Hong Kong, China
3–10 February
2010

Commission for Aeronautical Meteorology

Fourteenth session

World Meteorological Organization

WMO-No. 1053

Weather • Climate • Water

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Abridged final report with resolutions and recommendations

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GENERAL SUMMARY OF THE WORK OF THE SESSION

1. OPENING OF THE SESSION *(agenda item 1)*

1.1 OPENING REMARKS BY THE PRESIDENT OF CAEM, MR CARR MCLEOD

1.1.1 The fourteenth session of the Commission for Aeronautical Meteorology (CAeM) was opened at the Hong Kong Convention and Exhibition Centre in Hong Kong, China, on 3 February 2010 at 10.15 a.m. by the president of the Commission, Mr Carr McLeod (Canada).

1.1.2 Mr McLeod opened the session emphasizing its importance by noting that it would address several issues with far-reaching impacts. In particular, he noted, it would debate issues of quality assurance, of personnel qualifications, of operational practices and of technological opportunity, and that these issues all come to the table at the same time as the aviation industry continues to labour under a world economic downturn.

1.1.3 Mr McLeod concluded his remarks by thanking the hosts, the Hong Kong Observatory for their thoughtfulness and attention to detail in planning for the session and wishing all participants well in their time in Hong Kong, China. A complete list of participants is given in the appendix to the present report.

1.2 OPENING REMARKS BY THE SECRETARY FOR COMMERCE AND DEVELOPMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION OF CHINA, MRS RITA LAU

1.2.1 On behalf of the Government of the Hong Kong Special Administrative Region of China, Mrs Lau extended a warm welcome to the session's participants, observing that Hong Kong, China is very privileged to be the host for this fourteenth session of the Commission for Aeronautical Meteorology.

1.2.2 She noted that Hong Kong, China is located at the heart of Asia, and is within the reach of half of the world's population in five flying hours. Today, the Hong Kong International Airport handles about 750 inbound and outbound flights everyday. She further noted that through innovation and engagement with relevant aviation industry stakeholders, the Hong Kong Observatory has developed over the years some outstanding and advanced alert systems for the Hong Kong International Airport. One example is the world's first windshear alert system based on light detection and ranging. Another is an automatic device capable of issuing lightning warnings in a prompt manner.

1.2.3 Mrs Lau concluded by noting that Hong Kong, China is Asia's world city, and that it has much to offer for CAeM participants to see, to enjoy and to experience. She observed that the Chinese New Year was just round the corner and so extended her best wishes for the forthcoming Year of the Tiger and hoped that everyone would have a very enjoyable stay in Hong Kong, China.

1.3 OPENING REMARKS BY THE SECRETARY-GENERAL OF WMO, MR MICHEL JARRAUD

1.3.1 The Secretary-General expressed his appreciation to the president of CAeM, Mr Carr McLeod, for his leadership of the Commission and the outstanding work accomplished during the intersessional period since the thirteenth session of CAeM, held in Geneva in November 2006. He thanked the vice-president, Mr Shun Chi-ming, as well as the chairs and members of the Commission's groups and expert teams for their contributions in the intersessional period. Finally he expressed the WMO's appreciation to Hong Kong, China, for hosting this session of CAeM and the associated technical conference, to Dr Lee Boon-ying, Permanent Representative of Hong Kong, China with WMO and to all Hong Kong Observatory staff, for the warm welcome and the excellent arrangements.

1.3.2 The Secretary-General noted that this year is the ninety-first anniversary of the technical commission as the for-runner of the WMO, the IMO, launched the Commission for

Applications of Meteorology to Aeronautical Navigation in 1919 and congratulated the Commission for its achievements throughout its lifetime.

1.3.3 The Secretary-General highlighted five key issues that will be addressed in the session's work programme:

(a) The latest amendment, Annex 3 of ICAO's Convention on International Civil Aviation, which refers to Meteorological Service for International Air Navigation and is also Volume II of WMO Publication No. 49 (Technical Regulations, Meteorological service for international air navigation), will be requiring the implementation of a suitably organized and recognized quality management system for all aviation meteorological service providers;

(b) There is growing evidence that WMO needs to review its existing guidance on required qualifications and competencies for meteorological personnel serving civil aviation. New training methodologies, including distance-learning, web-based and computer-aided methods, as well as cooperation with recognized training institutions and an enlarged role for WMO Regional Training Centres, will need to be considered as ways to enhance the competency, knowledge and skills of meteorological staff;

(c) One of the foremost justifications for aviation services is to contribute in preserving lives in a transport sector that has traditionally excelled in ensuring safe and efficient travel. In this context, weather hazard warnings are an essential part of WMO's contribution to disaster risk reduction. However, some users have expressed concern about the degree of compliance with regulations, so this session will be invited to discuss improvements to this vital system;

(d) An issue with likely operational implications is the effects of aviation on climate, and in particular on modified patterns of severe and extreme weather. It is therefore considered likely that climate change will not only affect the demand for aviation services but will also pose a significant challenge to meteorological services supporting tactical and strategic decisions by air traffic management, operators and flight crews;

(e) There are emerging challenges originating from outer space in the form of cosmic and solar radiation which can have a critical influence on radio communications of aircraft as well as the health of their passengers and crews. New services will need to be developed to address this issue.

1.3.4 The Secretary-General concluded his remarks by once again thanking Hong Kong, China, for hosting this key session.

1.4 OPENING REMARKS BY THE PERMANENT REPRESENTATIVE OF HONG KONG, CHINA WITH WMO, DR LEE BOON-YING

1.4.1 Dr Lee welcomed the session's participants to Hong Kong, China, and to the fourteenth session of the Commission for Aeronautical Meteorology. He noted that it was the first time that a technical commission had conducted a session in Hong Kong, China and wished it every success.

1.4.2 Dr Lee briefly reviewed the history of meteorological support to aviation, noting that recent statistics indicate that the frequency of aircraft accidents has not recently fallen – the latest one being the Ethiopian Airlines' Boeing 737 which crashed on 25 January. He further noted that nearly half of all aircraft accidents and three quarters of flight delays are associated with adverse weather, and that without doubt, accurate weather forecasts and warnings are vital to the safety and efficiency of air traffic in the ever increasingly crowded skies.

1.4.3 Dr Lee emphasized the importance of international cooperation in the development and provision of services to aviation and highlighted the contribution of the Hong Kong Observatory's website in providing probabilistic tropical cyclone services as a contribution to aviation-weather

disaster risk reduction. Looking ahead, he observed that the development of more aviation-specific weather products will intensify. In particular, he expected that the development of the New Terminal Forecast for the wider terminal area of busy airports will lead to a new way of providing aviation weather forecasts.

2. ORGANIZATION OF THE SESSION *(agenda item 2)*

2.1 CONSIDERATION OF THE REPORT ON CREDENTIALS *(agenda item 2.1)*

The representative of the Secretary-General of WMO presented a brief report on delegations whose credentials had been found valid. In accordance with General Regulations 20 to 23, the Commission approved this report and decided not to establish a Credentials Committee.

2.2 ADOPTION OF THE AGENDA *(agenda item 2.2)*

The Commission adopted the proposed annotated agenda, as contained in CAeM-XIV/Doc 2.2.

2.3 ESTABLISHMENT OF COMMITTEES *(agenda item 2.3)*

2.3.1 In accordance with Regulations 22 to 31, the Commission decided to establish a Nomination Committee and a Coordination Committee. The Nomination Committee consisted of Ms Gaborekwe Khambule (South Africa) as the chair and Dr Somsri Huntrakul (Thailand) and Mr David Murphy (Ireland) as members. The Coordination Committee consisted of the president of the Commission, the vice-president of the Commission, Mr Ian Lisk, the representative of the Secretary-General, the Secretariat officers, as well as the chair of the Local Organizing Committee.

2.3.2 The Commission agreed that the work of the session would be carried out in plenary. General Plenary would be chaired by the president of the Commission and consider agenda items 1, 2, 3, 4.3, 6, relevant parts of 8, and 9 to 15. Mr Ian Lisk and Mr C.M. Shun were invited to assist the president in chairing Plenaries A and B, respectively to consider relevant parts of agenda item 4.1, 7 and 8 under Plenary A, and to consider relevant parts of 4.1, 4.2, 5 and relevant parts of 7 and 8 under Plenary B.

2.4 OTHER ORGANIZATIONAL MATTERS *(agenda item 2.4)*

Under this item, the Commission decided on its working hours for the duration of the session. In accordance with Regulation 112 of the WMO General Regulations, it was agreed that minutes of plenary meetings were not required in view of the technical nature of discussions. In accordance with Regulation 3, the Commission agreed to waive Regulation 109 (the “18-hour-rule” which stipulates the minimum time before a document can be considered after being made available to delegations).

3. REPORT BY THE PRESIDENT OF THE COMMISSION *(agenda item 3)*

3.1 The Commission agreed with the president that the Commission, through its Management Group, Expert Teams and members, had made great progress since CAeM-XIII in 2006. They also agreed that the resource issue was ongoing but understood the challenges of adequately funding Programmes with no real growth in the overall WMO budget for many years. The Commission encouraged the incoming Management Group to prioritize activities and to continue to emphasize the impacts of the current funding levels for the Programme, emphasizing what will not get done.

3.2 The Commission noted the discussions currently underway regarding the structure of technical commissions within WMO. They emphasized that technical commissions play a crucial role within WMO and that they leverage vast amounts of expertise and labour for very little cost

Commission endorsed the president's view that CAeM should play close attention to discussions concerning the structure of the technical commissions and ensure that the essential uniqueness as a user-focused, service-oriented Commission, especially its mandates given under the Working Arrangements between WMO and ICAO, not be lost in any implementation of a changed structure. In this regard, the Commission further noted that these Working Arrangements also regulate cost recovery for services to aviation, which form an important part of the overall revenue of many NMHSs.

3.3 The Commission appreciated the need to clarify how it is supporting the Expected Results as defined in the new Strategic and Operating Plan. The revision of the Commission's Terms of Reference was seen as an important outcome of this meeting.

3.4 The Commission also appreciated the president's review of the current most important programmatic issues facing CAeM. Although the issue of Amendment 75 to ICAO Annex 3 (WMO-No. 49) is well understood by Members, the implementation of the changes in relation to Quality Management Systems remains problematic in many countries. The Commission encouraged the president and Management Group to continue to support Members in their implementation efforts and endorsed the concept of Members collaborating on a regional basis to achieve QMS implementation.

3.5 The Commission agreed with the Executive Council and the president in emphasizing aviation safety over all other considerations with respect to SIGMET issuance. They encouraged further development of a regional SIGMET advisory capacity as one approach to solving the issue.

3.6 The Commission noted with appreciation the developments in the area of clarifying Aeronautical Meteorological Personnel (AMP) qualification and training requirements. The Commission agreed that the primary objective should be to include these requirements in regulatory documents, for the benefit of Members and aviation clients. They acknowledged the level of expertise that had gone into producing the recommendations to be presented at this meeting but acknowledged that Members would require significant support to respond effectively to these requirements.

3.7 The Commission supported the position that the work on providing documentation to support the issues of cost recovery and the broader issue of customer relations has been completed. The emphasis should now shift to assisting in the implementation wherever possible, again with the assistance of WMO regional bodies.

3.8 The Commission agreed that the work on the development of new products and services to assist Air Traffic Management was a highly important issue. It also agreed that these products and services will assist the aviation industry in meeting the challenges of climate change and also served as an excellent example of the type of benefit a technical commission can provide to Members.

3.9 The Commission noted the president's evaluation of the current structure of the Commission while also recognizing the need for further discussion on this matter.

4. REPORTS BY THE CHAIRS OF EXPERT TEAMS AND RAPPORTEURS OF REGIONAL ASSOCIATIONS *(agenda item 4)*

4.1 EXPERT TEAM REPORTS *(agenda item 4.1)*

Report of the Chair of the Expert Team on Customer Relations

4.1.1 The Commission acknowledged that, since its establishment at the thirteenth session of the World Meteorological Organization Commission for Aeronautical Meteorology held in Geneva, Switzerland, from 23 November to 1 December 2006, the Expert Team on Customer Relations had

succeeded in aligning its work with the milestones identified at the 1st Informal Meeting of the CAeM Management Group (Geneva, Switzerland, 1 December 2006).

4.1.2 The Commission appreciated that the work plan and terms of reference as adopted by the team and endorsed by the CAeM Management Group had been successfully implemented by the team, in particular by providing excellent guidance material in the field of cost recovery (WMO-No. 904) and customer relations, now available both in print and electronic form.

4.1.3 In the area of Quality Management Systems for services to civil aviation, the Commission acknowledged the positive contributions by the team to this highly relevant issue, noting in particular the successful implementation of QMS in the United Republic of Tanzania as requested by Resolution 18 (Cg-XV) adopted in 2007. Lessons learnt and examples of templates developed during this Pilot Project are now available on the CAeM Website.

