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10TH MEETING OF THE CAS MANAGEMENT GROUP
Geneva, 22 – 23 April 2015

PROVISIONAL ANNOTATED AGENDA

10TH CAS MANAGEMENT GROUP MEETING

TELECONFERENCE, 22 AND 23 APRIL 2015

1. Organization of the session

1.1 Welcome and Introduction

The President of CAS, Øystein Hov, will welcome CAS Management Group members participating in the teleconference.

1.2 Adoption of the agenda

Members will consider the provisional agenda for approval

2. CAS President background on Presidents of Technical Commissions meeting, interactions with CAeM, CAgM, CBS (on WIGOS and RRR), GFCS, etc.

(Øystein Hov)

The PTC meeting was held on 29 January 2015 and a joint meeting with the Presidents of the Regional Associations (PRA) was held on 30 January in Geneva.

Atmospheric science cuts across most of the other commissions, and there is quite a bit of research-related work in all commissions. It is a challenge to integrate the CAS-driven activities into the other commissions so that recommendations by WMO on operations and services build on the full R&D capability or the organization. The CAS MG should review the activities of the other TCs in order to ensure that their R&D components are transparent throughout the WMO organization with a minimum of parallel work and redundancies.

Specifically mentioned at the PTC meeting was:

- The Aviation Demonstration Project (AvRDP) joint with CAeM and in cooperation with CBS aimed at demonstrating the capability of nowcasting to provide information and products for enhanced air traffic management in terminal areas; this project is now in progress with the Hong Kong Observatory in the lead;
- The CBS Severe Weather Forecasting Demonstration Project (SWFDP) on services for the road sector; CAS should look into its contributions here;
- The Great Lakes and St Lawrence River (CHAMP) (CAS CHy CBS Coupled Hydrology Atmospheric Modelling and Prediction in the Laurentian Great Lakes where the previous CAS MG meeting (April 2014)) recommended that WWRP should take the lead on this

project on behalf of CAS, but with CHy as the lead commissions. There is a need to push this project forward, and WMO has taken steps to do so after the PTC meeting. The scientific objectives are aligned with the development of an earth system approach for short to medium range forecasting, in order to develop new and improved applications and services.

- CAgM develops “Operational Framework for AgroEcosystem Sustainability Assessment (OFASA)” with the aim to reduce3 emissions, increase carbon uptake, adapt to a changing climate, and increase resilience to impacts can improve public health, economic development, ecosystem protection, and quality of life of rural communities. An important additional dimension is how to design monitoring and assessing systems to track the impacts of the management and the policy interventions, and to assess whether these are contributing towards or away from Sustainability.
  This activity addresses global food production and GAW, the carbon tracker initiative (IG3IS), S2S, HiW can provide relevant information and support. Agricultural practices impact on climate, atmospheric composition, freshwater and marine waters in very significant ways, and are not much regulated.
- GFCS: CAS advocates that the relevant TCs should demonstrate a willingness to plan joint action in support of GFCS. This theme has been taken up by the ICG-WIGOS Chairperson, Dr Sue Barrell. She has communicated to GFCS/IBCS that WIGOS, WCRP and CAS, the WIGOS lead technical commissions, CBS and CIMO, stand ready and willing to build on this strong foundation and to collaborate with the GFCS project/programme on mutually-developed, well-described and collectively-agreed tasks, toward the mutual goal of reliable climate information.
- WIGOS is moving forward in a forceful manner. Its vision calls for an integrated, coordinated and comprehensive observing system to satisfy, in a cost-effective and sustained manner, the evolving requirements of WMO Members in delivering their weather, climate, water and related environmental services. WIGOS will enhance the coordination of WMO observing systems with those of partner organizations for the benefit of society. WIGOS will provide a framework for enabling the integration and optimized evolution of WMO observing systems, and of WMO’s contribution to co-sponsored systems. Together with the WMO Information System (WIS), this will allow continuous reliable access to an expanded set of environmental data and products, and associated metadata, resulting in increased knowledge and enhanced services across all WMO activities (http://www.wmo.int/pages/prog/www/wigos/documents.html).
- WIS seems to become an integral part of WIGOS. For the RRR process, MeteoSwiss is developing OSCAR (Observation Systems Capabilities and Review Tool) as a core of the WMO Integrated Observing Systems (WIGOS) framework and in support of the Rolling Review of Requirements (RRR) process. OSCAR will provide Documentation of (Observing) Requirements, Documentation of (Observing) Capabilities, Critical Review (= gap analysis), Statement of Guidance (= steps for improvement). OSCAR is the system to enable the RRR process. CAS contributes to and supports WIGOS (Sandro Fuzzi represents CAS on ICG-WIGOS).

