WORLD METEOROLOGICAL ORGANIZATION

COMMISSION FOR ATMOSPHERIC SCIENCES (CAS)

6th MEETING OF THE CAS MANAGEMENT GROUP

(Madrid, Spain, 15-17 November 2011)

MEETING REPORT
ACTIONS AND RECOMMENDATIONS

(30 November 2011)

MEETING OF THE CAS MANAGEMENT GROUP

(Madrid, Spain, 15-17 November 2011)

MEETING REPORT
ACTIONS AND RECOMMENDATIONS

1. INTRODUCTION

The meeting was opened by the President of the Commission for Atmospheric Sciences (CAS), Dr Michel Béland. He emphasized the leadership exercised by Spain in setting up the Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS) services, a result of the excellent collaboration between State Meteorological Agency (AEMET), Barcelona Supercomputing Centre (BSC) and CAS. Secondly, he referred to a number of other exciting environmental prediction products driven by a core state-of-the-art NWP data assimilation and forecasting system. The President of CAS highlighted at the Cg-XVI six of these new potential initiatives. He also highlighted the importance for WMO to maintain healthy and innovative research and development activities, especially in times of financial constraint as once lost, rebuilding such initiatives could take decades. Finally, Dr Béland expressed his gratitude for the hospitality shown by Spain and the AEMET in hosting the 6th meeting of the CAS Management Group (MG). He cordially acknowledged the presence of Prof. Ricardo Garcia Herrera, Permanent Representative of Spain with WMO, Mr Francisco Espejo, International Relations Department, and Mr Jose Antonio Garcia-Moya, Head of the Department of Development at AEMET and a member of CAS for Spain. Mr Garcia-Moya was invited to attend the meeting.

The PR of Spain welcomed the participants and presented an overview of new developments within AEMET related to an open data policy, the emphasis on capacity building to increase the number of PhD's in the service and increasing the effectiveness of local and international partnerships. He wished the participants well in the deliberations over the next two and a half days.

1.2 Adoption of the Agenda

The final Agenda and the list of participants are appended (Annexes I and II). The documents and presentations made at the meeting have been posted to the WMO website http://www.wmo.int/pages/prog/arep/cas/CAS-MG-Madrid.html

1.3 Review of 5th CAS MG Meeting Action list

CAS MG reviewed the actions of the 5th CAS MG meeting which was held in Geneva, 27-28 September 2010, and decided that the following actions should be kept current:

CASMGT01/ACTION 11: The President of CAS, D/ARE and the Chair of the WWRP/JSC should ensure that there is cross-representation between the ICSC-IRDR Research Programme and the WWRP/SERA Working Group (Action – President of CAS and D/ARE).

CASMGT01/ACTION 12: The links between the AMMA II project, including the work on the West African Monsoon, and WWRP and THORPEX should be clarified and strengthened as appropriate (Action - C/WWR and the THORPEX IPO).

CASMGT01/ACTION 19: Took note of the "Report of the EC Working Group on WMO Strategic and Operational Planning (WG/SOP) on WMO Reform"; the CAS Management Group agreed that CAS should be better connected with the WMO Regional Associations and that CAS Rapporteurs should be appointed for each Regional Association. (Action – President of CAS).

CASMGT01/ACTION 30: The secretariat will annotate the list of CAS-XV Actions showing the current status of the actions and the latest version of this list will be posted to the website (Action – C/AER, C/WWR and the Chairs of the two JSCs).

2. REPORTING

2.1 Report of the President of CAS

The President of CAS, Dr Michel Béland, gave an overview of the main outcomes of CAS-XV emphasizing the importance of a seamless approach to weather, climate, water, and environment research. Such an approach requires close cooperation with WCRP and developing partnerships with other research bodies such as ICSU. He also pointed out CAS is now moving rapidly forward on the sub-seasonal to seasonal prediction research initiative, with WWRP and WCRP, and also on a polar prediction initiative, both suggested at CAS XV. He also pointed out the start of serious discussions on another research initiative related to high resolution integrated greenhouse gas monitoring, also suggested at CAS-XV. Finally, six other goals for CAS suggested at CAS-XV were also highlighted, as well as the need to report on these at the next CAS XVI Session, i.e.:

- Implementation and successful completion of the Year of the Tropical Convection project;
- Extension of capacity building programmes to the developing countries showing real evidence of progress and achievement;
- Elevation of the Joint Scientific Committee (JSC) of WWRP to a status of international respect and recognition,
- Implementation of a joint strategy in hydrometeorology that cuts across relevant programmes of this and other Commissions;
- Implementation of a comprehensive initiative in air quality involving all programme areas of the Commission including regional aspects;
- Achieve progress in strengthening the governance arrangements of the Commission, particularly in relation to broader participation and gender equity and the preparation of plans that include expected results and performance indicators for consideration at the next session.