4.1.4 The Commission further appreciated the quality and value of the team's output in the field of customer relations. Following the recommendations of the Management Group, it had consolidated available consultation models and templates in a Guide titled "*Principles and Guidance on Aeronautical Meteorological Services Consultation and User Focus"*.

4.1.5 As the high priority areas defined at CAeM–XIII for the team had been successfully concluded during the intersessional period, and as a result of evolving priorities in the international aviation community, the Commission endorsed the recommendation by the meeting of the CAeM Management Group meeting held in September 2009 in Geneva that had identified the following priority areas:

(a) Implementation of Quality Management Systems;

(b) Cost Recovery;

(c) Resource Mobilization;

(d) Populating the WMO Country-level Database;

(e) Partnership with regional groups and international organizations, e.g. in coordinating and facilitating the Met contributions to new Air Traffic Management systems. In the light of these emerging priorities, the Commission endorsed the new name for the group proposed by the CAeM Management Group as "Expert Team on Governance and Partnership".

Report of the Chair of the Expert Team on New Terminal Forecast

4.1.6 The Commission recalled that the Expert Team on New Terminal Weather Forecast was established following the adoption of Resolution 3 (CAeM-XIII). Specific Terms of Reference that apply to the New Terminal Weather Forecast Expert Team are:

(a) To develop in close cooperation with the relevant bodies of ICAO proposals for a new terminal weather forecast adapted to the needs of the 21st Century;

(b) To develop guidance on the provision of new and tailored services for all aviation stakeholders including airlines, commercial and general aviation, national and regional air traffic management and airport operators.

4.1.7 The Commission appreciated the progress made by the group and endorsed in particular the decision by the team to select a subset of weather elements for a starting point. These elements are: convection, low ceilings/visibility, winter weather and wind. Additionally, an ad hoc working group of the ICAO Aerodrome Meteorological Observation and Forecast Study Group (AMOFSG) would be established to assist in developing and demonstrating the New Terminal Forecast (NTF).

4.1.8 The Commission noted that the ET-NTF continued to make good progress even after its Chair, Kevin Johnston (United States of America), had accepted a new position with the United

States Federal Aviation Administration (FAA) in November 2008 and therefore was unable to dedicate sufficient time to the ET-NTF. The Commission endorsed the action by its president, Mr Carr McLeod, to invite Mrs Stéphanie Desbios (France) to assume the role of co-chair of the ET-NTF in July 2009 to compensate for this resource. Both experts, Mr Johnston, who had been instrumental in initiating and promoting the work of the team, and Mrs Desbios, were thanked by the Commission for their great efforts, flexibility and dedication, and Ms Cynthia Abelman (United States) for her valiant support of the team.

4.1.9 The Commission expressed its deep satisfaction with the impressive progress of the team so far, and strongly supported the continued development of the New Terminal Forecast in close cooperation with the ICAO AMOFSG.

Report of the Chair of the Expert Team on Education and Training

4.1.10 The Commission agreed with the prioritized activities for the period 2007–2011 adopted by the ET-ET. These focused on providing support to Members in meeting aeronautical meteorological forecaster training requirements and in helping to define a clearer set of what these requirements actually are. The session endorsed the notion that the primary training delivery mechanism continued to be the CAeM training website at http://www.caem.wmo.int/moodle, and encouraged Members to make best use of this site, and to provide contributions and feedback for it.

4.1.11 The Commission recalled that EC-LXI in Geneva in June 2009 had requested it to review and refine the competence requirements in Supplement No. 1 to WMO-No. 258 (through the ET-ET) and in coordination with the EC Panel of Experts on Education and Training submit to EC-LXII as 'top level' Standards and Recommended Practices for inclusion in WMO-No. 49, Vol. II.

4.1.12 The Commission endorsed the review by the ET-ET of a draft 'secondary-level competence description document' produced as one of the outcomes from the Aeronautical Meteorology Curriculum Development Workshop held in Alanya, Turkey, in October 2009, and discussed the required status of this document. The session agreed that the aim of this document was to assist Members in mapping their national personnel assessment practices to the 'top level' Competence Standards. The Commission suggested that work on the 'secondary level document' should be continued including further review and discussion at the next EC Panel of Experts on Education and Training meeting in Boulder, United States at the end of March 2010.

4.1.13 The Commission agreed that the main priority of work for the next ET-ET during the 2010–2014 intersessional period should be to facilitate compliance with Aeronautical Meteorological Personnel qualification and competency requirements through the provision of training and guidance resources, in collaboration with the WMO Development and Regional Activities Department/Education and Training Office and ICAO.

4.2 REPORT ON THE REGIONAL ASPECTS OF METEOROLOGICAL SERVICES TO AVIATION *(agenda item 4.2)*

4.2.1 The Commission was informed of specific regional aspects of the Aeronautical Meteorology Programme, focusing on issues that require the attention of the Commission. Further background information on the detailed progress and problems in the different Regions are provided as Background Material to the present report.

4.2.2 The six WMO Regional Associations, during the their last RA meetings, individually decided on working structures appropriate to the nature of the issues before them, the human and financial resources available to address them, and the typical state of development of the majority of Members in the Region. While for some Regions, the traditional "Rapporteur" role was adopted to deal with issues of aeronautical meteorology, more recent RA meetings such as RA II decided on an ambitious working structure (Sub-Group on Aeronautical Meteorological Services (WGDRS-AeM) to address aeronautical meteorological service delivery with specialized experts working in fields such Quality Management and Training, Capacity-building and AeM Pilot Projects, MET

support for ATM and New Terminal Forecast, and Customer Relations and Partnership. The Commission supported the approach that such implementation activities be carried out at the regional level.

4.2.3 The Commission noted that similar problems exist in most Regions, and a regionally coordinated approach to implementing the necessary programmatic elements is seen as well suited to ensure progress. In detail, the Commission highlighted the following areas for regional cooperation:

(a) Qualifications and required competencies of personnel. The pending review of the WMO regulations on the qualification of meteorological personnel in WMO-No. 258, which is expected to see a new emphasis on knowledge base and performance criteria, requiring not only initial assessment and documentation, but ongoing monitoring to demonstrate currency and competency, will involve RTCs and regional workshops/ training based on distance-learning material specific to and adequate for the Region;

(b) The implementation of Quality Management Systems will greatly benefit from the exchange of best practice models, documentation and forms between Members of a Region, taken advantage of a “language focus” such as in RA III, the Eastern parts of RA VI or the western part of RA I. Regional agreements may also be an option to undertake mutual audits in preparing for certification according to ISO 9001:2008;

(c) Following the example of the Single European Sky framework, technically similar to the United States NextGen Air Traffic Management System, other Regions are likely to explore ways of regionalizing air traffic management and thus service provision to aviation. Experiences gained in Europe can be beneficially applied if and when other Regions, such as, for example, RA II, embark on similar systems;

(d) Issues of customer focus, cost recovery and partnership are expected to be significantly improved by regional cooperation. The administrative burden of devising and implementing an analytic cost recovery system can be largely reduced by sharing basic principles and methodologies with other Members of a Region, a common approach to institutionalize customer relations and coordination of input to regional ICAO groups will also provide tangible benefits to Members;

(e) Pilot Projects, such as the implementation of a QMS in a Least Developed Country, or the provision of meteorological information related to disaster risk reduction in aviation such as the Tropical Cyclone track and intensity forecasts for aviation provided by the Hong Kong Observatory for Members of RA II (http://adrr.weather.gov.hk), or the provision of numerical weather prediction guidance in support of aviation meteorological forecasts and warnings to be provided by China (http://www.aamets.org/ is expected to become operational in the autumn of 2010);

(f) The Commission noted with appreciation the report from the Russian Federation concerning subregional activities carried out by the GIS Interstate Council for Hydrometeorology at the subregional level. The report addressed critical issues and challenges such as Quality Management Systems that require attention of the Aeronautical Meteorology Programme in the eastern part of RA VI and western part of RA II;

(g) Similarly, the Commission noted the potential of further regional pilot projects based on the excellent results of the Severe Weather Forecast Demonstration Project, which has provided such guidance on a regional basis in Southern Africa.

4.2.4 As regards the development of the Aviation Disaster Risk Reduction pilot project established by the Commission at its thirteenth session for the provision of MET information including Tropical Cyclone track and intensity forecasts for aviation for Members of RA II (see 4.2.3 (e) above), the Commission was pleased to note that, with positive feedback from aviation

users and from RA II at its fourteenth session, and with support from India, Hong Kong, China planned to extend the area of coverage to the Bay of Bengal and the Arabian Sea, and to have the Website in full operation during 2010.

4.2.5 Noting the opportunities for implementing improvements to aviation services on a regional basis, the Commission requested regional associations, when developing their working mechanisms:

(a) To consider the most appropriate working structure to respond to the crucial issues and questions of the Aeronautical Meteorology Programme in their Region;

(b) To nominate appropriate experts, focal points and theme leaders for the thematic areas outlined above;

(c) To consider ways of resourcing and supporting issues in aeronautical meteorology that are a core function of most NMHSs and responsible for a significant portion of both their expenditure and external revenues.

4.2.6 The Commission further noted that its proposed Implementation Coordination Team would be expected to play an active role in the cooperation between the Commission and regional groups in implementation activities.

4.3 REPORT OF THE TECHNICAL CONFERENCE *(agenda item 4.3)*

4.3.1 The Commission recalled with interest the highly informative discussions that had taken place at the one and a half day Technical Conference (TECO). The Commission was informed that TECO had been attended by over ninety delegates and had included representation and input from members of the user community.

4.3.2 The Commission was informed that the TECO topics had been selected to be deliberately thought provoking whilst also being of direct relevance to the future work of the Commission. The topics discussed were as follows:

(a) Quality Management Systems (QMS) Implementation;

(b) Aeronautical Meteorological Personnel (AMP) Standards;

(c) New Terminal Forecast (NTF);

(d) Aerodrome Forecast (TAF) Verification;

(e) Regionalized Meteorological Service Provision i.e. SIGMET, SESAR, NextGen and the Impacts of ATM developments on Air Navigation Meteorological Service Providers (ANMSP) in other regions.

4.3.3 The Commission noted that TECO had been structured so as to encourage open discussion. Plenary keynote speeches were followed by four regionally based breakout groups with issues and recommendations then reported back to plenary. The primary outcomes from these discussions were as follows:

(a) QMS implementation – Requires buy-in at all levels in an organization (but especially at senior management level), takes time to set- up, requires significant resources and will require improved regional cooperation;

(b) AMP Standards – Compliance kit needs to be developed and distributed as a soon as possible and will need to include guidance on the role of assessors and frequency of assessment;

(c) NTF – Clearly a gap between what ANMSPs are currently providing and what they could be providing and the way that this gap is closed should be done in a globally coordinated (standardized) way. This was supported by representatives of IATA, IFALPA and IFATCA at the TECO;

(d) TAF Verification – Very important for reasons of quality, continuous improvement and transparency; further guidance is needed to promote global best practice techniques;

(e) Regionalized MpET Service Provision – Variable support for the formation of regional SIGMET Advisory Centres but agreement that CAeM should look to be more proactively engaged with SESAR and NextGen. Clear acceptance that the inevitable move towards a more regionally based, increasingly automated and data-centric model for service provision will heavily impact on the role of the forecaster and the MET services themselves.

4.3.4 The Commission was informed that a more detailed breakdown of the TECO discussions would be available as a Background Material (BM 4.3) document on the http://www.caem.wmo.int/moodle website.

5. TRAINING AND QUALIFICATION IN AERONAUTICAL METEOROLOGY *(agenda item 5)*

Capacity-building in Education, Training and Qualification

5.1 The Commission was informed of the progress that has been made in defining minimum Standards for the required competency of aeronautical meteorological forecasters and observers. Since the request for the development of such Standards by EC-LXI in June 2009, progress has been achieved by a succession of meetings and workshops. The Commission noted with appreciation the draft standards contained in the reports of the CAeM Expert Team on Education and Training and of the WMO Executive Council Panel of Experts on Education and Training and its Task Teams on Aeronautical Forecaster Qualifications and Distance and Online Learning. These can be found at the following locations:

TT-AFQ: http://www.wmo.int/pages/prog/etr/documents/REPORT_Task_Team_AFQ.pdf
ET-ET: http://www.wmo.int/pages/prog/amp/aemp/documents/final_et-et-2.pdf
TT-DOL: http://www.wmo.int/pages/prog/etr/documents/REPORT_Task_Team_DOL.pdf

The competency Standards are due to be published in WMO-No. 49 in November 2010 and thus will become mandatory in November 2013.

5.2 The Commission noted with concern that, in order to comply with the Standards, a significant effort on the part of all Members will have to be made to ensure that newly qualified and existing staff are able to demonstrate they can meet the minimum levels of performance criteria and knowledge required by the Standards.