3. Progress on CAS MG-9 action items (Øystein Hov and Deon Terblanche)

CAS MG-9 Action Items	
Action Item	**Progress**
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.	The water topic crosses cut all WG and projects. Specific areas are here considered: 1. The integrated water cycle (atmosphere, ocean, hydrology) in S2S and in CHAMP; 2. The rainfall extremes in HIWeather, in the nowcasting and mesoscale WG and in the Tropical Meteorology WG; 3. The link between the water cycle and the dynamics in the PDEF and DAOS WGs; 4. The verification of precipitation related parameters in the verification WG; 5. The societal value and the economic impact in the SERA WG.
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.	The initial steps have been taken. EPAC SSC reviewed the drafting team at the meeting in February 2015. The outline is already drafted. The team is led by Phil DeCola from the USA. The team will be contacted in April and initial work will be done off-line. Meeting in person is planned in the autumn 2015, when the second draft is prepared and the writing team is complete. The work of drafting team will depend on the approval by Congress of IG^{3}IS concept.
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.	It has been prepared and now and it will be available on line at: https://www.wmo.int/pages/prog/arep/wwrp/new/RDP-FDP.html from 15 April 2015. However WMO web site will be soon restructured and we need to rethink the way we would like to present RDP/FDPs.
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	This matter has been addressed in the implementation plan of the HIWeather project which is now available on the WWRP web site, see:

during June in the USA in order to clearly set it apart from previous THORPEX activities and to make it attractive and relevant to WMO Members.	https://ww.wmo.int/pages/prog/arep/wwrp/new/documents/HIW_IP_v1_4.pdf .
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.	EPAC SSC had a look at GAW structure at the meeting in February 2015 and recommended to establish more cross-SAG activities related to specific applications. Terms of reference of two groups were updated to include more modeling activities. The ToR of Data Centers is currently being reviewed by EPAC SSC.
CAS MG-9 Action Item 6: The EPAC SSC to consider and act upon the items (such as 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 Fuzzi, EPAC SSC, Scientific Advisory Group (SAG) Chairs and the CAS MG.	The Task Team on Observational Requirements and satellite observations was formed. It met in November 2014. TT reviewed “atmospheric chemistry” application area and proposed 3 applications to substitute it. TT will continue its work on user requirements tables and will closely interact with SAGs to ensure continuity of the process. Sandro Fuzzi is involved in teleconferences and in person meetings with EPAC SSC and SAGs on agenda items related to WIGOS and RRR.
CAS MG-9 Action Item 7: EPAC SSC to address the local station category issue in their next meeting.	EPC SSC considered category of local stations at both meetings (June 2014 and February 2015). The requirements to this category are developed and they will be included in a new GAW Implementation plan.
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.	1. A round table has been organized during the last WWRP SSC meeting involving NSF, NOAA, the Belmont Forum, and the EU Commission. 2. Moreover, a specific action has been dedicated to the polar regions. A document has been prepared in collaboration with WCRP in order to promote WWRP/WCRP research objectives for the next Horizon2020 calls. The document has been shared with the EU Commission. A preliminary draft of the next H2020 calls shows an important change with a specific reference to weather and climate research about high-latitude mid-latitude interactions. 3. Further actions need to be organized

	specifically towards the establishment of a fund raising plan for the three legacy projects. We should consider that the member's contributions to the three trust funds will be limited in the future. A preliminary discussion with Mary Power (Director: Resource Mobilization Office) has started.
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.	Both SSCs are considering the WMO priorities, to be approved by Congress, in drafting the GAW and WWRP Implementation Plans.
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.	This action point is done and closed.
CAS MG Action Item 11: CAS President to keep a file of exceptions on the membership of groups under CAS.	Yes, CAS President keeps a data base on exceptions on which he consults with CAS MG members.
CAS MG-9 Recommendations	
Recommendation	**Progress**
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).	Not much progress has been done in this direction. SAG Aerosols started the process of establishment of user requirements. It continues coordination of network but some obstacles do exist in relation to contributing networks. SSC decided to organize a special workshop to develop terms of reference attractive for contributing network. Network harmonization deem very difficult as different network were originally created for different purposes, measure different aerosol parameters and user application specific measurement techniques.

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 should 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.	The scientific plan of HIWeather has been finalized. One of the key topics deal with Urban related hazards (flash floods, air quality, heat waves). Urban issues have also been included as a cross-cutting subject in GFCS by IBCS-2 in 2014. Cg-17 will further consider how best to include urban matters within WMO Programmes and activities.
CAS President highlighted the inter-Commission CAS-CHy-CBS Coupled Hydrology Atmospheric Modelling and Prediction 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.	A first teleconference to discuss the CHAMP project is been planned just before the 2015 CAS MG. Detailed information will be provided during the meeting.
The CAS MG *recommended* for the two working groups (Nowcasting Research and Mesoscale Forecasting Research) to develop a ToR for the merged group and a timeline to implement the merger.	The merging phase will be completed by autumn this year, when the new WG will meet (around 12 members). The two co-chairs will be in charge until the end of 2016. Two new co-chairs have been already selected and they will assist the ones in charge. ToR will be prepared and discussed for the first WG meeting.
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	This recommendation will be taken into account for the organization of the 3rd heavy rainfall workshop.

