

**Minutes of the Third Management Group Meeting
of the
WMO Commission for Atmospheric Science**

World Meteorological Organization

Geneva, Switzerland

27-29 October 2008



**World
Meteorological
Organization**

Weather • Climate • Water



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Minutes of the 3rd CAS Management Group Meeting

World Meteorological Organization

Geneva, 24-26 September 2007

Management Group (present):

M. Béland (President), A. Frolov (Vice-President), O. Hov (Chair OPAG-EPAC), G. Brunet (Chair OPAG-WWRP), A. Mokssit, R. Yu, M. Miller, L. Ucellini, J. Butler, L. Barrie (WMO Secretariat).

Management Group (regrets):

H. Kelder, B. Ivancan-Picek, A. Thompson

Other WMO Secretariat Participants or Contributors:

G. Asrar, D. Parsons, L. Jalkanen, D. Burridge, J. Caughey

Annex I: Address list of participants

1. Introduction

The meeting was opened by WMO Deputy Secretary General, Prof. Hon Yang who pointed out the important role that CAS plays in implementing WMO science and the leadership that is needed from CAS in shaping a rapidly evolving WMO following Congress XIV in 2007. The WMO Secretariat restructuring of 1 January 2008 involved the creation of a Research Department that includes the WWRP and GAW programmes of CAS with the WCRP programme jointly sponsored by WMO, ICSU, and IOC. Under a results-based-management system the activities of this department are to be closely linked to relevant activities in other departments in addressing the objectives, strategic thrusts and deliverables set by congress.

The President and Vice President of CAS then welcomed the participants. The Co-director of the Research Department and Director of its Atmospheric Research and Environment Branch (D/ARE), Dr Leonard Barrie, briefed the group on the new WMO structure and logistics of the meeting. The group welcomed the other Co-director of the WMO Research Department and Director of the World Climate Research Programme (D/WCRP), Dr Ghassem Asrar, to his new position and to CAS. Participants introduced themselves and the agenda was adopted (Annex II).

2. Report of the President and Vice-President

President, Dr Michel Béland reported on his activities in support of CAS since the last meeting in September 2007 in Oslo. His efforts had focussed mainly on three issues:

- a) Moving forward the concept of “integrated environmental prediction” or/and “seamless prediction”;

- b) Pushing forward a tighter integration between WCRP, WWRP-THORPEX, and OPAG-EPAC, and between the work of other WMO Commissions; and
- c) Obtaining final approval by EC-LX for the WMO Statement and Guidelines on Weather Modification.

Dr Béland also emphasized the need to define clearly the role of CAS and the seven other technical commissions in a restructured WMO. A discussion ensued in which D/ARE pointed out that the Presidents of the Technical Commissions have an important role to play in defining the role of commissions, particular CAS, during their annual meeting 2-4 February 2009 as well as at EC-LXI in June 2009.

Vice-President, Dr A. Frolov brought to the attention of CAS the very successful "All-Russia GAW Programme Workshop" held in Moscow in October 2007. The meeting focussed on bringing together the institutional GAW activities of the Russian hydrometeorological service, Roshydromet, with the atmospheric chemistry research capabilities of the Russia Academy of Science community.

Dr Frolov also pointed out that he and the President represented CAS at the very successful SCAR/IASC IPY meeting at which the legacy of IPY was a major theme. One legacy will be an enhanced Arctic observing capability under the Sustained Arctic Observing Networks (SAON) initiative. This involves research-based networks under the WMO GAW programme and other parts of the WMO Integrated Global Observing System.

3. Review of Actions in Last Minutes

Thirty two decision/action items identified at the 2nd meeting in Oslo were reviewed. It was concluded that most actions had been addressed or were to be revisited during this meeting with the exception of two decisions having to do with technology transfer between research and operations. It was also agreed by the group that the number of decisions/actions identified by this group should be reduced to the highest priority items leaving minor details to be acted upon by the Secretariat. The two residual issues that remained were dealt with as follows.

3.1 Research and operations in NWP have different standards. Data assimilation capabilities of operational communities are attracting researchers who see that the only way for their work to develop effectively is through close collaboration with operational institutions. Common data exchange formats and standards that the WMO Information System is implementing are essential for this interaction. This is exemplified in THORPEX-TIGGE project and in the provision of data to NWP centres for reanalysis.

Decision 1. CAS-MG3 requested that the appropriated linkages are made between components of CAS programmes namely: WWRP-THORPEX, GAW and WIS (Action: President and Secretariat)

3.2 The group noted the continuing gap between WMO research and the operational for hydrology and water resources. Former Decision 8 from the last management group meeting "CAS MG recommends that the WMO Secretariat, in its restructuring, addresses the gap that exists in the research component of the WMO hydrology and water resource programme. In particular, it requests CAS, CBS and CHy Presidents and corresponding directors to develop a plan. Since little progress had been made with implementing this decision, the group decided to pursue this at the working level from within the WWRP Secretariat and the JSC-WWRP.

4. Report of Chair on OPAG-EPAC

Prof. Oystein Hov prefaced his opening remarks by noting that at its last Congress the WMO changed its mandate to include environmental issues. The WMO is a unique international mechanism for coordination and making a solid argument for a coordinated global effort there is a need to highlight the user needs. The following issues driving CAS activities were presented and endorsed by the group as highly useful as we plan for CAS-XV (Nov 2009 over the coming year):

A. Air pollution effects on human health in densely populated areas throughout the world

The forecasting of air pollution in urban areas is an important service in order to allow the population to take precautions on a daily basis and to identify policy measures to reduce emissions so that pollution target levels can be met. WMO enhances through the CAS-GURME project the capabilities of NMHSs to provide air quality forecasting, illustrating the linkages between meteorology and air quality; WMO facilitates the easy access to information on measurement and modelling techniques; WMO promotes pilot projects to demonstrate how NMHSs can expand their activities into urban environment issues; and WMO works with WHO and environmental agencies to better define meteorological and air quality measurements that support urban forecasting.

Recommendation 1. WMO provides advice and builds capacity in near real time delivery of environmental data which is an important component of forecasting urban pollution. Both the near real time delivery of urban observations and pollution forecasting activity should be pursued at the national or local levels.

B. Transport of air pollution across national and regional boundaries

There is emission growth in the Far East and in South America, while emissions in Europe and North America are levelling off or are being reduced. Since the economy is globalised there are important consequences for intercontinental transport of air pollution; aircraft emissions (ICAO); and shipping emissions (IMO). Changes in farmland practices and in physical climate give rise to more biomass burning and forest fires. Increasing attention is needed for intercontinental transport of air pollution and its contribution to the pollution levels in various regions (including Europe, the Arctic, marginal seas, etc.). The regional/continental organization of the research, monitoring and assessment of trans-boundary air pollution (EMEP in Europe, EANET in the far East, the Malé declaration in SE Asia, North America, S America, N Africa, Middle East) needs to be linked together through a common technical framework.