5.3 While it was accepted that the introduction of the overarching quality management systems for aviation meteorological services had to be seen in the context of an industry-wide drive for demonstrably high and uniform standards of quality and safety management, there was concern amongst Members relating to the associated resource implications of these developments, particularly for developing and Least Developed Countries and Small Island Developing States.

5.4 The Commission agreed that a coordinated and WMO-wide effort would be required to successfully implement the Standards for the qualification and competencies of personnel in aeronautical meteorology (aeronautical meteorological forecasters and aeronautical meteorological observers). In view of the large numbers of staff involved (numbers are expected to be around 10 000 worldwide), the Commission envisaged the following components as essential for implementation:

(a) A combination of approaches such as train-the-trainer, blended learning (class-room and distance-learning), and intensified computer-based learning;

(b) Resource mobilization, for example by obtaining commitments from developed countries willing to organize and host class-room based events;

(c) Intensive cooperation with training institutions such as COMET, the Regional Training Centres, and translation of existing training material by Members in a position to do so;

(d) Intelligent use of modern communication methods such as training fora, dedicated websites and discussion fora such as those utilized by the WMO Virtual Laboratory to train and discuss satellite imagery interpretation.

5.5 The Commission noted that it is the responsibility of Members to train their aeronautical meteorological forecasters and observers, and further noting the very limited resources available in the WMO regular budget for the support for, and coordination of, these activities, strongly encouraged Members to seek funding for their training needs from all available sources, including temporarily increased budgetary allocations, aid and funding agencies, cost recovery systems, Voluntary Cooperation Programme, and regional agreements for mutual support in the form of exchanging trainers, resources and facilities in close cooperation with WMO Regional Associations and their relevant management and working groups and teams. The Commission warmly welcomed and accepted the offer from Canada to dedicate personnel to the development of the compliance kit for aeronautical meteorological forecasters and the offer from Hong Kong, China to host an aviation training course for Members.

5.6 The Commission was informed that the Task Team on Aeronautical Forecaster Qualifications (TT-AFQ) had been created by the WMO Executive Council Panel of Experts on Education and Training at its 23rd Session (Costa Rica, March 2008) and received directions from the sixtieth session of the WMO Executive Council (EC-LX) in Geneva in June 2008 that have served as its Terms of Reference. Mr Ian Lisk of the Met Office, UK was selected to chair the Task Team.

5.7 The Commission was told that the TT-AFQ had reviewed the background and issues related to Aeronautical Meteorological Forecaster (AMF) qualification requirements at its first meeting, held at the United Kingdom Met Office in Exeter in February 2009. The Commission was informed that because aeronautical meteorology is a specialist area of Meteorology, the TT-AFQ felt that it was necessary to first examine the pathways for personnel to become a WMO 'Meteorologist'.

5.8 The Commission noted that the Executive Council at its sixty-first session in June 2009 had approved the TT-AFQ proposal that a revised definition of WMO 'Meteorologist' be submitted for approval to Sixteenth Congress in May 2011. The revised definition would give responsibility for defining requisite minimum national academic requirements for entry to the Basic Instruction Package – Meteorology (that is, degree or non-degree) to the respective Permanent Representatives of Members with WMO in consultation with appropriate governing bodies, for example, national regulatory and accrediting bodies. The Commission noted that the proposed additional WMO 'Meteorologist' pathway was designed to ensure that personnel taking a non-degree route would have an appropriate breadth and depth of meteorological knowledge (completing the BIP-M) supported by an underlying knowledge of physics and mathematics. The Commission was informed that guidelines for non-degree pathways to attain WMO 'Meteorologist' status will be included in the fifth edition of the *Guidelines for the Education and Training of Personnel in Meteorology and Operational Hydrology* (WMO-No. 258), Volume I: *Meteorology*.

5.9 The Commission agreed that following completion of the BIP-M, a WMO 'Meteorologist' could specialize in areas such as aeronautical meteorology, although that specialization would require additional education, as well as vocational training, including extensive supervised on-the-job training. Such training should be designed to ensure the competency of personnel to supply meteorological services to air navigation.

5.10 The Commission also noted that the Executive Council at its sixty-first session in June 2009 had approved the TT-AFQ proposal that Aeronautical Meteorological Personnel (AMP) competence requirements be included as Standards in the *Technical Regulations* (WMO-No. 49), Volume II. The Commission also recognized the importance of developing the appropriate guidance materials to assist Members in assessing the competence of their AMP and requested that, in close coordination with the Executive Council Panel of Experts on Education and Training, those materials be made available as soon as possible.

5.11 The Commission further agreed with the TT-AFQ that there were different possible approaches that could be taken to define and assess competence. These range from a minimum level of self or supervisor assessment linked to annual performance reviews to a more rigorous approach that incorporates the linking of competences to a national vocation qualification framework and potentially external certification, e.g. the National Vocational Qualification for Weather Forecasters in the United Kingdom).

5.12 Considering that EC-LXI also approved the TT-AFQ proposal that from 2016 an AMF must be a WMO 'Meteorologist', the Commission agreed that in order to comply with the Aeronautical Meteorologist Standards all air navigation meteorological service providers should have to both provide clear evidence that their AMF meet the competence Standards and that WMO-No. 258 'Meteorologist' qualification guidelines (recommended scope, depth and time periods) have been followed.

5.13 The competence Standards, developed after wide consultation by the CAeM ET-ET, were approved by the Commission in Recommendation 1 (CAeM-XIV) – Competence standards for personnel in aeronautical meteorology and will be submitted to the Executive Council at its sixty-second session for approval in June 2010. Subject to this approval the competence Standards will be included in the next revision of WMO-No. 49 Volume II in late 2010 with an applicability date of November 2013.

5.14 After some discussion the Commission agreed that the expected long-term benefits of the work currently being done could be summarized as follows:

(a) Implementation of the recommendations will improve the quality of the meteorological services provided to international air navigation by ensuring that personnel meet the defined performance criteria and knowledge requirements to provide these services;

(b) The current problem of "Standards" in *Technical Regulations* (WMO-No. 49, Vol. I and Vol. II) referencing "Guidelines" (WMO-No. 258) will be removed;

(c) Clarification of the definition WMO 'Meteorologist' would be consistent with the original intention of the changes introduced in the fourth edition of WMO-No. 258 (i.e. 'degree or equivalent' requirement to be a WMO Meteorologist) and will provide a natural development of the actions taken to implement WMO-No. 258 in recent years;

(d) The cost, in terms of financial and personnel resources, of the recommended approach for existing 'Meteorological Technicians' would be less than the original approach of all WMO 'Meteorologists' being required to have a degree while recognizing, for new entrants, the employment of personnel with a degree would be less costly and thus recommended as normal practice;

(e) Members would be given sufficient time to act and respond to the recommendations to ensure a synchronized approach between WMO and ICAO, the timeframe is explicitly tied to the governing update cycle for ICAO Annex 3 and the associated WMO-No. 49, Vol. II.

6. ELECTION OF OFFICERS *(agenda item 6)*

6.1 Mr C.M. Shun (Hong Kong, China) was declared elected by acclamation as president of the Commission.

6.2 Mr Ian Lisk (United Kingdom of Great Britain and Northern Ireland) was declared elected by acclamation as vice-president of the Commission.

7. COOPERATION WITH OTHER BODIES AND INTERNATIONAL ORGANIZATIONS *(agenda item 7)*

SIGMET Advisory

7.1 The Commission noted with concern the reports from the relevant ICAO groups (e.g., METWSG) highlighting serious and continuing deficiencies in the provision of warning messages for aviation (SIGMET) in several areas and Member countries. Considering that it was the responsibility of individual States to provide meteorological warnings over their sovereign territory, the Commission nevertheless accepted that the importance of such warnings for the safety of aviation necessitated decisive action to remedy the shortcomings identified by repeated SIGMET tests and regional ICAO offices.

7.2 The Commission further noted the recommendation by the second meeting of the ICAO METWSG to conduct a trial issuance of SIGMET-related advisories for severe icing, turbulence, and convection, similar to those provided for Volcanic Ash and Tropical Cyclones, by designated Volcanic Ash and Tropical Cyclone Advisory Centres (VAAC, TCAC) to Members in selected regions.

7.3 The Commission, considering also the importance of the delivery of safety-relevant services to civil aviation as a high-priority issue in their overall involvement in services to aviation, expressed appreciation to the Members NMHSs participating in the trial issuance of such SIGMET Advisories, and requested all Members in the Regions concerned to:

(a) Ensure full cooperation with the Members providing this service on a trial basis by providing relevant Aircraft Reports and access to relevant national data and products;

(b) Undertake all necessary steps to inform their relevant staff of these trials, and ensure their full cooperation in issuing SIGMET based on such trial advisories;

(c) Provide feedback to the members of the METWSG providing the trial advisories on the relevance, accuracy and completeness of these advisories;

(d) Ensure that SIGMET production and dissemination are compliant with ICAO regulations including those for QMS.

7.4 The Commission confirmed that every effort would be made by the relevant bodies, e.g. the Expert Team on Education and Training, in cooperation with national and international training institutions such as COMET (United States), Eumetcal (Europe), ACMAD/ASECNA (Africa), to support Members encountering difficulties in issuing SIGMET to make relevant training material available to these Members, and to continue to cooperate with Members and ICAO offering to organize and host events and ICAO in the provision of dedicated workshops for this subject.

7.5 The Commission, following an in-depth discussion of this critical issue, adopted Recommendation 2 (CAeM-XIV) – Urgent need to address long-standing SIGMET deficiencies.

Activities of the Expert Team on Operational Data Representation (CBS/CAeM–ET-ODR)

7.6 The Commission noted with interest the progress of the work performed by the ET-ODR. The ET-ODR had agreed during its first meeting in November 2008 on the development of a pilot project for representing OPMET data in the future. In a first phase of this pilot project, the ability of the AFTN to handle basic XML-type messages was tested. The representation in an XML/type message of less than 1 800 characters over the AFTN has been demonstrated to be possible where each node handling the message has a full IA5 character set. It was further noted that it would possibly be 2025 before XML messages would be widely implemented and that the AFTN would no longer exist in its current state of technological capability. During the second meeting in October 2009 it was agreed that the remainder of the ET-ODR work should be included within the work programme of the CBS IPET-MDI and that CAeM should actively participate. It was also agreed that the ET-ODR would re-engage when candidate data-encodings are ready to test.

7.7 The Commission requested Members to take due note of the impending decision by ICAO to stop the migration of current alphanumeric OPMET code to BUFR in the light of the newly emerging de-facto standards of Weather Exchange Models (WXXM) currently being developed on the basis of XML and other industry-standard data representation methods and communication infrastructure by the two major projects of future Air Traffic Management Systems, i.e. SESAR in Europe and the NextGen project in the United States. WMO CBS IPET-MDI is engaging with the development activities of WXXM to ensure ongoing compatibility with the WMO data model.

7.8 The Commission noted with interest that the design and function of these weather exchange models and the underpinning communications infrastructure concepts strongly resembled the WMO WIS concept and expressed the hope that mapping and exchange between these two net-centric, data-oriented projects based on data discovery, access and retrieval would be facilitated by the similarities of their design concepts and that compatible technical standards be adopted, particularly for meteorological data representation, and to ensure inter-operability.

Aviation and Climate Change

7.9 The Commission noted with concern the growing impact of aviation on global climate change through a very complex set of GHG emissions and subsequent secondary effects. While the emissions of CO_2 are well-known and quantifiable given the total fuel burn by civil aviation, the emission of other GHG such as NOx depended on technology and the modus of operation of aircraft engine, with complex trade-off between higher efficiency (reduced CO_2) and greater NOx production if engines are run at higher temperatures and thus better fuel efficiency.

7.10 The Commission also noted that the potential fuel savings (leading to reduced GHG emissions) through more efficient operations required improved use of meteorological data, and that these improvements depended on a close cooperation between all stakeholders including Air Traffic Management. The Commission thus reiterated their support for the prioritized development of the New Terminal Forecast by the relevant ET, also under a climate change mitigation perspective.

7.11 The Commission, noting the potentially large benefits of AMDAR humidity sensors for many applications, including guidance products for contrail avoidance, called on the Secretary-General to ensure a continued close liaison between the AMDAR programme, now being managed by the OBS department of WMO, and the AeM Programme to ensure that data availability is enhanced, and that the AeMP make best use of these data in supporting a sustainable aviation system respectful of climate issues.

7.12 Having been informed of new research initiatives in the Global Atmosphere Watch programme which is currently engaging in an EU 7th framework programme on monitoring of GHG, the Commission further encouraged the Secretary-General to foster close cooperation between all WMO bodies, departments and programmes that can contribute to successful mitigation of climate change, such as this cross cutting activity between research, observations and services.