Dr Béland then provided an overview of Cg-XVI focusing on the six research proposals presented and the side events linked to these. This was followed by a summary of some of the relevant task teams, coordination groups, working groups as well as the Focal Point on Research established by EC-LXIII. The fact that Expected Research 5 in the WMO Strategic Plan for 2012-2015 - *Enhanced capabilities of Members to contribute to and draw benefits from the global research capacity for weather, climate, water and the related environmental science and technology development* – is regarded as a recognition for Research and will simplify reporting.

In conclusion, the President of CAS reported that the appointment of the Vice-President of CAS has not been successful as the required quorum was not reached during elections.

CASMG06/ACTION 1: The President of CAS to pursue the inclusion of the Secretary-General of IAMAS (ICSU), Dr Hans Volkert, as a member of the CAS MG and confirm with Dr Philippe Bougeault whether he wishes to remain on the MG (Action – President of CAS).

CASMG06/ACTION 2: The President of CAS to obtain clarity from Mr C. Blondin (D/CER) on the alternatives related to filling of the vacant position of CAS VP after the latest unsuccessful ballot process due to not reaching a quorum (Action – President of CAS).

2.2 Report of the Chair of the JSC OPAG-EPAC

The Chair of the JSC/OPAG EPAC, Dr Oystein Hov, as an introduction provided an overview of the links between various components of the GAW Programme as well as how these components make contributions to a wide range of weather, climate, water and environmental services and knowledge. He proceeded to provide insight into the Executive Council Research Task Team (EC-RTT) outcomes related GAW and the status of the GAW Strategic Plan for 2008-2015, its recently updated Addendum as well as the recommendations of CAS. Dr Hov then provided a comprehensive overview of recent achievement of the various components of the GAW Programme, which include how:

- The GAW lidar network supports volcanic ash forecasting (Eyafjällajökull eruption April-May 2010).

- GAW observations support sand and dust storm forecasts (SDS-WAS).

- GAW is important for the analysis of climate-chemistry interactions.

- Through GURME GAW establishes urban air quality forecasts worldwide.

- GAW contributes to global water vapour observations (through high-resolution monitoring of water vapour dynamics at selected stations and through GHG observations as atmospheric water vapour changes in response to the temperature changes accompanying GHG changes.

- GAW contributed to the 2010 WMO-UNEP Scientific ozone assessment.

- GAW is maturing scientifically and many components are operationalized:
  - Air quality forecasting,
  - projectionsand reanalysis of the deposition of acidifying and eutrophying compounds and surface ozone and aerosols,
  - reanalysis and projections of future climate,
  - the reanalysis and evolution of the state of the stratospheric ozone layer including UV radiation.

- Good cooperation between developed and developing countries.

- Through evolving operational capabilities and real time transfer of information, GAW is embedded in WIGOS and WIS.

Prof. Hov concluded with challenges for networks and for integration which include sampling protocols, quality control, finding partners in regions which are under sampled, how best to provide data to users in a common format and enhance the interaction of the data generation and assimilation/modelling communities.

2.3 Report of the Chair of the JSC OPAG-WWRP

The Chair of the JSC/OPAG WWRP, Dr Gilbert Brunet, provided an overview of the long-term objectives of the WWRP, its structural components in terms of working groups and research focus areas as well highlights of recent achievements of the programme. A summary of the new structure which now include internationally recognised experts who can objectively evaluate progress and provide guidance to the Programme was given as well as a reference to the WWRP Strategic Plan for the period 2009-2017.

Dr Brunet summarized the highlights from CG-XVI that has a bearing on the future of the WWRP. Specific priorities related to the following were identified:

- Legacy of THORPEX
  - "mid-term review of the THORPEX Programme."
  - "THORPEX had become an integral component of the WWRP focusing on global scales and that the WWRP should fulfill the THORPEX high priority research activities for the next biennium if and when contributions to the THORPEX trust fund begin to "tail off" towards the end of the ten-year period of the programme."

