General Report on WWRP

Gilbert Brunet

World Weather Research Programme

WGNE-24, 03-07 November 2008, Montréal
World Weather Research Program: Long-term objectives

- To improve public safety and economic productivity by accelerating research on the prediction of high-impact weather;
- To demonstrate improvements in the prediction of weather, with emphasis on high-impact events through the exploitation of advances in scientific understanding, observational network design, data assimilation and modelling techniques and information systems;
- To improve understanding of atmospheric processes of importance to weather forecasting through the organization of focused research programmes (e.g. WWRP SP);
- To encourage the utilization of relevant advances in weather prediction systems to the benefit of all WMO Programmes and all Members.
Membership of JSC WWRP

- Dr Gilbert BRUNET, Chairman of WWRP-JSC, Environment Canada
- Dr Barbara BROWN, Chairperson of Working Group on Verification, NCAR, USA
- Dr David BURRIDGE, Chairman of THORPEX ICSC, ECMWF
- Dr Lianshou CHEN, Chairman of Working Group on Tropical Meteorology, China Meteorological Administration
- Dr Tom KEENAN, Chairman of Working Group on Nowcasting Weather Forecasting, Bureau of Meteorology Research Center, Australia
- Mr Brian Mill, Chairman of Working Group on Social and Economic Research and Applications, Environment Canada
- Dr Martin MILLER, Chairman of Working Group on Numerical Experimentation, ECMWF
- Mrs Jeanette ONVLEE, Chairperson of Working Group on Mesoscale Weather Forecasting, Royal Netherlands Meteorological Institute
- Dr Dave PARSONS, Member, JSC-WWRP, NCAR, USA
- Dr Melvyn SHAPIRO, Member, JSC-WWRP, NCAR, USA
- Prof Huw C. DAVIES, Member of JSC-WWRP, Institute for Atmospheric and Climate Science, ETH, Switzerland
- Dr Ko KOIZUMI, Member of JSC-WWRP, Numerical Prediction Division, Japan Meteorological Agency
- Mr Jean Philippe LAFORE, Member of JSC-WWRP, CNRM, Météo-France

THORPEX-Pacific Asian Regional Campaign/Tropical Cyclone Structure-08 Experiments and Collaborative Efforts

Patrick Harr
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European Coordinated Experiments 2007

- Convective and Orographically-induced Precipitation Study (COPS), WWRP Research and Development Project (RDP)
  Period: 01.06. – 31.08.2007
  Wulfmeyer et al. BAMS 2008

- General Observations Period (GOP)
  Period: full year of 2007
  Crewell et al. MetZet 2008, submitted

- Transport and Chemical Conversion in Convective Systems (COPS-TRACKS)
  Period: 16.07. – 02.08.2007

- Atmospheric Radiation Measurement (ARM) Program Mobile Facility (AMF)

- Demonstration of Probabilistic Hydrological and Atmospheric Simulation of flood Events in the Alpine region (D-PHASE)
  Period: 01.06. – 31.12.2007
  Rotach et al. BAMS 2008, submitted

WWRP Nowcasting Working Group Meeting, Helsinki, Finland

July 7-8, 2008

D-PHASE/COPS Model Evaluation

- 7 km
- 2.2 km

Windward/lee effect
Evaluation of D-PHASE Models in COPS Domain

Evaluation of D-PHASE Models in COPS Domain

Convection permitting models and 4DVAR confirmed superior performance.

MAP D-PHASE Summary

- Serves as a successful step toward an adaptive, user driven forecast system (TIGGE LAM concept) for high impact weather.

- A successful step toward high resolution ensemble prediction.

- Shows the benefits (some liabilities) of very high resolution modeling for convection and for orographic flows. Challenge also identified (e.g., high resolution assimilation, surface initialization, verification)

- Served as a successful focal point for research into how to improve mesoscale and nowcasting prediction.

- Serves as a successful model for united research and operational prediction efforts

- Serves as a model for how to undertake SERA activities.
Beijing ‘08

Region has large vulnerability to convective weather

Preliminary Outcomes of FDP and RDP for Beijing 08

• Multi-year effort that significantly improved the nowcasting capabilities of the international partners for prediction of warm season rainfall

• Transfer of nowcasting and mesoscale ensemble prediction technology to China (to Shanghai MHEWS also)

• SERA component with multiple users (impact assessment ongoing)

• Research and operational experience in high resolution modeling and mesoscale ensembles in convective rainfall

• More rainfall than normal and six events delayed. Close call on opening ceremony
Accumulated Precipitation
(04pm Aug. 8—06am Aug. 9)

Coordinating Air Chemistry, Weather and Climate Research

Weather Observations
Earth Surface Observations
Climate Change Prediction
Weather Prediction
Severe Events
Air Quality Prediction