7.13 Noting the emerging opportunities for developing new climate-relevant services to aviation, e.g. by supporting the avoidance of ice-supersaturate layers as a means to reduce contrails and aviation-related cirrus, and the emerging needs of aviation, tourism and transport in general, the Commission supported strengthening of climate-related activities and the continued function of a Rapporteur on Aviation and Environment as proposed in its new structure (see agenda item 10). This Rapporteur would also be expected to liaise with other relevant WMO bodies, such as the Commission for Climatology, IPCC or the WCRP, with a view to, in liaison with ICAO, engage these in cooperation for the development of aviation-related climate services.

7.14 The Commission noted that although the aviation community needs to continue to be concerned about its impact on climate change, it should also begin to focus significant attention on the impact climate change will have on the industry. The changes in climate will have an impact on:

(a) Tourism – may radically change the attraction of tourist destinations and thus have an impact on traffic routes and volume;

(b) Sea-level rise – several hundred coastal airports globally could be affected;

(c) Water availability at airports;

(d) Radical changes in food production and ensuing transportation needs of food world wide;

(e) Movement and strength of jet streams.

All of these impacts will inevitably lead to changes in aviation operations and the industry will require advice to mitigate the risks and maximize the opportunities.

Deliverables of ICAO MET Operations and Study Groups

7.15 The Commission was informed that in accordance with the Working Arrangements between the International Civil Aviation Organization and the World Meteorological Organization (ICAO Doc. 7475), ICAO is the body that is expected to establish the aeronautical requirements for meteorological information. This task is undertaken by the ICAO Secretariat, with the assistance of two operations groups (International Airways Volcano Watch Operations Group (IAVWOPSG) and World Area Forecast System Operations Group (WAFSOPSG) and two study groups (Aerodrome Meteorological Observation and Forecast Study Group (AMOFSG) and Meteorological Warnings Study Group (METWSG). WMO, as a full member of all the above groups, ensures that necessary coordination with the CAeM expert teams is undertaken.

7.16 The Commission noted that the work programmes of the groups are expressed in terms of deliverables and are presented in relevant pages on the ICAO website (www.icao.int).

7.17 The Commission was further informed that it may be expected that during the 2010/2011 time frame, all the groups will be tasked to assess the impact of the NextGen/SESAR Programmes in time for the planned conjoint WMO/ICAO MET/AIM Divisional Meeting (2014). The Commission strongly encouraged the Groups, in consultation with the president of the Commission, to undertake all relevant activities with a view to provide support to those innovative programmes. The Commission also invited the president to specifically address those activities in his future reports.

7.18 The Commission also noted that the ICAO Assembly would approve a new budget in September 2010 for the triennium 2011–2013. The ICAO delegate advised that it is possible that the MET work programme will have to be scaled down.

7.19 The Commission agreed that there was a need to improve coordination between ICAO Planning and Implementation Regional Groups (PIRGS) and the relevant WMO AeM Task Teams in the Regional Associations (RAs).

7.20 The Commission was informed that at the International Civil Aviation Organization (ICAO) World Area Forecast System (WAFS) Operations Group, WAFSOPSG/1 meeting held in November 2003, the World Area Forecast Centre (WAFC) Provider States were invited to study the feasibility of providing new global WAFS output products for turbulence, icing, and cumulonimbus (CB) clouds in grid point format.

7.21 Both WAFCs run Numerical Weather Prediction (NWP) models on supercomputers to produce the global wind and temperature data and provide first-guess input for the Significant Weather Forecasts. These NWP models are among the most accurate in the world, as demonstrated by the monthly CBS verification data exchanged internationally between major NWP centres.

7.22 The WAFCs will provide trial gridded forecasts on a 1.25 degree un-thinned grid at a 3-hourly temporal resolution with additional levels in the vertical at Flight Levels 270, 320 and 360. The trial forecasts of icing, turbulence and CB clouds will provide global coverage of these parameters at all relevant time-steps as required by the International Air Transport Association (IATA).

7.23 The Commission noted that the trial gridded forecasts will provide a step change in the volume of SIGWX information available for flight planning compared to the limited areal and temporal coverage of the existing medium-level significant weather charts. The forecasts are intended primarily for use in automated flight planning systems, but all users will be able to visualize these data on their own workstations in the future once upgraded software has been acquired.

7.24 The Commission was pleased to note that in response to the concerns voiced by the user organizations and Members at the WAFSOPSG/5 meeting workshop in Paris in September 2009, further evaluation, harmonization and verification work is to be carried out at all stages of the gridded forecasts implementation plan to ensure that any changes to the underlying algorithms or scaling factors do produce a measurable improvement in performance. In the meantime, the Commission agreed that the traditional SIGWX charts should continue to be made available for flight briefing purposes.

7.25 The Commission also encouraged the WAFCs to work in cooperation with the CAeM Expert Team on Education and Training to provide appropriate training and guidance material to support the effective use of the gridded forecasts and further encouraged Members to evaluate based on objective and subjective methods and provide feedback on the trial forecasts through the WAFSOPSG as they become available.

7.26 Given the importance of the WAFS in services to International Air Navigation, the Commission recognized that WAFCs are expected to be QMS compliant, which will ensure that transparent and well-documented processes of development, evaluation and user consultation of new WAFS products are in place.

7.27 The Commission is looking forward to receiving an invitation to present the work of the ET-NTF to meetings and workshops of stakeholder groups such as IFALPA, IATA and IFATCA.

User focus, governance and partnership

7.28 The Commission was informed of the critical importance of adequate funding available to meteorological service providers to aviation. While a number of Members were able to provide such funding through a combination of analytical, well-documented cost recovery mechanisms and public funds for basic infrastructure, many developing country Members are facing increasing difficulties to meet the stated requirements of aviation.

7.29 The Commission noted with satisfaction the wide range of high-quality guidance material developed by the relevant expert team on customer relations (ET-CR) and associated experts, appreciating the practical nature and ease of use of this material. Nevertheless, the

Commission noted with great concern that despite the availability of such information resources, many Members faced increasing difficulties to meet their obligations and commitments due to a shortfall of funds.

7.30 The Commission noted that it was a national sovereign decision by governments to decide on the preferred method of resourcing aviation meteorological services, but reminded Members that if they choose to apply cost recovery for these services, the methods employed should be:

(a) Fully in line with the relevant guidance by WMO and ICAO and established in a dialog with users;

(b) Clear and transparent to users;

(c) Equitable and fair to all users;

(d) Applying the principles of economy and adequacy.

7.31 The Commission agreed on the need to address the following specific challenges:

(a) One of the basics of cost recovery principles is that charges should be recovered related to the volume, type and location of the services provided and taken up by the users. This is to ensure that costs are attributed equitably to different users ranging from individual pilots to large, international airlines;

(b) While it is understood that charges to individual users and user groups should be related to the volume of uptake, it is equally undisputable that some basic costs (e.g. relating to the observing network, data processing and the creation of standard products) are independent of the number of users benefiting from these;

(c) With fluctuating uptake of data and products, it is necessarily difficult to define unit costs for individual products and services, in particular for services with a limited number of regular users. In these cases a well-documented evidence and analytical explanation of detailed costs for services may be beyond the capability of such smaller service providers, particularly in developing countries;

(d) In small island developing States and developing countries, the volume of air traffic, and financial strength of the operators may be insufficient for a full cost recovery of all aviation-related costs, even disregarding the cost of basic systems. The facilitation and support for a growing air traffic system is in the best interest of States, and thus political decisions may interfere with the charging of full costs to aviation. It is an issue of governance to ensure that service providers in these cases are sufficiently resourced to enable them to provide the services according to international regulations and user expectations;

(e) Continued under-funding of meteorological service providers results in a degradation of infrastructure, a lack of continued education and training for staff, inability to recruit and retain qualified and motivated experts and a consequential degradation of services to users, who in turn will begin to look for alternative service provision and possibly compromises in safety and efficiency of their operations;

(f) Cost recovery mechanisms should be based on a harmonized approach for all types of services to civil aviation including air traffic services in accordance with ICAO guidance.

7.32 Following some discussion, the Commission considered a number of possible approaches to overcome the challenges outlined above:

(a) Well-developed Member countries may be able to compensate for temporary shortfalls in cost recovery for the services to aviation, caused by increasing pressure to reduce costs for airlines operating in a harsher economic climate;

(b) Developing country members and small island developing States are advised to create economies of scale by increasing regional cooperation in research, product development, training and infrastructure investments;

(c) In the developing world, regional Members that lead in the capacity to provide aviation meteorological services ("lead meteorological services") are requested to provide support in terms of expertise, sharing of developments, provision of training opportunities and technological advice to less developed Member States and meteorological services in their area;

(d) Experts of such "lead meteorological services" are asked to provide consultancy to other services on a non-commercial basis in order to maintain coherence of standards, as well as the safety and efficiency of air traffic in the region as being in the best interest of all Members of a region;

(e) Regional coordination and harmonization are also required in the area of user focus (consultation, costing, development of value-added services) to establish and maintain the credibility of meteorological services to aviation;

(f) In some cases, it may be operationally advantageous for Members to transfer parts of the services under their responsibility, such as the operation of a Meteorological Watch Office for the Flight Information Region concerned, to other Members in a position to do so on a temporary basis and until a rehabilitation of services, and/or infrastructure, and/or restoration of required staff qualifications and competencies can be achieved.

7.33 In summary, the Commission agreed that the challenges in the field of technological renewal and improvement, staff qualifications and competency, and user-oriented development of new and dedicated services for all user groups including air traffic management are depending on adequate funding and resources for meteorological service providers. These providers, on the other hand, are challenged to demonstrate clearly that the services are provided at an equitable, justifiable and affordable cost to the users.

7.34 The Commission sees a continued need for providing advice and guidance to individual meteorological service providers to civil aviation in its Member countries. While the standardized guidance available in printed or web-based form is now considered adequate and sufficient for most Members, it is understood that individual Members' NMHSs in particularly difficult economic, technological and governance situations may require tailored advice and consultancy that could be provided through the relevant structures of the Aeronautical Meteorology Programme of WMO, regional and global partnership or commercial consultants.

8. NEW DEVELOPMENTS IN AERONAUTICAL METEOROLOGY *(agenda item 8)*

Coordination of the work of the CAeM Expert Team on New Terminal Weather Forecast from a requirements perspective

8.1 The Commission considered how improvements could be made in the provision of meteorological information to improve safety, capacity, efficiency and environmental impact mitigation in the airspace around aerodromes, particularly those with high traffic densities. The Commission was informed that in several regions aerodromes and air routes were reaching capacity limits, and noted the need to better coordinate the increasing number of national or even aerodrome-specific parallel developments of tailored MET services for this purpose. This would also promote global standardisation of information in support of common situational awareness and collaborative decision-making.

8.2 The Commission recognized that current OPMET data protocols are unable to fully communicate such information. Since new services would complement rather than replace current products, including TAFs, the Commission decided that a more appropriate name other than New Terminal Weather Forecast was required for the Expert Team, and suggested that it could be called the Expert Team on Meteorological Services in the Terminal Area (MSTA).

8.3 Recognizing that the Working Arrangements between ICAO and WMO clearly designate ICAO to be responsible for the definition of the user requirements for meteorological services to aviation, the Commission agreed that the Expert Team would have to base its future development work on close coordination with ICAO AMOFSG and its members which is the group that has been tasked by the ICAO Air Navigation Commission to develop Annex 3 draft provisions related to MET support to ATM. The Commission greatly appreciated the work carried out by the ET, and agreed that the team should strengthen their consultation with representatives of the user groups including Air Traffic Management, airlines, airports and pilots concerning the conceptual design of this service, as well as considering the evolving NextGEN and SESAR user requirements. Based on feedback, the ET should further develop the services concept, and the business case, in close consultation with the ICAO AMOFSG with a view to its inclusion as an enabling clause in the Standards and Recommended Practices (SARPs) of ICAO Annex 3 at an appropriate time.

8.4 The Commission fully agreed with the ET that, although the initial focus was on those aerodromes with high traffic densities, such services may in future be beneficial for many aerodromes and of interest to all Members. The Commission therefore requested the ET to ensure that all members were kept informed about progress.

8.5 The Commission stressed that it was important that the new services had a sound scientific basis, supported by well communicated validation and verification. The Commission urged that these services should follow transparent and well-documented processes. Although the services were likely to be largely automated, in order to ensure appropriate quality it was recognised that there may need to be some forecaster involvement if required, including communication with users to assist them in decision-making. The Commission noted that this was related to broader issues of the future role of the operational meteorologist, which were outside the scope of the ET.

8.6 The Commission welcomed the initial work by the ET on providing additional information to the aviation industry relating to convection and wind in the terminal area, and encouraged the ET to keep its work plan on further service elements under review in response to user requirements. The Commission also noted that the ET should also bear in mind the required infrastructure and resources to support such services.

Next Generation Air Transportation System (NextGen)

8.7 The Commission was informed about the changes in United States aviation weather services as a result of the Next Generation Air Transportation System (NextGen). The goals of these changes include increases to capacity and reliability, improved safety and security, and to minimize the environmental impact of aviation. To accomplish these goals, the Joint Planning and Development Office (JPDO) was formed to coordinate the work of diverse governmental agencies and private industry partners in research and development, to develop an overarching enterprise architecture, and to move the planning effort from initial steps toward implementation.

