

WWRP 2014 - 1

## Sixth Session of the Joint Scientific Committee (JSC) for the World Weather Research Programme (WWRP)

(Geneva, Switzerland, 18–19 July 2013)

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# WORLD METEOROLOGICAL ORGANIZATION

## WORLD WEATHER RESEARCH PROGRAMME

WWRP 2014 – 1

### Sixth Session of the Joint Scientific Committee (JSC) for the World Weather Research Programme (WWRP)

(Geneva, Switzerland, 18-19 July 2013)



MARCH 2014



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## **1. ORGANIZING OF THE MEETING**

### **1.1 Opening of the meeting**

1.1.1 The sixth session of the Joint Scientific Committee meeting of the World Weather Research Programme (WWRP) was held at the World Meteorological Organization (WMO) in Geneva, Switzerland from 18 to 19 July 2013, including the Joint Session of the THORPEX International Core Steering Committee meeting on 17 July 2013. The participants (see Annex II) were welcomed to the meeting by the Chairman, Gilbert Brunet. A tour de table of members was then conducted.

### **1.2 Adoption of the agenda**

Some minor adjustments were made to the order of the agenda items (see Annex I).

### **1.3 Working arrangements for the meeting**

It was agreed that the meeting would commence at 09.00 a.m. on the second day. Paul Joe would join via Webex from Canada and his presentations would be planned around 3 p.m. Geneva time.

## **2. MANAGEMENT REPORTS**

### **2.1 Report of EC-65 (15 to 23 May 2013)**

Tetsuo Nakazawa outlined the main outcomes from the 65<sup>th</sup> session of the WMO Executive Council for the research area. These were, accelerate transfer of research advances into the practice of NMHSs, pursue collaborative research at the weather/climate interface e.g. sub-seasonal to seasonal and polar prediction and provide direction for implementation of the WWRP including the future of THORPEX activities (and post THORPEX arrangements). The WWRP presentation to Congress was outlined. The programme achieved good visibility during Congress.

*In discussion it was noted that the strategic view for the WWRP is needed in some structure like teleconference to have a common background and future development between the JSC members and the Secretariat. Also it was agreed that the Secretariat would inform the JSC members the decisions and outcomes from Congress/EC/CAS Session.*

**Decision/Action WWRP JSC 6 (1):** Discussion on the strategic view of the WWRP should be coordinated regularly by the Secretariat during the preparation of the documents for the sessions of Congress/EC/CAS. (Action: C/WWR, regularly)

**Decision/Action WWRP JSC 6 (2):** C/WWR to report to JSC the Congress/EC/CAS decisions and development of relevance (Action: C/WWR, regularly)

### **2.2 Report of the Chair of the WWRP**

Gilbert Brunet overviewed the activities under the WWRP, including Nowcasting, Mesoscale, Verification, SERA. He mentioned that the first Strategic Plan (2009-2017) was comprehensive and covered crosscutting activities and would guide the overall evolution of the WWRP. The Implementation activities documented in the Strategic Plan address crosscutting activities at the interface of:

- Nowcasting - Mesoscale
- Mesoscale – Global
- Weather-climate prediction research, and
- Research-operation that are related to the delivery of a weather and climate services.

He showed that the three new THORPEX legacy projects are well aligned with the WWRP Strategic Plan.

### **2.3 Update on Monitoring and Evaluation of the programme in WMO**

2.3.1 Tetsuo Nakazawa explained the WMO monitoring and evaluation system which attempts to apply a business model to WMO activities and show that the organization is making concrete progress by measuring its' performance and effectiveness using key performance metrics. The system was designed to:

- Enable the senior management and programme managers of the Secretariat, the WMO constituent bodies and the scientific steering committees of WMO joint programmes to track the progress of the organization's activities, enhance performance and impact, and identify areas where corrective action is required with respect to activities and deliverables.
- Enable the Secretariat to demonstrate organizational effectiveness, efficiency, accountability and transparency externally and when reporting to WMO governing bodies.
- Facilitate dialogue and discussions at meetings of WMO constituent bodies, with partner organizations and donors, as well as other stakeholders.

2.3.2 The research area was most concerned with Expected Result 5 (Enhanced capabilities of Members to contribute to and draw benefits from the global research capacity for weather, climate, water and the related environmental science and technology development) and Key Outcome 5.2 (Research in the prediction of high-impact weather on time scales of hours to seasons is enhanced) and 5.4 (Seamless forecasts of weather, climate, water and the environment from month to seasons are developed) with several Key Performance Indicators (KPIs), such as KPI 5.2.1: Number of total research projects (new, ongoing and completed) focused on improving Members' operational products and services.

### **2.4 Action items at JSC-5**

Gilbert Brunet reviewed the actions items at the last JSC meeting. There were 54 action items at the meeting and most of these have been closed, but some are still open such as:

- Action item 15 to discuss with CBS for the future direction of the GIFS-TIGGE project
- Action item 29 for WGNE to address tropical meteorology prediction issues (monsoon, tropical cyclones) in coordination with the WGTMR
- Action item 32 for Chair of WGMWFR to establish communication with Dr Werner Thomas the seconded DWD expert in AER who made global evidence on existing ceilometers/lidars, to explore use of ceilometers in the mesoscale research
- Action item 39 for Chair of WGNR to provide quantified WWRP requirements as input to WIGOS

## **3. ACCOMPLISHMENTS AND STATUS OF RESEARCH ACTIVITIES**

### **3.1 Tropical Meteorological Research - *Status of the WGTMR***

3.1.1 Yihong Duan, chair of the WGTMR, presented the activities of the working group and future plans, covering the implementation of the action items at the last JSC meeting, activities since the last JSC meeting and the plans in 2013-2014. Highlighted is the document the WGTMR has prepared on "Scientific and research challenges the WGTMR is currently concerned with". Based on the recommendations from the Conferences and Workshops held in recent years, the WGTMR summarized its scientific and research challenges related to the understanding of tropical cyclones and monsoons. Both tropical cyclones and monsoons are associated with complicated multi-scale



interactions, and likewise related to different components of the earth system and there still exist gaps in integrating and communicating forecast uncertainties. He first listed up the challenges in tropical cyclones, such as:

1. Motion (sudden changes in TC tracks, effects of air-sea interaction, data sensitivity, etc)
2. Genesis (evaluation of the skill in genesis predictions, use of observations vs theories)
3. Intensity (large error in intensity forecast, concentric eye walls, physical processes)
4. Size (size changes)
5. Rainfall (physical processes, better rainfall prediction models)
6. Storm Surge (more research on understanding the accuracy)
7. Temporal variations on longer-than-synoptic time scales (decadal scale, number of landfalling TCs)

Also presented were the challenges in monsoon, as follows:

1. Mesoscale weather and Heavy Rainfall (mesoscale factors influencing monsoon precipitation, use of radar observations)
2. Intraseasonal forecasting in the Tropics (rainfall, MJO prediction, boreal summer ISO, equatorial waves, downscaling)
3. Indian Monsoon Onset (onset with broad range of time scales, defining the onset date, different views on the fundamental time scales of monsoon)
4. Relationships between Climate Change and Extreme Weather (long-term trends of different types of extreme events, high-resolution data, model improvement on monsoon, shift or change spread in pdf)

3.1.2 He presented the activities since the last JSC. He first showed the research and development projects; South China Monsoon Rainfall Experiment (SCMREX), and the Typhoon Landfall Forecast Demonstration Project (TLFDP).