- An Earth-system Prediction Initiative
  - "WWRP community needs to participate in the establishment of the international Earth-system Prediction Research Initiative in order to accelerate advances in weather, climate and Earth-system prediction."
  - "Elements of the Initiative are introduced in a compendium of papers that appeared in the October 2010 issue of the Bulletin of the American Meteorological Society (BAMS)"

Dr Brunet concluded with an overview of recent meetings and conferences as well as some future ones as supported by the WWRP and pointed our relevance to the broader, long-term goals of the Programme.

2.4 Report of the Chair of the ICSC THORPEX

Dr T. Nakazawa, Chief of the WWRP and THORPEX International Programme Officer presented the report on THORPEX on behalf of Dr Alan Dickinson, who unfortunately could not be present. Dr Nakazawa provided an overview of the 9th ICSC of THORPEX which was held in Geneva, 21-22 September 2011, focussing on the progress made on the THORPEX mid-term review and plans concerning the legacy of THORPEX that will be discussed in detail under item 5.2. He also provided brief summaries on working group and regional activities of THORPEX and how this THORPEX interacts with other WMO activities.

CASMG06/ACTION 3: D/ARE (Dr D. Terblanche) to provide the dates of the Technical Conference (TECO) and the extraordinary Congress in November 2012 so that possible conflicts in dates between the 2012 WGNE meeting and this event can be avoided (Action – D/ARE).

2.5 Report of the Chair of the WGNE

The Co-Chair of WGNE, Dr Andy Brown, started his presentation with an overview of the established liaison between WGNE and the activities of WWRP, THORPEX and WCRP. This was followed by a discussion on coordinated experiments and projects and the progress status on each of these, of particular relevance are the following:

- Transpose-AMIP through which climate models are tested in NWP mode;

- SURFA, the comparison of NWP surface flux data with observational products;

- The Grey Zone Project, focussing initially on a old air-air outbreak study and looking at how to parameterize physical processes in the "grey-zone" (1-10km);

- Investigation of issues associated with evaluation of forecast skill against a system's own analyses;

Dr Brown concluded his presentation with a summary of recent and upcoming meetings and workshops and changes to the membership of WGNE. He highlighted the planned initiative to use short-range coupled model errors to inform climate model development.

2.6 Report of the Director of the AREB

D/ARE report focused on the impact of a growing global population on environmental quality and the increasing vulnerability of societies to the impact of weather and environmental events. The challenges create unique and evolving opportunities for CAS and for WWRP/THORPEX and GAW,

despite reduced resources. The WWRP/THORPEX and GAW are now recognized as independent WMO Programmes and that the strategy of WMO makes provision for research contributions under Expected Result 5. These should be viewed as positive developments.

Emphasis was also placed on the importance of the structured transfer of research results, informed by user requirements, to improve operational services as well as cooperation with international research structures.

D/ARE also recognized and acknowledged the support and dedication of the Chiefs of the WWRP and GAW Programme – Dr Tetsuo Nakazawa (C/WWR) and Dr Liisa Jalkanen (C/AER) - and its staff within the Atmospheric Research and Environment Branch.

2.7 Report on the Outcomes of WCRP Open Science Conference (OSC)

Dr Brunet provided an overview of the WCRP OSC that took place in Denver, from 24 to 28 October 2011 with specific reference to the relevance to the WWRP. He mentioned the seamless weather-climate connections were emphasized throughout and that WGNE is playing an important role in this regard. These links between weather and climate were further highlighted by the importance of high-impact weather events and their possible attribution to climate change. In addition the fact that WWRP has cooperated in several WCRP initiatives such as GEWEX, CLIVAR and SPARC were mentioned.

Dr Brunet made specific mention of parallel session which focussed on the Prediction from sub-seasonal to multi-decadal scales, convened by D. Anderson, G. Brunet, B. Kirtman and I.-S. Kang. The main outcomes of this session were:

- Weather to Sub-seasonal to Decadal is the foundation for seamless prediction;
- Some prediction skill at subseasonal-seasonal-interannual and decadal scales;
- Land surface initialization can improve skill;
- Tropical SST trends: observed patterns are poorly simulated in coupled models, AMIP simulations agree with climate response;
- Predictive skill increased under specific regimes and not others.

Dr Brunet concluded his presentation with an overview of the WCRP OSC conclusions in which the concept of “actionable science” emerged as the mantra.