be encouraged by the Working Group on Tropical Meteorological Research.	
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.	The Expert Team on Weather Modification met in Thailand from 17 to 19 March supported by the limited remaining balance in the trust fund and reviewed the WMO documents on the subject. These will be finalized for approval by EC-68 in 2016 following endorsement by WWRP and CAS. WMO Members might raise the funding support of the Wx Mod during Congress.
The CAS MG *recommended* that more efforts are required by WMO Members to strengthen aerosol observations in an integrated manner to ensure that such data are made available also in the context of growing near real-time applications.	The topic features prominently in the Congress documents and in the dedicated side event during Congress. Through these efforts CAS and the Secretariat are highlighting the importance to strengthen aerosol observation.
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.	EPAC SSC develops the procedure for inclusion of RRR in the GAW structure.

4. Five minutes overview by each CAS MG member of perspectives of relevance to CAS (All)

During the teleconference.

5. Six CAS priorities - update and recommendations

5.1 High-impact weather and its socio-economic effects in the context of global change (To be discussed under 6)

5.2 **Water: modelling and predicting the water cycle for improved disaster risk reduction and resource management** (Sarah Jones and Paolo Ruti)

The HIWeather project will provide the main contribution to this topic, promoting underpinning research to Disaster Risk Reduction and contributing to an increase in resilience to high impact weather events and thus to the adaptation to long term climate variability and change. In particular, the focus on Urban Flood as one of five key hazards of the project will be important for this priority. The multi-scale modelling research theme will make a direct contribution to improved modelling capability for the water cycle, but the combined efforts of the research themes and cross-cutting themes are necessary to improve DRR.

A major requirement for improved DRR and resource management is rainfall quantification at local scale. Currently, global deterministic forecasts are provided at a resolution of about 10 km and less, while global ensemble forecasting systems use a resolution ranging from 25 to 100 km. Deterministic regional weather forecasts have already attained the 1-3 km scale, with a number of centres also conducting convection permitting ensembles operationally. The provision of detailed and quantified rainfall forecasts at catchment scale is feasible for several countries. However key advancements are needed for heterogeneous land surface (i.e. topography gradients, land-use, coastal regions) and to better understand the link between the water cycle and coupled dynamical processes ("the dynamics of the water systems" Ed Lorenz). Mesoscale interactive processes, convective scale data assimilation and ensembles, and land-atmosphere interaction are, amongst others, relevant topics that PDEF, DAOS and the Nowcasting and Mesoscale Weather Forecasting Research WGs should address.

The integration among different types of models (from weather to impacts) is the new element all met services should support in the near future. HIWeather project and other Research Development Projects (i.e., CHAMP) will bridge between traditional WWRP research topics and new risk management topics. The full forecasting model chain should include impact models.

Request to the CAS Management Group: the endorsement of the CHAMP activities to be introduced in the WWRP or other congress documents; advice on how to better link the water research topics undertaken in WWRP with other international initiatives (i.e., ICSU, UN Water) and how best to interact with the Technical Commission of Hydrology.

5.3 Integrated Greenhouse Gas Information System: serving society and supporting policy (To be discussed under 5)

5.4 Aerosols: impacts on air quality, weather and climate
(Greg Carmichael and Oksana Tarasova)

The importance of aerosols is very well understood. Developments related to the aerosol observational network are not moving forward with a pace that would be desirable. SSC discussed aerosol observations and research at the first (June 2014) and second (February 2015) meetings. One of the obstacles is unclear relations with contributing networks. There is no interest from those networks to contribute to GAW and to harmonize the protocols (e.g. AERONET is self-sufficient network, while there were some communications about long-term stability of the Precise Filter radiometer network). Air quality aerosol network do not satisfy the basic GAW siting requirement and requirements to quality of observations and measurement techniques. Point actions on the network development are taking place through personal contacts of SAG Aerosol members with institutions in poorly sampled regionals (like Chacaltaya in Bolivia) or within individual projects like CATCOS. There is a dramatic lack of capacity for high quality aerosol observations. ACTRIS projects provide support in capacity development. Network harmonization related to aerosol chemical composition is difficult due to lack of respective Central Facilities. On 15 April BIPM organizes Particle workshop with a stake holder community to work jointly of traceability aspect. Importance of aerosol research will be brought to the attention of members in particular through the side event during the Cg-17. Aerosol observations need to be further integrated by means of modelling to ensure merge of different platforms and proper models verifications.

5.5 Urbanization: research and services for megacities and large urban complexes
(Greg Carmichael, Deon Terblanche, Oksana Tarasova)

At the second meeting of the Intergovernmental Board on Climate Services (IBCS-2) from 10 to 13 November 2014, an urban dimension as a cross-cutting issue that should be considered in the development at services in all GFCS priority areas (health, water, DRR, agriculture and food

security, and the emerging priority on energy). In addition, Congress will consider also how best to include an urban focus across WMO Programmes and activities.

