group was encouraged to move forward with his proposal for repopulating the membership of this committee and work with the Chair of the JSC and Chief of the WWRD on selecting and then notifying members. Members of the JSC are encouraged to look at the proposal by Brian and (attached) and make suggestions for members by 15 September 2008.
4. **Decision:** The WMO Secretariat (David Parsons and Len Barrie) were tasked with finding out the status of the “Madrid Plus 5” meeting and ensure that this meeting contains a technical component. The outcome of this task will be reported upon by at the JSC.
5. **Decision:** Brian Mills in his capacity as the new Chair of the WWRP Societal and Economic Research and Application Working Group was encouraged to meet with Gordon McBean and discuss areas of mutual interest between the WWRP and ICSU efforts on Hazards and Natural Disasters. The outcome of this task will be reported to the JSC and to THORPEX at the Sept 2008 meeting of the THORPEX Working Groups.
6. **Decision:** The WMO Secretariat (David Parsons) was to investigate the interrelationship between CBS, WGNE and CAS-WWRP efforts on verification with appropriate persons (e.g., CBS representatives, Richardson, Parsons, Brown, Brunet, Miller) with a focus on whether actions could be made within the WMO to improve links between research and operational efforts on verification including the transition of research techniques to operations. The results of this enquire will be reported at next year’s WWRP JSC.
7. **Decision:** Based on the proposed future activities of several Working Groups. the JSC decided that the set of activities referred to as “Testbeds” will be incorporated into the future strategy of the WWRP. Proposed definitions of these activities and criteria for WWRP endorsement will be defined in our Strategic Plan. The WMO Secretariat (David Parsons) will be responsible for leading the drafting of this portion of the Strategic Plan from materials presented at the WWRP Science Steering Committee in Kunming, PRC (26 to 30 October 2005). The members of the JSC members are invited to contribute.

8. **Decision:** Given that hydrology is a user of radar and nowcasting products and the potential importance of improved hydrological prediction to NMHSs, the WWRP-JSC tasked the WMO Secretariat (David Parsons) to strengthen interactions between WMO-WWRD and hydrology within the WMO.
9. **Decision:** In addition to large international symposium on Nowcasting, the Nowcasting Working Group proposed several potential workshops targeting specific research and societal challenges. The Nowcasting Working Group (Tom Keenan) is encouraged to proceed with defining these activities and making proposals for these meetings and present them to the WWRP-JSC during this next year.
10. **Decision:** The WWRP-JSC notes the importance of aerosol and atmospheric chemistry as a component of the prediction system both as a direct societal need and through the impact of these constituents on meteorological variables. The WWRP-JSC requests that the Working Groups and the THORPEX programme focus on fostering increased collaboration with Environmental Prediction, particularly on the mesoscale where building upon the Sand and Dust Storm Warning Advisory and Assessment System(SDS-WAS) could further accelerate progress
11. **Decision:** A wealth of experience concerning high resolution modelling has been accumulated by the mesoscale research community and this experience is potentially of great value to future efforts in operational global numerical weather prediction (and eventually climate prediction). Thus, the WWRP-JSC encouraged efforts by the Chair of the WWRP-JSC (Gilbert Brunet), the Mesoscale Forecasting Research Working Group (Jeanette Onvlee) and the WMO Secretariat (David Parsons) to increase the links between mesoscale research and operational prediction.
12. **Decision:** Noting that nowcasting is often a blend of heuristic methods and high resolution modelling and noting the separate progress of the two Mesoscale and Nowcasting Working Groups for Beijing 08, the two groups are encouraged to continue to encourage collaborations between these groups and consider joint activities for a future FDP/RDP. The Chairs of these two Working Groups (Tom Keenan and Jeanette Onvlee) are to report on progress at the next meeting of the WWRP-JSC.
13. **Decision:** While the WWRP-JSC noted the difficulties in expanding the work by the Monsoon Panel beyond its current focus on Asia, the Chair of the Panel (C.P. Chang) is encouraged to have a broad international vision in future efforts to define the research vision for monsoon prediction.
14. **Decision:** The WWRP-JSC noted the progress of the Monsoon Panel in defining a weather research vision for their activities on monsoon research and the progress toward a successful international symposium. The WWRP-JSC encourages C.P. Chang and the Monsoon Panel to use the strategic planning process to continue to define the role of WWRP in monsoon research and consider such questions as “Where does monthly forecast and intra-seasonal time-scale fit in their programme?”, “How can this research-oriented panel enhance the transfer of research knowledge and products into enhanced operational services?”, “What is the role of operational forecasters in monsoon research?”.
15. **Decision:** The WWRP-JSC welcomed the presentation by Valerie Detemmerman on the efforts by the World Climate Research Program to coordinate their activities on monsoon prediction and increase collaboration between WCRP and WWRP on this subject. The WWRP-JSC thanks the JSC of the WCRP for their invitation to form a joint committee. However, at this time, the WWRP-JSC recommends that the WWRP and WCRP do not form a formal joint coordinating committee on monsoon research. This decision should not be interpreted as the WWRP-JSC not being in favour of collaborative activities with the WCRP, but rather we anticipate that the magnitude of