3.1.3 SCMREX was proposed by CMA and approved by the last JSC as a WWRP RDP. The Implementation Plan was discussed during the Second Monsoon Heavy Rainfall Workshop in December 2012 and finalized in April 2013 (<http://scmrex.cma.gov.cn:8080>).

The pilot phase was from 15 April to 31 May 2013, to test the equipment, communication, operation procedure and all aspects related to the observations. A data flight collection over the western Guangdong coastal area was successfully carried out.

3.1.4 TLFDP (<http://tlfdp.typhoon.gov.cn>) was organized by WGTMR, TCP and PWS, and implemented by the Shanghai Typhoon Institute/CMA, to enhance the ability of forecasters to issue timely and accurate typhoon forecasts. Currently there are thirteen typhoon forecast product providers to the project. A series of surveys to forecasters were carried out to assess the benefit of the project and it shows that the overall satisfaction factor was fairly high. WGTMR conducted several workshops and meeting, such as Workshop and Training Course on Operational Tropical Cyclone Forecast (12-14 June 2012, Shanghai), Second Monsoon Heavy Rainfall Experiment Workshop (10-12 December 2012, Kuala Lumpur), International High-Level Forum on Rapid Change Phenomena in Tropical Cyclones (5-9 November 2012, Haikou), and Fourth International Workshop on Extratropical Transition (21-25 May 2012, Montreal).

3.1.5 He then presented the future plans, covering a new RDP Project on “High-resolution numerical prediction of landfalling typhoon rainfall”, the extension of the TLFDP to 2015, and the first SCMREX Workshop in late February 2014. There are two important workshops and meetings. One is the 5<sup>th</sup> International Workshop on Monsoons (IWM-V), 28 October – 1 November 2013, Macao. There are 40 invited reviews, 70 contributing papers submitted, and 8 invited lectures at the Training Workshop in the IWM-V. Another one is the 8<sup>th</sup> International Workshop on Tropical

Cyclones (IWTC-VIII), in conjunction with the 3<sup>rd</sup> International Workshop on Tropical Cyclone Landfall Processes (IWTC-LP-III), 2-10 December 2014, Jeju, Republic of Korea.

*In discussion several members mentioned that the document “Scientific and research challenges” was well written in the science accomplishments, but was a bit FDP-like and needed more scientific perspective. The document should also have a closer linkage to not only the future WWRP activities, but also the current activities like T-PARC. Also it was pointed out that there is a shortage in mid-term forecasting in the activity in the WGTMR.*

**Decision/Action WWRP JSC 6 (3):** WGTMR is encouraged to further revise the document on science accomplishments, e.g. including T-PARC. The JSC invite the Chairs of the WGs to provide comments for inputs.

## **3.2 Mesoscale Weather Forecasting Research (MWFR)**

3.2.1 Jeanette Onvlee-Hooimeijer (KNMI), Chair of the WGMWFR, reported on the activities in the past year of the Working Group, including:

- COPS final activities
- FROST-2014
- Korean Winter Olympic Games in 2018
- Grey zone Project
- Extension of the Typhoon Landfall Forecast Demonstration Project (TLFDP) with high resolution models
- Intercomparison of spatial methods in complex terrain (ICP2) with verification
- Radar volume scan data for meso DA
- Mode-S observation by aircraft with high temporal resolution in every aircrafts

3.2.2 The 2018 Winter Olympic Games will be held in PyeongChang in the Republic of Korea. KMA is interested in the establishment of FDP/RDP for the Games. It is very good to start planning in advance the FDP/RDP with strong observational and systems support for the Games. The WG considers this a very good opportunity for data assimilation and process and very high resolution modelling studies.

3.2.3 Grey zone project, as a WGNE project, was endorsed by the JSC in 2011. It was jointly set up idealized grey zone experimentation by WGNE, WG-MWFR and GCSS, to run several LES systems at several 100 m resolution as a truth, and to set up basic experimental framework and gain participants for initial “simple” extratropical case of cold air outbreak over the sea. Currently more than 10 modelling groups expressed their interest to join, and a case was tested with two cloud resolution models and released to LAM/global modellers by December 2012. Regional and global model runs started in 2013.

3.2.4 There are other ongoing and new projects, related with the WG. The WG members involved in PPP, HYMEX, INCA-CE and SCMREX projects. The WG is preparing for Lake Victoria “understanding” project with the WGNR. At this meeting the WG proposed a new international RDP on TOMACS, which is the agenda item 4.6. The WG proposed the extension of the Typhoon Landfall FDP. The WG also proposed the ICP2 (Intercomparison of spatial methods in complex terrain) project with JWGFVR.

3.2.5 Radar volume data is the critical source for mesoscale DA, but there is a highly problematic access for NWP across borders, especially for smaller countries. OPERA ODIM data model is very helpful, but it doesn’t solve all problems yet.

3.2.6 Aircraft makes Mode-S observations every seconds of wind speed, direction in straight forward and temperature with some approximation. These data is comparable to radio soundings

for wind, and slightly worse for T. Impact studies show a significant positive impact to the forecast. Discussions are ongoing with several Air Traffic Control centers to arrange real-time data provision for a large European area in order to get the formal arrangements for free availability of these data to NMSs for official duty.

3.2.7 The WG had contacts with WGNR in various areas, such as:

- Nowcasting Symposium, Rio de Janeiro, August 2012
- Chair WGNR at WGMWFR meeting in Montreal
- Common activities in FROST 2014, TOMACS, INCA-CE, Lake Victoria
- Discussion on merging two WGs

*In discussion, an issue came out where the TIGGE-LAM should be located after the THORPEX. Is it under the WGMWFR, or under the new PDEF WG?*

**Decision/Action WWRP JSC 6 (4):** In the proposed WWRP reorganization after 2014 the convective scale DA and ensemble research, including TIGGE-LAM, should be under the responsibility of the DAOS and the new PDEF WG, respectively.

**Decision/Action WWRP JSC 6 (5):** C/WWR and Chair of the WGMWFR to draft a letter with required background attached from President of CAS to the Chair of ICG-WIGOS supporting with motivation effort to facilitate international radar data exchange for data assimilation.