8.8 Weather integration into Air Traffic Management (ATM) is a key component to the NextGen project. Weather contributes to 70% of all air traffic control delays; studies show that up to two thirds of that could be prevented with improved access to more accurate, consistent and timely weather information. Pilots and air traffic managers must know the position, intensity and evolution of all current and future weather hazards in order to properly plan for and minimize the impacts weather will have on take-off, landing and en-route flight operations.

8.9 The 4-Dimensional Weather Data Cube (4-D Cube) will be a virtual repository for weather information needed for pilots and air traffic managers to be aware of how the weather will impact airport and flight operations. The 4-D Data Cube will provide that capability by giving a pilot, for example, the understanding of what weather hazards he/she will encounter at what times during the flight, so he/she can plan an alternate route even before taking off.

8.10 On the question of authorized information, the Commission noted that a subset of the weather information in the 4-D Cube was the 4-D Weather Single Authoritative Source (SAS), which is expected to provide a consistent weather picture for all official air traffic management decisions. This information will be translated into impacts on the National Airspace System (NAS) and incorporated into risk- based decision management tools.

8.11 In view of the potential impacts on future global and regional requirements for the provision of services to international civil aviation, the Commission encouraged the United States of America to continue to provide such highly relevant information, and encouraged continued engagement of United States experts in the work of relevant expert teams to ensure international coordination in development and implementation of new ATM systems.

Update on the European SESAR Framework

8.12 The Commission was informed of recent developments and progress within the European framework, the so-called Single European Sky (SES). These developments consist of a legal framework regulating the service provision to aviation for all types of air navigation and related services, including meteorological services, and an overarching project, SESAR, which is aiming to provide the technological foundations for the new air traffic management system, the latter being described in the SES ATM Master Plan.

8.13 The Commission noted the implications of the SES legal framework on the provision of meteorological services, in that Meteorological Service Providers are, among others, required to:

(a) Be designated by each EU State for providing the services if the State so decides;

(b) Obtain a SES Certification, which includes full quality management, and elements of safety management, systems;

(c) Establish a transparent and equitable cost calculation for the charging scheme adopted;

(d) Find a solution for subregional cooperative agreements to provide services for newly formed Functional Airspace Blocks covering several Member countries.

8.14 Concerning the technological developments, the Commission was pleased to learn that Western European Members participating in the EUMETNET consortium are cooperating to develop a proposal in order to provide the meteorological scientific and technical development work needed to underpin the SESAR concept of operations.

8.15 Given the substantial contributions to the revenues of aviation meteorological service providers from the EUROCONTROL cost recovery mechanism, thus supporting the financing of the basic meteorological infrastructure, the Commission noted that, with the proposed role of private sector weather service providers, consideration should be given to the potential impact on the financing of this infrastructure. The Commission, noting also the increasing pressure from the European users and regulators to limit or reduce the costs for meteorological services to aviation, encouraged the Members concerned to achieve utmost transparency and strongest possible justification for their charges to aviation in order to safeguard the continuous role of these services in an increasingly competitive environment.

Enhanced User and Forecaster Oriented TAF Quality Assessment

8.16 The Commission considered the issues of verification and assessment of aerodrome forecasts (TAFs) under the aspects of quality management, user focus and the use of meteorological information for decision-making in air navigation. It recognized the need for an objective measure of quality, accuracy and user value in demonstrating continued improvement, and the obligation of service providers to aviation to quantify the expected accuracy and reliability of forecasts so that they can become an integral part of a complex decision-making process in flight planning and air traffic management. Finally, the Commission noted that forecaster performance can be improved through the systematic feedback of forecast verification information.

8.17 The Commission further noted that the global nature of aviation operations required also full transparency and inter-comparability of the measures of accuracy and reliability derived from forecast verification. The crucial role of TAF in determining the necessary fuel upload highlighted the importance of this comparability and reliability of verification measures.

8.18 The Commission, after some discussion, endorsed the notion that verification of TAF requires clear and unambiguous principles, and recommended that in view of forthcoming regulations concerning quality management systems for services to aviation, relevant WMO and ICAO groups cooperate in examining the possibility of developing clear guidance based on the principles presented below for future inclusion in the Standards and Recommended Practices.

8.19 Four general principles should be observed as an operational TAF verification system is developed:

(a) The verification system should take a user perspective. For example: (1) If the user requirement is for accuracy within a certain range then that accuracy standard should be used for verification, not some service provider standard. Example (2) When the user requires forecasts of multiple possible states of the atmosphere within a single time period the verification system should seek to verify the accuracy of forecasts' ability to meet this requirement;

(b) The verification scheme should lend itself to the improvement of forecaster competence through the provision of feedback to the forecaster on achieved forecast skill;

(c) The percentage of correct forecasts is heavily influenced by climatology of the location for which the forecast is being made, and in particular by the frequency of changes in atmospheric conditions that require changes to parameters as specified by the ICAO Annex 3, Appendix 5. The verification scheme should allow for inter-comparison of verification statistics for TAFs prepared at airports with different climatologies, taking into account differences in forecasting and observational practices;

(d) For verification purposes an accurate forecast of a parameter should be considered to occur when as compared to the observed value it is sufficiently accurate that an amendment would not be required when the criteria of ICAO Annex 3, Appendix 5 are applied. These criteria may also reflect specific user requirements by local arrangement between users and providers.

8.20 The Commission further recalled that the methodology presented in the background material to this agenda item was also described in a publication available from the AEM training website: http://www.caem.wmo.int/moodle/ for further reference, and invited Members to either review their own verification schemes in coordination with users and the appropriate ICAO and WMO bodies considering the principles outlined above, or to consider those as a basis for developing verification schemes for their own use. The schemes could then be considered for inclusion in the best practice examples at http://www.caem.wmo.int.

QMS Principles and Developments

8.21 The Commission noted the information provided on the implications of the imminent Amendment 75 to the Annex 3 of ICAO, in particular the paragraph 2.2.2 declaring the requirement for the implementation of a recognized quality management system in the provision of meteorological services to international civil aviation a Standard with applicability date of November 2012.

8.22 The Commission debated the impact of this requirement on the necessary resources, adaptation of the organizational structure and modernization and strengthening of the technical infrastructure of aviation meteorological services. The Commission considered the potential benefits of the introduction of these systems in the light of the continued involvement of NMHSs in the provision of services to aviation, which for many Members constituted a major part of the cost, but also of the revenue of the organization.

8.23 The Commission appreciated the relevance and usefulness of the available guidance material, training workshops and templates and thanked those Members that had facilitated such events, and provided funding, expertise and guidance material and templates, in particular the Tanzania Meteorological Agency, Morocco, France, Finland and Hong Kong, China for their invaluable support. The Secretary-General was thanked for his effective and focused support of the Pilot Project for TMA, which had resulted in a host of useful experiences, lessons learnt and guidance material now available on the AEMP Website. The Commission requested the Secretary-General, regional associations working groups and those Members already certified under ISO 9001:2008 to continue to make available all relevant expertise and guidance to facilitate the further implementation of this project.

8.24 In view of the urgency of the matter given the deadline of November 2012 for implementation, the Commission urged all Members that had not yet taken the necessary steps towards implementation of a QMS to:

(a) Appoint a Quality Manager at a high level of the Organization and a core team for implementation;

(b) Make financial and staff resource provisions for the necessary first steps of implementation, considering the benefits of a negotiated cost recovery system to complement existing funding sources, exploring also other funding agencies and donor programmes;

(c) Consider the benefits of employing an experienced, trustworthy and affordable consultancy service to provide the necessary on-site support for the first stages of implementation;

(d) Study the guidance material, lessons learnt and experiences of other Members to support the establishment of a realistic, time-bound and specific action plan with timelines and milestones for implementation;

(e) Inform the Commission through its relevant expert teams, the Secretary-General and relevant regional association working groups/task teams without delay of progress and problems encountered to ensure optimal support from these sources;

(f) Undertake an intensified user consultation process to obtain full cooperation, feedback and support from the wider user community including airlines, ATM, airports and business/general aviation;

(g) Maintain close liaison with the regional WMO and ICAO offices.

8.25 The Commission, considering the difficult situation of some Members to undertake the necessary implementation steps, requested the relevant WMO structures to provide adequate support through:

(a) The working groups, focal points or equivalent instances of the regional associations to facilitate the exchange of expertise, best practice examples (templates, forms, documentation) between Members of the Region;

(b) The relevant structures of CAeM (Expert Teams, Implementation and Coordination Teams, Management Group) to establish support teams for QMS implementation available for advice, review and gap analyses during the process;

(c) The Secretary-General, through the WM' Resource Mobilization Office, to endeavour to identify external funding sources for Members where Cost Recovery from aviation is insufficient to support the implementation activities due to low traffic or unresolved issues of governance.

8.26 The Commission encouraged all Members to adopt a practical, cost-effective and simple approach in QMS implementation, considering limiting the scope of initial efforts to the essential services to aviation and basic infrastructure rather than overstretching their resources in attempting a fully comprehensive and formal certification of all sections of their services.

8.27 The Commission reminded Members that as part of the QMS implementation, the required qualifications and competencies of their aeronautical meteorologists, technicians and observers are likely to be updated by the relevant WMO documents (WMO-No. 258, *Technical Regulations* (WMO-No. 49)).

Pilot Project for the Implementation of QMS in the United Republic of Tanzania

8.28 The Commission noted with appreciation that the AeMP had been very proactive in responding to the recommendations and requirements expressed by ICAO to support and expedite the implementation of QMS for meteorological services for international air navigation. In this context, the Commission was pleased to note that the United Republic of Tanzania had accepted to host a pilot project in implementing QMS and to share its experiences, documentation and templates with other Members. It recognized that there were challenges and drawbacks associated with the implementation of such a project in a Least Developed Country (LDC) and encouraged Members, especially the LDCs and Small Island Developing States (SIDS), to take advantage of the experience and knowledge gained from this project when implementing QMS in their own Services. The Commission was informed that guidance material, including the WMO *Guide*/ICAO *Manual on the QMS for the Meteorological Services for International Air Navigation* (WMO-No. 1001) (ICAO Doc. 9873) and the documentation and templates developed by the Tanzania Meteorological Agency (TMA), were available on the CAeM Website (http://www.caem.wmo.int/moodle).

8.29 The Commission noted the positive impacts of implementing QMS, especially in improving the efficiency and effectiveness of procedures, processes and resources necessary to provide highly relevant meteorological information to the users. However, the Commission noted with concern that the certification costs might be a constraint for a large number of Members in achieving the implementation of QMS for meteorological services for international air navigation by 2012. It therefore encouraged Members to jointly develop regional implementation projects, which would facilitate resource mobilization to further develop these activities and partnerships through national, regional and international support.

8.30 The Commission recalled that Recommendation 2.2.3 of Annex 3 to the ICAO Convention states that a properly organized quality system should be in conformity with the ISO 9000 series of quality assurance standards (which provide a basic framework for the development of a quality assurance programme), and certified by an approved organization. In this context, the Commission noted with concern that a number of Members had been implementing

alternatives to ISO 9001:2008 and stressed that it would not be beneficial in the long-term as the recommended practice for certification according to this ISO standard may also become compulsory.

8.31 The Commission encouraged Members who are planning to implement QMS to utilize the outcomes and recommendations of the pilot project on QMS in the United Republic of Tanzania as guidance for their implementation.

Impacts of regional ATM projects on AMSPs in other regions

8.32 The Commission was informed of concerns in many developing country Members about the potential impact of new, advanced Air Traffic Management systems currently developed on a regional basis such as NextGen in the United States and SESAR in the European Union. The session urged all Members to enter into a deepened and intensified cooperation with ATM units in their countries to be able to respond to emerging requirements and challenges.

8.33 In view of the increasing gap between the available resources in developing countries and the rapidly growing requirements and regional natures of new global ATM systems, the session urged Members to consider, develop and conclude agreements with other Members of their (sub-) regions in order to benefit from economies of scale and mutual support in responding to these challenges. Such agreements would also facilitate the delivery of services to newly formed blocks of airspace encompassing more than one country, while maintaining an active role of all Members in such subregions.

8.34 Members were reminded that the new ATM concepts for high-density airspace, while not necessarily applicable in the short term to some regions, will inevitably create a strong pressure to update and upgrade the meteorological infrastructure, from observations and communications to data processing and display. Early action involving governments, international funding agencies and contributions from the industry were seen as essential in order to meet the new requirements in a timely manner.

8.35 In view of the above, the Commission reiterated a call to Members to ensure a stable and adequate funding basis for the delivery of services to aviation. Wherever traffic volumes permitted, and government resources remained scarce, every effort should be made to negotiate and implement a fair, transparent and equitable cost recovery system. With the introduction of new, system-wide information management, pooling data and inputs from many different sources, clear accountability will be paramount for the continued role and viability of the provision of services to civil aviation by national aeronautical meteorology services.

