WORLD METEOROLOGICAL ORGANIZATION

COMMISSION FOR ATMOSPHERIC SCIENCES (CAS)

9th MEETING OF THE CAS MANAGEMENT GROUP

(Geneva, Switzerland, 23-25 April 2014)

MEETING REPORT

World Meteorological Organization
Weather • Climate • Water

April 2014

1. ORGANIZATION OF THE SESSION

1.1 Welcome and Introduction

The President of CAS, Øystein Hov opened the meeting at 09h00 on 23 April 2014. The President noted the six future priorities identified at CAS-16 and their linkage to the overall strategic priorities of WMO as being developed for the 2016-2019 financial period. The six priorities are (1) research related to high impact weather in the context of global change; (2) improved understanding of the water cycle, its modelling and prediction; (3) the development of an Integrated Global Greenhouse Gas Information System (IG^3IS) to deliver services to society and support policy; (4) aerosol observations and research, including assessment of impacts on air quality; (5) weather, climate, and environmental research and services for megacities and large urban complexes; and (6) utilization of evolving technologies, including climate engineering / geoengineering.

The President highlighted the approach of conducting research as an integral and very important component in service delivery and that this can best be achieved through strengthening further the links between CAS and other WMO Programmes and activities.

Deon Terblanche, on behalf of the Secretary-General of WMO, welcomed the Management Group Members to Geneva and highlighted the importance of this first meeting of CAS MG following the 16th Session of the Commission for Atmospheric Sciences in November 2013. Deon further emphasized the importance of research in ensuring that Members of WMO are well prepared to address the changing needs of the society in a rapidly changing world. He thanked the CAS MG members for attending and for the work they have done in preparing for the meeting and provided the participants with the necessary logistical and practical arrangements during the meeting.

1.2 Adoption of the Agenda

The agenda was adopted with some minor changes related to the scheduling of the various sessions to accommodate external participants and the presence of the members.

2. SETTING THE STAGE- SIX EMERGING CHALLENGES IDENTIFIED AT CAS-16: THE WAY FORWARD

2.1 High Impact Weather (ppt)

Mariane Diop-Kane presented on high impact weather reminding the CAS MG of the discussion and guidance provided by CAS-16 on this subject. The CAS MG agreed that high impact weather remains a serious threat to society but that its nature also varies substantially across the WMO Regions. The HIWeather project being developed (see 4.7) needs to take this into consideration and focus on a manageable number of user determined high priorities. The CAS MG looked forward to the outcome of the 2nd HIWeather workshop to be held from 2 to 4 June 2014 in Silver Spring, USA.

2.2 Water (ppt) (doc)

Peter May presented on water issues, highlighting that even the measurement of precipitation remains a complex and not completely solved matter. The relative scarcity or abundance of water is often at the centre of weather and climate related disasters. In addition, the management of this resource is also critical to, e.g. agriculture, energy, and health sectors, also in urban areas, and is affected by pollution.

CAS MG-9 Action Item 1: WWRP to take up the broad water issues on behalf of CAS and wherever relevant, incorporate water fluxes in the science themes of the WWRP Working Groups and projects.

2.3 Integrated Global Greenhouse Gas Information System (IG^{3}IS) (ppt)

Jim Butler presented on IG^{3}IS and CAS MG agreed that it is a CAS responsibility to support research that underpins emission estimates of GHGs, PM (and other biogeochemical substances). CAS MG felt that concrete steps are now necessary to move this initiative forward, integrating current developments into a global plan, that GAW is entrusted with the task of initiating the implementation plan development, and that EC-66 in June 2014 should be asked to support the first step.

CAS MG-9 Action Item 2: The Chair SSC EPAC to bring to the EPAC SSC the development by GAW of an implementation plan for IG^{3}IS with a long-term strategy and short-term goals, in a 10 years' time horizon following the procedure selected for the development of the PPP and S2S plans by WWRP. CAS MG advised that this process should start with a 2-3 day meeting to discuss ideas and opportunities and that this should be an inclusive process.

2.4 Aerosols (doc) (pdf)

Shiv Attri presented on aerosols highlighting the importance of aerosol in the climate system, to health and also to weather on local and regional scales. He highlighted the importance of expanding global observation networks through GAW and to ensure harmonized, quality assured measurements that are accessible.

CAS MG ***recommended*** for CAS, through GAW, to push the observational capability on a global scale of aerosols and aerosol properties and ensure that the downstream requirements (atmospheric composition/health, NWP, climate) dictate the specification of observed properties, also through the Rolling Review of Requirements (RRR) process. CAS (GAW) has the responsibility to coordinate networks, ensure compatibility of data, perform QA and calibration/standardization, managing the observational data, etc. Furthermore, CAS through WWRP and GAW, encouraged to carry out research and development activities to pave the way for applications and use of aerosol information (services).

2.5 Urbanization (doc) (pdf)

Greg Carmichael presented on urban issues highlighting the importance to address the growing needs of the urban population for useful weather, climate, water and related environmental services. He highlighted the opportunities to move forward on impact forecasts that will enhance the urban environment's resilience while also contributing towards a healthy, resource efficient environment.

The CAS MG ***recommended*** the establishment of an urban sustainability project, based on integrated weather, climate, water and related environmental services, as a main issue for WMO and cross-cutting for CAS, CBS, GFCS, and services delivery, with CAS to carry the project forward initially. In this initiative it would be desirable for WMO to put the science and service components together. WWRP and GAW are to together bring the urban sustainability issue forward: expand GURME, involve analysis of urban sustainability, modelling capability, how to best interact with the weather community: nowcasting, mesoscale modelling, HiWeather, and S2S.