**Decision/Action WWRP JSC 6 (6):** Veronique Ducrocq to draft a letter from President of CAS to President of CHY on the October Workshop on HYMEX.

### 3.3 Joint Working Group on Forecast Verification Research

3.3.1 Laurie Wilson, Co-chair of the JWGFVR, presented the comprehensive activities on verification. He started to show the aims of the WG, that is:

- Develop and promote new verification methods
- Training on verification methodologies
- Ensure forecast verification is relevant to users
- Encourage sharing of observational data
- Promote importance of verification as a vital part of experiments
- Promote collaboration among verification scientists, model developers and forecast providers

3.3.2 He then showed the relationships and collaboration with other activities; S2S, PPP, HIW, WGNE, SDS-WAS, SWFDP, CBS verification activities, etc. and added a new partner, CIMO-SPICE for precipitation verification and standardization of precipitation observation.

3.3.3 There are two publications, the final draft of "Verification of Tropical Cyclone Forecasts" for comment and feedback to be published by WMO soon, and a special issue of Meteorological Applications published in June 2013 with 12 papers based on presentations at the Melbourne Verification Workshop in 2011. The former one will include standard methods for assessing track and intensity forecasts, probabilistic and ensemble forecast verification, monthly-seasonal forecast verification, and a review of recent developments in this field. In addition to track and intensity, there are experimental verification methods for TC-related hazards (wind, heavy precipitation, storm surge), storm structure and size, landfall information (time, position, and intensity), TC genesis and track error distribution.

3.3.4 The WG has participated, since its establishment in 2002, in the previous and on-going FDPs and RDPs; Sydney 2000 FDP, MAP D-PHASE, Beijing 2008 DFP/RDP, SNOW-V10 RDP, FROST-14 FDP/RDP, Typhoon Landfall FDP, SCMREX, INCA-CE and SWFDP.

3.3.5 International comparison of many new spatial verification methods, called “Spatial Verification Method Intercomparison Project” is now in Phase 2 planning stage, including the verification in complex terrain.

3.3.6 For outreach and training, the WG has organized several verification workshops and published tutorials both in online and on site, and, EUMETCAL training modules, SWFDP verification document and the verification web page (<http://www.cawcr.gov.au/projects/erification/>) are available.

3.3.7 The WG proposed the 6<sup>th</sup> International Verification Method Workshop, invited by Indian Meteorological Department and National Center for Medium Range Weather Forecasting in March 2014, with special emphasis on Monsoon verification and Tropical Storm verification.

3.3.8 The idea of “Seamless verification”, which may include all space/time scales, was introduced. Attributes can be measured for any forecast projection or averaging period, such as generalized discrimination score.

3.3.9 He finally mentioned that the verification activities have a trend to have these within the projects, which is a change from the original intent of the WG.

**Decision/Action WWRP JSC 6 (7):** The final draft of “Verification of TC Forecast”, prepared by the JWGFVR, should be circulated to the JSC members for review. (Action: Chair of JWGFVR, JSC Members, end of August)

**Decision/Action WWRP JSC 6 (8):** The JSC endorsed the proposal to hold the 6<sup>th</sup> International Workshop on Forecast Verification, 13-19 March 2014 in India.

**Decision/Action WWRP JSC 6 (9):** The JSC asks the verification activity of the FROST-2014 to be involved with the JWGFVR. (Action: Dimitry Kiktev, ASAP)

### **3.4 Nowcasting Research**

3.4.1 Paul Joe, Chair of the WGNR, joined via teleconference to outline the ongoing activities of the WGNR. He started to talk about the membership in the WG, which is now organized to change every 4 years and 2-term rule. Then he reported the action items from the last JSC meeting, including the establishment of the link with CIMO (closed), Lake Victoria Project (on-going), and input to WIGOS on quantified WWRP requirement (ongoing). Similar to the WGMWFR, the WG has been participating in several projects; SNOW-V10, FROST-2014, INCA-CE, TOMACS, Korea Winter Olympic Games 2018, and Lake Victoria Project. The new initiative, “EUMETNET – Nowcasting” has just started in January 2013, with 23 countries participating.

3.4.2 There are two re-organization issues, one is JONAS+WGNR, another is WGNR + WGMWFR. JONAS is the joint activity between WGNR and PWS and the action item on this came from JSC-4. The initial discussion has been done with PWS with various options.

3.4.3 There are four components in Lake Victoria Project; nowcasting system, SWFDP, field campaign, and capacity building.

3.4.4 As for the merger between WGNR and WGMWFR, there was a discussion at the last WGMWFR meeting. There are common/independent scientific objectives; WGMWFR develops hi-resolution NWP and fine scale DA and WGNR uses hi-resolution NWP and analyze fine scale DA.

One of the impacts of the merger is to the membership, and the total number of a new merged WG (20 or less?). A brief summary at the WGMWFR meeting was that no one at the WGMWFR adverse to re-organization. There are several activities, which have just started and still in early stage, such as “Guide to Nowcasting”, and “Aviation Nowcasting Initiative” led by P. Li, HKO, and Brazil Regional Training Centre for Nowcasting, which was presented at the WGNR meeting in Rio de Janeiro.

*In discussion, it was noted that the number of a new working group after merging is not the issue, but the shift of responsibility in terms of gaps (forecast systems, observations) will happen.*

**Decision/Action WWRP JSC 6 (10):** The JSC recommended the merger of the WGNR and WGMWFR to form a new WG in the WWRP.

**Decision/Action WWRP JSC 6 (11):** The current WGs (DAOS, PDP, GIFS-TIGGE, Nowcasting Research, Mesoscale Weather Forecasting Research) to discuss and develop new ToRs including observations research for the proposed new merged Nowcasting, MWFR WG and Predictability, Dynamics and Ensemble Forecasting Research WG in time for consideration at the CAS-XVI session, 20-26 November 2013, in Turkey.

### **3.5 Weather Modification Assessment**

3.5.1 Roelof Bruintjes reported the status of the Weather Modification Research over the globe, as Chair of the Expert Team on Weather Modification Research (ETWMR). He first mentioned that 42 countries have active cloud seeding programmes, to enhance precipitation, suppress hail (and precipitation). China is leading in cloud seeding programmes with most programmes in China having active cloud seeding programs to enhance rainfall or mitigate severe weather. In the United States there are 36 active weather modification programmes. The committee of ETWMR also provided advice to 11 countries, apart from the 42 countries with active weather modification programmes. China has the largest investment in both operational programs and weather modification research programmes. While funding for weather modification has increased over the past five years in the USA, it is still well below the levels in the 1980's.

3.5.2 Activities of the ETWMR have been supported by the Trust Fund since 2010. WMO sent a request to the Permanent Representatives of the WMO twice to contribute to its trust fund, but the response was extremely limited.