8.36 Having recalled the discussions on the future requirements for the qualification and competency of all personnel in aeronautical meteorology, the Commission requested Members to assess their training requirements, encouraged the continued provision of excellent training material for all types of learning including distance–based studies by the ET-ET in cooperation with partner organizations, and finally requested the Secretary-General to provide for increased resources to support both the newly established Task Team on Personnel Assessment Kit (TT-PAK) and regionally based efforts to meet the challenging deadlines for achieving the required competencies and qualifications by 2013 and 2016 respectively.

New Issues: Space Weather, Sand and Dust Storms

8.37 Noting the serious impact of Space Weather on aeronautical activities, and considering the important benefits to be expected from increased coordination of efforts in Space Weather, the Commission was pleased that the Executive Council, at its sixtieth session, had endorsed the principle of WMO activities in Space Weather. It further noted that Space Weather activities of WMO would focus on:

(a) Harmonization of observation requirements, sensors and standards within WIGOS;

(b) Definition of products in interaction with major application sectors;

(c) Exchange and delivery of Space Weather information through the WIS;

(d) Coordination of the issuance of emergency warnings in the context of multi-hazard WMO activities;

(e) Encouraging the dialogue between the research and operational space weather communities.

8.38 The Commission recalled that the Executive Council had agreed that Space Weather activities would be supported by WMO on extrabudgetary resources, and thus urged WMO Members to consider the provision of resources through secondments and Trust Fund donations for Space Weather coordination activities.

8.39 The Commission, being aware that any new services for aviation required coordination with and endorsement by the International Civil Aviation Organization (ICAO), was pleased to note that the ICAO International Airways Volcano Watch Operations Group (IAVWOPSG) was currently deliberating on a draft Space Weather Manual as the basis for developing operational requirements for related services to aviation in the future, and that the forthcoming Volcanic Ash Workshop planned to be held in March 2010 in Santiago de Chile was also going to discuss issues on space weather and Sand and dust storms.

8.40 The Commission welcomed the setting up of an Inter-Programme Coordination Team on Space Weather (ICTSW) involving experts to be designated by CBS and CAeM, the Terms of Reference of which are included in Annex I to the present report. The Commission recommended that Members support the work of this Team through adequate resources and follow-up actions. It also recommended that the ICTSW collaborate with the IAVWOPSG.

8.41 The Commission noted with appreciation the development of the WMO Dust and Sandstorm Warning, Assessment and Advisory System which held the potential to become an important source of information supporting the provision of aerodrome warnings and SIGMET for aviation in areas affected by these phenomena and recalled the recent case of such storms closing the Sydney International Airport for an extended period. The Commission also recalled the efforts described under agenda item 7 to support Members in their issuance of SIGMET, which would also require information on sand and dust storms.

8.42 Considering the importance of this safety-relevant phenomenon for aviation, the Commission requested the Secretary-General to ensure good coordination between the SDS-WAS and the Aeronautical Meteorology Programme, and to inform ICAO of the availability of this new WMO initiative with a view to further develop relevant guidance and SARPS as necessary concerning sand and dust storms for warnings in close cooperation with WMO.

9. PLANS AND PRIORITIES – WMO STRATEGIC AND OPERATIONAL PLANS AND THE WORK OF THE COMMISSION *(agenda item 9)*

Alignment of TOR to the revised WMO Strategic and Operating Plans, and the AeMP Plan 2010–2014

9.1 The Commission recalled that its current Terms of Reference (ToR) have not been modified for some time. As recorded under agenda item 3, the Commission noted that the 2009 Meeting of Presidents of Technical Commissions, acting on advice from Members and the Executive Council, agreed that the Terms of Reference (ToRs) of the technical commissions needed review, with the aim to linking these with the WMO Results-based Management approach, the overall objectives and strategic thrusts of the Organization. Recognizing clear directions from the governing bodies of WMO for CAeM to align its work plan and deliverables to the WMO Expected Results, the Commission reviewed and proposed a modified version of its Terms of

Reference. This version is structured into functions which are common to all WMO Technical Commissions and those functions which are specific to CAeM.

9.2 The Commission recalled that, at its last session (CAeM-XIII, Geneva, November 2006), it had reviewed and adopted an AeMP Plan for 2008–2011. It recognized that this was to be a dynamic document, and should be closely linked to, and in conformity with, the overall organizational objectives, strategies, and expected results of WMO. Noting that, since CAeM-XIII, WMO had adopted a Strategic Plan for the period 2008–2011, the Commission agreed that there was a need to revise and update this document to address in particular the WMO Expected Results as included in the Strategic and Operating Plans. The Commission reviewed, revised and adopted the AeMP Plan for 2010–2014 as given in Annex II to the present report. In doing so, it recognized that the Plan would continue to be a dynamic document, and requested the president and the Management Group to finalize this document based on decisions taken during the session, to keep it under review and revise it as necessary during the coming intersessional period.

Resource requirements

9.3 The Commission noted that there were resource issues for the AeMP associated with adequately addressing on-going and emerging requirements. It therefore requested the president of the Commission, with the assistance of the Management Group, to work with the Secretariat to identify activities for which external funding may be appropriate. This could assist Members to develop proposals for projects that may be funded either by resource mobilization or through cost recovery from the user community.

9.4 The Commission, following an in-depth discussion and recognizing the lack of action-orientation in its current terms of reference, as reproduced in Annex 1 to Recommendation 3 (CAeM-XIV), adopted Recommendation 3 (CAeM-XIV) – Terms of reference of the Commission for Aeronautical Meteorology. It requested the Secretary-General to bring this recommendation to the attention of the Executive Council at its forthcoming sixty-second session.

10. STRUCTURE OF THE COMMISSION – ESTABLISHMENT OF EXPERT AND IMPLEMENTATION TEAMS *(agenda item 10)*

10.1 The Commission expressed its gratitude for the work done by CAeM under its current structure, and noted that responsibilities were shared among Management Group members so that each member had effectively a role to play in implementing the work programme.

10.2 The Commission discussed the most efficient way to organize its working structure, without increasing the cost, and in view of:

(a) The priorities and requirements set by the governing bodies of WMO;

(b) The increasing need to fulfil the Commission's growing responsibilities and to respond to emerging tasks;

(c) The need for resources in terms of number of experts engaged in the work of the Commission and regular budget allocated to support the work of the Commission.

Recognizing that there remained several possible approaches to the overall structure of CAeM to address its objectives and work priorities, the Commission nevertheless decided to continue with a streamlined structure, focussed on the essential roles that the Commission must play and being more in line with the available resources in terms of expert participation and available funding. Additionally, the Commission stressed that the success of the new structure would depend to a great extent on the strengthened role of the CAeM Management Group in assessing, guiding and coordinating the work of the Expert Teams, Task Teams, the Implementation Coordination Team, and other roles in making necessary adjustments in the intersessional period and in advising the

president on relevant issues. The Commission therefore decided to re-establish the CAeM Management Group by adopting Resolution 1 (CAeM-XIV) – Management Group of the Commission for Aeronautical Meteorology.

10.3 The Commission decided to implement a new working structure and establish a number of small and focused Expert Teams, Task Teams, an Implementation Coordination Team, and other roles by adopting Resolution 2 (CAeM-XIV) – Expert and task teams, network and other roles in the Commission for Aeronautical Meteorology. The Commission reaffirmed its commitment to the main long-term objectives of the Aeronautical Meteorology Programme to ensure the worldwide, reliable provision of good quality, timely, cost-effective and responsive meteorological service to users throughout the world in support of safe, regular, efficient and environmentally sustainable aviation operations. However, the Commission recognized the fundamental importance of the work of the individual experts within the proposed structure to the accomplishment of the CAeM work programme. It therefore requested Members to ensure to the extent possible that their appointed experts were allowed sufficient time within their normal national work programme to complete allocated tasks in support of the Commission, and to provide resources to carry out the related activities.

10.4 Noting the increased importance of the activities of CAeM groups, the Commission encouraged its president and the WMO Secretariat to keep members of the Commission informed of progress in the work by all appropriate means, including the CAeM Website (http://www.caem.wmo.int).

11. REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS *(agenda item 11)*

11.1 In accordance with WMO General Regulation 190, the Commission examined those resolutions and recommendations adopted by CAeM prior to its fourteenth session, which were still in force. The Commission also noted that action on most of the previous recommendations had already been taken and completed, or their substance incorporated into the WMO Technical Regulations, as appropriate. The Commission therefore adopted Resolution 3 (CAeM-XIV) – Review of previous resolutions and recommendations of the Commission for Aeronautical Meteorology.

11.2 The Commission examined resolutions of the Executive Council within the field of the activities of CAeM and adopted Recommendation 4 (CAeM-XIV) – Review of relevant resolutions of the Executive Council based on previous recommendations of the Commission for Aeronautical Meteorology.

12. SCIENTIFIC LECTURES *(agenda item 12)*

12.1 The president of the Commission introduced Dr Neil Gordon (New Zealand) who delivered a scientific lecture on the subject: “THORPEX, the Severe Weather Forecast Demonstration Project and Their Future Implications for Meteorological Services to Aviation”. The lecture was intended to serve as a means of informing Members on the development and implementation of projects that would contribute to improving meteorological services to aviation. It was directly relevant to, and in support of, the role of CAeM as the intergovernmental technical body for coordinating and regulating meteorological services to aviation.

12.2 Thereafter, Lord Julian Hunt, former Permanent Representative of the United Kingdom of Great Britain and Northern Ireland with WMO, who had been invited by the session host, delivered an additional lecture on issues on “Aviation and Urban Environment”.

12.3 The Commission agreed that the lectures presented were highly informative, and expressed its appreciation to Dr Gordon and Prof. Hunt for the time and effort they had spent in preparing them. The Commission highly appreciated the presentation of such technical lectures at each Commission session and requested its president and the WMO Secretariat to continue to support this initiative and arrange for the preparation of a similar lecture for its fifteenth session.

13. ANY OTHER MATTERS (*agenda item 13)*

Participation of women in the work of the Commission

13.1 The Commission recalled that, as a UN specialized agency, WMO takes action to follow the recommendations of the Beijing Declaration and the Platform for Action 1995 in the gender policy. WMO's policy aims to achieve gender equality through the strategy of gender mainstreaming, ensuring that the specific and different needs of men and women were considered in the programmes and activities of both WMO and its Members.

13.2 To increase the participation of women in the activities of WMO and in the work of National Meteorological and Hydrological Services (NMHSs), the Organization convened two Conferences on Women in Meteorology and Hydrology in 1997 and 2003. These Conferences concluded that the formation of regional/subregional networks to exchange ideas, experiences and policies could be one of the important steps towards improving equality of opportunity for women and men to benefit from environmental information.

13.3 In order to achieve its vision, WMO has developed an action plan which was finalized and approved by the Expert Meeting on Gender Mainstreaming held in Geneva, Switzerland, from 26 to 29 March 2007. The key implementation areas of the action plan include:

(a) Governance;

(b) Enhanced service delivery;

(c) Employment;

(d) Effective monitoring and evaluation.

13.4 The Commission for Aeronautical Meteorology coordinates its actions with the other seven WMO Technical Commissions to make an input to the implementation of the WMO action plan on gender equality. Through the participation in all the above gender mainstreaming events, the designated CAeM focal point took part in the discussions of the WMO action plan, demonstrating the Commission's interest in creating a balance for decision-making and planning of AeM activities to attract acute intelligence of both men and women. The Commission recalled that at its thirteenth session it had adopted Resolution 5 (CAeM-XIII) – Participation of women in the work of the Commission, and was pleased to keep this resolution in force given the importance of the issue.

13.5 Pleasingly, the Commission shows a steady growth in percentage of women involved in the work of its Management Group. Tracing back to 2002, there was only one woman in the CAeM Management Group. At the recent CAeM Management Group meeting in September 2009 four women represented different areas of activities. The comparison will be even more compelling if it is regarded that the Commission deals with the aeronautical meteorological community in which men dominate. In other WMO Technical Commissions Management Groups women represent a much smaller percentage.

13.6 In line with the key areas of the WMO action plan the Commission agreed:

(a) In the area of Governance*,* to keep a balance in decision-making and planning, to encourage the focal point to monitor the Organization's approach to gender equality;

(b) In the area of Enhanced service delivery*,* to contribute to equality of opportunity for men and women in accessing environmental information;

(c) In the area of Employment*,* to invite both men and women to participate in the CAeM training events;

(d) In the area of Effective monitoring and evaluation, to collect information on male/female ratio of the staff in NMHSs.

13.7 The Commission is setting an example for a trend towards enhanced involvement of women in key positions in its work, which complies with the WMO resolutions on gender issues.