2.6 New technologies, including geo/climate engineering (ppt-1) (ppt-2)

Philippe Bougeault presented on new technologies and emerging tendencies and trends in NWP, model dynamics and physics, coupling, data assimilation and new observations. Philippe also shared some recent progress regarding geoengineering in France. Deon described what has been happening within WMO regarding geoengineering since CAS-16. This discussion culminated in a review of and minor changes to the document that was being prepared for EC-66 on this subject. The emphasis in the EC-66 document is for WMO to assume a role in the assessment of the science related to relevant geoengineering techniques and identify gaps while taking note of the AMS statement on geoengineering and the Oxford Principles.

3. CAS RELEVANCE TO OTHER WMO ACTIVITIES

3.1 Feedback from the PTC-2014 Meeting (ppt)

The President presented on his participation in the Presidents of Technical Commissions (PTC) meeting and the day of joint sessions between PTC and Presidents of Regional Associations (PRA). His message centered strongly on the concept that research should be a cross-cutting feature of modern service delivery processes. This implies that CAS should strengthen its relationship and cooperation with other WMO activities and bodies.

He highlighted the inter-Commission CAS-CHy-CBS **C**oupled **H**ydrology **A**tmospheric **M**odelling and **P**rediction in the Laurentian Great-Lakes-St. Laurence River of North America (CHAMP) RDP/FDP that was discussed and supported at the PTC meeting. The MG ***recommended*** that WWRP should take the lead on this project on behalf of CAS.

The President also recalled a request by CAeM at PTC for support by CAS to address the emerging needs of the aviation sector for enhanced nowcasting and very-short range forecast products at high resolution. In this regard the CAS MG noted the progress made by WWRP to develop a CAS/CAeM joint RDP/FDP to deal with the aviation forecasting requirements related to convection, fog and turbulence. The aviation specific RDP (AvRDP) will at several airports in different climatological locations demonstrate the capability of nowcasting and mesoscale modeling techniques in support of the development of the next generation aviation initiative, namely Aviation System Block Upgrade (ASBU). The key concept in ASBU is the “Trajectory Based Operations” which would integrate high-resolution, rapidly-updated nowcast and forecast along the flight trajectory into the air traffic management (ATM) systems.

3.2 WMO Strategic Plan 2016-2019 role and links to WWRP and GAW (ppt)

The President gave an overview on progress related to the development of the WMO Strategic Plan for the period 2016-2019. He indicated that this plan will be discussed at EC-66 in June 2014 with the view to approve it at Cg-17 in mid-2015. The proposed priorities are disaster risk reduction, service delivery, GFCS, WIGOS and capacity development, while research, as a cross-cutting issue, is included as one of the strategic thrusts and also as an expected result, but these are still evolving and will also be further discussed at EC-66 in June 2014.

3.3 GFCS progress towards implementing enhanced climate services (ppt)

Deon Terblanche gave a short overview of GFCS and progress made since the previous CAS MG meeting. He mentioned that S2S, PPP and IGIS are specifically included in the compendium of GFCS projects to be considered for support. In addition, the CAS MG supported strongly the need to include the emerging requirement of the urban environment for climate services within the GFCS.

3.4 WIGOS and WIS overview and progress (ppt)

Lars-Peter Riishøjgaard presented on WIGOS, a framework for integrating all WMO observing systems and WMO contributions to co-sponsored observing systems. The observing component of GAW is part of WIGOS. WIGOS aims through coordinated data sharing and networks/systems development, to equip Members better to address existing deficiencies and to meet future challenges. Lars-Peter also highlighted the RRR as the process used by WMO to collect, vet and record user requirements for all WMO application areas and match them against observational capabilities, noting the benefits that the Observation Systems Capabilities and Review (OSCAR) tool is bringing. CAS, along with all other TCs, was asked to review relevant parts of the WMO Technical Regulations and Manual of WIGOS (see 6.6). Please see also item 5.2.

3.5 Polar matters (ppt)

Vladimir Ryabinin presented on broad polar issues. Polar Regions are gaining in strategic interest globally. At the same time the governance structures are weak in particular in the north. In this regard Vladimir suggested that WMO should focus on its core mission for the Polar Regions and be open to initiatives that "are distinguishable from existing mechanisms and add value to WMO efforts". ECPORS is the established mechanism for WMO to plan and implement polar activities in support of its core mission. He also indicated that WMO should continue to contribute in the development of the concept for an International Polar Partnership Initiative (IPPI).

3.6 Research service delivery: Strengthening the links

Abdoulange Haro presented on behalf of Tang Xu on the links between research and operations. CAS MG supported the idea to strengthen the research to service delivery links using initiatives such as the coastal inundation project, SWFDP and SDS-WAS. The SDS-WAS was put forward as a good example of research turning mature and the products becoming operational under CBS. The CAS MG placed a high priority on close cooperation between research and operations, including that related to Public Weather Service, Aviation, and Marine Meteorological Services.

4. WWRP, INCLUDING THORPEX ACTIVITIES

4.1 Merger of the Nowcasting Research and Mesoscale Weather Research Working Groups (pdf)

Gilbert Brunet presented a brief overview of the mission and activities of WWRP's Mesoscale Weather Forecasting Research and Nowcasting Research Working Groups and the rationale for their merger. The decision to merge was endorsed by CAS 16 as recommended by WWRP JSC-5 (2013) as closer collaboration between the experts of the two working groups are needed to work on the following scientific issues: high resolution modeling utilization, high impact weather forecasts, quantitative estimate of precipitation, seamless approach needed from minutes to two-day forecasts, development of an advanced data assimilation technique that also include radar reflectivity. The CAS MG noted that NWP models are taking over earlier and earlier in the nowcasting lead time (from T+2h). This justifies the merger of the groups. Rapid Update Cycles, data assimilation of radar data, EPS systems become important in nowcasting.