*In discussion, the JSC members asked if they can keep the similar level of activity as before (like to hold an annual ET meeting and an International Workshop every four years), without any further contribution from Members to the trust fund. New efforts will be conducted to attract contributions to the Trust Fund. Based on the discussions the decision was made to maintain the ETWMR activities for another two years with limited funds available in the trust fund and to have the JSC review the activities and to decide the future of the ETWMR in 2015.*

**Decision/Action WWRP JSC 6 (12):** The JSC endorsed the proposal by the Expert Team on Weather Modification to continue its activity for a provisional two-year period with limited financial support from WMO, to permit to start up and find contributors for the Trust Fund.

### **3.6 Sand and Dust Storm Warning Advisory System**

3.6.1 Dr Emilio Cuevas presented the status of the SDS-WAS related activities. He mentioned that there are three Regional nodes of the SDS-WAS; for Northern Africa, Middle-East and Europe, for East Asia and Pacific, and for Pan America (North, Central and South America) and added that the Regional node for West Asia (Gulf countries, Iran and Turkey) is under the preliminary situation. There was a short-term project between UNEP and WMO to provide an assessment report on skills and needs for establishing a new WMO SDS-WAS Regional node for West Asia

and a technical UNEP/WMO SDS conference was held in Abu Dhabi in May 2013 to discuss further necessary steps.

3.6.2 He pointed out that the current research topics in the SDS-WAS Regional Centers are, model validation/evaluation, high resolution modelling, data assimilation, long term forecasting, improvement/characterization of dust observations, and dust impact studies. For model validation/evaluation, he indicated that the near-real-time validation/evaluation has been done with AERONET data to get the bias error, root mean square error, correlation coefficient, and fractional gross error and it shows that the Aerosol Optical Depth (AOD) at 550 nm is better in the model intercomparison than the surface concentration with large spread among models. Also the evaluation of Saharan dust transport has been performed over Africa and the Atlantic. He especially showed a result of the evaluation of the dust forecasts with the MODIS Deep Blue in near-real-time basis.

3.6.3 He explained the current status of the CAS-CBS collaboration on operational aspect of the SDS-WAS. The current SDS-WAS activity resides in the CAS, but in the future a small part of the SDS-WAS will be operational under CBS, to provide the forecasts of sand and dust related products to the region. The mandatory functions of the Regional Specialized Meteorological Centre (s) with activity specialization in Atmospheric Sand and Dust storm Forecasts (RSMC-ASDF) have been defined and accepted and the consortium AEMET / BSC-CNS designated to host the first RSMC with specialization on atmospheric sand and dust forecast in December 2013.

*In discussion, it was noted that several research themes, including health issue, smoke fire, air quality, aerosol/composition forecast, should be focused in a wider group than the SDS-WAS team. Also it was agreed that the latest Implementation Plan should be circulated for review by the JSC.*

**Decision/Action WWRP JSC 6 (13):** The latest Implementation Plan on SDS-WAS should be circulated to the JSC members for comments.

**Decision/Action WWRP JSC 6 (14):** SDS-WAS to establish closer links with other WGs, such as DAOS, SERA, Verification, Mesoscale Forecast. The JSC requests the Chairs of the DAOS WG, GURME, SDS-WAS, Weather Modification Expert Team, Mesoscale and SERA WGs to propose a way forward with the research programme on aerosol, air quality, SDS, smoke of forest fires, and to provide several options in future research directions. One of the goals of that discussion is to identify the operational component of SDS-WAS and transfer it under the CBS. An option to explore is the establishment of a new WG on Atmospheric Composition Prediction in WWRP in collaboration with GAW. The SDS-WAS would be a flagship project in this proposed WG. Meanwhile SDS-WAS will stay an endorsed project under WWRP and GAW.

## **4. UPDATES/PROPOSALS OF FDPs/RDPs**

### **4.1 FROST 2014 for Sochi Winter Olympics**

4.1.1 Dmitry Kiktev presented a FDP/RDP proposal for Sochi 2014 Winter Olympics. The Olympics is envisaged as an opportunity to develop and test new techniques for weather forecasting and nowcasting. The complex orography and related weather conditions result in frequent high winds, low visibility and cloudiness, and intense precipitation. Roshydromet is proposing a blended FDP/RDP under the auspices of the Nowcasting and Mesoscale Weather Forecasting Working Groups that includes the following project components: nowcasting of multi- weather elements – wind speed and wind gust, visibility, fog, precipitation intensity and type; mesoscale ensemble modelling; high resolution (radar) data assimilation; verification using remote sensing data.

4.1.2 For observation in Sochi, one Doppler radar has been installed and would be operational in September-October 2013, and two profilers (one for wind, another for temperature/humidity) will be installed on a mobile platform.

4.1.3 First version of COSMO-LEPS (7-km grid spacing) centered around Sochi for a dynamical downscaling of the ECMWF EPS is already in place. The idea was to test run the COSMO-LEPS-Sochi during winter 2012/2013 and would be in production mode during winter 2013/2014. Deterministic, high resolution COSMO model (2.2 km grid spacing; forecast range up to 24 hours; rapid update cycle) nested into the 7-km COSMO-RU model in Moscow. The model runs should include data assimilation using all available data, including the Doppler radar in Sochi.

4.1.4 The web-based weather and forecast information has been available at <http://frost2014.meteoinfo.ru>, which is similar interface with the one for the MAP D-Phase.

## 4.2 La Plata Project

4.2.1 Celeste Saulo presented the status of the RDP for improving the prediction of heavy precipitating systems over La Plata Basin (LPB-RDP). The main objectives of the project are to assess state-of-the-art models ability to anticipate extreme weather conditions and to quantify their skill over LPB, to analyze the sources of model errors, to evaluate the impact of extra data, and to use TIGGE and other ensemble systems to develop products/tools adequate for extreme weather forecast.

4.2.2 At the first CHUVA (Cloud processes of the main precipitation systems in Brazil, <http://chuvaproject.cptec.inpe.br/portal/en/index.html>) national meeting, 8-10 May 2013, San Paulo, the LPB-RDP plan was presented and an idea on LPB-RDP/CHUVA sub project came out, to analyze the ability of high-resolution models to represent organized convection over southern LPB region to support the CHUVA Santa Maria field experiment, which was performed from 6 November to 22 December 2012. There is a high-resolution model intercomparison study for several convective events (22 November 2012, 7 and 10 December 2012) during the CHUVA Santa Maria period.

4.2.3 She introduced an international multi-agency field programme, RELAMPAGO (Remote sensing of Electrification, Lightning, And Meso-scale/micro-scale Processes with Adaptive Ground Observations, relampago translates to lightning in Spanish and Portuguese), to study multi-scale aspects of intense, organized convective systems that produce severe weather in subtropical south America. The RELAMPAGO Science steering group includes the members from USA, Brazil, Argentina.