Within GAW urbanization aspect is reflected through GURME activities (air quality modelling in the cities). Those activities need much better integration with the weather community, and there is growing cooperation with WWRP on GURME towards dealing with it as a cross-cutting activity between the two Programmes. Further inclusion into the more general urban services developed within WMO as to be considered at Congress. SAG GURME spend substantial efforts of capacity development (for example in the ASEAN countries), though little progress is done on the establishment of the new projects (science). More prominent role in the SAG should be given to collaboration with existing city initiatives, such as C40 and urban carbon community.

Within WWRP urban aspects are covered by the research activities of the HIWeather projects. Extreme events and vulnerability of the urban networks will be developed through several case studies.

5.6 Evolving technologies: their impact on science and their use
(All, Deon Terblanche on climate engineering)

Key technological advancements in observing and monitoring the atmospheric state rely on the use of opportunity networks (i.e. mobile phones and their networks, cars, drones). These networks should complement the conventional existing networks. We need to develop a suitable framework to integrate the two networks: a conventional one with strict rules and guidelines, let's call reference network, and a flexible one which is gathering all non-conventional observations (i.e., mobile phones, car's sensors). The former can be used to define reference nodes around which a cloud of non-conventional observations can be linked in order to provide a flexible platform. This approach is needed because it would be impossible to constrain non-conventional networks to WMO conventional rules. CBS will play a fundamental role in this context (i.e. CBS meeting on impact of observing systems on NWP in 2016 in China). Furthermore WWRP could contribute through the development of new assimilation methods (DAOS) and the assessment of the use of different types of observations into the urban environment (HIWeather).

Climate engineering is a fast emerging issue and CAS has, over the past number of years, highlighted the importance for WMO to keep this issue under review. At EC-66 in 2014 it was decided that CAS should inform EC and Congress of any significant developments in this field and contribute towards a scientific review. This matter will also be brought before Congress with a specific resolution for CAS to work with IPCC, WCRP, IOC UNESCO, IMO and others to initiate the assessment. Specifically the Expert Team on Weather Modification and the Scientific Advisory Group on Aerosols can contribute to such an assessment.

6. Working Group on Numerical Experimentation (Paolo Ruti and Jean-Noël Thépaut)

The 30th session of the CAS/WCRP Working Group on Numerical Experimentation met with the overarching objective to address the coordination needs for improvements of global and regional models, ranging from daily to decadal time scale. Hosted in the new NOAA Center for Weather and Climate Prediction (NCWCP), the group was welcomed by Dr Louis W. Uccellini, Director of the US National Weather Service, and Dr William M. Lapenta, Director of the US national Centers for Environmental Prediction. In this introductory speech, Dr Uccellini showed how NOAA will strongly move towards an environmental prediction system based on a unified modelling framework. This

meeting represents an occasion for the main global centers to interact and review the most relevant research activities for weather and climate models as well as to identify synergies across WCRP, WWRP, GAW and CAS. This year, it was the occasion to celebrate the 30th anniversary of WGNE and remind the attendees of the achievements in the past 30 years. This task was given to Larry Gates, past WGNE member, with a keynote presentation entitled “WGNE30 History”.

More information about the meeting including the presentations can be found here: http://polar.ncep.noaa.gov/conferences/WGNE-30/

7. GAW SSC Overview and issues for support, endorsement and guidance

7.1 GAW Implementation Plan (Greg Carmichael and Oksana Tarasova)

Some progress has been done on the drafting of the GAW Implementation plan. This was one of the major tasks during joint SSC and SAG Chairs meeting in February. The group spent quite some time in writing different pieces. The plan will be organized around the applications rather than focal areas.

7.2 IG^{3}IS progress (Jim Butler and Oksana Tarasova)

IG^{3}IS was presented at the one of the meeting organized by UNFCCC related to Intended Nationally Determined Contribution. The IG^{3}IS effort is aimed at improving the granularity of observations and analyses, in order to support the planning and management of Intended Nationally Determined Contribution (INDC) mitigation efforts by nations. IG^{3}IS is not designed to check compliance with regulations, but rather to provide information on policy and management-relevant scales and ensure that the information provided is consistent with a global network of high quality observations. UNFCCC expressed some reservations about the concept of IG^{3}IS as a tool for independent emission verifications (or as a political tool), so the concept of IG^{3}IS should be reconsidered from the angle of science (as a mean of carbon cycle research).

The details of the IG^{3}IS concept will be developed by the writing team. The team will be contacted in the beginning of April and will include one of the SAG Greenhouse Gases members. The writing team will be led by Phil DeCola. Initially the team will work offline, and composition of the team may evolve with time, depending on the contribution of individual team members and identified gaps in expertise. It is expected that outline of the IG^{3}IS implementation plan will be prepared by the WMO Congress 17. Depending on the Congress decision the plan may or may not be developed further.