3. DISCUSSION

3.1 World Weather Research Programme

3.1.1 La Plata Initiative

Dr Alice Grimm gave an overview of synoptic and mesoscale features that can produce high impact weather over the La Plata Basin in different time scales, and the current state of extreme weather forecast. Scientific questions that might be of interest and possible objectives to be reached in the context of a RDP for improving the prediction of heavy precipitating systems over La Plata Basin were presented. The need for a workshop to develop an implementation plan for the RDP was emphasized. A preliminary proposal was presented.

CASMG06/ACTION 4: Analysis of this preliminary proposal by WWRP. If further elements are needed, provide feedback. If endorsed by the JSC, discuss a future workshop to develop an implementation plan for the La Plata RDP. (Action – Dr Nakazawa, Dr Grimm)

3.1.2 Sub-seasonal to seasonal prediction

CASMG06/ACTION 5: CAS MG recommends that the joint WWRP/THORPEX and WCRP initiative on sub-seasonal to seasonal prediction, because of its relevance to the GFCS, be submitted as a high priority initiative in the GFCS Implementation Plan (Action – D/ARE).

3.1.3 Polar Weather Prediction Research

CASMG06/ACTION 6: CAS MG advises that the WWRP/THORPEX Polar Prediction Project should include the study of the influence of atmospheric contaminants on polar weather and climate, the role of Black Carbon (BC) and the role of aerosols in general in the modification of Arctic fog and cloud prevalence, being specific examples. The Open Area Group on Environmental Pollution and Atmospheric Chemistry in particular through its Science Advisory Group on aerosols, chaired by John Ogren, is prepared to contribute to the planning of the environmental (pollution) aspects of the THORPEX Polar Prediction Project (Action – C/WWR, C/AER).

3.2 Global Atmosphere Watch

3.2.1 Environmental research and services for megacities

CASMG06/ACTION 7: The CAS MG noted that GURME is working in several regions of the globe effectively on urban pollution issues. The CAS MG requested GURME to record lessons learned and technology being used, best practices found, requirements needed, main features of air quality forecasting and modeling that could then be used by other Members. GURME should consider the possibility of harmonizing the methods used for AQF (Action - C/AER).

CASMG06/ACTION 8: WGNE needs to be engaged in appropriate GURME/GAW activities and vice versa, especially on aerosols effect on NWP and numerical technique requirements to support air quality modeling and forecasting. CAS MG recommended that the co-chairs of WGNE invite an expert of GURME to present the community's experiences on how aerosols affect weather and climate predictions. GURME agreed to send International Workshop on Air Quality Forecasting Research (IWAQFR) reports to WGNE community (Action - C/AER and Co-Chair WGNE).

3.2.2 Air quality and climate interactions, including Short Lived Climate Forcings (SLCF)

CASMG06/ACTION 9: CAS MG recognizes the importance of methane measurements and took note of the declining number or lack of observation stations in areas of potential permafrost thawing. The President of CAS and members of the CAS MG should use any opportunity to highlight this concern to appropriate bodies, including WMO EC and Congress (Action – President of CAS, CAS MG).

CASMG06/ACTION 10: GHG and SLCFs observations need to be included appropriately in GFCS Implementation Plan related to observations and research. GAW to ensure that this is accomplished through its involvement in the GFCS Implementation Plan development (Action – C/AER).

3.2.3 Integrated greenhouse gas monitoring

CASMG06/ACTION 11: Recognizing the need for an integrated, global, greenhouse gas information system to inform decision-making in the future, consistent with findings from CAS XV, and recognizing that such a system will require enhanced observations of concentrations of greenhouse gases and other atmospheric properties, higher resolution transport modeling on global scales, and ensemble reanalysis applied to greenhouse gases, and that such a system would have benefits on local and regional scales and would impinge positively on climate, air quality, and weather products:

1. CAS MG has decided to task a subset of its membership (Butler, Hov, Brunet, Terblanche). to prepare a 1-2 page summary describing the goals and objectives for developing such a system, and

2. Identify the actions needed to accomplish these goals and objectives, and how these would be carried out by WWRP, GAW, WCRP, and other WMO and related programs, and

3. CAS MG requested D/ARE to ensure that the above initiative on an integrated, global, greenhouse gas information system is included as a core element to the GFCS Implementation Plan aligned to the decisions of CAS-XV

4. The summary would serve as a focal point for discussions leading to proposals, plans, and activities to develop the global greenhouse gas information system (Action – Drs Butler, Hov, Brunet, D/ARE).

