Seventh Session of the Scientific Steering Committee (SSC) for the World Weather Research Programme (WWRP)

Geneva, Switzerland, 18-20 November 2014
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1. ORGANIZATION OF THE MEETING

1.1 Opening of the meeting
The seventh session of the Scientific Steering Committee (SSC) meeting of the World Weather Research Programme (WWRP) was held at the World Meteorological Organization (WMO) in Geneva, Switzerland from 18 to 20 November 2014, including the joint session of The Observing system Research and Predictability Experiment (THORPEX) International Core Steering Committee (ICSC) meeting. The participants (see Annex A) were welcomed to the meeting by the Chairperson, Gilbert Brunet and by Deon Terblanche, Co-Director of WMO's Research Department.

1.2 Adoption of the agenda and working arrangements
Some minor adjustments were made to the order of the agenda items (see Annex B). Presentations and related documents are available under WWRP web page at:

2. THE MAIN ACHIEVEMENTS OF THORPEX ACTIVITIES

2.1 Data Assimilation and Observing Systems (DAOS)
Roger Saunders presented the activities of the Data Assimilation and Observing Systems (DAOS). DAOS working group was formed in 2008 as part of the THORPEX project. With the ending of the THORPEX project it has been agreed that DAOS would become a working group within the WWRP programme. The proposed terms of reference of the DAOS-WG under the WWRP are:

The Data Assimilation and Observing Systems (DAOS) working group (WG) will provide guidance to the WWRP on international efforts to optimise the use of the current WMO Global Observing System (GOS). It will also provide guidance on which data assimilation methods may provide the highest-quality analysis products possible from the GOS. Through these activities, the DAOS-WG will facilitate the development of advanced numerical weather prediction (NWP) capabilities, especially to improve high-impact weather forecasts. DAOS will be primarily concerned with data assimilation and observing system issues from the convective scale to planetary scales and for forecasts with time ranges of hours to weeks.

Roger Saunders provided details about recent meetings:


- Sixth DAOS-WG meeting at College Park, Maryland, USA 11 October 2013. A short meeting of the WG was held immediately after the Data Assimilation Symposium at the University of Maryland on 11 October 2013 and the meeting report is available at: http://www.wmo.int/pages/prog/arep/wwrp/new/thorpex_daos_index.html.


- Joint DAOS and MWFR WG meeting at Montreal, Canada 16 August 2014. The meeting report is available at: http://www.wmo.int/pages/prog/arep/wwrp/new/thorpex_daos_index.html.
He reviewed the main research activities and discussed the following issues:

- Standardized data assimilation terminology
- Targeting statement, WMO publication on targeting, and evaluation(s) BAMS paper planned
- Comparison of forecast sensitivity to observations metric Gelaro et al. (2010)
- Monitoring and communicating on observation and DA status
- Exploit field campaigns (e.g., ConcordIASI, HyMeX, DIAMET)

2.2 **Predictability, Dynamics and Ensemble Forecasting (PDEF)**

Richard Swinbank presented the main scientific topics that the new PDEF working group should address. PDEF should initially focus on a small number of important scientific challenges:

- Stochastic representation of the effect of sub-grid-scale uncertainty in numerical models
- Construction of ensemble initial conditions
- Interactions of diabatic processes with meso/synoptic scale dynamics
- Assessment of multi-model ensembles and calibration techniques
- Coupled modelling & assimilation

Membership and transition from THORPEX have been discussed.

Since THORPEX has provided the expertise on the subject areas of data assimilation, predictability, dynamics, and ensemble forecasting, it was agreed (at the CAS-16 meeting in November 2013) that the DAOS working group be transferred to WWRP and a new group formed from elements of the Predictability and Dynamic Processes (PDF), the THORPEX Interactive Grand Global Ensemble (TIGGE), the Global Interactive Forecasting System (GIFS) working groups to cover predictability, dynamics and ensemble forecasting. Along with other WWRP working groups, the DAOS and PDEF working groups will provide support for the THORPEX legacy projects and the WWRP FDPs and RDPs.

2.2.1 **Predictability and Dynamic Processes**

Richard Swinbank and Istvan Szunyogh reviewed the activities performed by PDF and TIGGE under THORPEX. Over the past decade, the THORPEX research programme has focused international effort on accelerating the improvement of forecasts of high-impact weather. This programme has been supported by three working groups on data assimilation & observing systems (DAOS), predictability and dynamical processes (PDP) and ensemble forecasting (GIFS-TIGGE).

2.2.2 **Global Interactive Forecast System and TIGGE**

Richard Swinbank reviewed the GIFS-TIGGE activities. The GIFS-TIGGE working group was established in 2005, first to develop the TIGGE data set of ensemble predictions, and second to foster research and development on ensemble prediction and the application of ensemble forecasts in order to contribute towards a future Global Interactive Forecast System (GIFS). Since the TIGGE archive was launched in October 2006, the usage of TIGGE data has increased substantially, both in terms of the number of users and the amount of data downloaded. The TIGGE dataset is a rich resource for a range of research studies, with about 120 publications based on TIGGE data, as of early 2014. This illustrates the increasing acceptance by universities and funding agencies of the value of the TIGGE dataset, underlining the value of maintaining and adding to the dataset.

2.3 **Working Group on Numerical Experimentation (WGNE)**

Andy Brown illustrated the activities of the Working Group on Numerical Experimentation. The WGNE has been jointly established by the World Climate Research Programme (WCRP) and the WMO Commission for Atmospheric Sciences (CAS) and has the responsibility of fostering the
The development of atmospheric circulation models for use in weather prediction and climate studies on all time scales and diagnosing and resolving shortcomings. Andy Brown highlighted the main WGNE activities presented also during the last WGNE meeting (WGNE 29, Melbourne 10-13 March 2014):

- Transpose-AMIP is testing climate models in weather mode.
- Cloudy-radiance, in order to compare methods used in data assimilation.
- Grey-zone, which aims to systematically explore convective transport and cloud processes in weather and climate models at various resolutions, is focusing on the representation of cold-air outbreaks at different resolutions.
- Verification is working along several lines: NWP performance (e.g. TCs, precipitation), Polar verification, i.e. ConcordIASI intercomparison, to be integrated into Polar Prediction activities, Climate metrics, and Boreal Summer Intraseasonal Oscillation intercomparisons (organized by the Madden-Julian Oscillation (MJO) task team).
- Importance of aerosols for weather and climate, assessing the level of complexity required.
- Comparison of model momentum budgets - how do they differ? What is right?

The MJO task team recently joined WGNE, and it continues to make progress towards its overall goal to facilitate improvements of the MJO in weather and climate models.

2.4 THORPEX overview paper
David Parsons presented the status of the two papers to be published in the Bulletin of the American Meteorology Society (BAMS). The original plan was a single review paper submitted to BAMS. Discussions with co-authors and with the Chief of BAMS Editorial Board led to the paper being split into two articles:

- THORPEX and the Science of Prediction (submitted November 2014)
- The Successes and Challenges of the THORPEX Quest to Benefit Society and the Economy Through Improved Prediction (Proposal submitted and informally accepted by BAMS Editor)

The first paper is structured as follow: Introduction --- motivation for a programme on high-impact weather, brief history of the programme, THORPEX from the poles to the tropics, research on numerical weather prediction systems, regional aspects of high-impact weather, societal and economic aspects of high-impact weather, roots in the Global Atmospheric Research Program (GARP), and conclusions. While, the second paper will be titled “The Successes and Challenges of the THORPEX Quest to Benefit Society and the Economy Through Improved Prediction”.

3. NEXT FUTURE: THE THORPEX LEGACY PROJECTS

3.1 Polar Prediction Project (PPP)
Thomas Jung, Chairperson of the WWRP Polar Prediction Project (2013-2022) provided a review and status update of the project. To date, two activities listed in the PPP preparation phase (2013-mid 2017) have been completed, with various levels of progress on the others. The meeting was informed that on 1 September 2014, Helge Goessling was appointed the first Director of the project’s International Coordination Office (ICO). Since the last Scientific Steering Committee (SSC), PPP had published 3 scientific articles and a white paper for the World Weather Open Science Conference (WWOSC), Montreal, Canada, 16 - 21 August 2014. Seven project related events were held which included a session on PPP at the WWOSC. The PPP Chairperson in September 2014 presented an overview of the project to funding agencies in the US (National Science Foundation (NSF), Office of Naval Research (ONR) and the National Oceanic and Atmospheric Administration (NOAA)) which generated a lot of visibility for and keen interest in the
PPP. Lastly, the meeting was briefed on future plans and events of the PPP with special focus on preparations for the Year of Polar Prediction (YOPP), one of the flagship themes of the project.