13.8 In accordance with Resolution 5 (CAeM-XIII), which was kept in force by Resolution 3 (CAeM-XIV), the Commission decided to appoint Ms Somsri Huntrakul as Gender Focal Point for the Commission.

14. DATE AND PLACE OF THE FIFTEENTH SESSION *(agenda item 14)*

The Commission advised that it is expected that its fifteenth session would be a conjoint session with ICAO, to be conducted in Montreal, Canada, in May or September 2014, and asked that the Secretary-General make the necessary arrangements.

15. CLOSURE OF THE SESSION *(agenda item 15)*

The fourteenth session of the Commission for Aeronautical Meteorology closed at 11.35 a.m. on Wednesday, 10 February 2010.

RESOLUTIONS ADOPTED BY THE SESSION

Resolution 1 (CAeM-XIV)

MANAGEMENT GROUP OF THE COMMISSION FOR AERONAUTICAL METEOROLOGY

THE COMMISSION FOR AERONAUTICAL METEOROLOGY,

Noting:

(1) The very effective experience and successful activity of the current Management Group of the Commission for Aeronautical Meteorology (CAeM Management Group),

(2) The report of the president of the Commission to its fourteenth session,

(3) The need to share responsibilities among the Management Group members so that each member had effectively a role to play in implementing the Aeronautical Meteorology Programme,

Recognizing:

(1) That the effectiveness of the Commission depends to a large extent on the effective management of its activities during its intersessional periods,

(2) That the Management Group is required to ensure the integration of activities of the Commission, evaluate the progress achieved, coordinate strategic planning and in matters of urgency take decisions on behalf of the Commission as well as decide on necessary adjustments to achieve the objectives of the Aeronautical Meteorology Programme,

Decides:

(1) To re-establish the CAeM Management Group with the following terms of reference:

   (a) To assist the president in guiding and coordinating the activities of the Commission and its working groups;

   (b) To take responsibility for achieving results under WMO Plans directly and through the activities of expert teams and expert networks under their leadership;

   (c) To ensure that the activities of the Commission meet the needs of developing countries, in particular in aeronautical meteorology training, as well as in implementing quality management and cost recovery programmes;

   (d) To ensure that Members are informed of the activities of the Commission, through the Aeronautical Meteorology Programme and CAeM Websites and other means;

   (e) To ensure cooperation with other WMO bodies in pursuit of WMO strategic goals;

   (f) To assist the president, as required, to take decisions on behalf of the Commission during the intersessional period on matters of urgency;

(2) That the composition of the CAeM Management Group shall be as follows:

   (a) The president of CAeM (Chair);

(b) The vice-president of CAeM;

(c) The chairs of the:

(i) Expert Team on Education and Training;

(ii) Expert Team on Meteorological Services in the Terminal Area;

(iii) Expert Team on Governance and Partnership;

(iv) Expert Network;

(d) Chairs of regional association Aviation Task Teams or equivalent to address regional aspects of the Aeronautical Meteorology Programme (to be designated by the presidents of the regional associations);

(3) To establish an Expert Network consisting of experts nominated to provide and summarize specialized and targeted expertise, liaison to other technical commissions, and where necessary, partner organizations;

(4) To establish, in cooperation with the Commission for Basic Systems, an Inter-Programme Coordination Team on Space Weather;

(5) To establish an Implementation Coordination Team that shall be composed of a subset of the Management Group and tasked to support Members in the implementation of the Aeronautical Meteorology Programme. This shall be achieved through the provision of expertise, identifying available resources in the National Meteorological and Hydrological Services of Members and partner organizations, working in close collaboration with the regional associations and the Resource Mobilization Office of WMO. The president of the Commission shall designate the chair of the Implementation Coordination Team;

Requests the Secretary-General to invite the Agency for Air Navigation Safety in Africa and Madagascar, International Council of Aircraft Owner and Pilot Associations, International Air Transport Association, International Civil Aviation Organization, International Federation of Airline Pilots' Associations, International Federation of Air Traffic Controllers' Associations, Intergovernmental Panel on Climate Change, European Organization for the Safety of Air Navigation and other appropriate international organizations by agreement with the president, to participate in the work of the Management Group;

Authorizes the president to invite additional experts as are necessary, resources permitting, to participate in meetings of the Management Group.

Resolution 2 (CAeM-XIV)

EXPERT AND TASK TEAMS, NETWORK AND OTHER ROLES IN THE COMMISSION FOR AERONAUTICAL METEOROLOGY

THE COMMISSION FOR AERONAUTICAL METEOROLOGY,

Noting:

(1) The pressing need for continued efforts in education and training in aeronautical meteorology,

(2) The need, based on an in-depth understanding of user requirements, to provide new and improved services to aviation for the twenty-first century,

(3) The need to institutionalize quality management, cost recovery and customer focus programmes,

Considering:

(1) The potential benefit of the introduction of new and improved services to aviation,

(2) The requirement for the development of standardized methods for the quality assurance of meteorological data and services,

(3) The important role that aeronautical meteorology plays in the economic and technological development of Members,

(4) The need to adapt content and format of forecasts and observations to the requirements of new concepts of air traffic management,

(5) The growing evidence of the effects of aviation both on local air quality and on climate change,

(6) The need to focus on completing a number of high-priority tasks in the field of training and assessment as well as relating to new developments in aeronautical meteorology,

Decides:

(1) To establish a number of small and focused expert and task teams, as well as other functions and an Expert Network to tackle specific issues, with the following terms of reference:

(a) To support Members in their drive to demonstrate compliance with competency standards for meteorological personnel. This is to be achieved by helping to organize workshops, through the sharing of best practices and reviewing and producing competency assessment resources. These resources will be made available in appropriate form, including, primarily, through the CAeM Website;

(b) To continue working, in close cooperation with the relevant bodies of the International Civil Aviation Organization (ICAO), on proposals for an expanded forecast service addressing also the wider approach and departure area around aerodromes, adapted to the needs of the twenty-first century;

(c) To assist Members in the introduction of recognized systems of quality management, cost recovery and customer focus programmes;

(d) To develop guidance on the provision of new and tailored services for all aviation stakeholders including airlines, commercial and general aviation, national and regional air traffic management and airport operators;

(e) To cooperate with ICAO through the WMO Secretariat and with the Commission for Basic Systems in the improvements to observations, the updating of codes and formats to meet aeronautical meteorology requirements and the transition to table driven codes including XML in information transmission;

(f) To provide input and feedback for relevant bodies of the Commission for Basic Systems, the Commission for Instruments and Methods of Observation and the Commission for Atmospheric Sciences in planning for new data types, observing and forecasting methodologies;

(g) To inform the Commission of the current scientific understanding of the effects of aviation on the global, regional and local atmospheric environment, the implications thereof for future development of aviation, and of potential effects of impending climate change on aviation operations. A Rapporteur would be nominated to liaise with other organizations and bodies, such as the Commission for Atmospheric Sciences, the United Nations Framework Convention on Climate Change, the Intergovernmental Panel on Climate Change, ICAO and the United Nations Environment Programme, and scientific societies to ensure that information is current and complete;

(2) To select, in accordance with Regulation 32 of the WMO General Regulations:

(a) Expert Team on Education and Training:

(i) Mr Shakeer Baig (Trinidad and Tobago) as the chair of the Expert Team on Education and Training;

(ii) The following five experts as core members of the Expert Team on Education and Training:

Mr Raf Windmolders (Belgium)

Mr Carl Weiss (United States)

Mr Chris Webster (New Zealand)

Ms Leena Neitiniemi-Upola (Finland)

Ms C.C. (Queenie) Lam (Hong Kong, China)

(b) Task Team on the Competency Assessment Toolkit:

(i) Mr Kent Johnson (Canada) as the chair of the Task Team on the Competency Assessment Toolkit;

(ii) The following four experts as core members of the Task Team on the Competency Assessment Toolkit:

Ms Michelle Hollister (Australia)

Mr Paul Bugeac (Romania)

Mr Goama Ilboudo (Senegal)

Mr Nir Stav (Israel)

(c) The Task Team on Meteorological Services in the Terminal Area User Needs:

(i) Mr Ian Lisk (United Kingdom) as the chair of the Task Team on MSTA User Needs;

(ii) The following three experts as core members of the Task Team on MSTA User Needs:

Ms Cynthia Abelman (United States)

Ms Sandy Song (Hong Kong, China)

Ms Susan O'Rourke (Australia)

(d) Expert Team on Meteorological Services in the Terminal Area):

(i) Ms Stéphanie Desbios (France) as the chair of the Expert Team on Meteorological Services in the Terminal Area;

(ii) The following five experts as core members of the Expert Team on Meteorological Services in the Terminal Area:

Ms Sandy Song (Hong Kong, China)

Ms Susan O'Rourke (Australia)

Mr Steve Ricketts (Canada)

Mr Jun Ryuzaki (Japan)

Ms Cecilia Miner (United States)

(e) Expert Team on Governance and Partnership:

(i) Ms Cynthia Abelman (United States) as the chair of the Expert Team on Governance and Partnership;

(ii) The following five experts as core members of the Expert Team on Governance and Partnership:

Mr Nigel Gait (United Kingdom)

Ms Joanne Volk (Canada)

Mr Jan Sondij (Netherlands)

Ms Gaborekwe Khambule (South Africa)

Ms Jiamei Hu (China)

(f) Implementation Coordination Team:

(i) Ms Marina Petrova (Russian Federation) as the chair of the Implementation Coordination Team;

(ii) The chairs of the:

– Expert Team on Education and Training;

– Expert Team on Meteorological Services in the Terminal Area;

– Expert Team on Governance and Partnership;

(g) Inter-Programme Coordination Team on Space Weather:

Mr Zhang Xiaoxin (China) as the CAeM Co-Chair of the Inter-Programme Coordination Team on Space Weather;

(h) Mr Bart Nicolai (Belgium) as Focal Point on Operational Meteorological Data Exchange;

(i) Mr Ulrich Schumann (Germany) as Rapporteur on Aviation and the Environment.

Authorizes the president, in consultation with the Management Group and the Permanent Representative of the Member concerned, to replace a chair or core member should that person no longer be able to fulfil his or her responsibilities;

Requests the Secretary-General to invite the Agency for Air Navigation Safety in Africa and Madagascar, International Council of Aircraft Owner and Pilot Associations, International Air Transport Association, International Civil Aviation Organization, International Federation of Airline Pilots' Associations, International Federation of Air Traffic Controllers' Associations, Intergovernmental Panel on Climate Change, Association of Hydro-Meteorological Equipment Industry and the European Organization for the Safety of Air Navigation and other appropriate international organizations, by agreement with the president, to participate in the work as appropriate.

Resolution 3 (CAeM-XIV)

REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF THE COMMISSION FOR AERONAUTICAL METEOROLOGY

THE COMMISSION FOR AERONAUTICAL METEOROLOGY,

Noting the actions taken on the resolutions and recommendations adopted by the Commission prior to its fourteenth session,

Decides:

(1) To keep in force Resolution 5 (CAeM-XIII);

(2) Not to keep in force other resolutions and recommendations adopted before its fourteenth session (2009).

Annex to Resolution 3 (CAeM-XIV)

REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF THE COMMISSION

Resolution 5 (CAeM-XIII)

PARTICIPATION OF WOMEN IN THE WORK OF THE COMMISSION

THE COMMISSION FOR AERONAUTICAL METEOROLOGY,

Noting:

(1) The United Nations Conference on Women (Beijing 1995) and its recognition of the importance of women and their contribution to science,

(2) The appeals made in *Agenda 21: Programme for Action for Sustainable Development* (Rio de Janeiro, June 1992), Chapter 24: Global action for women towards sustainable and equitable development,

(3) The Report of the Second WMO Conference on Women in Meteorology and Hydrology, Geneva, March 2003,

(4) Resolution 33 of the Fourteenth World Meteorological Congress (Cg-XIV), which calls for equal opportunities for the participation of women in meteorology and hydrology,

Considering:

(1) The need for trained, qualified professionals regardless of gender, in the work of the Commission,

(2) The need to encourage national education programmes in science and technology that actively target girls and woman predisposing and training them to enter the fields of meteorology and related sciences,

(3) The need to increase opportunities and inducements for the recruitment of women within NMHSs, and provide equal opportunities for career advancement to the highest levels,

Welcoming and supporting the active participation of women delegates in this Commission,

Urges increased participation and involvement of women in the work of this Commission;

Recommends that Members:

(1) Continue to encourage, promote and facilitate equal opportunities for women in science and technology in order to prepare them for careers in scientific professions such as meteorology and related sciences;

(2) Facilitate the participation of women in the activities of the Commission;

(3) Provide active encouragement and support for equal opportunity for the participation of women in all fields of meteorology and related sciences at decision-making levels, particularly, in CAeM and its working programmes;

Further recommends that Members encourage the promotion of science studies in schools, as a means of ensuring the participation of women and men on an equal basis in this field of work;

Requests the president of the Commission to report to the fourteenth session of the Commission on progress made on the main aspects of the implementation of this resolution during the intersessional period,

Decides to appoint and support a gender focal point with appropriate expertise, who will report to the president of the Commission.