4. EMERGING ISSUES AND CAS

4.1 Progress on the Global Framework for Climate Services (GFCS)

D/ARE gave a presentation prepared by the GFCS Secretariat, providing background to the system. The importance of partnerships were emphasised and the current timeline of planned activities leading up to EC-LXIII in June 2011 and the Extraordinary Congress in November 2011 were presented.

4.2 WCRP VIEWS on the Interaction between WCRP and Technical Commissions, EC and WMO Members

CASMG06/ACTION 12: CAS MG values the input by the Chair of the JSC WCRP to the meeting via video conference and took note of the planned close cooperation between WCRP and CCl. CAS MG agrees with the ongoing collaboration between and CAS and WCRP and supports where appropriate enhanced cooperation. The participation of the Chairs of WWRP and GAW, Co-chairs of WGNE and a representative of ARE as observers in the WCRP JSC is encouraged by CAS MG (Action - President of CAS, Chair JSC WWRP and D/ARE).

4.3 Global Ozone Programme and the Potential Impact of reduced member support

CASMG06/ACTION 13: CAS noted with concern the potential reduced support to the WOUDC. CAS also noted a weakening of the global stratospheric ozone monitoring and research programme support. CAS emphasized that stratospheric ozone remains a priority despite the fact that its perceived importance has diminished. CAS supports constructive engagements by WMO to have some of these decisions reconsidered (Action – C/AER and D/ARE).

4.4 CAS Role in Weather Modification Research

D/ARE Provided background to recent developments related to WMO role in weather modification research and how it is to be supported by voluntary contribution to a dedicated Trust Fund. He explained the reasons why the establishment of the International Centre for Weather Modification Research and related activities (including a review of relevant Geo-engineering approaches) as was envisaged through the support of the UAE Government was not successful. It was also mentioned that the ET on WMR has been rearranged with new members.

CASMG06/ACTION 14: CAS MG supports the ET on WMR to work closely with ARE in investigate ways to stabilizing the financial support of its activities and will review progress on a regular basis (Action – C/WWR).

4.5 Sand and Dust Storm – Warning Advisory and Assessment System

CASMG06/ACTION 15: CAS MG welcomed the recommendation by EC-LXI, to request the Commission of Basic Systems (CBS) to collaborate with the Commission for Atmospheric Science (CAS) to determine the role of CBS Global Data-Processing and Forecasting System (GDPFS) SDS Specialized Centres with the appropriate operational and research capabilities (Action – C/WWR and C/AER).

CASMG06/ACTION 16: CAS MG gave its support to the establishment of a CBS GDPFS SDS Specialized Centre in Spain (AEMET and BSC).

CASMG06/ACTION 17: CAS MG did not support the creation of a new WG exclusively for SDS-WAS. The SDS-WAS activity should be dealt with as a project which reports to the WWRP/JSC (Action – Action – C/WWR and C/AER).

CASMG06/ACTION 18: CAS MG also noted that biomass burning is an important issue and that through the planned cross-cutting "Forest Fires Workshop" for 2012 concrete plans on how CAS/GAW/WWR should address this, should be put together. The approach of SDS-WAS could perhaps be used (Action – C/WWR and C/AER).

5. THORPEX

5.1 THORPEX Mid-Term Review

CASMG06/ACTION 19: CAS MG supported the scheduling of the meetings of WWRP/JSC and THORPEX/ICSC at the same time, due to the common interests and converging topics. It would also reduce the cost of traveling (Action – Chair JSC WWRP and C/WWR).
CASMG06/ACTION 20: CAS MG encouraged its members to read the draft 1 of the THORPEX Mid-Term Review (which will be available within a few weeks) and provide comments to the WMO Secretariat (Action – CAS MG).

5.2 The Legacy of THORPEX

CASMG06/ACTION 21: CAS MG agrees with initiatives related to the legacy of THORPEX such as the Open Science Conference and summer school on Earth System Modelling. CAS MG members are encouraged to provide input on identifying successful components of THORPEX and how these should evolve into sustainable research efforts within the WWRP.

6. UPCOMING EVENTS

6.1 WWRP Open Science Conference and Summer School on Earth System Modelling (NH Summer 2013)

CASMG06/ACTION 22: Secretariat will inform CAS MG of developments. CAS MG members are also to encourage their countries to consider bidding to host the event.