**Decision/Action WWRP JSC 6 (15):** The JSC recognized that the RELAMPAGO project in the La Plata Basin is important to WWRP. WWRP should participate in the kick-off meeting in October 2013, organized by CPTEC to discuss the science themes and how WWRP contributes to the project.

## 4.3 INCA-CE Project

4.3.1 Ingo Meirold-Mautner presented the INCA-CE (Integrating nowcasting with crisis management and risk prevention in a transnational framework) project for Central Europe, under which 13 operational NMCs are participating, with 24 institutions, 1 nowcasting system (INCA), 3 applications (civil protection, hydrology and road safety), and 10 pilot studies ([www.inca-ce.eu](http://www.inca-ce.eu)). The goals of INCA-CE are to provide more detailed and accurate weather forecasts in time and space for civil protection, to provide optimized strategies of using weather information and its visualization for hydrology, and to have a better coordination between weather services and crisis management authorities for road safety.

4.3.2 Civil Protection: There are three activities under this application, that is, INCA-SWING (Severe Weather INterpretation Guide), INCA-MCPEX (Meteorology and Civil Protection EXercise) and INCA-ISW (Impact of Severe Weather). There are several pilot studies, for example, a storm case on 11 July 2012 over the Lake Balaton, and an extreme winter condition on 14-15 March 2013.

4.3.3 Road Safety: The strategy document has been prepared to show the time lines.

- Few days : Weather reports used for general planning in winter road maintenance
- 1-2 days : Detailed forecasts for medium term planning
- 5 hours : Online web portal, actual deployment  
: Preventive spreading
- 0 hours : Mobile applications (portal) for smartphones  
: SMS warnings

4.3.4 INCA-ISW has contributed to improve road conditions especially in the winter season and to consume less salt, thus better protection of the environment. In summary, multidisciplinary and transnational links in nowcasting and applications has been established for INCA-CE to improve safety for society and to protect the environment.

#### **4.4 Southern China Monsoon Rainfall Experiment**

4.4.1 Yihong Duan presented the progress and future plan of the SCMREX. The recent progress of the RDP was; the Implementation Plan was refined, the pre-phase field experiment was conducted, a website was established, a new proposal to CMA was submitted and the data processing/analyzing and research work are ongoing. The International Science Steering Committee has been established with co-chairs, Prof. Richard Johnson and Dr Jiao Meyan, and the members from USA, Republic of Korea, Japan, Malaysia and experts from the WWRP WGs.

4.4.2 The preliminary Implementation Plan was discussed extensively at the 2<sup>nd</sup> International Workshop on Heavy Monsoon Rainfall in Kuala Lumpur, Malaysia in December 2012. The full draft was completed by the end of February 2013, based on the SCMREX proposal and suggestions from the Kuala Lumpur Workshop. The full version was finalized in early April.

4.4.3 The pre-phase field campaign started in April 2013, with the opening ceremony at SanShui, on 13 April 2013. The initial checking period for instruments was from 15 to 30 April. There was two IOPs; 8 – 17 May, and 24 – 28 May 2013.

4.4.4 The experiment area in the Southern China consists of three different spatial scale area; synoptic-scale area (105E – 120E, 16N – 27N), meso-scale area (110E – 117E, 20N – 25N), and two convective scale area, A and B, with several radars within the meso-scale area. The airborne observation is over the South China Sea east of Hainan Island.

4.4.5 He introduced a new RDP proposal on high-resolution numerical prediction of landfall typhoon rainfall, which was initially proposed at the side meeting of the International High-Level Forum on Rapid Change Phenomena in Tropical Cyclones in Haikou, 2012. He explained why high-resolution prediction of landfalling typhoon rainfall is important. Currently most of the operational forecasts of rainfall associated with typhoon landfalling are statistical in nature, showing quite limited capability in the prediction of extreme rainfall events for typhoon. Coarse-resolution numerical forecasts of landfalling typhoon rainfall generally perform not well, thus these are not satisfying the needs of disaster prevention and mitigation.

4.4.6 In these days more and more high-resolution regional numerical models and ensemble prediction systems are developed and employed in operational forecasting in many forecasting and research centers. Some examples are:



- GRAPES-TCM (Shanghai Typhoon Institute of CMA, 10 km grid)
- High-resolution Typhoon Prediction System (CAMS, 2 km grid)
- Regional Numerical Forecasting System (CWB of Taiwan, 5 km)
- Hong Kong Mesoscale Numerical Prediction System (HKO, 2 km)
- JMA Mesoscale Model (JMA, 5 km)
- Regional Prediction Model (KMA, 10 km)

4.4.7 The goals of the project are to understand the current capability of high-resolution regional numerical weather prediction (NWP) models and ensemble prediction systems (EPSs) in predicting rainfall related to landfalling typhoons, and to improve the model settings for better NWP of landfalling typhoon rainfall.

4.4.8 The region of interest in this project will be the western North Pacific and the potential participants will be from the WMO Members surrounding the western North Pacific region and any other interested, such as China, Australia, Hong Kong, Japan, Philippines, Republic of Korea, Thailand, USA, Vietnam and others. The project should be jointly supported by the WGTMR, WGMWFR, JWGFVR, etc. and guided by the International Scientific Steering Committee.

*In discussion, it was noted that the new proposal on high-resolution numerical prediction of landfall typhoon landfall is interested in for the JSC members, but the full proposal document has not been available yet for the JSC members. Thus the JSC encouraged the Chair of the WGTMR to send the final plan of the project to the JSC members for review as soon as possible.*

**Decision/Action WWRP JSC 6 (16):** The Science and Implementation Plan of the SCMREX project should be finalized and the JSC encouraged the JSC members to review the plans.

**Decision/Action WWRP JSC 6 (17):** The JSC welcomed the new proposal on high-resolution numerical prediction of landfall typhoon rainfall. The JSC encouraged Yihong Duan to send the final Science and Implementation Plan of the project to the JSC members for review. (Action: Yihong Duan, ASAP).

#### **4.5 TOKYO Metropolitan Area Convection Study for Extreme Weather Resilient Cities (TOMACS)**

4.5.1 Jeanette Onvlee showed the new RDP proposal on Tokyo Metropolitan Area Convection Study for Extreme Weather Resilient Cities (TOMACS), initiated by 25 Japanese institutes/authorities, aimed at making megacity urban areas more weather-resilient, but includes plenty of scope for international cooperation and follow-up research in the basis of the TOMACS database. There are three subjects under the project, namely, 1) Field Experiments, to obtain new insight on mechanisms of extreme weather, 2) Development of Early Detection and Prediction System, collaborating with end users, and 3) Social Experiments, to evaluate and to adapt the developed nowcasting / forecasting system.