During discussions the following action items were recorded:

- Prepare invitation letters to Permanent Representatives (PRs) for YOPP Summit (European Centre for Medium-Range Weather Forecasts (ECMWF), Reading, UK, 9-10 July 2015).
- Establish connection with Arctic Net especially its field component.
- Look into the Arctic Marine Shipping Assessment 2013.
- Explore the connection with Polar Data forum which could help provide a data archiving strategy for PPP.
- Present its plans to University of Lapland’s Arctic Centre and Antarctic Treaty Secretariat rather than just seek WMO endorsement.
- Engage with CLIVAR to ensure that relevant effort is devoted to Antarctic.
- Increase in-situ measurements of snow depth and sea ice.

3.2 Sub-seasonal to Seasonal Prediction Project (S2S)
Frederick Vitart, Co-Chairperson of the Sub-seasonal to Seasonal Prediction Project (2013-2018) presented to the meeting the project's status and future work plans. He reported that 5 sub-projects have been set up which includes: the S2S Monsoon Subproject, the S2S MJO subproject, S2S Africa Subproject, S2S extreme Weather Subproject and the S2S Verification Subproject. As part of its capacity building effort, a workshop and a training course on S2S had been organized with 3 more similar events scheduled for 2015 and 2016. It was also reported that all the technical issues for S2S data archiving such as those of re-forecasts and the definition of some parameters have been effectively addressed in the latest version of GRIB2 (GRIdded Binary) data format. There are plans to open the database portal in early 2015 with at least 3 models available. During discussions, it was noted that although the weather regime is a very important component it was not mentioned in the project's implementation plan.

During discussions the following action items were recorded:

- Consider weather regimes in S2S
- Consider downscaling (dynamical and statistical) in S2S
- Develop specific diagnostics on low and high latitude variability in coordination with PDEF
- SSC to decide whether there is a need for a WWRP SSC liaison for S2S

3.3 High Impact Weather Project (HIWeather)
Brian Golding, Co-Chairperson of the High Impact Weather Project (2014-2023), newest of the three THORPEX Legacy Projects, presented a brief overview of the projects’ objectives and activities. The scope of the HIWeather is defined by the following hazards: urban flood, disruptive winter weather, wildfire, urban heat waves and air pollution and extreme local wind. The various obstacles to effective mitigation of the disasters brought about by these natural hazards defines the five research pillars of the project which are: predictability and processes, multi-scale forecasts, vulnerability and risks, communication and evaluation. These pillars are in turn supported by 8 cross-cutting activities: Benefits in Operational Forecasting, Design of Observing Strategies, Field Campaigns & Demonstrations, Uncertainty, Knowledge Transfer, Verification, Impact Forecasting and Data Management & Archiving. Several areas for possible future work and development of the HIWeather were noted during the presentation and this included the establishment of an International Coordination Office and identification of 5 theme Principal Investigators to lead the research coordination and communication for the project.
During discussions the following action items were recorded:

- WWRP SSC to suggest names/experts to HIWeather SG and Scientific Advisory Group (SAG).
- HIWeather to establish formal links with IRDR’s Risk Interpretation and Action Project.
- Explore possible collaboration with WCRP on topics dealing with urban environment and coastal areas.
- HIWeather to collaborate with WMO GAW Urban Research Meteorology and Environment (GURME) project.

3.4 Round table discussion with funding agencies: societal relevance of WWRP projects

Representatives from 4 funding agencies (NSF, NOAA, European Commission (EU) and the Belmont Forum) were present at the meeting. The representatives of these funding agencies provided the meeting the funding requirements, funding opportunities and guidelines for submission of research proposals of their agencies. It was noted that most of the agencies have their own specific requirements. The NSF funded projects are mostly on basic research, NOAA’s projects are focused on ultimate improvement on operations (i.e. applied research) while the EU and Belmont Forum projects are oriented on societal challenges/needs and mainly on bridging research and innovation. Aside from presenting basic research grant terms and conditions, the group also provided the meeting with suggestions on how best to engage stakeholders and importance of involving them at an early stage of the project. They also put emphasis on the significance of not merely focusing on the quality of the project but more importantly on its potential impact to society.

4. COLLABORATION WITH OTHER PROGRAMMES/PROJECTS

4.1 WMO perspectives

Paolo Ruti, Chief of the World Weather Research (WWR) division, outlined the ongoing activities of the Working Group on Nowcasting Research (WGNR). Firstly, he spoke about the WWRP’s aims and tasks within the WMO strategic priorities (2016-2019):

- High-impact services for disaster risk reduction
- Aviation meteorological services
- Polar and high alpine regions
- Global Framework for Climate Services
- WMO Integrated Global Observing System
- Capacity Development
- WMO governance, with the main research priorities of WWRP: high impact weather, S2S forecasting, polar predictions and urban meteorology

He then reported on WWRP’s aims and tasks within the long-term CAS-16 priorities, considering the links with the three legacy projects:

- High-impact weather and its socio-economic effects
- Water: improved disaster risk reduction and resource management
- Integrated greenhouse gas information system
- Aerosols: Impacts on air quality, weather and climate
- Urbanization: Research and services for megacities
- Evolving technologies: Their impact on science and its use
In discussion, it was noted that more cross-cutting activities between WWRP, WCRP and the Global Atmosphere Watch (GAW) are needed.

### 4.2 Global Atmosphere Watch (GAW)

Oksana Tarasova, Chief of the Atmospheric Environment Research (AER) division, outlined the aims and ongoing activities of the GAW Programme that recently celebrated its 25th anniversary.

The GAW mission is to:

- Perform systematic global, long-term observations of the chemical composition and selected physical characteristics of the atmosphere with emphasis on quality assurance.
- Deliver integrated products, services and assessments in support of International Conventions and users.
- Develop of air pollution, weather and climate Predictive Capability.

She also presented the current evolution of the GAW concept to: (i) “Science for services”, (ii) from “long-term objectives” to user applications, (iii) as a first step in the preparation of the new GAW Implementation Plan, the Environmental Pollution and Atmospheric Chemistry (EPAC) SSC will formulate the application areas for different user groups that need GAW observations and analysis.

The following issues were suggested for GAW collaboration with WWRP:

- Must be enhanced in GURME («Urban meteorology» projects) -> potentially should be involved in high-impact weather activities.
- SDS-WAS provides regional forecasting of one of the GAW variables, but it is detached from GAW. There is no communication between SDS steering groups and GAW Scientific Advisory Group on Aerosols.
- Several potential joint initiatives are suggested, including:
  - Sand and dust storms are but the one of the problems related to aerosol transport, others include aerosol transport from biomass burning or volcanic plumes propagation. Those transport related alterations of atmospheric composition should be considered systematically as similar scientific issues.
  - GAW is supporting the Interdisciplinary Biomass Burning Initiative, but the formal involvement of the GAW or WWRP communities in this initiative is rather limited. Links should be established with WMO activities (S2S project).
  - WWRP and GAW can work together on the development of assimilation schemes of the GAW observations in NWP models (e.g. through WGNE).

During discussions the following action items were recorded:

- The SSC suggested to involve WGNE to develop research activities for meteorology-chemistry modelling and forecast.

### 4.3 World Climate Research Programme (WCRP)

David Carlson, Director of the WCRP/RES, outlined the goals and ongoing activities of the WCRP, as well as the main directions of current and further collaborations with WWRP. He started from a note that acronyms may offer internal convenience but overall they represent a barrier to communication, especially as science attempts to improve communications with the public. He stressed in his presentation the following issues:

- We talk about seamless research and predictions across time and space scales but in fact we continue to organize our efforts into increasingly fragmented groups and panels.
• WCRP seeks to refresh its directions and programmes through so-called Grand Challenges, with mixed results so far.
• A greater challenge lies in addressing, in a seamless climate and weather together effort, the short and long-term needs of megacities, particularly coastal megacities.