Recommendation 2. WMO take on the task of linking the technical work on the regional/continental long range transport of air pollution. This includes the near real time delivery of environmental data to allow for day-to-day assessment of the long (and very long) range transport of air pollution; hindcast analysis and scenario calculations.

C. Two-way Interactions of Air Pollution and Climate Change

The UNFCCC focuses on climate change effects of long lived greenhouse gases. However, aerosols (directly and indirectly) and, to a lesser extent, tropospheric ozone exert regional radiative forcing on climate which is expected to modify the distribution of synoptic weather patterns and the frequency distributions of weather elements like precipitation and wind on a regional basis. The regional modification of synoptic weather is expected to have been

taking place throughout the history of pollution emissions beginning in the late 1800s. The extent of the modification and its societal impact is not well known but could be important.

Climate variability and change have consequences for atmospheric composition through the modification of the frequency distribution of temperature, surface properties (drought and plant cover), cloud cover, precipitation including length of dry periods, boundary layer mixing properties etc. The adaptation of societies to climate change has consequences for atmospheric composition e.g. through changes in the emissions from energy consumption as the energy production system moves towards more extensive inclusion of renewable energies including biofuels.

Recommendation 3. WMO should take the lead in the technical analysis of how climate variability and change and air pollution interact both ways on a regional basis, and in combination on a global basis, as these are issues of immediate concern throughout the world affecting societies to an extent that is not well known but could be significant (air pollution events, floods, droughts; water supply, food supply etc).

D. Effects of disturbance of the reactive nitrogen cycle on water quality and climate change

The atmospheric component of the biogeochemical cycle of reactive nitrogen including its relation to the sequestration of carbon in ecosystems is not well known. Reactive nitrogen cascades through the global environmental compartments with approximately 165 Mt-N of reactive nitrogen produced each year, of which about 75% is related in some way to agriculture and 25% to the combustion of fossil fuels and the industrial use of nitrogen. For instance, the majority of European anthropogenic emissions of the greenhouse gas N₂O to the atmosphere are agricultural in origin and related to nitrogen cycle disturbance.

Recommendation 4. Develop a common understanding of issues related to the disturbance by air pollution of the reactive nitrogen cycle, its spatial extent driven by long range atmospheric transport and the influence on climate change. The IPCC, the Reactive Nitrogen Initiative, GEOSS/GMES, CLRTAP, EANET and the Malé declaration could benefit from a common approach that WMO could lead.

The ensuing discussion revealed that the European Community GEMS project involving assimilation of air pollution variables by the ECMWF model is now moving into a new phase through a project called MAAC. It benefits from both GAW and WGNE activities of CAS – this raises the question of whether air quality modelling should be added to the tasks of the WGNE.

Decision 2. Considering the growing recognition of the need to incorporate ozone, aerosols and greenhouse gases into operational atmospheric climate and NWP models, add appropriate representation in atmospheric composition, data assimilation and modelling to the tasks of the WGNE and ensure that this is consistent with the work being carried out in GAW GURME (Action: Secretariat, WGNE chair, EPAC-Chair).

5. WMO/IUGG Assessment of the Effects of Aerosol Pollution on Precipitation

The group received a briefing by L. Barrie D/ARE on the successful outcome of the WMO/IUGG Science Assessment of Aerosol Effects on Precipitation on Local, Regional and Global Scales that was requested by Congress XIV and which was coordinated by WMO and the IUGG through offices of L. Barrie and Roland List respectively. The assessment was published in late 2008 as a book (Aerosol Pollution Impact on Precipitation: A Scientific

Review, Eds. Z. Levin and W. Cotton, Springer, ISBN 978-1-402008689-2). In particular the ten recommendations of the review (Annex III) were discussed. The group considered that follow-up was appropriate.

Decision 3. D/ARE was requested to lead the drafting of a statement with M. Miller, G. Brunet and O. Hov for the President of CAS to use in advising WMO on follow-up actions to the WMO/IUGG Science Assessment of Aerosol Effects on Precipitation on Local, Regional and Global Scales. (Action: D/ARE)

6. The Role of GAW and WWRP In Developing Carbon Tracking Tools For Climate Change Research and Support of International Conventions

6.1 GAW Greenhouse Gas Bulletins

Dr Jim Butler CAS representative to the GCOS Atmospheric Observations Panel for Climate and member of the GAW Scientific Advisory Group for Greenhouse Gases reviewed the status of the main activities in GCOS and related UNFCCC for which the GAW programme is taking a lead. He noted that a comprehensive GCOS network, the WMO-GAW Global Greenhouse Gas Monitoring Network" was well accepted and linked to the UNFCCC process. Annually, the GAW SAG for aerosols and the Secretariat produces the WMO Greenhouse Gas Bulletin that summarizes major advances and insights into the sources, sinks, trends and radiative forcing of greenhouse gases in the atmosphere based on a global consortium of observing networks, calibration centres and activities and a World Data Centre for Greenhouse Gases. In November 2008, the fourth Greenhouse Gas Bulletin was issued for Convention of the Parties of the UNFCCC in Posnan highlighting the inadvertent success in mitigation of greenhouse gas radiative forcing achieved by emission reductions attained under the Montreal protocol on ozone depleting chlorofluorocarbons. The reduction in radiative forcing as of 2008 expressed in equivalents of carbon dioxide emission reductions was ~four times that of the reductions targeted through the Kyoto protocol.

6.2 Carbon Tracking

Dr Butler also raised the issue of development of carbon tracking tools that will eventually be run operationally. Implementation and verification of successors to Kyoto will benefit greatly from the use of these tools. Because the increase of CO₂ and other greenhouse gases in the atmosphere is the single largest contributor to observed climate change, society is moving rapidly to reduce or mitigate these emissions through a variety of regionally distinct approaches. These endeavours will require independent verification of their success or failure, yet no formal requirement for verification currently exists at national or international levels (e.g., IPCC, Kyoto Protocol). Independent verification has been critical to the success of emission reductions related to stratospheric ozone depletion, air quality, and acid rain. For CO₂ emission mitigation, reliable verification can only be made from a global system of in-situ and remote measurements, accompanied by sophisticated reanalysis models. Such a system would be independent of conventional bottom-up emission evaluation, where fossil fuel consumption by specific installations or users is translated into CO₂ emission figures

Carbon tracker tools deduce monthly average sources and sinks of carbon on sub-regional resolution on an operational basis using an Integrated Global Carbon Observing System supported by GAW. They do this by the assimilation of observations into a carbon cycle model run inversely with analyzed meteorological fields provided by operational meteorological centres such as NCEP or ECMWF. The problem facing the research community, that CAS and other WMO commissions can help solve, is how to move prototype carbon tracker systems under development for instance by NOAA ESRL or the European GEMS/MAAC project from research to operations. A recent review of NOAA

ESRL carbon tracker efforts led to the conclusion that the “Carbon Tracker” is not compatible with operational models.