effort required to coordinate WCRP and WWRP efforts on monsoons does not merit the formation of a new committee at this time. The joint WWRP-WCRP Year of Tropical Convection project is already an existing mechanism for collaboration between the WCRP and WWRP on tropical meteorology (including topics such as the diurnal cycle and monsoon convection), which lessens the need for an additional separate committee.

The WWRP–JSC instead proposed the following path forward:

- i) Len Barrie (Director of the ARE) and David Parsons (Chief of the WWRD) will communicate this decision and the proposal for a path forward to the Ghassem Asrar (Director of the WCRP) so that the WCRP-JSC is informed of our response and initiate a path forward.
 - ii) The WWRP-JSC proposed two contact points (C.P. Chang and a person to be named later) from its Monsoon Panel and asks that the WCRP to do the same. These contact points will be used whenever coordination issues arise or opportunities for collaboration occur. Noting the desire by WCRP-JSC for coordination. N. Lomarda and Valerie Detemmerman are requested to assist these contact in communicate as soon as possible by phone and/or email to discuss the research priorities of the two programmes and outline the potential for specific projects, collaborations and coordination between WWRP and WCRP on monsoon prediction that fulfil the criteria of filling the gaps in international cooperation. Coordination issues should focus on time-scales and research topics that lie at the interface between weather and climate. The recommendations by the monsoon contact points are requested to summarize their discussions in a brief two to three page report to the Chairs of the two JSCs for possible action. For the WWRP, the recommendations will be considered for input to the WWRP-JSC Strategic Plan.
 - iii) Within the WMO, discussions should take place between WCRP, WWRP and relevant service delivery support and observational programs to determine how research could improve prediction and societal response to monsoon events. Research co-directors, G. Asrar and L. Barrie are requested to arrange an inter-departmental meeting to address this.
16. **Decision:** The WWRP-JSC recognizes the need for improving the geographic balance of the membership of the Committee for the 6th International Workshop on Tropical Cyclones (IWTC-6). The WWRP-JSC recommends that the geographical balance of this committee be improved and a member should be added to represent the Tropical Cyclone research efforts and societal needs of India. The WWRD is requested to initiate a WMO contact to the PR of India by 1 September 2008 requesting suggestions for a member of the IWTC-6 from India.
 17. **Decision:** As part of the strategic planning process, Russ Elsberry Chair of the Tropical Cyclone Panel, assisted by the WMO Secretariat (Nanette Lomarda), agreed to inform WCRP of the work of the WWRP in verifying seasonal forecasts of tropical cyclones.
 18. **Decision:** The WWRP-JSC recognized the success of the THORPEX Interactive Grand Global Ensemble (TIGGE). Due to the potential of TIGGE to improve prediction of, mitigation and response to high-impact weather, the WWRP-JSC requests better advertisement of TIGGE capabilities by the WMO Secretariat and TIGGE co-chairs through conferences, publications, targeting sectors and developing user links. These activities should cut across relevant areas of the WMO. Strategies should be discussed in meeting of the THORPEX Working Groups in September and reported to the Chair of the WWRP-JSC and Chief of the WWRD.