The CAS MG ***recommended*** for the two working groups to develop a ToR for the merged group and a timeline to implement the merger.

4.2 Tropical Meteorological Research (ppt) (doc)

Yihong Duan presented the progress of recent activities of the Working Group on Tropical Meteorology Research. He also provided a brief overview of the challenges and future activities of the working group. This included the successful implementation of the following projects: Typhoon Landfall Forecast Demonstration Project, Northwest Pacific Tropical Cyclone Ensemble Forecast Project and the South China Monsoon Rainfall Experiment. The said projects resulted in new understanding and methodologies to help answer some problems related to tropical cyclone and monsoon forecasting. The CAS MG ***recommended*** that the development of similar projects in other tropical cyclone/monsoon affected regions be encouraged by the Working Group on Tropical Meteorological Research. It welcomed the plans of the working group to establish a new research and development project "High-resolution Numerical Prediction of Land-falling Typhoons" which will focus on tropical cyclone wind structure and rainfall. This year, the working group is organizing the eighth international workshop on tropical cyclones in conjunction with the third international workshop on tropical cyclone landfall processes in Jeju, Republic of Korea. The MG supported the continuation of these events as both workshops had been recognized as highly effective fora for the exchange of views between tropical cyclone researchers and forecasters.

4.3 The role of RDPs and FDPs (ppt)

Alice Grimm presented the role of WWRP RDPs and FDPs in responding to regional needs. She emphasized that CAS-16 acknowledged the substantial work carried out by WWRP working groups on projects that provide a bottom-up mechanism through which regional and national research needs are met. These projects focus on demonstrating the potential of research models, tools and techniques in an operational setting and on the initial stages of the technology transfer from research to operations. Considering the importance of FDPs and RDPs the meeting strongly supported the plan to increase their visibility by developing a dedicated webpage for these projects on the CAS/WWRP webpage and to strengthen the links between these projects and the Regional Associations.

CAS MG-9 Action Item 3: The Chief WWR to set up a dedicated website for WWRP RDPs and FDPs as an information resource on past projects and lessons learnt, procedures for RDPs and FDPs to be considered, future plans etc.

4.4 Weather Modification (ppt)

Deon Terblanche presented the current status of weather modification activities undertaken by WWRP. He emphasized that the lack of contributions to the Weather Modification Research Trust Fund holds a considerable risk to future activities in this field. The meeting then supported the plan for a final meeting of the Expert Team on Weather Modification in 2015 to review the statement on weather modification and to request the 17th session of the WMO Congress (2015) to provide a clear indication whether or not to continue the WMO Scientific Conference on Weather Modification quadrennial series and the work of the aforementioned expert team.

CAS MG ***recommended*** that a review of the status on weather modification should ideally be carried out every few years or when new evidence accumulates, and be based on the core budget of WMO, as weather modification is an important issue in many countries.

4.5 Conclusion of THORPEX (pdf)

Gilbert Brunet presented the major accomplishments of THORPEX and its conclusion at the end of 2014. Although the major contribution of THORPEX to the advancement of weather forecasting capability, especially global Numerical Weather Prediction has been widely recognized, there were some important areas which were omitted from THORPEX. This and as other areas have gained importance as a result of external change motivated the establishment of three new projects on: polar prediction, sub-seasonal to seasonal prediction and high-impact weather. Also, as the THORPEX structures (e.g., TIGGE) are increasingly used in wider research it is important that we continue to capitalize on the expertise gained during THORPEX to achieve further advances in the post-THORPEX era. The meeting therefore strongly supported the future structure of WWRP with the establishment of the Working Group on Predictability, Dynamics and Ensemble Forecasting and the Working Group on Data Assimilation and Observing Systems.

4.6 Establishment of PDEF and DOAS WG under WWRP (pdf)

Tetsuo Nakazawa presented additional information on the establishment in 2015 of the Working Group on Predictability, Dynamics and Ensemble Forecasting and the Working Group on Data Assimilation and Observing Systems under the WWRP. This included the role, scientific scope and proposed terms of reference of the two working groups.

4.7 HIWeather (pdf)

HIWeather is one of three THORPEX legacy projects, it aims to promote cooperative international research to achieve a dramatic increase in resilience to high impact weather, worldwide, through improving forecasts for timescales of minutes to two weeks and enhancing their communication and utility in social, economic and environmental applications. The HIWeather project will focus on

future needs of WMO Members for decreasing vulnerability to high impact weather by considering urbanisation, increasing population, demographic changes and on predictive time scales of minutes to two - weeks, build upon THORPEX to improve warnings on high impact weather events. The HIWeather project will be shaped by user-needs, assessed through communication and interaction with stakeholders and incorporate and foster advances in new predictive capability. Also presented was the Lake Victoria and Severe Weather Forecast Demonstration Projects both of which are also centered on high impact weather events.

Gilbert Brunet added that the HIWeather project needs an implementation plan with work packages and deliverables. It is not a set of RDPs, which is a WWRP-SSC-task to oversee. High resolution modelling, including environmental forecasting is a focus for the HIWeather project.