Recommendation 5. WMO work towards establishing an integrated, Global Carbon Observation, Prediction and Assessment System, acknowledging that monitoring requirements may be forthcoming to support global emission reduction and mitigation policy, and recognizing that CO₂ interacts strongly with the biosphere and hydrosphere, that considerable research is necessary to support such a system, and that such research will need to be compatible with what might ultimately become operational – that is, aiming at operational implementation:

- a. Integrating and expanding existing observing systems and validating and incorporating satellite and aircraft measurements to produce a global, near-real time database of atmospheric CO₂;
- b. Developing and implementing an ensemble-based reanalysis for research and operational applications that includes surface-atmosphere interactions; and
- c. Applying model-based systems to analysis and prediction of the transport and evolution of CO₂. These systems should be linked to operational frameworks to insure reliable access to data, production of forecasts, and delivery of services.

7. Report of Chair on OPAG-WWRP

Dr Gilbert Brunet updated the group on progress in implementing the WWRP programme. Dr D. Parsons was welcomed as new Chief of the World Weather Research Division arriving at WMO 1 March 2008. In July 2008, a successful meeting of the JSC-WCRP was held in which programme needs and the development of a WWRP Strategic Plan were advanced. In September an all-working group meeting of THORPEX took place which provided the opportunity for strong interaction between the groups.

The latest outline of the WWRP plan was presented, discussed and approved by MG. Also the many decisions recorded by JSC-WCRP were reviewed. A few issues arose that captured the attention of CAS MG and led to decisions or general agreement on a strategy.

7.1 SERA

The vitality of the Societal and Economic Research Activity (SERA) and its working group was discussed. The group thanked Dr Lazo of NCAR as outgoing chair for his contributions.

Decision 4. MG approved the proposal by Chair JSC-OPAG WWRP that Brian Mills Chair the SERA WG and recommended that, initially, the SERA group focus on a small number of specific tasks that are of direct benefit to effective delivery of weather services. (Action: Chair JSC-WWRP, C/WWR)

7.2 Tropical Meteorology Research

The issue of coordination of monsoon research within WWRP-THORPEX and between WCRP and WWRP-THORPEX was discussed. At the WCRP/JSC meeting in April 2008 in Arcachon, France the suggestion was made to better coordinate with WWRP-THORPEX to avoid duplication and clarify the confusing landscape of monsoon research projects related to weather and climate. G. Brunet and D. Parsons reported that the JSC-WWRP decided that it was premature to create a formal joint group between WCRP and WWRP on monsoon

research coordination. Rather, they preferred to liaise with WCRP through the Monsoon panel of the tropical meteorology research (TMR) working group and to focus first organize monsoon, tropical cyclone and other tropical research activities within WWRP especially within TMR and THORPEX as well as coordinating these WWRP efforts with operational programmes of WMO under CBS programmes.

Decision 5. To use the WWRP Strategic Planning Process to clarify how best to serve research needs of tropical meteorology as currently relevant activities are in both THORPEX and TRM (Action: Chair JSC-WWRP, C/WWR)

7.3 Mesoscale Weather Forecasting Research

Dr Parsons, C/WWR reported that there are 10 to 12 named WWRP mesoscale projects underway and institutions in 80 to 90 countries carrying out mesoscale studies and research. David Burrige and Abdul Mokssit emphasized that whatever is done in WWRP regarding coordination and support of mesoscale weather forecasting research the goal of serving user needs in high impact weather needs to be a priority.

Decision 6. CAS endorses the plans of JSC-WWRP to explore an improved more focussed mesoscale forecasting research effort that will serve the needs of 80-90 countries that are actively involved in mesoscale forecasting especially for urban mega-city and complex terrain regions (Action: Chair JSC-WWRP, C/WWR)

7.4 Interface of NWP Research with Applications Sector and Environmental Prediction

The WWRP-JSC noted the importance of aerosol and atmospheric chemistry as a component of the prediction system both as a direct societal need and through the impact of these constituents on meteorological variables. It requested that the Working Groups of WWRP and the THORPEX programme focus on fostering increased collaboration with environmental prediction, particularly on the mesoscale where building upon the Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS) could further accelerate progress. The CAS MG discussed how to deal with NWP in the applications sector such as water, environmental prediction and alternative energy. It was agreed that numerical prediction of weather, climate water and the environment, the focus of a research task team established by the WMO Executive Council, NWP is facing new demands including high risk weather, climate change, water quality and supply, air pollution, energy production and supply and biodiversity.

Recommendation 6. In reviewing and presenting CAS activities and programmes the linkages to applications and societal benefits should be emphasized first and then this should be complemented by explanations of how they are supported by WMO research and technical activities.

8. Weather Modification Research (WMR)

8.1 Strengthening WMR

Dr Abdul Mokssit, CAS MG member responsible for WMR and the Secretariat summarized progress since the last CAS MG meeting Oct 2007. He emphasized that it is important for CAS to be aware of the worldwide activities in weather modification. According to Jean Pierre Chalon member of the Expert Team on WMR chaired by Dr Deon Terblanche, there was an average of 68 operational projects per year since 1984. About 61% of these projects were related to precipitation enhancement or precipitation redistribution, 35% were related to hail suppression and 4% were related to fog dissipation. But the exact numbers of

weather modification projects are certainly much higher. Independent inventories have estimated the number of operational projects to be in the order of 200. It is interesting to note that most of the projects were considered by their organisers to be operational, and included insufficient tools to allow a correct evaluation and a better understanding of the seeding impacts.

In November 2007, WMO Atmospheric research and environment programme led by its Expert team on Weather Modification Research successfully organized and hosted, together with the Meteorological Service of Turkey, the 9th Quadrennial Scientific Conference on Weather Modification in Antalya, Turkey. Of the total papers presented 50% concerned precipitation enhancement activities, 29% hail suppression, 5% fog dissipation, ~ 16% on the development of methods and techniques and only a few papers on inadvertent weather modification.