Process Studies, Modelling & Observations Serving User Needs

Integrated Observations
Earth System Simulation
GHGs
Aerosols & Dust

O₃
WWRP STRATEGIC PLAN

- FOREWORD (Secretary General)
- EXECUTIVE SUMMARY (4 pages)
- 1. INTRODUCTION (3 pages)
  - 1.1. The Rationale for WWRP
  - 1.2. WWRP Mission
  - 1.3. Main Long-Term Objectives
- 2. CHALLENGES (7 pages)
  - 2.1. Introduction
  - 2.2. Achievements and Accomplishments
  - 2.3. Challenges

- 3. ORGANIZATIONAL COMPONENTS (3 pages)
  - 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
WWRP STRATEGIC PLAN

4. ACTIVITIES (30 pages) –
4.1. Working Group on Nowcasting Research (4 pages)
   4.1.1. Scope and Research Priorities
   4.1.2. Research Strategy
   4.1.3. Implementation Tasks
   4.1.4. Long range outlook
4.2 Working Group on Mesoscale Weather Forecasting Research (4 pages)
4.3 THORPEX Programme (10 pages)
4.4. Working Group on Tropical Meteorology Research (4 pages)
4.5. Working Group on Verification Research (4 pages)
4.6. Working Group on Societal and Economic Research and Applications (4 pages)

SERA Working Group Structure

Figure 4.1.1: Proposed SERA Working Group Structure
Development of a WWRP-wide Societal and Economic Research and Applications Working Group

- 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.

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

- 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,
  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.
5. OTHER CROSS CUTTING ACTIVITIES (5 to 8 pages)

- 5.1. Introduction
- 5.2. WGNE
- 5.3. Approaches to integrated forecasting systems
- 5.4. The WMO Sand and Dust Storm Warning System
- 5.5. Shanghai MHEWS

6. UNIFIED APPROACH TO WEATHER, CLIMATE AND ATMOSPHERIC CHEMISTRY (6 pages)

- 7. Impacts (4 pages)
  - 7.1. Transfer Research results to NMHS, policy- and decision-makers
  - 7.2. General Capacity Building and Training
  - 7.3. Benefits to society
Future Efforts

- Hydrology is a critical user of weather information and an important component of environmental prediction. A gap occurs within the WMO in the area of hydrological research and significant international activities are taking elsewhere. Thus, the WWRP should concentrate on hydrological application and research where the WMO can uniquely contribute, such as HEPEX (Hydological Ensemble Prediction Experiments), HYMEX (Hydological Cycle in the Mediterranean Experiment) and efforts similar to MAP D-PHASE.

- Realize that these FDP/RDP projects, NAEFS (North America Ensemble Forecasting System) and the real-time dissemination of tropical cyclone track information from TIGGE demonstrate how the TIGGE, TIGGE LAM and cascading concept of Severe Weather FDP can change how predictions are made for weather disasters in the developing world in a seamless way from week 2 down to hours (consider as a major emphasis of CAS).

- Toward a Seamless Process for the Prediction of Weather and Climate: On the Advancement of Sub-seasonal to Seasonal Prediction in collaboration with WCRP.

Future Efforts

- Regional Centers will be developed for Sand and Dust Storm (SDS-WAS) in 2009.
- Shanghai MHEWS (Multi-hazard Early Warning System) 2010
- TIGGE SERA demonstration projects.
- A Nowcasting FDP --- Vancouver 2010 Winter Olympics.
- T-NAWDEX (THORPEX North Atlantic Waveguide and Downstream Impacts Experiment)
- Mesoscale Modeling Testbeds/Intercomparisons
- Tropical cyclone field campaigns in the 2011-2013 time-frame
- Severe weather in monsoons (SE Asia)
Conclusion

- **WWRP Focus in 2008-09**
  1) Strategic Plan;
  2) Implementing an healthy SERA WG;
  3) WWRP WGs structure and new directions to propose at the 2009 CAS Meeting.
  4) Upcoming meetings (5-6 major events);

Notable Events Supported by WWRP

- **WMO workshop on 4D-VAR and Ensemble Kalman Filter inter-comparisons, Buenos-Aires, Argentina, 10-13 November 2008.**
  The primary purpose of the workshop is to encourage scientific discussions for a better understanding of the two data assimilation methods by current researchers in the field and to stimulate interest of younger scientists.
  The discussions should therefore provide a solid scientific basis for supporting practical decisions eventually to be taken by meteorological agencies concerned. (Organizing committee: L. Fillion, E. Kalnay, R. Errico, M. Ehrendorfer and K. Puri)

- **Commission for Atmospheric Sciences XV Session, Republic of Korea, 18-27 November 2009**
First Announcement

Third THORPEX International Science Symposium and TIGGE User Workshop
4 to 8 May 2009
Portola Hotel, Monterey, California

Organising Committee

Jim Hansen (NRL) - Chair
Istvan Szunyogh (U. Maryland) – Programme Chair
Rolf Langland (NRL)
Richard Swinbank (UK Met Office)
Florence Rabier (Meteo France)
Tetsuo Nakazawa (JMA/MRI)
Huw Davies (ETH)
Gilbert Brunet (MSC)
Eugene Poolman (SA Weather Service)
Dan Hodyss (NRL)
David Parsons (WMO)
David Burridge (WMO)

www.wmo.int/thorpex