During discussions the following action items were recorded:

• The proposed new WCRP coastal megacities initiative was greatly supported as a good case for joint WCRP-WWRP project.
• Collaboration with WCRP should go through integration. HIW could have a central role with a specific focus to urban environment and coastal areas.
• Explore the possibility to have common sessions in scientific congress/workshops especially linking the grand challenge on extremes and the HIW project.

4.4 Group on Earth Observations (GEO)
Jim Caughey and Alexia Massacand (GEO scientific officer) outlined the ongoing activities and further plans of the Group on Earth Observations (GEO). J. Caughey spoke about the current results and ongoing activities according to the GEO Work Plan 2012-2015 and A. Massacand continued about the expected continuation for a further 10 years.

The 2015 strategic targets respond to the call of the 2008 G8 Summit in Tokyo to accelerate GEO efforts to meet the growing demand for Earth observations. The Strategic Weather Target is that by 2015, GEO aims to: close critical gaps in meteorological, ocean and related observations; enhance observational capabilities; and improve weather information especially for high-impact events and in the developing world. This will be achieved through the programmes and activities of WMO.

At a recent GEO Ministerial meeting it was agreed that GEO should continue for a further 10 years. The future structure of the programme is currently under active consideration and a new Strategic Plan is under development by the Implementation Plan Working Group (IPWG). This will be tabled in outline form at the next GEO Plenary. It will then be refined during the course of 2015.

The development of GEO is moving to a more strategic phase as is clear from the structure and objectives of the current 2012-2015 Work Plan and the evolving plans for the next phase 2016-2025. The current version of the 2012-2015 Work Plan (which is regarded as a 'living document') can be downloaded from http://www.grouponearthobservations.org.

The contributions from WWRP-THORPEX (and the WMO more generally) form very important elements of the GEO Work Plan. This is a two way supportive relationship in which the GEO framework can help WMO/WWRP-THORPEX deliver its objectives by linking cross-discipline activities, providing visibility at ministerial level and helping identify resource mobilisation opportunities.

During discussions the following action items were recorded:

• To explore funding possibilities through GEO for WWRP and WCRP joint activities.

4.5 Integrated urban services initiative
Liisa Jalkanen, WMO urban programme, outlined the newly suggested Integrated urban services initiative. Urbanization is rapidly becoming the dominant feature of societal dynamics. More than half the global population now lives in cities and this percentage is expected to increase to approximately 70% by 2050. The risks in the urban environment include but are no limited to: 1) flooding; 2) poor air quality; 3) sea-level rise; 4) extreme heat and human thermal stress; 5) energy and water sustainability; and 6) public health problems caused by the previous. These urban risks are largely related to weather and climate extremes and a key question would be to better understand how these would change in a changing climate.
The Sixteenth WMO Congress in 2011 requested for WMO to look at the challenges faced by megacities in order to provide better services, recognizing that this will require a coordinated effort across a broad spectrum of activities, from research to service delivery, in support of a wide range of user groups. Many WMO Members are working on urban issues but as an organization WMO has not addressed these in a consolidated manner. As a first step, an expert group put together the publication “Establishing integrated weather, climate, water and related environmental services for megacities and large urban complexes – initial guidance”. Currently urban related activities throughout WMO are being mapped and will be considered in a combined manner for presentation to the 17th WMO Congress in May 2015 for discussion. These integrated services will be relevant for urban resilience and sustainable development, climate change adaptation and mitigation, city planning, the anticipation and mitigation of natural hazards, including flooding and droughts, reducing the vulnerability of the urban poor to natural hazards, transportation, power supply, food safety, and the health of the citizens, amongst others.

During discussions the following action items were recorded:

- To promote the collaboration with urban programme to prepare Congress documents on cross-cutting issues (HIW)
- GURME could be an important research platform to be linked with HIW project.

4.6 Year of Tropical Convection (YOTC)
Mitch Moncrieff, outlined the ongoing activities of the Year of Tropical Convection. Coordinated jointly by WWRP-THORPEX & WCRP, and involving institutions, research groups and individuals worldwide, the YOTC project addresses the weather-climate intersection (sub-seasonal timescales). The science is focused on the organization of tropical convection and its multiscale interaction. Embedded in the objectives is how insights from high-resolution global weather models, cloud-system resolving models, and theoretical insights can accelerate the development of the next-generation of global models. The YOTC project consists of three major components: a high-resolution global numerical weather prediction database or virtual global field campaign, multi-sensor satellite databases and collaborative research.

The YOTC-ECMWF database consists of a complete global analysis, 10-day forecasts, and over 30 subgrid tendencies from the ECMWF IFS on a 25km computational mesh for the 2-year period May 2008 - April 2010. The “Year” features El Nino, La Nina, and Arctic Oscillation conditions. The YOTC project will formally end in December 2014, its website is http://yotc.ucar.edu.

In discussion, it was noted that the YOTC project has very good scientific results (a literature survey identified approximately 100 papers engaging the YOTC project) and needs to be further implemented.

4.7 North Atlantic Waveguide – Experiment
Patrick Harr outlined the aims and ongoing activities of the THORPEX North Atlantic Waveguide and Downstream Impact Experiment (T-NAWDEX). He started from the history of T-NAWDEX since the originally proposed by the THORPEX working group Predictability and Dynamical Processes (PDP) and HALO-THORPEX in 2005. He reported on the scientific scope, instrumentation, and plans for an international coordination of the T-NAWDEX.

The considered factors modifying wave-guide disturbances are the following:

- Tropopause polar vortices (pos. PV anomalies)
- Warm conveyor belt outflow (neg. PV anomalies)
- Extratropical transition of tropical cyclones
- Precursor wave packets
Scientific scope of the T-NAWDEX (wave guide modification by negative and by positive PV anomalies) is based on the following overarching hypothesis:

- There are systematic errors in model representation of waveguide perturbations that are attributable to diabatic processes.
- Errors are manifested as errors in PV distribution → evolve into forecast errors of high-impact weather downstream.

Unique aspects of the First T-NAWDEX field experiment (expected in Autumn 2016) include:

- To examine the development of forecast errors on a transatlantic scale over many days.
- To study the physical processes responsible for modification, propagation and downstream impact of Rossby waves.
- To study transatlantic evolution of wave disturbances on both sides of the Atlantic.
- PV measurements by observing MTP temperatures and wind velocities.
- Interesting links to other communities (cirrus clouds/UTLS/water vapour transport).
- Synergies with planned satellite missions ADM and EarthCare.

International partnership of the T-NAWDEX includes US (NPS, NCAR, OU, Princeton, MIT, NOAA), UK (Universities of Leeds, Manchester), Germany (DLR IPA, FX, KIT Karlsruhe, Univ. Mainz), France, Canada, Switzerland, and links to weather services: DWD, ECMWF.

4.8 HYdrological cycle in Mediterranean Experiment (HyMeX)
Veronique Ducroq presented the HYdrological cycle in Mediterranean Experiment (HyMeX). The HyMeX (www.hymex.org) programme is a 10-year concerted experimental effort at the international level aiming at advancing the scientific knowledge of the water cycle variability in all compartments (land, sea and atmosphere) and at various time and spatial scales. It also aims at improving the processes-based models needed for forecasting hydro-meteorological extremes and the models of the regional climate system needed for predicting and planning adaptation strategies against the impacts of climate variability and change and human activity on the frequency and severity of hydro-meteorological hazards in the Mediterranean basin.

Two field campaigns in northwestern Mediterranean have been performed in 2012 and in 2013. Two international HyMeX workshops were held: in October 2013 in Cassis, France and in September 2014, in Valletta, Malta. The next 9th workshop will take place in Greece in Fall 2015. About 500 users are registered to the HyMeX database that contains now about 400 datasets. In addition, for the regional climate runs, interoperability between the HyMeX database and the MedCORDEX database is established.

A literature survey identified more than 180 peer-review papers contributing to the HyMeX programme.