CAS MG-9 Action Item 4: The C/WWR to ensure that a clearer focus and direction for HIWeather be determined at the 2nd HIWeather project workshop during June in US in order to clearly set it apart from previous THORPEX activities and to make it attractive and relevant to WMO Members.

5. GAW, INCLUDING GURME ACTIVITIES

5.1 Enhancing GAW observations and filling the gaps (doc) (pdf)

Greg Carmichael presented an overview of observations within the GAW Programme. GAW coordinates global observations and analysis of data from 29 Global Stations, about 400 fully operational Regional Stations, and about 100 stations operated by contributing networks. He highlighted that data from these stations are important to a wide range of critical scientific and societal issues, including, amongst others, climate change, air quality, ozone depletion, and acidification. Greg listed a number of initiatives to further enhance the GAW networks and the utilization of data. These include furthering efforts to better quantify the role of short-lived climate forcers (SLCFs) in climate change and to investigate the possible measures that can be recommended to policy makers on emission controls to get simultaneous benefits by minimizing health, climate and other impacts (e.g., crop loss) due to these compounds, continuing efforts for the provision of data in NRT of GAW observations and increasing the density of observations in data sparse regions (particularly the tropical regions of Africa, Southeast Asia and Latin America, and in Eurasia and the Arctic) and over the oceans. It was noted that although satellites can provide important information for some atmospheric chemistry parameters, they provide very limited information on surface concentrations.

CAS MG-9 Action Item 5: The Environmental Pollution and Atmospheric Chemistry Scientific Steering Committee (EPAC SSC) to review the GAW structure as to its usefulness and relevance to for instance the demands from services and different application areas.

5.2 Interaction between WIGOS and GAW (ppt)

Sandro Fuzzi provided an overview of the interaction between CAS and ICG-WIGOS as well as the participation of CAS experts in the various WIGOS Task Teams. He gave an overview of the RRR process and the current application areas which could be considered to be restrictive from a GAW point of view. He highlighted the need for inter SAG communication on WIGOS issues and requested for the Secretariat to set up appropriate mechanisms to ensure consultation between himself, the CAS MG and EPAC SSC. It was noted that WIGOS is only one motivation of many for GAW and the EPAC SSC needs to address WIGOS needs within a broad context of GAW requirements.

CAS MG-9 Action Item 6: The EPAC SSC to consider and act upon the items (e.g. defining application areas and requirements for GAW observations, the rolling review of requirements process, growing need for near real-time data availability) proposed by Sandro Fuzzi as member of the ICG-WIGOS while the Secretariat is requested to establish a mechanism for routine interaction between Sandro, EPAC SSC, Scientific Advisory Group (SAG) Chairs and the CAS MG.

5.3 Global aerosol network (ppt)

Alexander Baklanov highlighted the fact that the impact of aerosols remains one of the most significant and uncertain aspects of climate change projections. Aerosols also play a significant role in human health issues and in environmental effects caused by biomass burning, dust storms and volcanic eruptions, and at shorter timescales than those of climate, also in NWP. The CAS MG appreciated the expansion of aerosol observations but noted that many areas of the globe are still lacking measurements and took note of the recent publication "Recommendations for a Composite Surface-Based Aerosol Network" (GAW Report No. 207). Alexander further provided an overview of the various network components of GAW (and other initiatives) that contributed to global aerosol measurements. He also provided some suggestions for strengthening global aerosol measurement. The issue of the Rolling Review of Requirements was also discussed in the context that it could be time consuming but also provides strong motivation for investments in observations as these are linked to user requirements and various application areas. There was discussion on using the term "Black Carbon" (BC). It was agreed that we need to know what BC is formally but that we also need to support the usage of the term.

The CAS MG ***recommended*** that more effort is required by WMO Members to strengthen aerosol observations in an integrated manner to ensure that such data is made available also in the context of growing near real-time applications.

CAS MG further ***recommended*** for the Rolling Review of Requirements (RRR) to become routine in GAW and requested EPAC SSC to give this matter the required attention. Gap analysis should identify the most important gaps first. As these gaps become filled, gaps of second order importance can be identified and filled.

5.4 GAW data submission and use (doc)

Greg Carmichael stated that collaboration between different agencies, institutions and academia are central to GAW and that contributing networks and observations through such collaborations are a valuable component of GAW. There are important networks that have not signed a Letter of Agreement (LoA) with GAW but that GAW may have even extensive collaboration with, such as EMEP, AERONET, SKYNET and MPLNET, and with which continued efforts to coordinate activities with GAW could extend the global coverage of observations. There remain issues of how to integrate data from contributing stations as they may not follow GAW QA/QC protocols.

Greg further highlighted that the impact and use of GAW observations will benefit from improved data submission. Strategies to increase the data flows and collaborations are needed. A collected effort, that includes CAS MG members, is required to help work with WMO Members to help get data flowing. In terms of metadata, the establishment of a truly global group (ECMWF, GEO CoP, WMO/GAW, others) who could administer a controlled vocabulary database for atmospheric composition may be a positive option.

5.5 Satellite measurements in GAW (doc)

Geir Braathen and Liisa Jalkanen informed the MG of the plans for assessing current needs regarding satellite observations in GAW. In response to the request by WMO Cg-XVI, a Task Team (TT) has been formed to address this question. It will function in co-operation between the WIGOS office, Space Programme Office and GAW, and in coordination with CBS groups ET-SAT and ET-EGOS, the CEOS Atmospheric Composition Constellation Group, and CGMS. The work will include the update of the Tables and Figures in the IGACO Report (GAW Rep No. 159) that date from 2004. The TT will also consider the ongoing WMO Rolling Review of Requirements (RRR) and provide input to this process. It was noted that it is important to include persons active in and knowledgeable of GAW in the TT.