6.2 CAS-XVI Session (December 2013)

CASMG06/ACTION 23: CAS President and Ms Alice Grimm to approach the PR of Brazil on possibility of hosting the event during late November/early December 2013.

7. RESPONSE TO REQUESTS OF Cg-XVI, EC-LXIII and CAS-XV

7.1 Cg-XVI, EC-LXIII Major Outcomes for Research

CASMG06/ACTION 24: CAS MG noted from the CAS President report that EC-LXIII appointed a focal point for Research in the person of Prof. Garcia Herrera, the PR of Spain. The CAS President will follow closely the development of TOR for this position (Action – President of CAS).

7.2 Improvement and alignment of WMO Strategy, Operational and Budget Processes and Practices

CASMG06/ACTION 25: CAS MG requests the OPAG/JSCs to consider the measures of performance/evaluation as captured in the WMO Strategic Plan in their discussions and evaluation of the programmes. It should be noted that a similar process is being considered by the WCRP-JSC (Action – Chair JSC WWRP, Chair OPAG EPAC and D/ARE).

8. PROCEDURES ON CHAIRS AND MEMBERSHIP OF OPAG, WORKING GROUP, EXPERT TEAM

8.1 Procedures for WWRP/THORPEX, and

8.2 Procedures for GAW as per GAW Strategic Plan

CASMG06/ACTION 26: It was noted that regular reviews of Expert Group memberships needs to be made for GAW and WWRP. In addition, the procedures on selection of chairs and membership of OPAG, Working Groups and Expert Teams will be monitored by CAS President (Action – President of CAS, Chair JSC WWRP, Chair OPAG EPAC, C/AER and C/WWR).

9. GENERAL

CASMG06/ACTION 27: Regional and national activities
The CAS MG members should be kept informed about the GAW and WWRP activities in their region or country. It should be considered how the corresponding CAS MG members would be able to represent CAS in, or be better linked to, their RA's meetings (Action – President of CAS and D/ARE).

CASMG06/ACTION 28: CAS President and Secretariat to draft letters to reintroduce and confirm the roles of CAS MG members to their respective PR and Regional Presidents as the ambassadors of CAS (Action – President of CAS and D/ARE).

CASMG06/ACTION 29: GAW/WWRP volunteers
CAS President requested an estimate of the number of SAG and WG members and other volunteers that form part of the resources supporting ARE programmes and which are not reflected in budget discussions. (Action – President of CAS, Chair JSC WWRP, Chair OPAG EPAC, C/AER and C/WWR).

10. ACTION ITEMS

The Actions listed above were agreed by the CAS Management Group.

11. CLOSING THE MEETING

The President of CAS closed the meeting at 11:30 a.m. on 17 November 2011.

ANNEX I

1. ORGANIZATION OF THE SESSION

1.1. Welcome and Introduction
1.2 Adoption of the Agenda
1.3 Review of Previous Action

2. REPORTING

2.1 Report of the CAS President
2.2 Report of the Chair of JSC OPAG-EPAC
2.3 Report of the Chair of JSC OPAG-WWRP
2.4 Report of the Chair ICSC THORPEX
2.5 Report of the Chairs of WGNE
2.6 Report of the Director of the Atmospheric Research and Environment Branch
2.7 Report on the Outcomes of WCRP OSC

3. NEW RESEARCH INITIATIVES

3.1 World Weather Research Programme
  3.1.1 La Plata initiative
  3.1.2 Sub-seasonal to seasonal prediction research, WWRP/THORPEX and WCRP
  3.1.3 Polar weather prediction research

3.2 Global Atmosphere Watch Programme
  3.2.1 Environmental research and services for megacities
  3.2.2 Air quality and climate interactions including SLCFs
  3.2.3 Integrated green house gas monitoring

4. EMERGING ISSUES AND CAS

4.1 Progress on the Global Framework for Climate Service
4.2 WCRP view on Interactions between WCRP and Technical Commissions, EC and WMO Members
4.3 Global Ozone Programme and the Potential Impact of Reduced Member Support
4.4 CAS Role in Weather Modification Research
4.5 Sand and Dust Storm-Warning Advisory and Assessment

5. THORPEX

5.1 THORPEX Mid-term Review
5.2 The Legacy of THORPEX

6. UPCOMING EVENTS

6.1 WWRP Open Science Conference and Summer School on Earth System (2013)
6.2 CAS Quadrennial Meeting (December 2013)

7. RESPONSE TO REQUESTS OF Cg-XVI, EC-LXIII and CAS-XV

7.1 Cg-XVI, EC-LXIII Major Outcomes for Research
7.2 Improvement and alignment of WMO Strategy, Operational and Budget Processes and Practices