4.9 The World Weather Open Science Conference (WWOSC)
Gilbert Brunet, Deputy Director Weather Science, UKMO, and WWRP/SSC Chairperson, outlined the aims and main outcomes of the 1st World Weather Open Science Conference (WWOSC). He informed about the WWOSC participation: over 1000 participants, experts from over 50 countries in meteorology, application developments, social science as well as users; and presentations: 12 concurrent sessions and panels, over 700 oral presentations and 300 posters.

He reported on the main achievements:

Shape the thinking of an entire scientific community: taking stock of the status of scientific advances, doing a concerted identification of challenges, collectively setting priorities and joint
programmes to address them (i) User’s perspectives, (ii) Seamless prediction, (iii) Polar Prediction Project, S2S and HIWeather, (iv) Urban weather and environmental prediction.

Outcomes:
Peer reviewed white paper (5 main themes with about 20 chapters) to be published before (or after, in this case a short summary will be distributed) Congress.

During discussions the following action items were recorded:

- The SSC noted that it was a very successful conference which needs to be continued. The SSC recommended organizing such a conference every 10 years.
- WWOSC press release to be sent to all SSC Members.

5. STATUS OF RESEARCH ACTIVITIES AND MEMBERSHIP

5.1 Mesoscale Forecast and Nowcasting Research
Paul Joe presented both mesoscale forecast and nowcasting activities, which will be under a new working group from 2015 in order to promote a seamless approach from minutes to few days forecast. He showed the main outcomes from the existing initiatives (see extended description under http://www.wmo.int/pages/prog/arep/wwrp/new/documentation_plan_WWRSSC7_2014.html and presented the new initiatives which have been promoted and will be a cornerstone of the new working group, a short summary includes:

- Understanding and prediction of rainfall associated with landfalling tropical cyclones (UPDRAFT): a workshop on preparing this project was held in May 2014 in Nanjing. The project aims to focus on better understanding and forecasting the behaviour of landfalling typhoons, with an emphasis on rainfall.
- La Plata Basin. A proposal for an RDP to better understand and forecast the extreme MCS’s in this region was already supported by the JSC some time ago. After an initial field campaign (CHUVA), a more extensive one is now being planned on Remote sensing of Electrification, Lightning, And Meso-scale/micro-scale Processes with Adaptive Ground Observations (Relampago). However, a better coordination among several countries in the region should be envisaged.
- Meso-Vict is a follow-up for the spatial verification methods intercomparison project (ICP), using real-life cases in (moderately) complex terrain. The aim is to create a community testbed for verification methods (NOT for models), starting with data from June- November 2007 for the models COSMO-2, GEM-LAM and COSMO-LEPS. Other models, or more recent versions of these models, can be added as the participants see fit. A kickoff meeting for Meso-VICT will be held on 2-3 October in Vienna.

Other relevant research development projects (RDP) and forecast demonstration projects (FDP) will be discussed under section “Updates and new proposal for RDPs/FDPs”.

Mesoscale and nowcasting working groups have been involved in the drafting of an Implementation Plan for High Impact Weather. See the HIW Implementation Plan under www.wmo.int/wwrp. The new working group should better define how it can contribute to it.

5.2 Tropical Meteorology Research
Yihong Duan exposed the research activities of the Tropical Meteorology Research working group and their future plans, and he updated the information about several field and modelling research experiments, workshop and meetings:
• The South China Monsoon Rainfall Experiment (SCMREX) successfully carried out the 2014 field campaign.
• The WMO Typhoon Landfall Forecast Demonstration Project (WMO-TLFDP) organized by Shanghai Typhoon Institute (STI) of CMA has entered the extended period since 2013. Real-time typhoon forecasts from a total of 13 agencies and forecast verification results continued to be provided for users through the WMO-TLFDP website (http://tlfdp.typhoon.gov.cn).
• The 5th International Workshop on Monsoon (IWM-V) was cosponsored by WMO/WWRP and the Macao Meteorological and Geophysical Services between 28-31 October 2013. It was attended by approximately 200 research scientists and NMHS forecasters from two dozen countries and regions. In addition, a Monsoon Training Workshop on Weather Observations and Forecasting was held on 31 October in Macao and 1 November in Hong Kong.
• The workshop on the preparation of the RDP proposal (Understanding and PreDiction of Rainfall Associated with landFalling Tropical cyclones, UPDRAFT) was held in Nanjing, China on 6-18 May 2014.

5.3 Societal and Economic Research and Application (SERA)
Brian Mills recalled that the primary purpose of the SERA working group is to advance the science of the social and economic application of weather-related information and services. This is accomplished in part through the provision of advice to WWRP and WMO and through the development, review and promotion of societal and economic-related research focused on high-impact weather (HIW) and information. The clear direction to WG SERA and the 5 other WWRP WGs now in place is to have a strong presence within, and make contributions to, the 3 THORPEX legacy projects: Sub-seasonal to Seasonal (S2S) prediction project; High Impact Weather (HIW) project and the Polar Prediction Project (PPP).

Brian Mills detailed the most relevant activities in the last year:

• SERA working group played an active role in chairing and executing the User and Social science (UAS) Programme of the World Weather Open Science Conference (online materials on www.wmo.int/wwrp). The event was likely the largest international gathering of social and interdisciplinary scientists and application specialists focused on weather-related research.
• Concerning the three THORPEX legacy projects, SERA WG has been involved in several ways: SERA is presently represented on the PPP Steering Committee by Brian Mills. A SERA sub-committee is in the process of being formed largely drawing upon the existing network of social scientists involved in climate change related research in the Arctic. A meeting is being tentatively planned for March 2015, most likely in Ottawa or Waterloo, Canada. SERA Members were involved in the June 2014 organizational workshop in Silver Spring, USA, facilitated a special HIWeather project session at the WWOSC, and have provided input to the latest HIWeather proposal.
• SERA provided inputs to the Coastal Flood Inundation Demonstration Project (CIFDP) which aims to integrate and apply existing models, tools and knowledge to improve coastal flood hazard forecasting in particularly vulnerable countries.
• This initiative is designed to aid WMO Members, especially developing countries, in understanding and making sound choices with respect to designing and contracting studies to assess the socio-economic costs and benefits of services as well as communicating and making use of the results of such research. The preparation of the guidance book has involved a dozen authors and editors, supported by WMO (Public Weather Services), the World Bank, and Climate Services Partnership through the USAID-funded Climate Change Resilient Development Project. The book Forecast Value: Economic Assessment of Meteorological and Hydrological Services is expected to be published by WMO in 2015.
**Integration with other international initiatives**

A formal working arrangement between the WMO WWRP and the Integrated Research on Disaster Risk (IRDR) programme, which is supported by the International Council for Science (ICSU), International Social Science Council (ISSC), and United Nations International Strategy for Disaster Reduction (UN ISDR), was established to facilitate greater interaction between SERA (and other WWRP WGs) and IRDR to realize shared goals and objectives.

5.4 Joint Forecast Verification Research

Marion Mittermaier presented the activities of the Joint Working Group on Forecast Verification Research, focusing on the next spatial methods inter-comparison using a rich data set from a previous MAP D-PHASE/COPS RDP/FDP. She provided an exhaustive description of the collaborative research projects that the working group is involved in:

- A second spatial verification methods intercomparison, now referred to as MesoVICT or “Mesoscale Verification Inter-Comparison over Complex Terrain”. The project was launched at the EMS/European Conference of Applied Meteorology (ECAM) in Reading, UK, September 2013.
- Strong involvement in all three THORPEX legacy projects, Sub-seasonal to Seasonal prediction (S2S), the Polar Prediction Project (PPP) and High Impact Weather project (HIW), where they have developed the verification components of the implementation plans. One of the research themes of HIW is evaluation, including the verification of hazard impacts.
- The working group also participated in the Task Team of the Technical Commission of Basic Systems for global surface verification. This task team has been looking at the inconsistencies in data retrievals by different global centres from the GTS, lack of precision in surface station location information (which is causing difficulties with km- scale NWP with grid resolutions of the order 0.015 degrees, need at least 3 decimal places to identify nearest gridpoint), difficulties in implementing station-based precipitation climatologies, impact of using nearest grid point compared to nearest land point, and the impact of height-based temperature corrections, as part of their remit. The outcome of the recent meeting in October 2014 was the drafting of new mandatory rules for the exchange of global surface metrics.
- A key achievement in the last 12 months is the publishing of the guidance document on Verification of Tropical Cyclone Forecasts, and is available for download from the working group web page.