Too many projects taking place in the world are designed neither to improve scientific understanding nor to evaluate accurately the consequences of artificial cloud seeding. This underlines the need for continuation of the Experts Task Team on Weather Modification Research to advise and inform its members on the state of the art in weather modification techniques and to help them in developing adapted design, research tools and evaluation methods. D/ARE reported that to strengthen links to the clouds and precipitation research community the WMO co-sponsored the Quadrennial Symposium of the International Commission on Clouds and Precipitation (ICCP) of the International Association of Meteorology and Atmospheric Science (IAMAS) that was held in Cancun Mexico July 2008. Participation of scientists from developing countries was the target of WMO funds as well as presentation of WMO activities.

8.2 WMO Weather Modification Research Trust Fund

In June 2007, WMO Congress (Cg-XIV) endorsed the creation of a WMO Trust Fund to Support Weather Modification Research and Development to:

- Encourage research on weather modification, and provide guidance on available scientific knowledge about weather modification,
- Assist Member countries that request advice in practising sound weather modification research,
- Support the organization of the quadrennial WMO Scientific Conferences on Weather Modification, encouraging especially participation of scientists from developing countries and scientists new in the weather modification research,
- Support activities of the WMO Expert Team on Weather Modification (Expert Team Terms of Reference as defined in CAS-XIV).

The WMO Congress (Cg-XIV) strongly recommended that such activities be supported by research and modelling that provides:

- a) a deeper understanding of the effects of cloud modification on cloud/precipitation development; and
- b) a scientifically accepted evaluation of the weather modification activities.

In early 2008 the Secretariat has established the trust fund. It is based on voluntary contributions.

Decision 7. CAS MG requested the WMO Secretariat to circulate a letter from the Secretary general to Permanent Representatives of the Members of WMO and to other potential sponsors inviting them to contribute to the WMO Trust Fund To Support Weather Modification Research And Development (Action: Secretariat, A. Mokssit)

9. Secretariat Management of CAS Related Activities

L. Barrie, co-director of Research Department and Director (D/ARE) of the Atmospheric Research and Environment programmes informed CAS MG on the status of programme implementation and planned activities (Annex IV). CAS MG welcomed the type of report and thanked the secretariat for providing necessary background material.

Decision 8. CAS MG requested that the type of report tabled at this meeting continue since the overview of resources and the detailed list of meetings and activities happening since the last meeting and anticipated for the next year are necessary background material to enable the group to advise on scientific and technical matters (Action: D/ARE)

10. Fifteenth Session of the Commission for Atmospheric Science

The Management Group was briefed by L. Barrie, D/ARE on the initial progress made with the planning process for CAS-XV which is to be held 18 to 25 November 2009 in Seoul, Republic of Korea kindly hosted by the Korean Meteorological Agency (KMA). It will be preceded, on 16-17 November 2009, at the same location, by a scientific/technical conference. The group was informed that in the light of changes in WMO requested by the Cg-XIV June 2007 the landscape for Research and CAS is changing. On 1 January 2008, results-based management was introduced and the WMO Secretariat was restructured. A research department has been created that brings together the WCRP, WWRP and GAW programmes addressing climate, weather, water and environmental prediction and assessment research. It is important that CAS-XV in 2009 reflect these changes and respond to WMO's need to address the zero-no-growth budget approved by Cg-XIV. The Management Group and the Secretariat has been asked to examine the organization and programmatic content of the CAS-XV in Seoul with this in mind. He requested advice from the group on (i) topics for a technical meeting 16-17 November 2009 and (ii) the agenda of the meeting. In February 2009, a teleconference to update CAS MG on progress and to invite comments on these two aspects of CAS-XV was suggested.

10.1 Scientific/Technical Conference Preceding CAS-XV

The group discussed the purpose of a scientific/technical conference and agreed that it should explicitly address societal needs at a high level while still being attractive to the technical experts need at CAS-XV. Several suggestions were made for a theme:

- a) Weather, Water and Environmental Forecasting and Analysis Challenges
- b) Environmental Prediction In the Next Decade

The technical conference theme will be decided by the President after consultation with the CAS MG and the host country. In spring 2009, a scientific steering group and a local organizing committee will be established.

10.2 CAS-XV Content

The group discussed briefly the agenda. Some elements that the agenda needs to contain are the following:

- 1) Accomplishments: Report from the President
- 2) WMO Strategic Plan: The Future Directions for the WMO
- 3) Strategic Issues for CAS Linkages
 - (i) Climate-Weather
 - (ii) Air Quality-Urban Prediction
 - (iii) Water Quality/Supply: linking hydrology weather, air chemistry and climate
 - (iv) Research to Operations: from observations to prediction to service delivery.
- 4) Addressing the strategic issues in Numerical Experimentation (WGNE)
 - (i) Ensembles Multi-model
 - (ii) Earth system models applied to weather, climate and oceans
 - (iii) Data assimilation
- 5) Clouds and Precipitation Prediction: Linking Physic and Chemistry to Models
- 6) Training: Implications For Addressing Strategic Issues
- 7) Capacity Building: Societal Benefits
- 8) Future of CAS: Is It Organized, Positioned For the Future.

11. Next Meeting of CAS MG

It was decided that a physical meeting of CAS MG will not take place in 2009 since CAS-XV is taking place. Instead, we will hold a series of teleconferences to assist in planning and implementing the meeting. The first will be held in late spring 2009 focussed on the CAS-XV organization and the associated technical conference.

Annex I

**Third CAS Management Group Meeting
(Geneva, Switzerland, 27-29 October 2008)**

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Annex II

WORLD METEOROLOGICAL ORGANIZATION

CAS-MG3 / Doc. 1

COMMISSION FOR ATMOSPHERIC SCIENCES

29.VIII. 2008)

MANAGEMENT GROUP, THIRD SESSION

Original: ENGLISH

GENEVA, SWITZERLAND, 27-29 OCTOBER 2008

AGENDA

Location: Press Room, Ground Floor (Lake-end), WMO Secretariat

Opening of the session: 13:00 on 27 October 2008

Closing of the session: 17:00 on 29 October 2008

1. ORGANIZATION OF THE SESSION

1.1 Welcome and Introductions

- Secretary General's Representative
- CAS President
- CAS Vice-President
- Director of Research/ARE
- Introduction of participants at the meeting