5.6 Local Stations as a new GAW category (doc) need (pdf) here too is on web

CAS-16 recommended adding a new category "local" to the GAW stations that would provide locally representative information for use in, e.g., air quality studies and forecasting, health studies and urban climate services. Shiv Attri presented to the MG background on GAW stations and concepts on local stations; guidelines and station siting criteria by several authorities for establishing what could be called local stations (residential, traffic); and the need to address new observational requirements through user communities in GFCS. There was discussion on whether the term "local" would be most suitable for this new GAW category, noting that this was largely a communications issue. It was decided that the EPAC SSC will address the local station category in their meeting in May 2014.

CAS MG-9 Action Item 7: EPAC SSC to address the local station category issue in their next meeting.

5.7 Engagement of agencies outside NMHSs on urban issues

Liisa Jalkanen introduced the item on involving agencies other than NMHSs on urban issues. Engaging the C40, Cities Climate Leadership Group, a network of the world's megacities committed to addressing climate change, was seen to be a very useful idea. Relevant areas for use of weather and climate data were mentioned, such as urban planning, developing building regulations to avoid bad micro-climates, land occupation and use within cities, traffic management. It was mentioned that often only prominent wind directions have been/are used by city planners, whereas using modelling would result in better information for planning city development. Relationships would need to be developed with local authorities as these are most of the time key to activities in urban areas, however, building and traffic codes are usually of wider national or international character. It was also thought that the International Telecommunication Union (ITU) could be a good collaborator, there could be potential for crowd-sourcing of data systems. Many areas within urban issues, such as traffic management, are vibrant research fields. It was felt that there is a lot of space for best practices information and sharing of it, use of media was seen as very relevant here.

6. JOINT WWRP, GAW, WCRP ACTIVITIES

6.1 WGNE (ppt)

Andy Brown reminded CAS MG that the Working Group on Numerical Experimentation (WGNE) was jointly established by WCRP and CAS with the main aim of fostering the development of atmospheric circulation models for use in weather prediction and climate studies on all time scales and diagnosing and resolving shortcomings. Andy gave a brief overview of the WGNE coordinated projects and experiment including the relatively new initiatives on the importance of aerosols for weather and climate - assessing the level of complexity required, and the comparison of model momentum budgets - how do they differ? What is right? CAS MG recognized the important role of WGNE in addressing model related issues across weather and climate time-scales and supported the initiatives to also build stronger links with GAW. Andy mentioned that WGNE-29, held between 10 and 13 March 2013, also highlighted the need to raise the profile of research and specifically that related to model development and refinement among funding agencies.

CAS MG-9 Action Item 8: CAS and WMO in general should work with Members to raise its profile in research funding circles (IGFA, Belmont Forum) in order to maintain and build momentum in atmospheric research and model development across timescales.

6.2 S2S and PPP (pdf) (ppt)

Gilbert Brunet presented the status of the sub-seasonal to seasonal prediction (S2S) project as a joint initiative between WCRP and WWRP. He started from the history of S2S in November 2009

when CAS recommended setting up S2S. The Implementation Plan has been finalized and printed. The Terms of Reference have been drafted. The Planning Group prepared the Implementation Plan and the Steering Group was established to implement the project. The project officially started in November 2013 as a 5-year project and the International Coordination Office has been established in Jeju Island at the National Institute of Meteorological Research of the Korean Meteorological Administration. There are five subprojects, including monsoons, MJO, Africa, extreme weather, and verification. Gilbert Brunet also explained the S2S database up to 60-day forecasts and reforecasts, to achieve many of the goals of the projects. The database follows the same protocol as for TIGGE but contains more ocean and surface variables for sub-seasonal to seasonal prediction and the products are three weeks behind real-time with common grid of 1.5 by 1.5 degree horizontal resolution. S2S remains both in the NWP and climate communities, since it is important to benefit from its dual role, by bridging of systems and methods between NWP and climate.

Ryabinin Vladimir provided the update of the polar related activities, such as Global Integrated Polar Prediction System (GIPPS), WWRP Polar Prediction Project (PPP), WCRP Polar Climate Predictability Initiative (PCPI), Year of Polar Prediction (YOPP) and Multidisciplinary drifting Observation for the Study of Arctic Climate (MOSAiC). He showed that the flagship PPP themes are sea ice prediction, linkages between polar regions and lower-latitudes, improved availability of observations from polar regions, and the YOPP. YOPP aims a significant improvement in environmental prediction capabilities for the polar regions and beyond, by coordinating a period of intensive observing, modelling, verification, user-engagement and education activities. The PCPI has six themes, three of them are joint activities with PPP.

6.3 Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS) (ppt) (doc)

Yihong Duan presented the SDS-WAS related issues. Following CAS-XVI, CAS-MG acknowledged the initiative to designate another SDS-WAS regional node in Beijing, China, as the RSMC-ADSF for the region consisting of Asia and the Central Pacific. CAS-MG noted that a Joint CBS-CAS Task Team on Atmospheric Sand and Dust Storm Forecasts are developing a document to evaluate the dust forecast products in SDS-WAS regional nodes. CAS-MG recognized that an SDS-WAS Steering Committee be established, as soon as possible, for global research coordination of regional activities, supported by a trust fund.