8. PROCEDURES ON CHAIRS AND MEMBERSHIPS OF OPAG, WORKING GROUP AND EXPERT TEAM

8.1 Procedures for WWRP/THORPEX
8.2 Procedures for GAW as per GAW Strategic Plan

9. NEW ACTION ITEMS

10. CLOSURE OF THE MEETING

AGENDA

ANNEX II

LIST OF PARTICIPANTS

Ms Elena D. ASTAKHOVA
Hydrometeorological Research Center of the Russian Federation
Bolshoi Predtechenskii per, 11-13
123242 MOSCOW
Russian Federation
Tel: +7499 7952146
Fax: +7499 2551582
Email: helen@mecom.ru / elena_ast_hmc@mail.ru

Dr Michel BELAND *(CAS President)*
Atmospheric and Climate Science
Environment Canada
2121 Trans-Canada Highway
DORVAL, QUEBEC H9P 1J3
Canada
Tel: +1514 4214771
Fax: +1514 4212106
Email: michel.beland@ec.gc.ca

Dr Andy BROWN
UK Met Office
FitzRoy Road
EXETER EX1 3PB
United Kingdom
Tel: + 441392 886 461
Fax: +441392 885 681
Email: andy.brown@metoffice.gov.uk

Dr Gilbert BRUNET
Meteorological Research Division
Environment Canada
2121 Trans-Canada Highway
DORVAL, QUEBEC H9P 1J3
Canada
Tel: +1514 4214617
Fax: +1514 4212106
Email: gilbert.brunet@ec.gc.ca

Dr James BUTLER
Global Monitoring Division
NOAA Earth System Research Laboratory
325 Broadway
BOULDER, COLORADO 80305
USA
Tel: +1303 4976898
Fax: +1303 4976975
Email: james.h.butler@noaa.gov

Dr Mariane DIOP-KANE
Agence Nationale de la Météorologie du Sénégal - ANAMS
Aéroport Léopold Sédar Senghor
BP 8257 DAKAR-YOFF
Senegal
Tel: +221 338695339
Fax: +221 338201327
Email: riane_diopkane@yahoo.fr

Ms Alice Marlene GRIMM
Departamento de Física
Universidade Federal do Paraná
Caixa Postal 19044
81531-990, CURITIBA, PARANÁ
Brazil
Tel: +5541 33613097
Fax:+5541 33613418
Email: grimm@fisica.ufpr.br

Dr Øystein HOV
Norwegian Meteorological Institute
PO Box 43, Blindern
0313 OSLO
Norway
Tel: +47 22 963360
Fax: +47 22 963050
Email: oystein.hov@met.no

Dr Yunfeng LUO
Department of Science & Technology and Climate Change
China Meteorological Administration
46 Zhongguancun Nandajie
Haidian District
BEIJING 100081
China
Tel: +8610 68406342
Fax: +8610 62172954 / 62174797
Email: luoyf@cma.gov.cn

Mr Bhawoodien PARKER
South African Weather Service (SAWS)
Jan Cilliers Street, Stellenbosch
7599 CAPE TOWN
South Africa
Tel: +2721 8882624
Fax: +2721 8882688
Email: bhawoodien.parker@weathersa.co.za

INVITED EXPERT AND SPANISH MEMBER OF CAS

Mr Jose Antonio GARCIA-MOYA
State Meteorological Agency of Spain (AEMET)
C/ Leonardo Prieto Castro, 8
E-28040 MADRID
Spain
Tel.: +34 91 5819 856
Fax.: +34 91 5819 767
Email: jgarciamoyaz@aemet.es

WMO SECRETARIAT

Dr Deon E Terblanche
Research Department
Atmospheric Research and Environment Branch
Tel: +4122 7308240
Fax: +4122 7308049
Email: dterblanche@wmo.int

Dr Tetsuo NAKAZAWA
World Weather Research Division
Research Department
Tel: +4122 7308071
Fax +4122 7308049
Email: tnakazawa@wmo.int

Dr Liisa JALKANEN
Atmospheric Environment Research Division
Research Department
Tel: +4122 7308587
Fax: +4122 7308049
Email: Ljalkanen@wmo.int