She finished with an overview of a strategic response from the working group to the white papers submitted by all the groups ahead of the conference in Montreal. The importance of observations was highlighted.

6. UPDATES AND NEW PROPOSALS FOR RDPS/FDPS

6.1 Lake Victoria Project

Paul Joe briefed WWRP SSC on the Lake Victoria project. The project has been tasked to set up an “understanding” project to enhance our knowledge of the evolution of life-threatening weather over the lake. Basis of the “understanding” project will be an observational field campaign on and around the lake. A proposal for this has been prepared by members and associates of the Nowcasting Working Group to NSF, requesting a dense observation network, partly to be taken from the NSF equipment pool, but also requiring much equipment from other sources. Data will be available from Eumetsat, the MetOffice low-frequency lightning network, and model forecasts from the UM4km model for Southern Africa. Mesoscale modelling should include both the atmosphere and the lake itself. Experts from the lake (observation and modelling) community have expressed interest to participate. Given the likely impact of the circulation within the lake itself on thunderstorm conditions, the possibility is being considered of nesting very high resolution coupled
atmosphere-lake models within the UM4km model. Interested partners for this are being sought. The complexity to find adequate support for the field campaign suggests the idea to proceed with a first phase based on the use of satellite products and high-resolution numerical forecasts.

7. STATUS OF RESEARCH ACTIVITIES AND RDPS/FDPS

7.1 South China Monsoon Rainfall Experiment (SCMREX)
Yihong Duan reported by WebEx the current progress and activities of the South China Monsoon Rainfall Experiment (SCMREX) RDP. The main results for the reporting period are the following:

- The field campaign was successfully carried out during April - June 2014
- Data collection was completed and data processing is ongoing
- Preliminary research results have been obtained

The future plans include the following activities of the working groups: SCMREX WGs of Data Processing/Sharing, Physical Mechanism Study, and NWP Study, respectively, will continue to carry out relevant works. Specifically, QC of the variety of datasets and production of high-resolution gridded analysis will be the focuses of the Data Processing WG. Physical Mechanism Study WG will conduct both observational analysis and numerical modelling for the heavy rainfall events during the 2014 IOP. The NWP WG will investigate impacts of observational data on quantitative precipitation forecasts (QPFs) through data assimilation in both case study experiments and continuous experiments using different forecast systems. A SCMREX workshop – as a special session of HIW - is planned to take place in Ningbo, Zhejiang province during January 2015.

7.2 Sand and Dust Storm Warning and Assessment System (SDS-WAS)
Slobodan Nickovic, chair of the NA-ME-E node of SDS-WAS, briefed WWRP SSC on the Sand and Dust Storm Warning and Assessment System (SDS-WAS) activities and news. The regional nodes for SDS-WAS have been established in Asia (hosted by China), the Northern Africa-Middle East-Europe (hosted by Spain) and the Americas (hosted by USA), with an additional potential regional node in West Asia in collaboration with UNEP. It was noted the designation by EC-65 of the SDS-WAS regional centre in Barcelona, Spain, as the RSMC-Atmospheric Sand Dust storm Forecasts (ASDF) for Northern Africa (north of Equator), the Middle East, and Europe and was pleased with the operational status since March 2014 of the Barcelona Dust Forecast Center, the result of the cooperative efforts of AEMET, the Barcelona Supercomputing Center and WMO. There are some initiatives to designate another SDS-WAS regional node in Beijing, China, as the RSMC-ASDF for the region consisting of Asia and the Central Pacific. The Joint CBS-CAS Task Team on Atmospheric Sand and Dust Storm Forecasts is preparing a study on the evaluation of dust prediction models to address the questions raised at CBS-15 on the performance of dust models.

During the discussions the importance to develop the operational component of SDS-WAS and transfer it under the CBS was noted. Closer collaboration with CBS is needed for that.

During discussions the following action items were recorded:

- SSC considered and approved the WWRP SSC Science and Implementation Plans for 2015-2020 (the final version to be circulated by email).

7.3 Landfall Typhoon Rainfall Prediction
WGTMR has expressed its interest to prepare a proposal for ‘Understanding and Prediction of Rainfall Associated with Landfalling Tropical Cyclones (UPDRAFT)’ and submitted the proposal summary for SSC consideration.
Yihong Duan briefed WWRP SSC about the proposed project. It was noted that with the fast growth of the population and infrastructures along the coastal region around the Pacific Ocean, there is an urgent need to accurately predict rainfall intensity and distribution from landfalling tropical cyclones (TCs). The Key Laboratory of Mesoscale Severe Weather (LMSWE) of the Ministry of Education, Nanjing University and the Chinese Academy of Meteorological Sciences of the China Meteorological Administration (CMA) thus propose to establish a WMO/WWRP RDP entitled “Understanding and PreDiction of Rainfall Associated with landFalling Tropical cyclones (UPDRAFT)”. The overall goal of this proposed project is to improve our understanding and prediction of rainfall associated with landfalling TCs based on observational data analysis, model evaluation and model improvements.

During discussions the following action items were recorded:

- SSC agreed that this is an important study. A document will be circulated between members for approval.

### 7.4 PyeongChang Winter Olympic Games

The Korea Meteorological Administration (KMA) has expressed its interest in preparing a proposal for a WWRP RDP for the Korean Winter Olympics in 2018.

Jong-Chul Ha (KMA) briefed WWRP SSC about the proposed project. KMA is already hard at work to provide an impressive and dense observational infrastructure in support of the services for these Games. Concerning the science which can take shape in such an RDP, KMA has expressed its interest in process studies on hydrometeors and snow, and sub-km modelling. In addition, the use of km-scale EPS is being considered.

The dense surface network, with the addition of dual-pol radar and lidars, could be a very good testbed for (mesoscale) impact studies of those relatively new instruments. It would also offer good opportunities for validating very high (sub-km) resolution models, for establishing which observations are the most appropriate to initialize such a model, for testing new developments in the modelling of winter (stable) and snow conditions, and for assessing the performance of EPS systems at the 1km-scale. For these reasons, the WG-MWFR has expressed to KMA its strong encouragement of organizing an RDP along those lines, and has provided KMA with some advice concerning the planning and organizing of this RDP.

During discussions the following action items were recorded:

- SSC agreed that this is an important study. A document will be circulated between members for approval.

### 7.5 La Plata Project

Celeste Saulo presented the La Plata Project. This Research and Development Project for improving the prediction of heavy precipitating systems over La Plata Basin (LPB-RDP) was proposed in 2012 by Celeste Saulo (UBA, Argentina), Christopher Cunningham (CPTEC, Brazil) and Alice Grimm (UFPR, Brazil) and approved by the 5th JSC WWRP. The project is motivated by the lack of comprehensive understanding about the processes that determine severe weather events in the La Plata Basin, and limitations to provide skillful forecasts which would contribute to minimize their impacts. The team of the RELAMPAGO international project involves experts and organizations from Argentina, Brazil, USA and Mexico. The focus region – the La Plata Basin – is a complex region including megacities, coastal, tropical areas, etc. The key science focus is on convective processes, aerosol cloud interactions, etc. They suggest a Nowcasting FDP/RDP in connection with RELAMPAGO – November 2017.
7.6 FROST 2014

Dmitry Kiktev, RosHydroMet, reported on the FROST-2014 (Forecast and Research in the Olympic Sochi Testbed 2014) RDP/FDP. Seven international participants took part in the project. Eight deterministic high resolution numerical weather prediction models were implemented for the region of the Olympics (five models were run with grid spacing of 1 km or finer (down to 250 m). Six ensemble prediction systems (including two convection permitting ones) and six nowcasting systems contributed to project. Radar data from Turkey and Ukraine were merged with the Russian radar to produce a composite. FROST-2014 provides a valuable information resource for mesoscale predictability studies, development and validation of forecasting systems over complex terrain. The FROST-2014 information archive of observations and forecasts is intended to be a part of the project legacy for the international research community. The project is over, suggestions/input to the Olympic Committee provided. A journal special issue is planned to be published.