6.4 Forecast Verification Research (ppt) (doc)

Peter May emphasized the need for meteorological services to share observations for verification purposes. Currently, much more could be achieved with the much richer data available to NMHSs, especially when quality observations from external parties are included. It is also necessary to encourage the use of third party data, social media, (such as twitter) for subjective verification of forecasts for high impact events, research on the impacts of observation uncertainties on forecast verification results and interpretation, model verification in “observation space” (i.e., satellite radiance or brightness temperature for cloud, radar reflectivity for rain) to help get over retrieval errors for remotely sensed observations, and the development and use of new verification methods and scores (e.g., extreme dependency) that handle rare/extreme events better than the traditional ones. Another important issue to focus on is the need for better communication of forecast uncertainty so that users have the confidence to make appropriate decisions based on expected forecast quality. This may mean converting from “weather space” into “user space”. A good example is UKMO’s flight time error – drive the plane through model winds, compare to actual flight time to get error. Verification of environmental forecasts is not nearly as advanced as weather forecast verification and this is an area worth looking into. Attention should also be given to how to verify timing (lead time, onset, cessation etc.) and intensity of spatial warnings.

The CAS MG supported a move toward verification methods for ensemble predictions, extreme value prediction, environmental forecasts and recommended collaboration with CBS to ensure operationability of new verification techniques.

6.5 Updating Implementation plans for WWRP and GAW (wwrp) (gaw)

Gilbert Brunet highlighted several directions in updating Implementation plans for WWRP. He pointed out that the High Impact Weather Project is timely because there are new capabilities in short range forecasting and advances in coupling prediction models. He also mentioned that WWRP should focus more on water issues for improved disaster risk reduction and water resource management. Then he talked about the current research issues in short-range numerical weather prediction models, which is a challenge for WWRP and WGNE. The issues include model physics, ensemble and data assimilation techniques, new observations (high spectral resolution IR sounders, wind lidars, met radars, EarthCare etc).

Greg Carmichael highlighted the plans for updating the GAW Strategic and Implementation Plan. Input from the GAW Scientific Advisory Groups (SAGs) and Expert Teams (ETs) was compiled into a "Science for Service" strategic document. The key point in the implementation plan for 2016-2019 will be to further develop user driven products, with GAW striving for "one chain" delivery. The backbone of GAW remains good observations. The use of GAW data will be further promoted for various purposes, including air quality and climate, and numerical weather prediction. The EPAC SSC will address the development of the GAW Implementation Plan in their upcoming meeting in May 2014.

CAS MG-9 Action Item 9: The emerging priorities in the WMO Strategic Plan for 2016-2019 need to be addressed and responded to by EPAC SSC and WWRP SSC.

6.6 Updating Technical Regulations applicable to GAW (doc1) (doc2) (doc3) (doc4)

Liisa Jalkanen presented to the MG the current activities related to the updating of the WMO Technical Regulations (TR), this item has also been addressed under item 3.4 of this report. Prof Ann Webb, the CAS representative in the Task Team on WIGOS Regulatory Material (TT-WRM), assisted by Oksana Tarasova (WMO Secretariat), had very successfully and concisely put together the sections relevant for GAW, with input from GAW SAGs. GAW is included as Section 5 in Technical Regulations, VOLUME I – General Standards and Recommended Practices; PART I - WIGOS. This is about one half page of high, general level text. The WIGOS Manual includes the Observing Component of GAW, also in Section 5, with short and concise text on the requirements; design, planning and evolution; instrumentation and methods of observation; operations; observational metadata; quality management; and capacity development.

CAS MG-9 Action Item 10: The review of the WIGOS Manual Volume I and the General standards and recommended practices-documents are left with EPAC SSC to respond to CAS President in order to meet 10 July deadline on behalf of GAW.

6.7 CAS activities and Capacity Development (ppt-1) (ppt-2)

Jae-Cheol Nam gave a comprehensive overview on this item, noting on the need for qualified meteorologists, the role of Regional Training Centres (RTCs), and gave information on an assessment of areas (such as forecasting, climatology, micrometeorology) where the training is needed in several developing countries. Nam highlighted actions in GAW on personnel development, the importance of GAWTEC in Germany, and of such actions as CATCOS by Switzerland. He also informed the meeting of the activities of the EC Panel of ETR and of the WMO Fellowship Programme.

Tetsuo Nakzawa gave a presentation on specific activities of WWRP, including training courses and tutorials, expert meetings, workshops and conferences, and publications.

7. CAS WORKING STRUCTURE

7.1 Membership of CAS structures

There was general discussion of the CAS structures, as revised at CAS-16 in Nov 2013 and where the process had been decided. For further clarification it was stressed that the max time for service would be 4 plus 4 years, for example if a person became a chair in their 6th year, an exception should be agreed upon, if the person would be chair for 4 years, that is, be in the group for 10 years.

Any exception is to be suggested by the SSC (EPAC or WWRP) Chair to the CAS President, who then consults with the CAS MG. The CAS President will keep a file of exceptions and report to the CAS Session on these.

Tetsuo Nakazawa and Gilbert Brunet presented the new WWRP/SSC membership after the first term ends. Almost half of the members would be replaced by new members, with a good number remaining to keep the continuation of the activities. CAS-MG endorsed the new WWRP/SSC membership as proposed.

CAS MG Action Item 11: CAS President to keep a file of exceptions on the membership of groups under CAS.