19. **Decision:** All in attendance were encouraged to continue input to WWRP eNews and increase its distribution.
20. **Decision:** The WWRP-JSC agreed to a request by the co-chair of the Year of Tropical Convection (YOTC) project, Duane Waliser, that the WMO Secretariat arrange a joint WWRP/WCRP publication of the YOTC Science Plan
21. **Decision:** The YOTC co-chairs (Duane Waliser and Mitch Moncrieff) are encouraged to articulate written requests to the WWRP and WCRP that outline their needs for financial and logistical support for their upcoming meetings. The first meeting is to focus on strategies for accessing and utilizing observations, particularly satellite-based measurements.
22. **Decision:** The WWRP-JSC noted the request by YOTC to catalogue and publicize both important weather and climate events in the tropics and significant interactions between the tropics and extra-tropical interactions. The WWRP-JSC recognizes the value of such activities, especially if undertaken in a systematic manner. All members present are invited to send the YOTC co-chairs (Duane Waliser and Mitch Moncrieff), Chair of the WWRP(G. Brunet), and Chief of the WWRD(D. parsons) a list of possible contacts who might be interested in participating.
23. **Decision:** Following the action initiated at the June 2008 Executive Council of the WMO, Indonesia should be invited to increase its role in WWRP activities associated with tropical convection. Dave Parsons through the Research department co-directors will initiate a letter from the WMO Secretary General to the Permanent Representative to WMO of Indonesia.
24. **Decision:** The WWRP-JSC accepts the proposal to reinstate criteria and a formal endorsement process by which projects become a WWRP activity. The project criteria (FDP, RDP, Testbeds, etc) will be refined and drafted as part of the drafting of the Strategic Plan for the WWRP. The process should be streamlined, if possible, and focused on improving proposed projects, but will still include the preparation and review of a written proposal. The endorsement process is delegated to the Working Groups and THORPEX programme and the administration to the WMO Secretariat C/WRD, (D. Parsons). By 15 September 2008, David Parsons (the author of the relevant section of the plan) will circulate current criteria for the proposal procedure on project approval process to all in attendance for comment and subsequently keep the group informed on the status of that section of the plan.
25. **Decision:** The WWRP-JSC welcomed a presentation by Chair Nowcasting Tom Keenan on the Nowcasting project for the Vancouver 2010 Winter Olympics (Lead: George Isaac of Environment Canada) and invited those responsible to submit a proposal for endorsement and publication ????? as a WWRP technical document as soon as possible. In addition, the WWRP-JSC felt that there was an opportunity for this project to cross the time-scales of prediction from nowcasting to the medium range. George Issac and Tom Keenan were requested to initiate discussions with Jeanette Onvlee (Mesoscale Forecasting Research Working Group), Zoltan Toth (TIGGE Co-chair and lead of the NOAA Winter Storms Reconnaissance Program), and Tiziana Paccagnella (TIGGE LAM) to discuss the possibility of using broader time-scale information.
26. **Decision:** The WWRP-JSC noted the importance of a coordinated approach to the prediction and the dissemination of forecast products for hazards and was quite encouraged by the plans for a Shanghai Multi-Hazard Early Warning System Demonstration Project. The WWRP-JSC supported the proposed joint meeting of the Mesoscale and Joint Verification Working Groups in December 2008. The WWRP-JSC requested that outcomes of this joint meeting are written as proposals for joint projects

between the two working groups for endorsement by the JSC-WWRP.. Finally, the WWRP-JSC recommended that the Shanghai MHEWS project should develop a coordinated approach to the dissemination of all hazard information. This Decision is to be transmitted to the EC WG-DRR by the Secretariat (L. Jalkanen)