7.3 ICG-WIGOS fourth meeting (Sandro Fuzzi and Oksana Tarasova)

WIGOS is an integrated, comprehensive, and coordinated system that is comprised of all the present WMO global observing systems. WIGOS is not in itself a new observing system, but a new framework to enable the existing observing systems to provide more efficiently and effectively the data required for delivery of services across WMO's application areas, and for all regions of the world.

ICG-WIGOS is an Inter-Commission Task Teams formed to address WIGOS standardization process, WMO regulatory material issues, and improvement of WIGOS observing components.

The first phase of WIGOS terminates this year with the 17th Congress. With the completion of the draft regulatory material, draft metadata standards, WIGOS station identifiers, and with all OSCAR databases soon to be available, the implementation of the WIGOS Framework has reached a level of maturity where WIGOS is enabling the further development and deployment of its component systems.

The above achievements are the building blocks for the further development of WIGOS, but a substantial amount of work remains to be done in areas such as the development of guidance material, quality management, education and training and overall capacity development. This work will proceed during the WIGOS Pre-operational Phase (WPP) in 2016-2019. CAS needs to be an active part in this effort.
GAW operations, and data management and availability, are the essential contributions of CAS to WIGOS. For an effective contribution of GAW to WIGOS, and for the improvement of the role of atmospheric chemistry within the WMO system, the following needs are highlighted:

- Since organizations other than Met Services (Universities and Research Institutions) provide a substantial input to GAW, the importance of long-terms collaboration between Met Services and research community needs to be favoured and taken into account;
- GAW needs to improve the communication strategy with Permanent Representatives, which presently does not allow in many cases to deliver the priorities and needed actions to the countries;
- There is a need for mutual recognition between Met Services and research institutions that work on atmospheric composition to make the GAW system sustainable;
- There is a need for a body (or bodies) within GAW that can cut across the SAGs and work on customized applications.

On the other hand, an efficient and effective involvement of GAW within WIGOS provides opportunities for the programme: an improved visibility, the potential for an extension of the network, a harmonized approach to quality assurance, and the promotion of data exchange between different programmes.

7.4 Collaboration with WIGOS (including RRR process)

(Greg Carmichael and Oksana Tarasova)

Collaboration with WIGOS requires that GAW applies the same principles to observation as the other WIGOS components. The evolution of the observing system in WIGOS is controlled through Rolling Review of Requirements (RRR) process. This process includes formulations of the user requirements for a number of application areas. RRR has been initiated in GAW several years ago. The processes were perceived differently by different SAGs. To assist the RRR process, the Task Team on user requirements and satellite observations (TT-ObsReq) was compiled. In its current form it does not include SAG members. TT met in November 2014 and looked at the atmospheric chemistry application (which includes most of GAW parameters) and other application areas that use atmospheric composition measurements. TT came up with three applications substituting “atmospheric chemistry”:

- *Forecasting Atmospheric Composition*
- *Monitoring Atmospheric Composition*
- *Providing Atmospheric Composition information to support services activities in urban and populated areas (U)*

The TT-ObsReq will take a lead in the establishment of the RRR process in GAW. As the next step to fill in user requirement, a two-day workshop should be organized between TT-ObsReq and

SAGs. Each SAG is expected to nominate a dedicated member to ensure the continuity of the process. SAGs are expected to continue with the process and approach user groups through scientific community.

7.5 Endorsement of scope extension of two SAGs (Greg Carmichael and Oksana Tarasova)

The proposal has been made by the SAG Precipitation Chemistry on extension of the scope of this group to cover total atmospheric deposition. SSC discussed the proposal and was very positive about it. Extension of PC SAG scope opens the door for flux studies. This group can be used as a focal group to address ecosystem services (for example, sulfur and nitrogen cycles). This group can serve as an integrator between SAGs. SSC noted that SAG should collaborate with iLeaps project. The new name of the SAG is SAG on Total Atmospheric Deposition (SAG-TAD).

SSC identified a strong need for further fostering atmospheric composition modelling component within GAW. There is also a strong need for Near-Real-Time for assimilation in forecasting systems. Considering the increasing role of modelling on regional and global scale, and the importance of atmospheric composition for weather and climate modeling, the chairman of ET-NRT-CDT, Vincent-Henri Peuch, came up with a proposal to extend the scope of ET to better address modelling activities in GAW. Such group can address applications that use NRT data delivery on scales larger than urban. The particular tasks would include development of boundary conditions for local modelling, improve models and develop services related to dust, volcanic ash and biomass burning plums and health applications. It is clear that to support these applications the whole data system should be reviewed to ensure possibility of service delivery. To implement its tasks, the composition of the group should change. More modelling centers must be involved in this group, including the National Oceanic and Atmospheric Administration (NOAA), Environment Canada, the European Centre for Medium-Range Weather Forecasts (ECMWF), and Japan.