1.2 Adoption of the agenda

2. CAS

2.1 Report of CAS President

2.2 Review of Actions in Last Minutes (report of CAS MG2)

3. OPAG-EPAC

3.1 Report of Chair JSC OPAG-EPAC

3.2 WMO/IUGG Assessment of Aerosol Pollution Effects on Precipitation

3.3 GCOS AOPC and GAW

4. OPAG-WWRP

4.1 Report of Chair JSC OPAG-WWRP including progress on WWRP Strategic Plan

4.2 THORPEX Progress Report

4.3 Major WWRP Field Campaigns (T_PARC-TCS08, Beijing 08 FDP and RDP)

4.4 THORPEX IPY Cluster

4.5 Weather Modification Progress Report

5. INTER-COMMISSION/ INTER-PROGRAMME ACTIVITIES

5.1 EC Working Group on WIGOS/WIS

5.1.1 Report of CAS Representative

5.1.2 WIGOS/WIS GOS/GAW Pilot Project

5.2 WMO Sand and Dust Storm Warning Advisory and Assessment System

5.3 WMO Quality Management Framework (QFM)

- 5.4 EC Working Group on Disaster Risk Reduction (DRR)
 - 5.4.1 Report of CAS Representative to EC WG-DRR
 - 5.4.2 Shanghai MHEWS Update
 - 5.4.3 Operational Southeast Africa Severe Weather FDP & Research Connections
- 5.5 Joint CAS/GEO Joint Activities
- 5.6 WMO/UNESCO/IMO Group of Experts on Scientific Aspects of Marine Pollution (GESAMP)

6. AREP PROGRAMME MANAGEMENT

- 6.1 Report of Director
- 6.2 AREP and WMO Strategic Operating Plan
 - 6.2.1 Introduction to WMO RBM and Strategic Planning
 - 6.2.2 Proposed ARE Deliverables: 2010-2011

7. CAS-XV AND TECHNICAL CONFERENCE Seoul, Republic of Korea, November 2009

- 7.1 Status of Organization
- 7.2 Proposed Agenda

8. COOPERATION WITH WCRP

- 8.1 Report to CAS of WCRP
- 8.2 CAS/JSC-WCRP Working Group on Numerical Experimentation (WGNE)
- 8.3 Progress Report on Year of Tropical Convection (YOTC)
- 8.4 Status of WMO Executive Council Research Task Team (EC-RTT) Activities

9. CLOSING OF THE MEETING

Recommendations of the WMO/IUGG Science Assessment of Aerosol Effects on Precipitation on Local, Regional and Global Scales that was requested by Cg-XIV, coordinated by WMO and IUGG through liaisons L. Barrie and Roland List, respectively and published in late 2008 as a book entitled:

Aerosol Pollution Impact on Precipitation: A Scientific Review, Eds. Z. Levin and W. Cotton, Springer, ISBN 978-1-402008689-2

1. A series of international projects targeted toward unraveling the complex interactions among aerosols, clouds, and precipitation be implemented. WMO/IUGG take the lead in such projects together with other UN and International Organizations. Some of those projects could be sponsored and financially supported by the countries involved.
2. Since ice formation in clouds is not yet fully understood, it is recommended that further laboratory studies and in situ measurements be conducted to clarify the nucleation mechanisms. A workshop should be held on developing improved instrumentation for measuring ice nuclei (IN), small ice particles and precipitation.
3. There is a special need for *more in situ measurements* to follow and link physical processes leading from aerosol effects on cloud growth and precipitation.
4. Because indications are strong that orographic clouds are highly susceptible to precipitation modification due to pollution aerosols, and because the ramifications on water resources are large, it is recommended that focused, coordinated observational and modeling campaigns are implemented to study aerosol precipitation interactions for selected watersheds where pollution effects are likely to be large. A workshop should be held to determine a strategy for a focused, coordinated observational and modeling campaign to address the effects that aerosols have on orographic clouds.
5. Because cloud-resolving models suggest a significant dynamic response to pollution aerosols, which then modifies simulated precipitation, particularly through secondary dynamic responses of clouds via cold pools and gravity waves, a coordinated observational and modeling campaign should be organized to investigate the response of cloud systems to varying amounts and characteristics of pollution.
6. Because of the indications of strong influences of urban land-use and aerosol pollution on precipitation and lightning, it is recommended that a coordinated modeling and observational campaign be established in a number of large metropolitan regions where convection is prevalent.
7. Cloud-resolving model intercomparison studies should be implemented for models that explicitly represent aerosol-cloud-precipitation interactions. Such studies should serve as a stimulus for model refinement research and evaluations of model performance.
8. Existing and new statistical methods be applied to current and future data sets to distinguish aerosol effects on precipitation from meteorological influences. Numerical models should play an important role in this process.
9. Aerosol-cloud-precipitation specialists collaborate with global climate model (GCM), developers to refine the representation (parameterization) of aerosol-cloud-precipitation processes in GCMs.

10. Assemble data sets or climatologies that can be used for the assessment of climate simulations with GCMs, including aerosol cloud- precipitation parameterizations. Some of the parameters that need evaluation include seasonal and annual precipitation amounts, regional precipitation climatologies, global and regional aerosol distributions, and top of atmosphere (TOA) radiation budgets.

AREP PROGRAMME MANAGEMENT

Report of the Director

(submitted by L. Barrie, D/ARE)

Purpose of Document and Major Decision(s) Requested

To inform CAS Management Group of the status of programme implementation and planned activities for 2009.

Summary of Activity

Since the last CAS Management Group Meeting in Oslo September 2008 many changes have taken place within the WMO Secretariat that concern the implementation of the programmes of CAS. In response to Congress XV outcomes that mandated the secretariat to implement a results-based management system, the WMO Secretariat was restructured on 1 January 2009 creating a new Research Department. This consists of the Atmospheric Research and Environment Branch (ARE) that includes the WMO World Weather Research Programme (including THORPEX) and the Global Atmosphere Watch (GAW) programme of CAS and the World Climate Research Programme. Dr Ghassem Asrar, Director of Joint Planning Staff of WCRP and Dr. L. Barrie Director of ARE are co-Directors of the new Research Department. The activities supported by the Research Department are summarized in Figures 1 and 2.