7.7 Aviation RDP (AvRDP)

Peter Li (HKO, Hong Kong) presented by teleconference the proposed Aviation RDP. ICAO and CAEM (WMO) meet once every 12 years to lay out the vision of the Aviation Navigation System of the future. The vision formulated in 2013 (until 2028) is described in the GANP (Global Aviation Navigation Plan) and is laid out in 5 year blocks (ASBU – Aviation Strategic Block Units) with specific visions and goals. Achieving these goals will depend substantially on improved weather information. CAEM has formally requested cooperation and collaboration from CAS to achieve these meteorological goals. The SSC approved the plan.

In the next 13-15 years, the focus will be on delivering nowcasting and mesoscale modelling techniques to support “trajectory based operations” and to support “terminal area” operations. In the US and Europe, meteorological activities are being organized in the context of NextGen and SES. The purpose of the AvRDP is to demonstrate and advance the capability of nowcasting and mesoscale modelling techniques for aviation and it is expected that its outcomes will show the benefits of such advanced forecasting methods in support of current and future air traffic management systems. Furthermore, AvRDP will promulgate those technologies within members to help build capacity to meet the requirements for enhanced services stemming from the GANP. The proposed RDP/FDP aims to coordinated required research activities for the remaining met community and demonstrate the outcomes at several airports in different climatological locations.

Hong Kong has offered to host the next symposium on nowcasting and to combine it with an aviation capacity building workshop related to the Aviation RDP. An alternative location was offered by Alan Seed if there were any issues with hosting it in Hong Kong and this would provide an opportunity to coordinate with a workshop on urban nowcasting (i.e. see TOMACS, SREP and PA15 items).

During discussions the following action items were recorded:

- Recognizing the importance of the nowcasting and forecasting research for aviation the SSC WWRP recommends the Aviation Research Demonstration Project (AvRDP) proposed by the WGNR, as a joint project between CAS, CBS and CAEM.

8. UPDATES AND NEW PROPOSALS FOR RDPS/FDPS

8.1 Expert Team on Weather Modification

There was an update from the Weather Modification group, saying that currently 52 countries worldwide were engaged in activities, with 39 active programmes in the US alone. The group has been asked to compile a report on geo-engineering. The difference between the two is the scale of impact and the cross-border nature of geo-engineering. WMO has thus far not made a statement on geo-engineering.
8.2 North Western Pacific Tropical Cyclone Ensemble Forecast Project
Yoshiaki Takeuchi presented results from the NW Pacific TC ensemble forecasting project. It uses the Cyclone XML (CXML) format devised back in 2008. Eight forecast centres are participating to provide a multi-centre grand ensemble consisting of 207 members. Track forecast products are provided via a web page. The evaluation looks at the 3-day window between 5-8d lead times against climatology. Skill is found up to 10 days. In 2015 the project plans to consider cyclogenesis estimates at the medium range.

8.3 Tokyo Metropolitan Area Convection Study for Extreme Weather Resilient Cities
Paul Joe presented results from the TOMACS project under the theme of “Extreme weather resilient cities”. Tokyo has 30 million people in a 50 km radius. The project included a field experiment, early detection and prediction systems, social experiments (e.g. putting weather warnings on city billboards and gauging how people react to this).

9. MANAGEMENT REPORTS

9.1 Towards the Congress: key topics
Paolo Ruti (Head of World Weather Research) presented the main topics that should be proposed to the Congress:

- The development of three major projects based on the THORPEX experience: ‘Polar Prediction Project’ (PPP), ‘Sub-seasonal to Seasonal’ project (S2S) and ‘High Impact Weather’ project (HIWeather).
- The role of the World Weather Open Science Conference (WWOSC) in reviewing recent advances in weather science and in the science and practice of weather prediction.
- The collaboration between WWRP, WCRP and GAW towards the development of a seamless approach.
- The importance of the work performed by WWRP Working Groups, and the establishment of the new ones: the Predictability, Dynamics and Ensemble Forecasting, the Data Assimilation and Observing Systems, and the Mesoscale and Nowcasting.
- The significant role of Research Development Projects (RDPs) and Forecast Demonstration Projects (FDPs) to transfer research outcomes into operational applications and to provide members a bottom-up opportunity to benefit from the expertise within WWRP. Lake Victoria and Aviation RDPs should strongly advance in 2015.

9.2 Implementation Plan
Paolo Ruti outlined the WMO Strategic Plan. The main focus areas are: extreme weather and climate events; global and regional aspects important to civil aviation; expansion of transport into polar regions and vulnerability of urban societies. CAS has additional priorities of water, integrated greenhouse gas systems, aerosols, and the evolution of technologies. During the discussion, the members strongly supported the development of a seamless approach and the continued convergence between weather and climate research activities.

During discussions the following action items were recorded:

- SSC agreed that an outline of the implementation plan should be prepared for the WMO Congress, while the plan should be finalized by the end of the year.
10. TOWARDS FUTURE PLANNING

10.1 Meeting diary for 2014/2015
A preliminary list of meetings has been discussed, and a specific google calendar has been created (see Annex D for the first half of the year):

- https://www.google.com/calendar/embed?src=wmo.int_d56aqfqmnfoa0h8jaqymuli8%40grou p.calendar.google.com&ctz=Europe/Zurich

The calendar will be constantly updated.

10.2 Revision of decisions/actions and next WWRP meeting
Actions have been discussed. A detailed list can be found in Annex C. Dates of the next WWRP SSC meeting will be decided at the beginning of 2015.

10.3 Recommendation of WWRP Chair and Wrap-up
Gilbert Brunet highlighted that weather prediction has achieved immense progress, driven by research and increasingly sophisticated telecommunication, information technology and observational infrastructure. Predictive skill now extends in some cases beyond 10 days, with an increasing capability to give early warning of severe weather events many days ahead. Ensemble methods now routinely provide essential information on the probability of specific events, a key input in numerous decision-making systems. Partly because of these advances, the needs of the users of weather services have simultaneously diversified to encompass "environmental" prediction products such as air quality or hydrological predictions. But as the science advances, critical questions are arising concerning, for example, the possible sources of predictability on weekly, monthly and longer time-scales; seamless prediction; optimal use of local and global observing capabilities; and the effective use of massively-parallel supercomputers. The science now is primed for a step forward informed by the realization that there can be predictive power on all space and time-scales arising from what are currently poorly-understood sources of potential predictability.
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WMO secretariat

Deon Terblanche, David Carlson, Paolo M Ruti, Michel Rixen, Oksana Tarasova, Nanette Lomarda, Alexander Baklanov.
SCHEDULE

DAY 1, 18 November - WWRP-THORPEX Joint Session

08:30 to 08:40: Welcome – Opening of the meeting
Deon Terblanche
Gilbert Brunet

08:40 to 09:00: Adoption of the agenda and Working arrangements
Paolo Ruti

The main achievements of THORPEX activities (Rapporteur P. Ruti)

09:00 to 09:40: Data Assimilation and Observing Systems
Roger Saunders
09:40 to 10:10: Predictability and Dynamic Processes
Istvan Szunyogh
10:10 to 10:40: Global Interactive Forecast System and TIGGE
Richard Swinbank
10:40 to 11:00: Predictability, Dynamics and Ensemble Forecasting
Richard Swinbank
11:00 to 11:20: Break

11:20 to 12:00: Working Group on Numerical Experimentation
Andy Brown
12:00 to 12:30: THORPEX overview paper
David Parsons
12:30 to 14:00: Lunch

Next future: the THORPEX legacy projects (Rapporteur N. Lomarda)

14:00 to 14:45: Polar Prediction Project
Thomas Jung
14:45 to 15:30: Sub-seasonal to Seasonal Prediction Project
Frederic Vitart
15:30 to 15:45: Break
15:45 to 16:30: High Impact Weather Project
Brian Golding
16:30 to 18:00: Round table discussion with funding agencies:
societal relevance of WWRP projects (Telec)
Patrick Harr, J. Cortinas, P. Monfray, A. Tilche