SSC decided to endorse the extension of the scope of the ET-NRT-CDT to cover a limited number of tasks related to applications that require NRT delivery of atmospheric composition data. SSC agreed that initial focus of the group should be on Biomass Burning, Sand and Dust Storms, Volcanic ash plume forecasting. SSC agreed that group should focus on global and regional scale modeling and keep intrinsic link to GURME.

Each thematic SAG should have a liaison with this modelling group (residing in the group as ex-officio members). To ensure connection with WWRP, this programme will be invited to nominate two experts in the group. Linkages to the World Climate Research Programme should also be perused.

7.6 Water Vapour (Greg Carmichael and Oksana Tarasova)

SSC recalled that CAS-16 considered water among six priorities in the ten-year plan.

Currently water vapour is address by Commission for Instruments and Methods of Observations (CIMO as relative humidity. Measurements of relative humidity are described in the CIMO Guide. The chapter on relative humidity was developed in the 60s and it is out of date. CIMO would appreciate collaboration with GAW on water vapour. There are about 10,000 stations measuring relative humidity with large uncertainty, some of those stations convert mixing ratio to relative humidity. Water vapour in the stratosphere is one of the parameters addressed by Stratosphere-troposphere Processes And their Role in Climate (SPARC) project, but this initiative is not connected to CIMO. In atmospheric composition measurements water vapour is considered as an

obstructing factor rather than as a measurement parameter. Currently observations of water vapour are done in the stratosphere and mesosphere by NDACC. GRUAN also addressed vertical profiles of water vapour. Research aircraft projects measure water vapour in the upper troposphere/low stratosphere.

SSC decided to establish a small task team on water vapour to make an inventory of where and how observations are done. SSC would like to propose to CAS MG that water vapour be included as a GAW parameter and to discuss with CIMO and GCOS on how to share the responsibilities. The water vapour task team should also help defining the observational requirements for water vapour as a chemical species relevant for atmospheric chemistry as this entry in the OSCAR data base so far is empty.

7.7 **Local stations** (Greg Carmichael and Oksana Tarasova)

EPAC SSC discussed the category of stations at its 2014 and 2015 meetings as there are some challenges in implementing it. Considering the need to integrate urban observations, local stations can be used in pairs with Regional GAW stations to define cities increment in atmospheric composition. The position of such stations should be carefully selected to include stations in the outflow from a city, but implement the same quality control as at the other GAW stations (unlike monitoring for air quality purposes).

It is clear the GAW cannot be monitoring urban environments. GAW should enable urban networks to take part in atmospheric composition research. SSC chairmen noted that local stations could serve as a transfer standard enabling other urban stations not following exactly GAW protocols to be used in certain applications.

Implementation of “local measurements” has some issues with GAW mandate. Observations in the cities are carried out at municipal level.

SSC will develop station requirements and propose them for Technical Regulations. Those requirements will be clearly formulated in the GAW Implementation Plan.

8. WWRP SSC Overview and issues for support, endorsement and guidance

8.1 **WWRP Implementation Plan** (Sarah Jones and Paolo Ruti)

The current WWRP Implementation Plan is valid until 2017. However, given the major changes in WWRP including the conclusion of THORPEX, the integration of the THORPEX Working Groups in WWRP, the merger of the Nowcasting and Mesoscale Working Groups, and the establishment of the three THORPEX Legacy projects, the implementation plan needs to be modified. The involvement of the SSC and the Working Groups in the development of the implementation plan is a prerequisite for its feasibility. High level guidelines from SSC are under development and will be provided to the WGs and projects before their meetings in 2015. The WGs will then propose challenges, key tasks and expected results. All these comments and additional material will be discussed during the WWRP SSC at the end of 2015. Feedback will be provided to the WGs/projects and revisions

Time line: outline ready by mid-May. Receiving feedbacks by all WGs until the end of November 2015. Revision during the WWRP SSC (end of November or beginning of December 2015). Editing and finalization by March 2016.

8.2 **THORPEX conclusion** (Sarah Jones and Paolo Ruti)

THORPEX activities are internationally recognized for their tangible contribution to advancing the science of weather prediction, promoting cooperation between academic and operational research and transferring research outcomes to operations. The World Weather Open Science Conference (WWOSC) and the last session of its international steering committee in 2014 have been unique occasions to review the THORPEX activities. Two BAMS papers will review THORPEX, and David Parsons is taking care of this action (the first BAMS paper is under review). The book gathering the main results and future priorities from the WWOSC is under preparation and it will provide future perspectives of THORPEX considering the three legacy projects.
The trust fund has been officially closed at the end of January 2015. The remaining contribution has been split between the three legacy projects' trust funds.

8.3 **Legacy projects and their finances** (Sarah Jones and Paolo Ruti)

8.3.1 Short Review : HIWeather, S2S and PPP

The Polar Prediction Project (http://polarprediction.net) is organizing the Year of Polar Prediction (YOPP) which will cover an extended period of coordinated intensive observational and modelling activities, in order to improve polar prediction capabilities on a wide range of time scales in both Polar Regions, and involving key stakeholders. A summit has been planned to take place in Geneva, from 13 to 15 July.