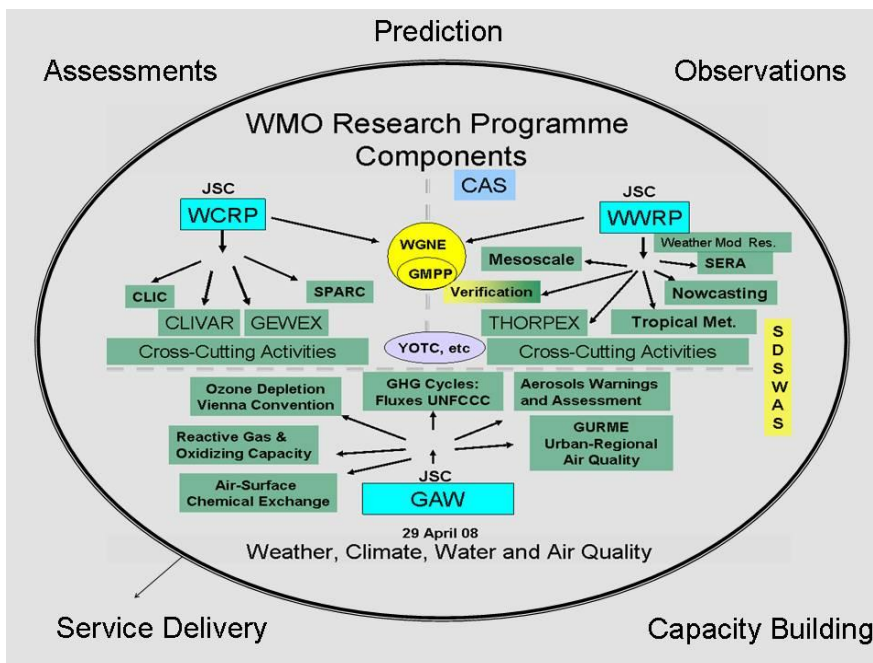
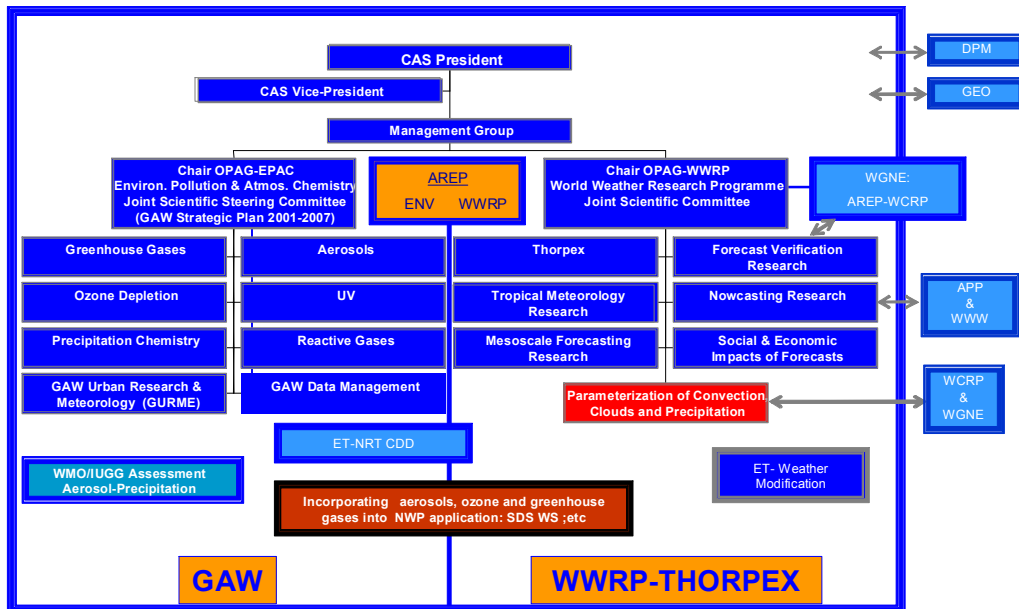


Figure 1 Activities supported by the WMO Research Department

CAS/AREP PROGRAMME COMPONENTS



20 April 07

Figure 2 Detailed schematic of CAS and supporting WMO secretariat structure

The implications of this restructuring on programme management and implementation is minimal in the case of the Research Department. Organizationally the two directors are working closely together to identify tasks that can be shared to minimize time and resources expended. For 2008-2011, Congress XV approved a separate budget for the WCRP (a joint programme of WMO/IOC/ICSU) and for the ARE Branch that supports CAS activities. WMO manages these separately through the Resources Management Department. As of 1 January 2008 the WMO financial tracking system separates the budgets for personnel and non-salary activities. The non-salary budget must cover the service costs charged by WMO technical departments for computer and information technology support as well as publishing and printing. In 2008, Departmental Directors have been granted the flexibility of transferring resources between then personnel and non-salary budgets.

Resource and administrative information for ARE in 2008 and 2009

In Congress XV Document 8.2, the approved 2008-2011 (zero no-growth option) budget is 13.6 MCHF. This amounted to a decrease of -9.3% from the previous four year period. The ARE staff situation for 2008 and 2009 is shown in Table 1.

Table 1 Summary of ARE Staff resources

Post Grade	Function	PY Use in 2008	2008 Cost (kCHF)	PY Use in 2009	2009 Cost (KCHF)
D1	Director ARE	1	290	1	290
G6	Admin Ass. ARE	1	150	1	150
G5	Sen. Sec. & ARE Publications	0.8	100	1	100
P5	Chief WWR including THORPEX	1	257.5	1	257.5
G5	Sen. Sec. WWR & THORPEX IPO	1	125	1	125
P5	SSO WWR	1 (1/3 staff association)	257.5	1	257.5
P4	2/3 SSO WWR 1/3 SSO AER	1	207.5	1	207.5
P5	Chief AER(GAW)	1	257.5	1	257.5
G5	Sen. Sec. AER	1	125	1	125
P5	SSO AER (GAW)	1	257.5	1	257.5
P5 2008 P4 2009	SO AER (GAW)	0	0	1	207.5
Total		9.8	2027	10.7	2234.5

The non-salary budget available to ARE for 2008 was 736 kCHF and is likely to be similar for 2009. The CAS XV meeting budget provided by WMO is 267 kCHF and provided as an allotment in 2009 in addition to the non-salary budget. Salary-savings from 2008 for the P5 post unfilled was 213 kCHF. Much of this will be available for use in 2009. Thus, the 2009 non-salary budget is expected to be approximately 900 kCHF.

The general budget for ARE is split equally between WWR and ARE after removing costs of ARE support of CAS President and the CAS Management Group meeting, WMO EC and international activities related to ARE and the Branch costs of computer and information technology support.

In addition to the general budget approved by Congress, ARE receives approximately 100 kCHF in 2008 and 2009 from the Congress-approved surplus budget for Disaster Risk Reduction and 30 kCHF for WIGOS/WIS pilot project for GAW. These funds are accessed by AER and WWR through cross-cutting joint projects.

Activities in 2008 and projected for 2009 related to GAW and WWRP are listed in Appendices I and II, respectively.