27. **Decision:** The WWRP-JSC congratulated the Sand and Dust Storm Warning, Advisory and Assessment (SDS-WAS) Project organizers on their progress and future plans. It recommended that the leads of SDS-WAS to continue to explore links to seasonal forecasting products, health implication and the exploration of a WWRP SERA Demonstration Project involving SDS-WAS (Brian Mills, L. Barrie, S. Nickovic)
28. **Decision:** The WWRP-JSC considered the potential for WWRP projects to be initiated in Africa including the satellite nowcasting or the limited use of TIGGE forecast products in support of the Southeast Africa Severe Weather Forecast Demonstration Project, exploration of ensembles forecast systems for tropical convection, expansion of user benefits to the SDS-WAS project, improved prediction of tropical cyclones for E Africa, food security and the defined plans of WWRP-THORPEX African Regional Committee, etc. The WWRP-JSC challenged the working groups and the THORPEX programme to work with the WMO Secretariat to initiate a project(s) in Africa during the next year,
29. **Decision:** The WWRP-JSC noted that Warren Tennant of the S African Weather Service is changing positions and is leaving the TIGGE Working Group. After considering the importance of capacity building in Africa, the WWRP-JSC asked the Co-Chairs of the WWRP-THORPEX TIGGE Working Group (Z. Toth; P. Bougeault) to appoint another representative from the S. African NWP research community.
30. **Decision:** The WWRP-JSC encouraged the continuation of activities in the JONAS (Joint Nowcasting Application and Services) that will bring research advances in nowcasting into operational prediction. The WWRP-JSC encourages the efforts of the WWRP Working Group on Nowcasting to fine-tune the JONAS terms of reference including specific references of the transition of research to operations and efforts to minimize redundancy between the two working groups.
31. **Decision:** A presentation was made by Martin Miller on the last meeting of Joint CAS/JSC-WCRP Working Group on Numerical Experimentation (WGNE) showing model developments and improvement. The WWRP-JSC welcomed the incorporation of efforts to improve model physics and chemistry into WGNE through the incorporation of additional WGNE members and recommended that CAS approve this change in direction. Given this change in WGNE direction, the WWRP-JSC proposes that the Terms of Reference of WGNE be examined by the WWRP during the drafting of the WWRP Strategic Plan and any suggestions for changes be proposed to WGNE, CAS and JSC-WCRP. It recommended that the terms of reference clearly state that the numerical experimentation promoted by WGNE should include efforts to address priority research problems identified by the JSCs of WWRP and WCRP.
32. **Decision:** The next WGNE meeting 3-7 November 2008 Montreal should include a presentation and discussion on the priorities of the Working Group on Mesoscale Forecasting Research. The WMO Secretariat (D. Parsons) will notify WGNE of this suggestion well in advance of the meeting.
33. **Decision:** Forecast systems. The WWRP-JSC recognizes the importance of examining the entire forecast system in mitigating disasters from high impact weather as the users are typically not provided with detailed numerical output, but rather highly processed products. The WWRP-JSC asks that Tom Keenan and Dave Parsons WWRD take the lead in meeting the WMO Executive Council action for a workshop by relevant parties within WMO on forecast systems. The WWRP-JSC encouraged efforts to involve the climate community and CBS in this workshop.

34. Decision: The WMO-JSC acknowledged and thanked Mel Shapiro and Gilbert Brunet for developing two white papers that outline the path to collaborations with WCRP on topics of mutual interest. Two minor suggestions for improvement were made for modification to the Gilbert Brunet white paper on seamless weather climate prediction: i) Fully coupled data assimilation is far from ready to be used for reanalysis; ii) The paper should place a greater emphasis on the importance of resolution for weather research and prediction, particularly in the tropics. In this regard, the potential revolution in weather research and prediction due to increased resolution, particularly for convection should be emphasized in the WWRP Strategic Plan.

35. Decision: On the strategic plan:

- i) The WWRP-JSC noted the progress on the writing of the WWRP Strategic Plan for 2009-2016 and emphasized the need to shorten the plan and for the sections to be more uniform. A new outline was completed with lead authors identified and this outline appears in the annex to this report. The deadlines proposed by for authors to provide sections to the strategic plan's technical manager (Pierre Dubreuil) is 19 October 2008 with a draft completed by the end of December.
- ii) The WWRP-JSC noted the need for a brief "high level science" derived from the scientific sections of Strategic Plan. This document will be produced after the completion of the Strategic Plan.
- iii) The text within the Strategic Plan needs to be concise, which means that it is difficult to delve deeply into the science plans of the individual working groups. The Mesoscale Working Group wishes to publish their science plan either in the WMO or a scientific peer-reviewed journal. The WWRP-JSC supported this action and encouraged other groups to do the same as long as it does not delay the WWRP Strategic Plan beyond agreed deadlines.