The research topics of S2S (http://s2sprediction.net) are being organized around a set of six sub-projects: Africa, Monsoon, Extreme weather, MJO, Verification and Interactions and teleconnections between midlatitudes and tropics. A main deliverable of the S2S project is the establishment of a database containing sub-seasonal (up to 60 days) forecasts from 11 operational centres. The database is hosted at ECMWF and CMA and the data portal will open in April 2015. A letter has been sent by WMO in order to get the agreement from the global centers to transfer the data from ECMWF to CMA. Preliminary results from the forecasts already available in the database, suggest that all models have issues representing MJO teleconnections over the Northern hemisphere, particularly over the Euro-Atlantic sector, which is an issue likely to reduce the sub-seasonal predictive skill. MJO teleconnections (and more generally topical-extratopical interaction) have been identified as a possible topic for collaboration between WGNE and S2S, and could be included in the 2016/17 WGNE workshop on systematic errors.

HIWeather has finalized his scientific plan last year (https://www.wmo.int/pages/prog/arep/wwrp/new/high_impact_weather_project.html). A first workshop has been organized in Nimbo (China) focusing on high-impact weather in Asian regions. The HIWeather plan has been presented to the 30th WGNE meeting.
Short review of the trust funds: the trust funds of PPP and S2S have enough resources to support their activities almost for the next two years. HIWeather trust fund has been recently opened. Several countries have indicated their intention to contribute. A Junior Professional Officer position for HIWeather has been advertised in Germany but not yet filled.

Many members cannot guarantee relevant direct contributions to the trust funds, but they could indirectly support WMO channeling other funding agencies towards WWRP research objectives. A

long term planning should be conceived and prepared for the upcoming years (CAS MG should advise) considering GFCS, ICSU and other partnerships.

The implementation plans of the individual projects define the expected achievements of the projects. The role of the WWRP SSC in monitoring the projects should be strengthened. This will be discussed at the SSC meeting in 2015 and the proposed strategy submitted to the CAS MG in 2016 for advice and approval.

8.3.2. Year of Polar Prediction summit

The summit for the YOPP has the following purposes:

- To give an overview of the present level of planning,
- To identify stakeholder expectations and requirements,
- To develop priorities,
- To define intensive observing periods,
- To agree on the YOPP data legacy,
- To coordinate planned activities, and
- To gather formal commitments from parties interest in YOPP.

The venue of the summit is Geneva, from 13 to 15 July on invitation only (around 180 participants). The agenda has been organized around key sections (using relevant aspects, YOPP observing component, YOPP modeling component, YOPP data component, education and outreach) and corresponding breakout groups considering also fund raising. The economic cost would be around 40-50 KCHF. A consultant has been hired to support the preparation of the YOPP summit and the revision of its implementation plan. The secretariat is undertaking some actions: development of a fund-raising plan discussed with Mary Power ; interactions with GEO in order PPP to be considered in their new scientific plan ; collaboration with WCRP and WIS for the organization of the YOPP summit.

8.3.3 S2S Monsoon Workshop and link to Agriculture Met Commission

The National Institute of Meteorological Research (NIMR) of the Korea Meteorological Administration (KMA) will host the Workshop on Sub-seasonal to Seasonal Predictability of Monsoons, with the collaboration to the International Coordination Office of the Subseasonal to Seasonal Prediction Project (S2S) and the International Organizing Committee of the Workshop. The workshop will be held in Seogwipo, Jeju, Republic of Korea, from 22 to 24 June 2015. The venue of the workshop is the NIMR, KMA, 33 Seohobuk-ro, Seogwipo-si, Jeju-do, Republic of Korea. It is followed by the S2S Steering Group meeting at the same venue, from 25 to 26 June 2015.

The Commission of Agricultural Meteorology has proposed to develop an applied project in order to use the S2S monthly forecasts to force crop models and to use the outcomes for agricultural and food-security planning. However a specific implementation plan has not been presented.

8.3.4 Links between WWRP and WCRP

All activities of the S2S project are managed in collaboration with WCRP.

A common plan has been developed to promote the polar activities internally through the GFCS trust fund and externally through the Horizon 2020 calls in Europe. A common position paper has been shared with the European Commission.

A common session between WCRP and WWRP has been proposed to « Our common future climate change » (http://www.commonfuture-paris2015.org). The proposal has been coordinated by Brian Goldwing.

The association of young scientists (YESS) has been supervised by both WCRP and WWRP. The WWRP role in this network arose through the very successful Early Career Scientist activities at the WWOSC.

Future directions focus on the involvement of WWRP in the WCRP grand challenges. The priority Grand Challenges are those on extremes and on cloud, circulation and climate sensitivity.

In recognition of the essential role model development plays to weather and climate science, WCRP and WWRP have developed an award entitled “WCRP/WWRP International Prize for Model Development”. The prize will be awarded annually for an outstanding contribution to weather and climate model development by an early- to mid-career researcher.