GAW Meetings 2008 and projected for 2009

GAW-related Meetings in 2008

1. Joint meeting of the PC SAG and ACCENT, 28-31 January, Las Vegas, USA
2. Workshop on stratospheric water vapor, 11-14 February 2008, Bern
3. GCOS/GRUAN, 26-28 February, Lindenberg
4. GMES Atmospheric Service Implementation Group, 13 March, Brussels
5. First Meeting of ad-hoc CBS CAS expert group on "Joint GOS-GAW Pilot Project to accelerate the implementation of WIGOSWIS", 25 – 27 March, Geneva
6. EGU, 14-16 April, Vienna, Austria
7. Mountains as early indicators of climate change, 17-18 April, Padova, Italy
8. IGACO-Ozone/UV-NDACC meeting on ozone measurements, 21-23 April, Geneva
9. 9th TFMM, 23-25 April, Bordeaux, France
10. GAS-IG, 28 April, Brussels, Belgium
11. GAWTEC XIV, Hohenpeissenberg/Zugspitze
12. GESAMP session, 13-16 May, Accra, Ghana
13. 7th Meeting of the Ozone Research Managers, 19-21 May, Geneva
14. IGOS theme meeting, 28 May, Paris, France
15. Harbors and Air Quality, 29-30 May, Rotterdam, Netherlands
16. TFHTAP, 9-13 June, Washington DC, USA
17. AGAGE semi-annual meeting, June, Grindelwald, Switzerland
18. WMO EC XV, 18-27 June, Geneva
19. Ozone SAG, 25 June – 27 June, Tromso, Norway
20. Quadrennial Ozone Symposium, 29 June – 5 July, Tromso, Norway
21. Joint Meeting of the Wildland Fire Advisory Group / Global Wildland Fire Network, 4-5 July, Freiburg, Germany
22. GAW VOCs, 7-9 July, Zurich, Switzerland
23. BSRN, 7-11 July, Netherlands
24. International Radiation Symposium, 3-8 August, Foz do Iguazu, Brazil
25. UV SAG, 6-7 August, Foz do Iguazu, Brazil
26. SPARC General Assembly, August, Bologna, Italy
27. IGAC Conference Bridging the scales in atmospheric chemistry, 7-12 September, Annecy, France
28. EMEP Steering Body, 8-10 September, Geneva
29. Kick-off meeting of IAGOS-ERI, 15-16 September, Maastricht
30. GMES Forum, 16-17 September, Lille, France
31. Meeting of GAW Data Managers, 2-3 October, St Petersburg, Russian Federation
32. NDACC Steering Committee, 25-29 September, Greenland
33. TFHTAP, 13-14 October, Hanoi, Viet Nam
34. EANET, 15-17 October, Hanoi, Viet Nam
35. Swiss GAW, 23 October, Zurich, Switzerland
36. Megapoli kick-off meeting, 27-28 October, Mainz, Germany
37. CAS Management Group 27-29 October, Geneva
38. GAWTEC XV, 2-15 November, Zugspitze/Hohenpeissenberg
39. Meteo Forum "Air Quality and Health", 7 November, Brussels
40. Montreal Protocol MOP/Vienna Convention COP, 16-20 November, Doha, Qatar
41. Air Quality Forecasting training course for South Asia, 8-12 December, Pune, India
42. CLRTAP Executive Body, 15-19 December

GAW-related Meetings Projected for 2009

1. AMS Annual Meeting, 11-15 January, Phoenix, USA
2. Joint GEOmon/IMECC meeting, 26-30 January, Geneva
3. UV SAG Instrument Group, February
4. Dobson intercomparison for RA I, 23 February – 14 March, Irene, South Africa
5. GCOS GRUAN, 2-4 March, Oklahoma, USA
6. GAW NOx meeting
7. Swiss GAW, 2 April, Zurich
8. EGU, Vienna, 19-24 April 2009
9. World Met Day, 23 March 2009 "Weather, climate and the air we breathe"
10. 7th International Conference on Air Quality – Science and Application, 23-27 March, Istanbul, Turkey
11. ASAAQ, 21-23 April, Jinan, China
12. Joint GURME Shanghai project and AirNow International air quality forecasting workshop, 24-28 April (tentative), Shanghai, China
13. Joint TFHTAP and TFMM workshop, Paris, France
14. TFMM, Paris, France
15. GAWTEC XVI training course, Hohenpeissenberg/Zugspitze
16. Observations of natural radioactive compounds used in climate studies, Vienna, Austria
17. Meeting of GAW Scientific Advisory Group on Aerosols, week of April 20 or 27 in Switzerland (held in conjunction with European Aerosols Network)
18. GAW 2009 Workshop, 5-7 May, Geneva
19. JSC OPAG EPAC biennial meeting, 8 May, Geneva
20. Ozone theme meeting, 11-13 May, Geneva
21. WMO EC XVI, 3-12 June, Geneva
22. GESAMP-35 annual meeting, 15-19 June, Geneva
23. SAG Ozone, 29 June – 3 July, Helsinki
24. WCC-3, 31 August – 4 September, Geneva
25. WMO/IAEA Experts Workshop on Observations of Greenhouse Gases and Related Tracers, 7-10 September 2009 Volksbad, Jena, Germany
26. WMO Scientific Advisory Group on GHGs, 11 September 2009, Max-Planck-Institute for Biogeochemistry, Jena, Germany
27. 8th International Carbon Dioxide Conference (ICDC8), 13-19 September 2009, Friedrich-Schiller University of Jena, Jena, Germany
28. NDACC Steering Committee meeting, September, Geneva
29. IGAC Steering Committee, 21-25 September (tentative), Kyoto, Japan
30. Swiss GAW, 29 October, Zurich
31. GAWTEC XVII Training Course, Hohenpeissenberg/Zugspitze
32. WMO/UNEP ozone assessment meeting of authors and reviewers, November, US
33. CAS, 18-27 November, Seoul, Korea.

WWRP Meetings 2008 and Projected for 2009

WWRP meetings in 2008

1. COPS Science Symposium, France, Oct 2008
2. WGNE Meeting (3 to 7 November, Montreal) -- note also listed under THORPEX
3. WWRP Briefing to US National Academies of Science (6 November, Washington DC)
4. EU-Africa-Middle East Regional Meeting of SDS-WAS Project, Tunis-Carthage, 24-25 November 2008
5. Asian Regional Meeting of the SDS-WAS Project, Beijing, China, November 2008
6. Meeting of the Int'l Scientific Steering Committee of MEDEX, (Barcelona, 24-25 Nov)
7. Joint Meeting of the Working Groups on Mesoscale Forecasting Research and the Joint Working Group on Verification -- planning for Shanghai, MHEWS, (1-3 December 2008 -- Shanghai, China)

THORPEX meeting in 2008

8. GEO STC meeting in September - (JC attending)
9. Health Forum meeting in Oxford (3 September) - (DB to attend)
10. THORPEX mini - workshop (22 - 26 September) - (everyone attending)
11. EMS Annual Meeting (29 September -) - (DB & DP)
12. UK THORPEX meeting (8/9/10 October) - (DB attending)
13. NCEP meeting on Winter TPARC (8/9/10 October) - (DP to attend?)
14. CAS Management Meeting (27 to 29 October) - (JC & DB will be in Geneva at this time)
15. EC Expert Committee (Geneva - 30 & 31 October) - (DP & DB)
16. WGNE Meeting (3 to 7 November) - (DP & GB)
17. Buenos Aires DA meeting (November 2008) - (SN attending)
18. ICSC 7 (18 to 20 November 2008) - (DP, DB, JC)
19. CONCORDIASI Science Planning Meeting, Toulouse, 10 December 2008