Annex2 to paragraph 4 – WWRP Joint Science Committee

Commented Draft Outline of the WWRP Strategic Plan

Revised from the JSC Version on 7/27/2008

FOREWORD (Secretary General)

EXECUTIVE SUMMARY (4 pages) – To be completed after drafts of other sections

- 1. INTRODUCTION (3 pages) – Dave Parsons lead on first version**
 - 1.1. The Rationale for WWRP
 - 1.2. WWRP Mission – *note disaster preparedness, mitigation, transfer results to obs*
 - 1.3. Main Long-Term Objectives

- 2. CHALLENGES (7 pages) – Gilbert Brunet lead on first version, input invited from JSC members, note that the basic idea is to move away from sections to a narrative of our critical challenges, it may shorten the text, subsections are listed for FYI only, note challenges are defined by both by the research agenda and societal needs for improved prediction**
 - 2.1. Introduction
 - 2.2. Achievements and Accomplishments
 - 2.3. Challenges

- 3. ORGANIZATIONAL COMPONENTS (3 pages) – Dave Parsons lead on first version with input from Len Barrie and Nanette Lomarda. Note that the terms of reference and the FDP etc criteria will be examined as part of the strategic plan with the full terms in an appendix/annex**
 - 3.1. The Structure of WWRP (include figure)
 - 3.2. National Meteorological and Hydrological Services (NMHSs)
 - 3.3. Working Groups (General terms of reference)
 - 3.4. Implementation Strategy
 - 3.5. Implementation Principles
 - 3.5.1. Criteria for projects
 - 3.5.2. Linkage identified and insured (CBS ...)
 - 3.6. Secretariat
 - 3.7. WWRP Partners
 - 3.8. Resources

- 4. ACTIVITIES (30 pages) – Oversight of this section led by Pierre Dubriel who will contact lead authors to decide on method to move the text forward.**
 - 4.1. Working Group on Nowcasting Research -- **Tom Keenan (4 pages)**
 - 4.1.1. Scope and Research Priorities (1 page summarizing the scope of the working group and its research priorities)
 - 4.1.2. Research Strategy (2-3 pages summarizing what the W.G. will do to address the research priorities. This includes a short description of the research activities, a list of required linkages, knowledge transfer and capacity building activities as well as products and services).
 - 4.1.3. Implementation Tasks (be specific about tasks and how will do them, this information may be pulled into an annex later)
 - 4.1.4. Long range outlook (paragraph or page on vision beyond the next few years)

- 4.2. Working Group on Mesoscale Weather Forecasting Research -- **Jeanette Onvlee** (4 pages)
 - 4.2.1. Scope and Research Priorities (1 page summarizing the scope of the working group and its research priorities)
 - 4.2.2. Research Strategy (2-3 pages summarizing what the W.G. will do to address the research priorities. This includes a short description of the research activities, a list of required linkages, knowledge transfer and capacity building activities as well as products and services).
 - 4.2.3. Implementation Tasks (be specific about tasks and how will do them, this information may be pulled into an annex later)
 - 4.2.4. Long range outlook (paragraph or page on vision beyond the next few years)

- 4.3. THORPEX Programme --- **David Burridge and Jim Caughey based on input from THORPEX WGS and Committees** (10 pages)
 - 4.3.1. Scope and Research Priorities (2 pages summarizing the scope of the working group and its research priorities)
 - 4.3.2. Research Strategy (6 pages summarizing what the W.G. will do to address the research priorities. This includes a short description of the research activities, a list of required linkages, knowledge transfer and capacity building activities as well as products and services), note IPY, T-PARC, TIGGE, YOTC are now in this section, which increased the length
 - 4.3.3. Implementation Tasks (be specific about tasks and how will do them, this information may be pulled into an annex later)
 - 4.3.4. Long range outlook (paragraph or page on vision beyond the next few years)