4.5.2 International partnership (Australia, Brazil, Canada, China, France, Germany, Hong Kong, Korea and USA) has been established for the Project, including the International Science Steering Committee, the International Advisory Board, and local organizing committee. The proposed RDP period was three years from July 2013 to June 2016 and the first RDP International Workshop is planned in December 2013 in Tsukuba, Japan.

4.5.3 She also showed a new proposal to extend TC international data exchange and verification to LAM and LAM EPS forecasts. It is proposed to explore the definition of an FDP aiming at the extension of TC international exchange and verification, as started in TLFDP for TC tracks, to LAM and LAM EPS forecasts of TC intensity and precipitation, later possibly also wind.

**Decision/Action WWRP JSC 6 (18):** The JSC endorsed the FDP proposal for TOMACS.

## 5. VISIONS FOR THE FUTURE

### 5.1 WWRP Open Science Conference and Summer School

5.1.1 Michel Beland introduced the progress status on the World Weather Open Science Conference (WWOSC, <http://wwosc2014.com/>), which will be held in Montreal, Canada, from 16 to 21 August 2014. The targeted attendance is 1,500 and the list of twelve plenary speakers is being finalized. Both the Weather Science Program and the Users/Social Science Program should be finalized soon. It is planned to announce the “call for abstracts” in November 2013. He also talked about “Association of Weather Early Career Scientist” (AWECS), with the analogy of the creation of APECS (P for Polar) after the IPY 2007-2009, to encourage young scientists to submit their abstracts and come to the WWOSC with lump-sum support from the organizer.

### 5.2 WWRP Reorganization

5.2.1 Tetsuo Nakazawa showed a diagram of the possible new WWRP structure in early 2015, which includes the establishment of:

- Two new Working Groups under the WWRP, which will be transferred from THORPEX at the end of THORPEX
- A new merged Working Group (Working Group on Nowcasting and Mesoscale Weather Forecast Research)
- New WWRP Regional Committees (RCs), which are the continued activities of the current THORPEX RCs, if the participating regional members decide on the continuation, on a self-organizing and self-funding basis, in collaboration with the Regional Associations, the WWRP Working Groups and projects, including three THORPEX legacy projects (S2S, PPP and HIWeather), Research and Development Projects and Forecast Demonstration Projects
- A trust fund for SDS-WAS activities

**Decision/Action WWRP JSC 6 (19):** C/WWR and Chair of the GIFS-TIGGE WG to draft a letter with required background attached from President of CAS to President of CBS on the TIGGE future.

**Decision/Action WWRP JSC 6 (20):** The JSC endorsed the recommendation of the ICSC-11, on the current THORPEX Regional Committees’ function under the WWRP umbrella on a self-organizing and self-funding basis.

**Decision/Action WWRP JSC 6 (21):** The JSC invited WWRP to liaise with WCRP in developing the new WWRP structure, so as to identify activities and areas of common interest to weather and climate communities which could be coordinated.

**Decision/Action WWRP JSC 6 (22):** The JSC encouraged WCRP and WWRP to share the future meeting schedules in order to avoid the conflict.

### 5.3 Preparation for CAS-XVI in Turkey (18-26 November 2013)

5.3.1 Tetsuo Nakazawa showed the current preparation status for the CAS Session in Turkey and the CAS Technical Conference (TECO) on “Responding to the environmental stressors of the 21<sup>st</sup> century”, with six potential themes for TECO;

- **High Impact Weather** and its socio-economic effects in the context of global change
- **Water:** Modelling and predicting the water cycle for improved DRR and resource management

- Integrated **Green House Gas** Information System: Serving society and supporting policy
- **Aerosols**: Impacts on air quality, weather and climate
- **Urbanization**: Research and services for megacities and large urban complexes
- **Evolving technologies**: Their impact on science and its use (satellite technology and other remote sensing, computing power, social media etc.) including geoengineering.

The website for the CAS Session and TECO is now available at <http://cas-16.wmo.int/>

## 6. MEETING DIARY FOR 2012 AND BEYOND

Meetings for 2012 and beyond are listed in Annex III.

## 7. REVIEW OF DECISIONS AND ACTIONS

The Decisions/Actions are listed in Annex IV.

## 8. DATE AND PLACE OF NEXT MEETING

The date of the next meeting would be in August 2014, in conjunction with the World Weather Open Science Conference, Montreal, Canada.

**Decision/Action WWRP JSC 6 (23)**: The JSC recommended that the next JSC meeting, in conjunction with the World Weather Open Science Conference, Montreal, Canada, be in August 2014.

## 9. OTHER BUSINESS

**Decision/Action WWRP JSC 6 (24)**: D. Parsons and B. Golding, currently JSC members, will have the status as observers on JSC while they are involved as WMO consultants.

## 10. CLOSURE OF THE MEETING

Gilbert Brunet, Chair of the WWRP/JSC, closed the meeting at 17:00 on 19 July 2013.

**Sixth Session of the Joint Scientific Committee (JSC)  
of the World Weather Research Programme (WWRP)**

**(Geneva, Switzerland, 18-19 July 2013)**

***Meeting Agenda***

**1. ORGANIZATION OF THE MEETING**

- 1.1 Opening of the meeting
- 1.2 Adoption of the agenda
- 1.3 Working arrangements for the meeting

**2. MANAGEMENT REPORTS**

- 2.1 Report on EC-65 (*Tetsuo Nakazawa*)
- 2.2 Report of the Chair of the WWRP JSC (*Gilbert Brunet*)
- 2.3 Monitoring and Evaluation of the Programme in WMO (*Nanette Lomarda*)
- 2.4 Action items at the JSC-5 (*Gilbert Brunet*)

**3. ACCOMPLISHMENTS, STATUS of RESEARCH ACTIVITIES**

- 3.1 Tropical Meteorological Research (*Yihong Duan*)
- 3.2 Mesoscale Weather Forecasting Research Working Group (*Jeanette Onvlee*)
- 3.3 Joint Working Group on Forecast Verification Research (*Beth Ebert*)
- 3.4 Nowcasting Research Working Group (*Paul Joe*)
- 3.5 Weather Modification Assessment (*Roelof Bruintjes*)
- 3.6 Sand and Dust Storm Warning and Advisory System (*Emilio Cuevas*)

**4. UPDATES/PROPOSALS of FDPs/RDPs**

- 4.1 FROST 2014 for Sochi Winter Olympics (*Dmitry Kiktev*)
- 4.2 La Plata Project (*Celeste Saulo*)
- 4.3 INCA-CE Project (*Wang Yong*)
- 4.4 Southern China Monsoon Rainfall Experiment (*Yihong Duan*)
- 4.5 Tokyo Metropolitan Area Convection Study for Extreme Weather Resilient Cities (TOMACS) (*Jeanette Onvlee*)