WWRP meetings projected in 2009

1. International Conference on Indian Ocean Tropical Cyclones and Climate Change, Oman, March 2009
2. Combined Meeting of all WWRP Working Groups, TBD-March 2009
3. WWRP JSC, TBD-March 2009
4. International Workshop on Tropical Cyclone Landfall Processes, Shanghai, April 2009
5. 4th WMO Intl Symposium on Verification, Helsinki, June, 2009.
6. 9th WMO Intl Symposium on Nowcasting and Very Short Range Forecasting, British Columbia, 30 Aug-4 Sept 2009
7. 5th WMO Intl Symposium on Data Assimilation, Melbourne, 5-9 Oct 2009
8. SDS-WAS Science Meeting and Training Workshop, TBD
9. SDS-WAS Regional Meetings, TBD
10. WGNE, TBD
11. CAS Management Meeting and Pre-CAS Conference, Nov 2009

THORPEX meeting projected in 2009

12. THORPEX sessions, 9th International Conference on Southern Hemisphere Meteorology and Oceanographic, Feb 2009
13. TIGGE LAM, Bologna, Jan 2009
14. Follow up to African planning probably at ICTP (February 2009)
15. S Hemisphere Symposium (4 to 8 May 2009)
16. TIGGE Users meeting (between 4 to 8 May 2009)
17. THORPEX EC02 (Spring 2009)
18. Asian-hosted YOTC meeting
19. N American Regional Committee meeting, Mexico TBD
20. Asian Regional THORPEX Committee meeting, TBD
21. EU Regional THORPEX Committee, TBD
22. African THORPEX Regional Committee Meeting, TBD
23. THORPEX IPY (Summer 2009)
24. WWRP JSC (???)
25. THORPEX WGs (early Autumn 2009)
26. ICSC 8 (Autumn 2009)
27. CAS (Autumn 2009)
28. T-PARC Science Meeting, TBD
29. GEO STC, TBD
30. GEO Plenary, TBD

Summary of Recommendations by CAS-MG3

Recommendation 1. WMO provides advice and builds capacity in near real time delivery of environmental data which is an important component of forecasting urban pollution. Both the near real time delivery of urban observations and pollution forecasting activity should be pursued at the national or local levels.

Recommendation 2. WMO take on the task of linking the technical work on the regional/continental long range transport of air pollution. This includes the near real time delivery of environmental data to allow for day-to-day assessment of the long (and very long) range transport of air pollution; hindcast analysis and scenario calculations.

Recommendation 3. WMO should take the lead in the technical analysis of how climate variability and change and air pollution interact both ways on a regional basis, and in combination on a global basis, as these are issues of immediate concern throughout the world affecting societies to an extent that is not well known but could be significant (air pollution events, floods, droughts; water supply, food supply etc).

Recommendation 4. Develop a common understanding of issues related to the disturbance by air pollution of the reactive nitrogen cycle, its spatial extent driven by long range atmospheric transport and the influence on climate change. The IPCC, the Reactive Nitrogen Initiative, GEOSS/GMES, CLRTAP, EANET and the Malé declaration could benefit from a common approach that WMO could lead.

Recommendation 5. WMO work towards establishing an integrated, Global Carbon Observation, Prediction and Assessment System, acknowledging that monitoring requirements may be forthcoming to support global emission reduction and mitigation policy, and recognizing that CO₂ interacts strongly with the biosphere and hydrosphere, that considerable research is necessary to support such a system, and that such research will need to be compatible with what might ultimately become operational – that is, aiming at operational implementation:

- a. Integrating and expanding existing observing systems and validating and incorporating satellite and aircraft measurements to produce a global, near-real time database of atmospheric CO₂;
- b. Developing and implementing an ensemble-based reanalysis for research and operational applications that includes surface-atmosphere interactions; and
- c. Applying model-based systems to analysis and prediction of the transport and evolution of CO₂. These systems should be linked to operational frameworks to insure reliable access to data, production of forecasts, and delivery of services.

Recommendation 6. In reviewing and presenting CAS activities and programmes the linkages to applications and societal benefits should be emphasized first and then this should be complemented by explanations of how they are supported by WMO research and technical activities.

Summary of Decisions by CAS-MG3

- Decision 1.** CAS-MG3 requested that the appropriated linkages are made between components of CAS programmes namely: WWRP-THORPEX, GAW and WIS (Action: President and Secretariat)
- Decision 2.** Considering the growing recognition of the need to incorporate ozone, aerosols and greenhouse gases into operational atmospheric climate and NWP models, add appropriate representation in atmospheric composition, data assimilation and modelling to the tasks of the WGNE and ensure that this is consistent with the work being carried out in GAW GURME (Action: Secretariat, WGNE chair, EPAC-Chair).
- Decision 3.** D/ARE was requested to lead the drafting of a statement with M. Miller, G. Brunet and O. Hov for the President of CAS to use in advising WMO on follow-up actions to the WMO/IUGG Science Assessment of Aerosol Effects on Precipitation on Local, Regional and Global Scales. (Action: D/ARE)
- Decision 4.** MG approved the proposal by Chair JSC-OPAG WWRP that Brian Mills Chair the SERA WG and recommended that, initially, the SERA group focus on a small number of specific tasks that are of direct benefit to effective delivery of weather services. (Action: Chair JSC-WWRP, C/WWR)
- Decision 5.** To use the WWRP Strategic Planning Process to clarify how best to serve research needs of tropical meteorology as currently relevant activities are in both THORPEX and TRM (Action: Chair JSC-WWRP, C/WWR)
- Decision 6.** CAS endorses the plans of JSC-WWRP to explore an improved more focussed mesoscale forecasting research effort that will serve the needs of 80-90 countries that are actively involved in mesoscale forecasting especially for urban mega-city and complex terrain regions (Action: Chair JSC-WWRP, C/WWR)
- Decision 7.** CAS MG requested the WMO Secretariat to circulate a letter from the Secretary general to Permanent Representatives of the Members of WMO and to other potential sponsors inviting them to contribute to the WMO Trust Fund To Support Weather Modification Research And Development (Action: Secretariat, A. Mokssit)
- Decision 8.** CAS MG requested that the type of report tabled at this meeting continue since the overview of resources and the detailed list of meetings and activities happening since the last meeting and anticipated for the next year are necessary background material to enable the group to advise on scientific and technical matters (Action: D/ARE)