7.2 Youth and Gender (ppt)

Jae-Cheol Nam gave a presentation on youth and gender issues. He remarked that the theme for the 2014 World Meteorological Day had been “The Weather and Climate: Engaging Youth”. Nam noted that we need to strengthen formal and informal education about climate change, promote sustainability and support youth to become environmental champions in their own communities. He reminded the meeting that the WWOSC will support the partricipation of a very large number of young scientists. Regarding gender issues, Nam highlighted the history of addressing actions regarding gender in WMO, gave statistics on the participation of men and women in CAS and informed the meeting of the Third WMO Gender Conference, to be held 5-7 November in Geneva. The CAS MG recognized the importance of keeping these two items high on the CAS agenda.

8. MAJOR UPCOMING EVENTS

8.1 GAW-25

Greg Carmichael reported that 2014 marks the twenty-five year anniversary of the GAW Programme. There are several activities planned. One major one will be the celebration activities at the 13th iCACGP / 13th IGAC Quadrennial Symposium/Conference. The conference will take place on 22-26 September 2014 in Natal, Brazil (http://igac-icacgp2014.org/). Activities on GAW will include: GAW talks in the sessions; special session on GAW 25; photo exhibition; a special GAW booth in the conference hall foyer, with posters, highlighting GAW activities; and a "glossy brochure" highlighting the developments in the GAW Programme within the 25 years.

8.2 WWOSC-2014

Michel Beland provided a short overview of progress regarding the World Weather Open Science Conference (WWOSC) to be held in Montreal, Canada from 16 to 21 August 2014 (http://wwosc2014.org/welcome_e.shtml).

8.3 Climate Summit – September 2014 (ppt)

Deon Terblanche presented on the Climate Summit and informed CAS MG that as part of a global effort to mobilize action and ambition on climate change, United Nations Secretary-General Ban Ki-moon is inviting Heads of State and Government along with business, finance, civil society and

local leaders to a Climate Summit in September 2014, New York. The Summit will come one year before countries aim to conclude a global climate agreement in 2015 through the United Nations Framework Convention on Climate Change. Although the 2014 Climate Summit is not part of the negotiating process, countries have recognized the value of the Summit.

Deon further explained that CAS through GAW will make an important WMO contribution to the Summit by the earlier compilation and release of the GHG Bulletin to coincide with the Climate Summit. At the same time a limited expansion of the Bulletin will also occur as the current format has become limiting to accommodate sufficiently the information in all six languages. This year's Bulletin will also include a summary on ocean acidification jointly produced by the International Ocean Carbon Coordination Project (IOCCP) of the Intergovernmental Oceanographic Commission of UNESCO (IOC-UNESCO) and the Scientific Committee on Oceanic Research (SCOR), the Ocean Acidification International Coordination Centre (OA-ICC) of the International Atomic Energy Agency (IAEA) and the World Meteorological Organization (WMO), acknowledging the contribution of data suppliers.

8.4 Any other business

Tetsuo Nakazawa reported on the current financial status of three trust funds (THORPEX, S2S and PPP). For the THORPEX trust fund, which may end this year, there are some uncertainties in expenditure for the travel support to the WG meetings during the WWOSC, but for S2S and PPP, it seems that the contribution from Members to their trust funds is gradually coming, so that the current condition to support these two projects would be safe, but of course more contributions from Members are welcome.

9. SUMMARY AND CLOSURE OF THE MEETING

9.1 List of Action Items

CAS MG-9 Action Item 1: WWRP to take up the broad water issues on behalf of CAS and wherever relevant, incorporate water fluxes in the science themes of the WWRP Working Groups and projects.

CAS MG-9 Action Item 2: The Chair SSC EPAC to bring to the EPAC SSC the development by GAW of an implementation plan for IG^{3}IS with a long-term strategy and short-term goals, in a 10 years' time horizon following the procedure selected for the development of the PPP and S2S plans by WWRP. CAS MG advised that this process should start with a 2-3 day meeting to discuss ideas and opportunities and that this should be an inclusive process.

CAS MG-9 Action Item 3: The Chief WWR to set up a dedicated website for WWRP RDPs and FDPs as an information resource on past projects and lessons learnt, procedures for RDPs and FDPs to be considered, future plans etc.

CAS MG-9 Action Item 4: The C/WWR to ensure that a clearer focus and direction for HIWeather be determined at the 2nd HIWeather project workshop during June in US in order to clearly set it apart from previous THORPEX activities and to make it attractive and relevant to WMO Members.

CAS MG-9 Action Item 5: The Environmental Pollution and Atmospheric Chemistry Scientific Steering Committee (EPAC SSC) to review the GAW structure as to its usefulness and relevance to for instance the demands from services and different application areas.

CAS MG-9 Action Item 6: The EPAC SSC to consider and act upon the items proposed by Sandro Fuzzi as member of the ICG-WIGOS while the Secretariat is requested to establish a mechanism for routine interaction between Sandro, EPAC SSC, SAG Chairs and the CAS MG.

CAS MG-9 Action Item 7: EPAC SSC to address the local station category issue in their next meeting.

CAS MG-9 Action Item 8: CAS and WMO in general should work with Members to raise its profile in research funding circles (IGFA, Belmont Forum) in order to maintain and build momentum in atmospheric research and model development across timescales.

CAS MG-9 Action Item 9: The emerging priorities in the WMO Strategic Plan for 2016-2019 need to be addressed and responded to by EPAC SSC and WWRP SSC.

CAS MG-9 Action Item 10: The review of the WIGOS Manual Volume I and the General standards and recommended practices-documents are left with EPAC SSC to respond to CAS President in order to meet 10 July deadline on behalf of GAW.

CAS MG Action Item 11: CAS President to keep a file of exceptions on the membership of groups under CAS.