DAY 2, 19 November – WWRP SSC

Collaboration with other programmes/projects (Rapporteur A. Baklanov)

08:45 to 09:00: WMO perspectives
Paolo Ruti
09:00 to 09:30: Global Atmosphere Watch
Oksana Tarasova
09:30 to 10:00: World Climate Research Programme
David Carlson
10:00 to 10:30: Group on Earth Observations
J Caughey/A. Massacand
10:30 to 11:00: Integrated urban services initiative
Liisa Jalkanen
11:00 to 11:15: Break
11:15 to 11:45: Year of Tropical Convection
Mitch Moncrieff
11:45 to 12:15: North Atlantic Waveguide - Experiment
Patrick Harr
12:15 to 12:45: HYdrological cyclone in Mediterranean Experiment
Veronique Ducroq
12:45 to 14:30: Lunch
14:30 to 15:00: The World Weather Open Science Conference
Gilbert Brunet
Brian Mills
Sarah Jones

**Status of research activities and membership (Rapporteur T. Nakazawa)**
15:00 to 15:30: Mesoscale Forecast Research
Paul Joe
15:30 to 16:00: Nowcasting Research
Paul Joe
16:00 to 16:15: Break
16:15 to 16:45: Tropical Meteorology Research
Yihong Duan
16:45 to 17:15: Societal and Economic Research and Application
Brian Mills
17:15 to 17:45: Joint Forecast Verification Research
Marion Mittermaier

**Updates and new proposals for RDPs/FDPs (Rapporteur T. Nakazawa)**
17:45 to 18:15: Lake Victoria Project
Paul Joe

**DAY 3, 20 November – WWRP SSC**

**Status of research activities and RDPs/FDPs (Rapporteur A. Baklanov)**
08:30 to 09:00: South China Monsoon Rainfall Exp.
Yihong Duan
09:00 to 09:30: Sand and Dust Storm Warning and Assessment System
Slobodan Nickovic

**Updates and new proposals for RDPs/FDPs (Rapporteur A. Baklanov)**
09:30 to 10:00: Landfall Typhoon Rainfall Prediction
Yihong Duan
10:00 to 10:30: PyeongChang Winter Olympic Games
Jong-Chul Ha
10:30 to 11:00: Break
11:00 to 11:30: La Plata Project
Celeste Saulo
11:30 to 12:00: FROST 2014
Dmitry Kiktev
12:00 to 12:30: Aviation RDP (Teleconf)
Peter Li
12:30 to 14:00: Lunch

**Updates and new proposals for RDPs/FDPs (Rapporteur T. Nakazawa)**
14:00 to 14:30: Expert Team on Weather Modification (Teleconf)
Roelof Bruinjtes
14:30 to 15:00: North Western Pacific Tropical Cyclone
Yoshiaki Takeuchi
  Ensemble Forecast Project.
15:00 to 15:30: Tokyo Metropolitan Area Convection Study
  for Extreme Weather Resilient Cities
Paul Joe
15:30 to 15:45: Break

**Management Reports**
15:45 to 16:15: Towards the Congress: key topics
Paolo Ruti, Gilbert Brunet
16:30 to 17:00: Implementation Plan
Gilbert Brunet, Paolo Ruti

**Towards future planning**
17:00 to 17:15: Meeting diary for 2014/2015
Paolo Ruti
17:15 to 17:30: Revision of decisions/actions and next WWRP meeting
Paolo Ruti
17:30 to 18:00: Recommendation of WWRP Chair and Wrap-up
Gilbert Brunet
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<th>Outcomes</th>
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<td>Data assimilation in weather and climate</td>
<td>Organize a teleconference with WCRP key scientists to discuss common activities between WWRP and WCRP for data assimilation</td>
<td>C/WWRP and co-chairs of DAOS</td>
<td>Minutes of the teleconf. to be shared with SSC Members in order to discuss further initiatives</td>
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<td>Better connection between PDEF and WCRP initiatives on climate predictability</td>
<td>Review the different initiatives within WCRP concerning predictability research. Email exchange with WGNE, GEWEX</td>
<td>PDEF co-chairs</td>
<td>Table describing the WCRP activities and possible links with PDEF topics.</td>
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<td>3</td>
<td>Regional balance: South-America representatives should be included in DAOS and PDEF WGs</td>
<td>Consider scientists from the South-America in future membership</td>
<td>PDEF and DAOS co-chairs</td>
<td>List of potential members for future rotations</td>
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<td>4</td>
<td>How to prioritize coupling issues within PDEF and DAOS?</td>
<td>Organize a teleconference: PDEF-DAOS co-chairs, C/WWRP</td>
<td>PDEF and DAOS co-chairs, C/WWRP</td>
<td>Minutes of the teleconf. to be shared with SSC Members in order to discuss further initiatives.</td>
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<td>5</td>
<td>Define priority areas to be included into the Congress documents with a specific focus to WWRP initiatives</td>
<td>Discussion at WWRP SSC, and interactions with WWRP SSC chair</td>
<td>C/WWRP and WWRP SSC Chair</td>
<td>Congress documents.</td>
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<tr>
<td>6</td>
<td>YOPP summit, July 2015, PR involvement and other key stakeholders</td>
<td>Preparation of a letter to PR</td>
<td>PPP Chair and C/WWRP</td>
<td>Letter to PR to be sent.</td>
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<td>7</td>
<td>Establish connections with relevant stakeholders for YOPP: Arctic Net especially its field component; Arctic Marine Shipping Assessment 2013; Polar Data forum; University of Lapland’s Arctic Centre and Antarctic Treaty Secretariat</td>
<td>Establishment of an organizing committee for the YOPP summit</td>
<td>PPP Chair and WWRP SSC</td>
<td>List of actions in preparation of YOPP summit</td>
</tr>
<tr>
<td>8</td>
<td>Climate model deficiencies for southern ocean and Antarctica.</td>
<td>Ensure the right link with CLIVAR</td>
<td>PPP Chair</td>
<td>Report to the next WWPR SSC.</td>
</tr>
<tr>
<td>9</td>
<td>Promote the increasing of in-situ and upper air measurements, especially concerning radio-sounding, snow depth and sea ice</td>
<td>To be considered for the letter on YOPP summit to be sent to PRs</td>
<td>PPP Chair</td>
<td>Letter to PR to be sent.</td>
</tr>
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<td>10</td>
<td>Relevance of weather regimes in the context of sub-seasonal to seasonal forecast</td>
<td>Promote verification activities for this topic</td>
<td>S2S co-chairs</td>
<td>Establishment of diagnostic projects</td>
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<tr>
<td>11</td>
<td>Consider downscaling (dynamical and statistical) in S2S</td>
<td>Link with existing initiatives (i.e., EU projects, EUPORIAS)</td>
<td>S2S co-chairs</td>
<td>Inviting key scientists to future meetings</td>
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<td>12</td>
<td>Low and high latitude variability</td>
<td>S2S could think to specific diagnostics in coordination with PDEF</td>
<td>S2S co-chairs</td>
<td>Establishment of diagnostic projects</td>
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<td>High Impact Weather (HIWeather) membership</td>
<td>Establish formal link with IRDR.</td>
<td>HIWeather co-chairs</td>
<td>Participation to a possible stakeholder’s board</td>
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<td>14</td>
<td>Establish formal link with IRDR.</td>
<td>HIWeather co-chairs</td>
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<td>15</td>
<td>Strengthening the role of chemistry modeling for weather forecasting</td>
<td>Defining a joint strategic plan with WGNE and GAW.</td>
<td>WWRP SSC chair and C/WWRP</td>
<td>Minutes of GAW and WGNE next meetings.</td>
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<tr>
<td>16</td>
<td>Urban environment, extremes and climate. Collaboration between WCRP and HIWeather with a specific focus to urban environment and coastal areas</td>
<td>Explore the possibility to have common sessions in scientific congress/workshops</td>
<td>HIWeather co-chairs, C/WWRP</td>
<td>Establishment of Congress sessions in 2015</td>
</tr>
<tr>
<td>17</td>
<td>WMO Urban programme</td>
<td>Collaborate with Urban program to prepare Congress documents on cross-cutting issues (HIW)</td>
<td>C/WWRP</td>
<td>Congress document</td>
</tr>
<tr>
<td>18</td>
<td>Strengthening the link between GURME and HIWeather.</td>
<td>Discussion between GURME and HIWeather co-chairs</td>
<td>HIWeather co-chairs, C/WWRP</td>
<td>HIWeather plan modification</td>
</tr>
<tr>
<td>19</td>
<td>Strengthening the link between PPP and GEO activities</td>
<td>Promoting the role of WWRP and WCRP into the GEO initiatives with a special focus on the Polar Regions</td>
<td>PPP Chair, C/WWRP</td>
<td>Proposal</td>
</tr>
<tr>
<td>20</td>
<td>Sharing information about WWOSC media dissemination</td>
<td>Press release sent to all SSC Members</td>
<td>WWRP SSC Chair</td>
<td>Email to SSC Members</td>
</tr>
<tr>
<td>21</td>
<td>Developing the ToR of the new Mesoscale-Nowcasting Working Group</td>
<td>Co-chairs of Mesoscale and Nowcasting WG provide the draft terms of reference of the joint WG by April 2015 to be reviewed by the WWRP/SSC Members</td>
<td>Mesoscale and Nowcasting co-chairs</td>
<td>ToR Document</td>
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<tr>
<td>22</td>
<td>Consider all processes related to the tropical belt</td>
<td>WWRP - SSC requested Tropical Meteorology WG to consider all phenomena affecting the weather variability into the tropical belt</td>
<td>Tropical Meteorology WG Chair</td>
<td>Argument to be discussed in the next Tropical Meteorology WG Minutes</td>
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<tr>
<td>23</td>
<td>Lake Victoria RDP</td>
<td>SSC requested co-chairs of the new Mesoscale-Nowcasting WG to further coordinate and implement the project in order to go to the next phase among donors and participating organizations, such as CAS, CBS, WCRP, EAC, as early as possible</td>
<td>Mesoscale-Nowcasting WG</td>
<td>Implementation phase</td>
</tr>
<tr>
<td>24</td>
<td>RDP-FDP endorsement</td>
<td>RDP-FDP (Updraft, Olympic, Aviation) to be evaluated and endorsed by email</td>
<td>WWRP SSC</td>
<td>Endorsement email</td>
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<tr>
<td>25</td>
<td>Role of WWPR SSC Members</td>
<td>Better identify the role of the SSC Members</td>
<td>WWRP SSC chair, C/WWRP, ARE</td>
<td>Comments for the CAS MG</td>
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Annex D