8.3.5 Status of the merger between the Nowcasting Research and Mesoscale Meteorology Research Working Groups

The merging process has been guided through the selection of key topics. The new group should cover: high resolution surface modeling and urban aspects, observations; sub km modeling, PBL, LES, convection, cloud, precipitation; new types of observations and new technologies; aviation related expertise; evaluation; data assimilation and ensemble forecasting; communication for short time decision.

The previous chairs of the working groups have agreed to continue as chair until the end of 2016 (one currently pending approval from CAS MG). Two new co-chairs have been identified who will take over from 2017 pending the approval of CAS and the endorsement of the respective PRs. Thus there is a transition phase planned between 2015 and 2016 in order to define new Terms of Reference and effect a smooth merger.

The total number of members will be reduced to 12 from 2015.

8.4. Research Development Project and Forecast Demonstration Project

(Sarah Jones and Paolo Ruti)

8.4.1 Lake Victoria RDP

It has been decided to review the implementation plan in order to focus more on satellite and modelling products. A meeting should take place in May, depending on resources from the Data-processing and Forecasting Division (D/WDS). DFID (UK foreign affairs office) is strongly interested to contribute to the Lake Victoria project. A final decision has not been taken.

8.4.2 **Inter-commission initiatives** (Sarah Jones and Paolo Ruti)

8.4.3 CHAMP

A first internal meeting between the research department and the hydrological department has been organized in order to discuss the background and the needs. A teleconference among several key US and Canadian experts has been organized, hopefully before our CAS MG meeting. The teleconference aims at analysing the state of the art and at defining the next actions, considering also congress documents.

8.4.4 Aviation RDP

The scientific plan has been approved and the Kickoff meeting will take place at the end of June 2015. The purpose of the AvRDP is to demonstrate the capability of nowcasting and mesoscale modelling techniques, in support of the development of the next generation aviation initiative, namely, the Aviation System Block Upgrade (ASBU) under the new Global Aviation Navigation Plan (GANP) which was endorsed by ICAO in 2013. A first group of airports have been identified as potential stakeholders: Charles de Gaulle (Paris), Honk Hong, Tambo International airport (Johannesburg), Shanghai and Toronto International airport. A first link with a south-American airport has been established through the THORPEX regional group.

9. CAS working structure membership
(Øystein Hov, Sarah Jones, Greg Carmichael, Paolo Ruti and Oksana Tarasova)

This will be discussed during the teleconference.

10. **Cg-17** (Øystein Hov and Deon Terblanche)

10.1 Site events during Congress

Three CAS specific side events are planned during Congress:
A joint WCRP, WWRP and GAW event in which Øystein Hov, Guy Brasseur, Sarah Jones and Greg Carmichael will highlight recent advances and future opportunities for mutually supporting and joint research aimed at improving knowledge for policy decisions, and in developing new and enhanced services.

- WWOSC Book Launch in which Sarah Jones and Gilbert Brunet will introduce and give an overview of the book containing a selection of peer-reviewed papers summarizing the outcomes of WWOSC.
- A side event on Aerosols highlighting their role in weather, climate, the oceans and how they impact people's health. This side event highlights the important for members to invest more in aerosol observations and research.

10.2 **Overview of Documents** (Øystein Hov and Deon Terblanche)

The documents for Congress are available on the Cg-17 mini site at: http://cg-17.wmo.int/

The research documents are structured as follow:
- Doc 4.3(1) An integrated WMO research approach in support of future seamless services
- Doc 4.3(2) World Climate Research Programme
- Doc 4.3(3) World Weather Research Programme

- Doc 4.3(4) Global Atmosphere Watch Programme
- Doc 4.3(5) WCRP, WWRP and GAW Joint Research Activities

11. Think tank on emerging issues (Øystein Hov and All)

CAS MG members are invited to highlight particular issues that have relevance to CAS or in which CAS should be active.

12. Support for Research in an area of rapid global change
(Øystein Hov and Deon Terblanche)

Members of the CAS MG is challenged to debate and propose tangible actions for CAS to promote research as an essential building block, utilizing the expertise in NMHSs, universities and other institutions to enhance understanding and predictive skill during the current rapid socio-economic change and changes in the Earth's climate system.

13. General

In additional items identified.

14. Closure

15. Useful links

GFCS website: http://www.gfcs-climate.org/

WCRP website: http://wcrp-climate.org/

GAW website: http://www.wmo.int/pages/prog/arep/gaw/gaw_home_en.html

WWRP website: http://www.wmo.int/pages/prog/arep/wwrp/new/wwrp_new_en.html

WGNE website: https://www.wmo.int/pages/about/sec/rescrosscut/resdept_wgne.html

S2S project website: http://s2sprediction.net/

Polar Prediction project website: http://polarprediction.net/

Congress documents: http://cg-17.wmo.int/documents-english