**5. VISIONS FOR THE FUTURE**

- 5.1 WWRP Open Science Conference and Summer School (*Gilbert Brunet/Brian Mills*)
- 5.2 WWRP Reorganization (*Tetsuo Nakazawa*)
- 5.3 Preparation for CAS-XVI in Turkey (18-26 November 2013) (*Tetsuo Nakazawa*)

**6. MEETING DIARY FOR 2012 AND BEYOND (*Tetsuo Nakazawa*)**

**7. REVIEW OF DECISIONS AND ACTIONS**

8. DATE AND PLACE OF NEXT MEETING
9. OTHER BUSINESS
10. CLOSURE OF THE MEETING

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**Sixth Session of the Joint Scientific Committee (JSC)  
of the World Weather Research Programme (WWRP)**

**(Geneva, Switzerland, 18-19 July 2013)**

***List of Participants***

<b>Family Name</b>	<b>First Name</b>	<b>Email</b>	<b>Working Group / Project</b>
<b>JSC Members</b>			
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<b>Chair of Working Groups and Expert Team</b>			
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Saunders	Roger	roger.saunders@metoffice.gov.uk	Co-chair, THORPEX DAOS WG
Duan	Yihong	duanyh@cma.gov.cn	Chair, WWRP Tropical Meteorological Research
Onvlee	Jeanette	jeanette.onvlee@knmi.nl	Chair, WWRP Mesoscale WG
Mills	Brian	brian.mills@uwaterloo.ca	Chair, WWRP SERA WG
Joe	Paul	paul.joe@ec.gc.ca	Chair, WWRP Nowcasting WG Attending through WEBEX
Bruintjes	Roelof	roelof@ucar.edu	Chair, ET Weather Modification
<b>Leader of the Projects</b>			
Béland	Michel	michel.beland@ec.gc.ca	CAS President
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## Meetings in 2012 and Upcoming Meetings for 2013 and Beyond

	<b>Meeting</b>	<b>Date</b>	<b>Location</b>
1	5 <sup>th</sup> WWRP/JSC	11-13 April 2012	Geneva
2	FROST-2014 Meeting	16-18 April 2012	Moscow
3	INCA-CE Mid-Term Conference	24-27 April 2012	Zakopane, Poland
4	GEO Work Plan Symposium	30 April- 2 May 2012	Geneva
5	THORPEX Africa RC	8-10 May 2012	Geneva
6	Third International Workshop on Extratropical Transition	21-25 May 2012	Montreal
7	5 <sup>th</sup> Workshop on the Impact of Various Observing System on MWP	22-25 May 2012	Sedona, USA
8	Workshop and Training Course on Typhoon Landfall	12-14 June 2012	Shanghai
9	THORPEX PDP WG	18-20 June 2012	Reading
10	WMO Executive Council	25 June – 3 July 2012	Geneva
11	THORPEX GIFS-TIGGE WG	25-27 June 2012	Boulder
12	International Cloud Modelling Workshop	23-27 July 2012	Warsaw
13	WWRP SERA WG meeting and Workshop	25-30 July 2012	Melbourne, Australia
14	16 <sup>th</sup> International Conference on Clouds and Precipitation	30 July – 3 August 2012	Leipzig, Germany
15	Dynamics and Predictability on high impact weather and climate events	6-9 August 2012	Kunming, China
16	WMO 3 <sup>rd</sup> International Symposium on Nowcasting and Very Short Range Forecasting	6-10 August 2012	Rio de Janeiro , Brazil
17	WWRP Nowcasting WG (with some members in Mesoscale WG)	11-12 August 2012	Rio de Janeiro , Brazil
18	Pan GASS and MJO TF Meeting	10-14 Sept 2012	Boulder
19	THORPEX DAOS WG	19 – 20 Sept 2012	Madison
20	THORPEX ICSC 10	3-5 Oct 2012	Geneva
21	GEO Board	October 2012	TBD
22	THORPEX ARC and Asian Science Symposium	31 Oct – 2 Nov 2012	Kunming
23	Int. Workshop on Unusual Tropical Cyclone Behaviour	5-9 Nov 2012	Ganzhou, China
24	CAS/WCRP WGENE annual meeting	5-9 Nov 2012	Toulouse, France
25	International Conference on Ensemble Methods in Geophysical Sciences	12-16 Nov 2012	Toulouse, France
26	2 <sup>nd</sup> Monsoon Heavy Rainfall Workshop	10-12 Dec 2012	Kuala Lumpur
27	1 <sup>st</sup> WWRP Open Science Conference (OSC)/International Organizing Committee (IOC) meeting	8 Jan 2013	Austin, USA
28	AMS THORPEX Town Hall meeting	9 Jan 2013	Austin, USA
29	S2S Planning Group meeting	5-7 Feb 2013	Exeter, UK



30	Panel on Tropical Cyclones	25 Feb-1 Mar 2013	Colombo
31	MJO Data and Analysis Workshop	4-8 Mar 2013	Hawaii
32	HIW Workshop & T-NAWDEX meeting	18-20 Mar 2013	Karlsruhe
33	ICMCS-9	27-29 Mar 2013	Beijing
34	FROST2014	10-12 Apr 2013	St Petersburg
35	WGNE Systematic Error Workshop	15-19 Apr 2013	Exeter, UK
36	INCA-CE meeting	22-24 Apr 2013	Italy
37	WGMFR WG	8-10 May 2013	Montreal, Canada
38	UNEP SDS Conference	May 2013	Abu Dhabi
39	GIFS-TIGGE WG	12-14 June 2013	Exeter, UK
40	ECMWF/WWRP/THORPEX Workshop on Polar Prediction	24-27 June 2013	ECMWF
41	DACA13	8-12 July 2013	Davos
42	THORPEX ICSC-11	15-17 July 2013	Geneva
43	WWRP JSC-6	17-19 July 2013	Geneva
44	Training on Nowcasting	5-16 August 2013	Argentina
45	Verification Training	8 Sep 2013	Reading, UK
46	PPP SG meeting	1-3 Oct 2013	Boulder, US
47	6th International Symposium on Data Assimilation	7-11 Oct 2013	College Park, US
48	Training Course in Weather Modification Expert Team Meeting of WM	21 Oct - 1 Nov 2013	Nanjing
49	JWGFVR meeting	25-27 Oct 2013	Macao
50	WGTMR meeting	26-27 Oct 2013	Macao
51	5th International Workshop on Monsoon	28-31 Oct 2013	Macao
52	TECO and CAS-16	18-26 Nov 2013	Turkey
53	SERA WG	December 2013	(TBD)
54	Training on SDS-WAS	December 2013	Oman
55	WWRP Open Science Conference	15-21 Aug 2014	Montreal, Canada