Upcoming Meetings List

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<tr>
<th>WWRP Calendar</th>
<th>Jan 2016 (Zurich)</th>
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<th>Feb 2016 (Zurich)</th>
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<th>May 2016 (Zurich)</th>
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<th>Jun 2016 (Zurich)</th>
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Please refer to the PDF for the full schedule.
World Weather Research Programme (WWRP)
Report Series

Sixth WMO International Workshop on Tropical Cyclones (IWTC-VI), San Jose, Costa Rica, 21-30 November 2006 (WMO TD No. 1383) (WWRP 2007 - 1)

Third WMO International Verification Workshop Emphasizing Training Aspects, ECMWF, Reading, UK, 29 January - 2 February 2007) (WMO TD No. 1391) (WWRP 2007 - 2)

WMO International Training Workshop on Tropical Cyclone Disaster Reduction (Guangzhou, China, 26 - 31 March 2007) (WMO TD No. 1392) (WWRP 2007 - 3)


Report of the CAS Working Group on Tropical Meteorology Research (Shenzhen, China, 12-16 December 2005) (WMO TD No. 1414) (WWRP 2007 - 6)


WMO Training Workshop on Operational Monsoon Research and Forecast Issues – Lecture Notes, Beijing, China, 24-25 October 2008 (WMO TD No. 1453) (WWRP 2008 - 3)

Expert Meeting to Evaluate Skill of Tropical Cyclone Seasonal Forecasts (Boulder, Colorado, USA, 24-25 April 2008) (WMO TD No. 1455) (WWRP 2008 - 4)

Recommendations for the Verification and Intercomparison of QPFS and PQPFS from Operational NWP Models – Revision 2 - October 2008 (WMO TD No. 1485) (WWRP 2009 - 1)


4th WMO International Verification Methods Workshop, Helsinki, Finland, 8-10 June 2009 (WMO TD No. 1540) (WWRP 2010 - 1)

1st WMO International Conference on Indian Ocean Tropical Cyclones and Climate Change, Muscat, Sultanate of Oman, 8-11 March 2009 (WMO TD No. 1541) (WWRP 2010 - 2)

Training Workshop on Tropical Cyclone Forecasting WMO Typhoon Landfall Forecast Demonstration Project, Shanghai, China, 24-28 May 2010 (WMO TD No. 1547 ) (WWRP 2010 - 3) (CD only)
2nd WMO International Workshop on Tropical Cyclone Landfall Processes (IWTCLP-II), Shanghai, China, 19-23 October 2009 (WMO TD No. 1548) (WWRP 2010 - 4)

5th WMO Symposium on Data Assimilation, Melbourne, Australia, 5-9 October 2009 (WMO TD No. 1549) (WWRP 2010 - 5)

7th International Workshop on Tropical Cyclones (IWTC-VII), Saint-Gilles-Les-Bains, La Réunion, France, 15-20 November 2010 (WMO TD No. 1561) (WWRP 2011 - 1)


Recommended Methods for Evaluating Cloud and Related Parameters (WWRP 2012 - 1)

Proceedings of the 10th WMO Scientific Conference on Weather Modification, Bali, Indonesia, 4-7 October 2011 (WWRP 2012 - 2)

Fifth Session of the Joint Scientific Committee (JSC) for the World Weather Research Programme (WWRP), Geneva, Switzerland, 11-13 April 2012, (WWRP 2012 - 3)

Second WMO/WWRP Monsoon Heavy Rainfall Workshop, Petaling Jaya, Malaysia, 10-12 December 2012 (WWRP 2013 - 1)

International Workshop on Unusual Behaviour of Tropical Cyclones, Haikou, Hainan, China, 5-9 November 2012, (WWRP 2013 - 2)

Abstracts of Papers for the Fifth WMO International Workshop on Monsoons (IWM-V), Macao, China, 28–31 October 2013, Hong Kong, China, 1 November 2013, (WWRP 2013 - 3)

Second International Conference on Indian Ocean Tropical Cyclones and Climate Change (IOTCCC-II), New Delhi, India, 14-17 February 2012 (WWRP 2013 - 4)

WMO/WWRP International Workshop on Rapid Changes in Tropical Cyclone Intensity and Track, Xiamen, China, 18-20 October 2011 (WWRP 2013 - 5)

5th International Verification Methods Workshop, Melbourne, Australia, 5-7 December 2011 (WWRP 2013 - 6)

Verification Methods for Tropical Cyclone Forecasts (WWRP 2013 - 7)

Sixth Session of the Joint Scientific Committee (JSC) for the World Weather Research Programme (WWRP), Geneva, Switzerland, 18-19 July 2013 (WWRP 2014 - 1)

Joint Meeting of the THORPEX International Core Steering Committee (ICSC) and the World Weather Research Programme (WWRP) Joint Scientific Committee (JSC), (Geneva, Switzerland, 17 July 2013) (WWRP 2014 - 2)
Workshop on Communicating Risk and Uncertainty, Melbourne, Australia, 26-27 July 2012 (WWRP 2014 - 3)

International Conference on Opportunities and Challenges in Monsoon Prediction in a Changing Climate (Pune, India, 21-25 February 2012) (WWRP 2014 - 4)


6th International Verification Methods Workshop, New Delhi, India, 13-19 March 2014 (WWRP 2014 - 6)

Pre-Workshop Topic Reports Eighth WMO International Workshop on Tropical Cyclones (IWTC-VIII) Jeju, Republic of Korea, 2-10 December 2014 (WWRP 2014 - 7)

Proceedings of the 5th International Workshop on Monsoons, Macao, China, 28-31 October 2013, Hong Kong, China, 1 November 2013 (WWRP 2015 - 1)