9.2 Closure of the meeting

The President closed the meeting at 11:45 on 25 April 2014 and thanked the CAS MG members for their contributions to a successful meeting and wished them safe journeys back home.

9TH MEETING OF THE WMO/CAS MANAGEMENT GROUP

Geneva, 23-25 April 2014

(Venue: WMO headquarters)

P R O G R A M M E

(22 April 2014)

WEDNESDAY, 23 April 2014

1 - ORGANIZATION OF THE SESSION

09:00 - 09:10	Welcome	WMO Secretary-General or representative
09:10 - 09:15	Opening Remarks by the president of CAS	Øystein Hov
09:15 - 09:20	Opening Remarks by the Director of the Atmospheric Research and Environment Branch	Deon Terblanche
09:20 - 09:30	Adoption of the Agenda	Øystein Hov / Deon Terblanche

2 - SETTING THE STAGE: SIX EMERGING CHALLENGES IDENTIFIED AT CAS-16 (Chair: Ø. Hov)

09:30 - 09:45	High Impact Weather	Mariane Diop-Kane
09:45 - 10:00	Water	Peter May
10:00 - 10:15	Integrated Greenhouse Gas Information System	Jim Butler
10:15 - 10:45	Coffee break	
10:45 - 11:00	Aerosols	Shiv Dev Attri
11:00 - 11:15	Urbanization	Greg Carmichael / Liisa Jalkanen
11:15 - 11:30	New technologies including geo/climate engineering	Philippe Bougeault / Deon Terblanche
11:30 - 12:00	Recommendations to EPAC SSC and WWRP SSC	All

3 - CAS RELEVANCE TO OTHER WMO ACTIVITIES (Chair: Jae-cheol Nam)

12:00 - 13:30	Lunch	
13:30 - 13:45	Feedback from the PTC-2014 meeting	Øystein Hov
13:45 - 14:00	WMO Strategic Plan 2016-2019 role and links to WWRP and GAW	Øystein Hov
14:00 - 14:25	GFCS Progress towards implementing enhance climate services	Filipe Lucio
14:25 - 14:50	WIGOS and WIS overview and progress	Lars Peter Riishojgaard
14:50 - 15:15	Polar matters	Øystein Hov / Vladimir Ryabinin
15:15 - 15:40	Research Service Delivery: Strengthening the links	Tang Xu
15:40 - 16:00	Coffee break	

4 - WWRP, INCLUDING THORPEX ACTIVITIES (Chair: Jae-cheol Nam)

16:00 - 16:15	Merger of the Nowcasting Research and Mesoscale Weather Research Working Groups	Gibert Brunet
16:15 - 16:30	Tropical Meteorological Research	Duan Yihong
16:30 - 16:45	The role of RDPs and FDPs	Alice Grimm

16:45 - 17:00	Weather Modification	Deon Terblanche
17:00 - 17:15	Conclusion of THORPEX	Gilbert Brunet
17:15 - 17:30	Establishment of PDEF and DOAS WG under WWRP	Tetsuo Nakazawa
17:30 - 17:45	HIWeather	Gilbert Brunet

THURSDAY, 24 April 2014

5 - GAW, INCLUDING GURME ACTIVITIES (Chair: Ø. Hov)

09:00 - 09:15	Enhancing GAW observations and filling the gaps	Greg Carmichael
09.15 - 09:30	Interaction between WIGOS and GAW	Sandro Fuzzi
09:30 - 09:45	Global Aerosol Network	Liisa Jalkanen / Alexander Baklanov
09:45 - 10:00	GAW contributing networks, data submission and use	Greg Carmichael
10:00 - 10:15	Satellite measurements in GAW	Liisa Jalkanen
10:15 - 10:45	Coffee break	
10:45 - 11:00	Local stations as a new GAW category	Shiv Dev Attri
11:00 - 11:15	Engagement of agencies outside NMHSs on urban issues	Liisa Jalkanen
11:15 - 12:00	Discussion	All
12:00 - 13:30	Lunch	

6 - JOINT WWRP, GAW, WCRP ACTIVITIES (Chair: Ø. Hov)

13.30 - 13:45	WGNE	Andy Brown
13:45 - 14:15	S2S and PPP	Gilbert Brunet / Vladimir Ryabinin
14:15 - 14:30	SDS-WAS	Duan Yihong
14:30 - 14:45	Forecast Verification Research	Peter May
14:45 - 15:15	Coffee break	
15:15 – 15:45	Implementation plans for WWRP and GAW	Greg Carmichael / Gilbert Brunet
15:45 - 16:00	Updating Technical Regulations applicable to GAW	Liisa Jalkanen
16:00 - 16:15	CAS activities and capacity development	Jae-cheol Nam
16:15 - 17:00	Discussion	All

FRIDAY, 25 April 2014

7 - CAS WORKING STRUCTURE (Chair: Ø. Hov)

09:00 - 09:30	Membership of CAS structures	Øystein Hov
09:30 - 09:45	Youth and Gender	Jae-cheol Nam

8 - MAJOR UPCOMING EVENTS (Chair: Ø. Hov)

09:45 - 10:00	GAW-25	Greg Carmichael / Liisa Jalkanen
10:00 - 10:30	WWOSC	Michel Béland / Deon Terblanche
10:30 - 10:45	Climate Summit - September 2014	Deon Terblanche
10:45 - 11:15	Any other business	

9 - SUMMARY AND CLOSURE (Chair: Ø. Hov)

11:15 - 11:45	List of action items	Øystein Hov / Deon Terblanche
11.45 - 12:00	Closing remarks and adjournment	Øystein Hov

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