## List of Decisions/Actions

No.	Subject Area	JSC ACTION/DECISION	RESPONSIBILITY	STATUS
1	Coordinated discussion on the strategic view of WWRP	Discussion on the strategic view of the WWRP should be coordinated regularly by the Secretariat during the preparation of the documents for the sessions of Cg/EC/CAS.	C/WWR	Regularly
2	Report to JSC on decisions by Cg/EC/CAS	C/WWR to report to JSC the Cg/EC/CAS decisions and development of relevance.	C/WWR	Regularly
3	Revision of the WGTMR document	WGTMR is encouraged to further revise the document on science accomplishments, e.g. including T-PARC. The JSC invite the Chairs of the WGs to provide comments for inputs.	Chair of WGTMR	ASAP
4	Convective scale DA and Ensemble research	In the proposed WWRP reorganization after 2014 the convective scale DA and ensemble research, including TIGGE-LAM, should be under the responsibility of the DAOS and the new PDEF respectively.		
5	Letter to Chair of ICG-WIGOS on international radar data exchange	C/WWR and Chair of the WGMWFR to draft letter with required background attached from President of CAS to the Chair of ICG-WIGOS supporting with motivation effort to facilitate international radar data exchange for data assimilation.	C/WWR and Chair of WGMWFR	ASAP
6	Letter to President of CHY on HYMEX Workshop	Veronique Ducrocq to draft letter from President of CAS to President of CHy on the October Workshop on HYMEX.	Veronique Ducrocq	ASAP
7	Review of "Verification of TC Forecast"	The final draft of "Verification of TC Forecast", prepared by the JWGFVR, should be circulated to the JSC members for review.	JSC Members	End of August 2013
8	6 <sup>th</sup> International Workshop on Forecast Verification	The JSC endorsed the proposal to hold the 6th International Workshop on Forecast Verification, 13-19 March 2014 in India.		
9	FROST-2014	The JSC asks the verification activity of the FROST-2014 to be involved with the JWGFVR.	Dmitry Kiktev	ASAP
10	Merger of WGNR and WGMWFR	The JSC recommended the merger of the WGNR and WGMWFR to form a new WG in the WWRP.		

11	New ToRs for new WGs	The current WGs (DAOS, PDP, GIFS-TIGGE, Nowcasting Research, Mesoscale Forecasting Research) to discuss and develop new ToRs including observations research for the proposed new merged Nowcasting, MWFR WG and Predictability, Dynamics and Ensemble Forecasting Research WG in time for consideration at the CAS-XVI session, 20-26 November 2013, in Turkey.	Chair of WGNE, DAOS, PDP, GIFS-TIGGE, Nowcasting, Mesoscale WG and JSC Chair.	October 2013
12	ETWM	The JSC endorsed the proposal by the Expert Team on Weather Modification to continue its activity for a provisional two-year period with limited financial support from WMO, to permit to start up and find contributors for the Trust Fund.		
13	SDS-WAS Implementation Plan	The latest Implementation Plan on SDS-WAS should be circulated to the JSC members to get comments.	C/WWR	ASAP
14	Atmospheric Composition Prediction in WWRP	SDS-WAS to establish closer links with other WGs, such as DAOS, SERA, Verification, Mesoscale Forecast. The JSC requests the Chairs of the DAOS WG, GURME, SDS-WAS, Weather Modification Expert Team, Mesoscale and SERA WGs to propose a way forward with the research programme on aerosol, air quality, SDS, smoke of forest fires, and to provide several options in future research directions. One of the goals of that discussion is to identify the operational component of SDS-WAS and transfer it under the CBS. An option to explore is the establishment of a new WG on Atmospheric Composition Prediction in WWRP in collaboration with GAW. The SDS-WAS would be a flagship project in this proposed WG. Meanwhile SDS-WAS will stay an endorsed project under WWRP and GAW.	Chair of the DAOS WG, GURME, SDS-WAS, WeaMod, Mesoscale WG and SERA WG	Next JSC meeting
15	La Plata Basin Project	The JSC recognized that the RELAMPAGO project in the La Plata Basin is important to WWRP, WWRP should participate in the kick-off meeting in October 2013, organized by CPTEC to discuss the science themes and how WWRP contributes to the project.	Celeste Saulo	ASAP
16	SCMREX	The Science and Implementation Plan of the SCMREX project should be finalized and the JSC encouraged the JSC members to review the plans.	Yihong Duan	ASAP

17	New Project on High-resolution numerical prediction of landfall typhoon rainfall	The JSC welcomed the new proposal on high-resolution numerical prediction of landfall typhoon rainfall. The JSC encouraged Yihong Duan to send the final science and implementation plan of the project to the JSC members for review.	Yihong Duan	Next JSC meeting or before using emails exchanges
18	New RDP: TOMACS	The JSC endorsed the RDP proposal for TOMACS.		
19	Letter to President of CBS on TIGGE future	C/WWR and Chair of the GIFS-TIGGE WG to draft letter with required background attached from President of CAS to President of CBS on the TIGGE future.	C/WWR and Chair of GIFS-TIGGE WG	ASAP
20	Continuation of the current THORPEX RCs under WWRP	The JSC endorsed the recommendation by the ICSC-11, ICSC-11 (13), on the current THORPEX Regional Committees' function under the WWRP umbrella on a self-organizing and self-funding basis.	THORPEX RCs	Next JSC meeting
21	WCRP-WWRP coordination on common activities	The JSC invited WWRP to liaise with WCRP in developing the new WWRP structure, so as to identify activities and areas of common interest to weather and climate communities which could be coordinated.	Secretariat	ASAP
22	WCRP-WWRP coordination on meeting schedule	The JSC encouraged WCRP and WWRP to share the future meeting schedules in order to avoid the conflict.	Secretariat	Regularly
23	Next JSC meeting	The JSC recommended that the next JSC meeting, in conjunction with the World Weather Open Science Conference, Montreal, Canada, be in August 2014.		
24	WMO consultants	D. Parsons and B. Golding, currently JSC members, will have the status as observers on JSC while they are involved as WMO consultants.		

## 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 WMO/CAS Working Group on Tropical Meteorology Research (Guangzhou, China, 22-24 March 2007) (WMO TD No. 1393) (**WWRP 2007 - 4**).

Report of the First Session of the Joint Scientific Committee (JSC) for the World Weather Research Programme (WWRP), (Geneva, Switzerland, 23-25 April 2007) (WMO TD No. 1412) (**WWRP 2007- 5**).

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

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2<sup>nd</sup> WMO International Workshop on Tropical Cyclone Landfall Processes (IWTCLP-II), Shanghai, China, 19-23 October 2009 (WMO TD No. 1548) (**WWRP 2010 - 4**).

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

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