- 4.4. Working Group on Tropical Meteorology Research -- **C.-P. Chang, Lianshou Chen and Russ Elsberry** (4 pages)
 - 4.4.1. Scope and Research Priorities (1 page summarizing the scope of the working group and its research priorities)
 - 4.4.2. Research Strategy (2 to 3 pages summarizing what the W.G. will do to address the research priorities. This includes a short description of the research activities, a list of required linkages, knowledge transfer and capacity building activities as well as products and services).
 - 4.4.3. Implementation Tasks (be specific about tasks and how will do them, this information may be pulled into an annex later)
 - 4.4.4. Long range outlook (paragraph or page on vision beyond the next few years)

- 4.5. Working Group on Verification Research -- **Barb Brown** (4 pages)
 - 4.5.1. Scope and Research Priorities (1 page summarizing the scope of the working group and its research priorities)
 - 4.5.2. Research Strategy (2 to 3 pages summarizing what the W.G. will do to address the research priorities. This includes a short description of the research activities, a list of required linkages, knowledge transfer and capacity building activities as well as products and services).
 - 4.5.3. Implementation strategies (be specific about tasks and how will do them, this information may be pulled into an annex later)
 - 4.5.4. Long range outlook (paragraph or page on vision beyond the next few years)

- 4.6. Working Group on Societal and Economic Research and Applications -- **Brian Mills** (4 pages)
 - 4.6.1. Scope and Research Priorities (1 page summarizing the scope of the working group and its research priorities)

- 4.6.2. Research Strategy (2 to 3 pages summarizing what the W.G. will do to address the research priorities. This includes a short description of the research activities, a list of required linkages, knowledge transfer and capacity building activities as well as products and services).
 - 4.6.3. Implementation strategies (be specific about tasks and how will do them, this information may be pulled into an annex later)
 - 4.6.4. 4.6.4 Long range outlook (paragraph or page on vision beyond the next few years)
5. **OTHER CROSS CUTTING ACTIVITIES** (5 to 8 pages: 1 to 1.5 page per item) --- **Pierre Dubriel** will serve as the lead for coordinating this section
- 5.1. Introduction (describing what this section is and that many of the previous activities have a cross-cutting nature, here we are describing plans that clearly do not fit the WG and program structure – **Pierre Dubriel**)
 - 5.2. WGNE – **Martin Miller and Gilbert Brunet**
 - 5.3. Approaches to integrated forecasting systems -- **Tom Keenan**
 - 5.4. The WMO Sand and Dust Storm Warning System – **Len Barrie and Slobodan Nickovic**
 - 5.5. Shanghai MHEWS – **Nanette Lomarda**
6. **UNIFIED APPROACH TO WEATHER, CLIMATE AND ATMOSPHERIC CHEMISTRY** (6 pages) -- **Gilbert Burnet** is the lead for this section and will write the first version of sections 6.1 to 6.5. **Len Barrie** is the lead for section 6.6 and will seek input from **Adrian Simmons** and possibly others. This section is to be matched to the white paper visions and modified. Input to be provided by Tropical WG and others, also to include tasks we like to see happen if the collaboration is to be a success from the weather side of the equation.
- 6.1. Introduction – **Gilbert Brunet**
 - 6.2. Seamless weather/climate prediction including EPS – **Gilbert Brunet**
 - 6.3. The multi-scale organization of tropical convection and its two-way interaction with the global circulation – **Gilbert Brunet**
 - 6.4. Data assimilation for coupled models as a prediction and validation tool for weather and climate research – **Gilbert Brunet**
 - 6.5. Utilization of sub-seasonal and seasonal predictions for social and economic benefits – **Gilbert Brunet**
 - 6.6. Atmospheric chemistry and Weather (GEMS, etc) – **Len Barrie**
7. **Impacts (DP, BM, JO and LB)** (4 pages) – **Dave Parsons** with consultation from **Brian Mills, Jeanette Onvlee, Pierre Dubriel and Len Barrie**. Vision here is to be a conclusion with some examples of success and what we can do in the future
- 7.1. Transfer Research results to NMHS, policy- and decision-makers
 - 7.2. General Capacity Building and Training
 - 7.3. Benefits to society

REFERENCES (up to several pages, an extremely long list of scientific references is not appropriate for a strategic document)

LIST OF FIGURES AND TABLES (1 page)

ANNEX: ACRONYMS (1 page)

Defn of FDP, RDP, Testbeds etc

Terms of reference

Task lists may be moved to the annex