RECOMMENDATIONS ADOPTED BY THE SESSION

Recommendation 1 (CAeM-XIV)

COMPETENCE STANDARDS FOR PERSONNEL IN AERONAUTICAL METEOROLOGY

THE COMMISSION FOR AERONAUTICAL METEOROLOGY,

Noting that Resolution 9 (EC–LXI) – Qualification and competency requirements for aeronautical meteorological personnel, requested the Commission for Aeronautical Meteorology to review and refine the competence requirements in the *Guidelines for the Education and Training of Personnel in Meteorology and Operational Hydrology* (WMO-No. 258), Supplement No. 1: Training and Qualification Requirements for Aeronautical Meteorological Personnel, and then to submit these to the Executive Council at its sixty-second session as Standards and Recommended Practices for inclusion in the *Technical Regulations* (WMO-No. 49), Volume II, in coordination with the Executive Council Panel of Experts on Education and Training,

Noting further the final report of the meeting of the Expert Team on Education and Training, held in Barbados in December 2009, which provided a refined and agreed version of the competency requirements as given in the annex to this recommendation,

Considering the need to provide uniform, realistic and achievable standards of competency in terms of knowledge base and performance criteria for the personnel working in aeronautical meteorology,

Requests the Executive Council to endorse the set of competencies given in the annex to this recommendation;

Requests the Secretary- General to bring these to the attention of all Members for implementation in line with the timetable decided by the Executive Council at its sixty-first session, that is, an applicability date of November 2013;

Urges Members to make every effort to meet these timelines.

Annex to Recommendation 1 (CAeM-XIV)

COMPETENCE STANDARDS FOR AERONAUTICAL METEOROLOGY PERSONNEL

Aeronautical Meteorological Forecaster

An Aeronautical Meteorological Forecaster should be a "WMO Meteorologist"[1] and shall,

(a) For the area and airspace of responsibility,

(b) In consideration of the impact of meteorological phenomena and parameters on aviation operations, and

(c) In compliance with aviation user requirements, international regulations, local procedures and priorities,

be able to:

(i) Analyse and monitor continuously the weather situation;

(ii) Forecast aeronautical meteorological phenomena and parameters;

(iii) Warn of hazardous phenomena;

(iv) Ensure the quality of meteorological information and services; and

(v) Communicate meteorological information to internal and external users.

Aeronautical Meteorological Observer

An Aeronautical Meteorological Observer shall,

(a) For the area and airspace of responsibility,

(b) In consideration of the impact of meteorological phenomena and parameters on aviation operations, and

(c) In compliance with aviation user requirements, international regulations, local procedures and priorities,

be able to:

(i) Monitor continuously the weather situation;

(ii) Observe and record aeronautical meteorological phenomena and parameters;

(iii) Ensure the quality of meteorological information and performance of systems; and

(iv) Communicate meteorological information to internal and external users.

[1] As defined in the latest edition of the *Guidelines for the Education and Training of Personnel in Meteorology and Operation Hydrology* (WMO-No.258), Volume I: *Meteorology*.

Recommendation 2 (CAeM-XIV)

URGENT NEED TO ADDRESS LONG-STANDING SIGMET DEFICIENCIES

THE COMMISSION FOR AERONAUTICAL METEOROLOGY,

Noting with serious concern the continuing complaints by users and relevant groups of the International Civil Aviation Organization (ICAO) concerning the following aspects of SIGMET:

(a) Frequent errors in coding and failure to adhere to ICAO Annex 3 templates, which affect the transmission and ingestion of SIGMET by end-user systems,

(b) Insufficient coverage of all relevant hazardous phenomena in the SIGMET,

(c) Lack of accuracy, reliability, updating and regional consistency of a significant percentage of these messages,

(d) Non-issuance of SIGMET by some Members,

Considering the serious implications of such deficiencies on the safety of civil aviation,

Considering further the high relevance of these issues in implementing, and adhering to, a recognized Quality Management System for the provision of services to aviation,

Recognizing that oversight of compliance with Annex 3 remains an ICAO responsibility, whereas support to Members in fulfilling their mandate is within the WMO remit, and that the prerogative of the State in determining its meteorological services for international air navigation should be respected,

Resolves:

(1) That the CAeM Management Group cooperate closely with ICAO and the Commission for Basic Systems in providing improved guidance and templates for SIGMET so as to address issues of incorrect coding;

(2) That the Implementation Coordination Team, the Task Team on the Competency Assessment Toolkit and the Expert Team on Education and Training, together with aviation task teams or equivalent groups of regional associations, pay particular attention to this issue when supporting the implementation of Quality Management Systems and personnel qualifications and competence assessments;

Recommends:

(1) That WMO strengthens its cooperation with the relevant ICAO groups in order to accelerate the resolution of current deficiencies in coding, regional coordination and issuance of all types of SIGMET;

(2) That the Secretary-Generals of both WMO and ICAO continue to urge Members/Contracting States to undertake all necessary steps to ensure compliance with the relevant regulations;

(3) That relevant WMO bodies, including the Commission for Basic Systems and the Commission for Instruments and Methods of Observation, and programmes consider the need for an improved exchange and use of data types, such as weather radar, lightning detection and aircraft reports, as a basis for regional SIGMET coordination;

(4) That Members consider concluding bilateral agreements to transfer SIGMET responsibility, under the auspices of the designated Meteorological Authorities concerned, to another Member in a position to do so, on a temporary basis, if they find themselves unable to issue SIGMET;

(5) That Members cooperate with the trial SIGMET advisory centres in the issuance and distribution of SIGMET for their region when trial advisories become available.

Recommendation 3 (CAeM-XIV)

TERMS OF REFERENCE OF THE COMMISSION FOR AERONAUTICAL METEOROLOGY

THE COMMISSION FOR AERONAUTICAL METEOROLOGY,

Noting:

(1) The *Abridged Final Report with Resolutions of the Thirteenth World Meteorological Congress* (WMO-No. 902),

(2) The final report of the 2009 Meeting of the Presidents of WMO Technical Commissions (Geneva, February 2009),

(3) The *WMO Strategic Plan* (WMO-No. 1028),

Recognizing that the existing terms of reference of the Commission for Aeronautical Meteorology (CAeM) had served well,

Considering at the same time that the terms of reference of all technical commissions of WMO should be linked to and in conformity with the WMO Results-based Management approach and overall Organization objectives and strategic thrusts, and have a common structure,

Considering further the new preamble proposed at the 2010 Meeting of Presidents of Technical Commissions to be incorporated in the WMO General Regulations general terms of reference,

Recommends that the existing terms of reference of CAeM as reproduced in Annex 1 should be amended as given in Annex 2 to this recommendation, with further background on linkages to the draft WMO Strategic Plan provided in Annex 3 to this recommendation;

Authorizes its president to work with the Executive Council and Sixteenth Congress to ensure that the terms of reference are appropriately aligned with the terms of reference of other technical commissions and demonstrate their relevance to the overall WMO strategies through linkage with the approved Strategic Plan;

Requests the Secretary-General to bring this recommendation to the attention of the Executive Council at its sixty-second session for its consideration.

Annex 1 to Recommendation 3 (CAeM-XIV)

EXISTING TERMS OF REFERENCE OF THE COMMISSION FOR AERONAUTICAL METEOROLOGY FOR INFORMATION

The Commission shall be responsible[1] for matters relating to:

(a) Applications of meteorology to aviation, taking into account the relevant meteorological developments in both the scientific and practical fields;

(b) The study of aeronautical requirements for meteorological services and arranging so far as possible for these requirements to be met either by its own action or, when coordination is necessary, by referring the requirements to the relevant constituent bodies;

(c) International standardization of methods, procedures and techniques employed or appropriate for employment in:

  (i) The application of meteorology to aeronautics and the provision of meteorological services to international air navigation;

  (ii) The making, reporting and dissemination of meteorological observations from aircraft;

(d) Consideration of requirements for basic meteorological data needed for aeronautical meteorological purposes;

(e) Consideration of requirements for climatological data needed for aeronautical meteorological purposes;

(f) Consideration of aeronautical requirements for meteorological observations and specialized instruments;

(g) Consideration of the meteorological aspects of the impact of aviation on the environment;

(h) The training of meteorological and non-meteorological personnel in aeronautical meteorology.

[1] In cooperation with the International Civil Aviation Organization whenever appropriate.

Annex 2 to Recommendation 3 (CAeM-XIV)

TERMS OF REFERENCE OF THE COMMISSION FOR AERONAUTICAL METEOROLOGY

The terms of reference of the Commission for Aeronautical Meteorology shall be:

(a) To assist Members in improving delivery of aeronautical meteorological observation and forecast services, and in applying quality standards in line with the requirements of aviation users;

(b) To coordinate development and implementation of aeronautical meteorological services in support of safe and efficient Air Traffic Management, in collaboration with the International Civil Aviation Organization (ICAO);

(c) To assist Members in developing and promoting aeronautical meteorological related climate services in collaboration with the other WMO constituent bodies;

(d) To enhance the capabilities of Members in the provision of aeronautical meteorological warning services to reduce the impacts of hazardous weather on aviation users;

(e) To provide the best available guidance, resource material and coordination for aeronautical meteorological education and training to Members in cooperation with the regional associations, ICAO regional groups and the Education and Training Office of WMO, particularly for those of developing and Least Developed Countries;

(f) To develop and implement, in coordination with regional associations, pilot projects to demonstrate and share best practices for capacity-building of Members in the provision of aeronautical meteorological services and to promote regional cooperation for technology transfer to developing and least developed countries;

(g) To develop guidance material for Members to enhance their management of aviation weather service provision in cooperation with regional associations;

(h) To review existing and emerging user requirements, in cooperation with regional associations, and to develop and update associated regulatory documentation and effective cost recovery mechanisms related to the provision of aeronautical meteorological services in collaboration with the International Civil Aviation Organization.

Annex 3 to Recommendation 3 (CAeM-XIV)

EXPLANATORY TEXT ON THE TERMS OF REFERENCE OF THE COMMISSION FOR AERONAUTICAL METEOROLOGY

The following shows which expected result is contributed to by each of the objectives in the terms of reference of the Commission for Aeronautical Meteorology:

Expected result 1: Enhanced capabilities of Members to deliver and improve access to high-quality weather, climate and water and related environmental predictions, information and services in response to users' needs and to enable their use in decision-making by all relevant societal sectors.

This is contributed to by proposed new terms of reference (a), (b) and (c).

Expected result 2: Enhanced capabilities of Members to reduce risks and potential impacts of hazards caused by weather, climate and water and related environmental elements

This is contributed to by proposed new terms of reference (d) in particular, but also (a) and (b).

Expected result 3: Enhanced capabilities of NMHSs to produce better weather, climate and water and related environmental information, predictions and warnings to support in particular climate impact and adaptation strategies

This is contributed to by proposed new terms of reference (c).

Expected result 6: Enhanced capabilities of NMHSs, in particular in developing and least developed countries, to fulfil their mandates

This is contributed to by proposed new terms of reference (e), (f) and (g).

Expected result 7: New and strengthened partnerships and cooperation activities to improve NMHSs' performance in delivering services and to increase the value of the contributions of WMO within the United Nations system, relevant international conventions and national strategies

This is contributed to by proposed new terms of reference (h).

Recommendation 4 (CAeM)

REVIEW OF RELEVANT RESOLUTIONS OF THE EXECUTIVE COUNCIL BASED ON PREVIOUS RECOMMENDATIONS OF THE COMMISSION FOR AERONAUTICAL METEOROLOGY

THE COMMISSION FOR AERONAUTICAL METEOROLOGY,

Noting with satisfaction the action taken by the Executive Council on the previous recommendations of the Commission for Aeronautical Meteorology or concerning the Commission,

Considering that a number of previous resolutions of the Executive Council are still valid,

Recommends:

(1) That Resolutions 8 (EC-LIX), 7 (EC-LX), 8 (EC-LX) and 9 (EC-LXI) be considered no longer necessary;

(2) That Resolution 16 (EC-LIX) be kept in force.

ANNEXES

ANNEX I
Annex to paragraph 8.40 of the general summary

TERMS OF REFERENCE OF THE INTER-PROGRAMME COORDINATION TEAM ON SPACE WEATHER

The terms of reference of the Inter-Programme Coordination Team on Space Weather shall be as follows:

(a) Standardization and enhancement of Space Weather data exchange and delivery through the WMO Information System;

(b) Harmonized definition of end-products and services, including, for example, quality assurance guidelines and emergency warning procedures, in interaction with aviation and other major application sectors;

(c) Integration of Space Weather observations, through review of space- and surface-based observation requirements, harmonization of sensor specifications, monitoring plans for Space Weather observation;

(d) Encouraging the dialogue between the research and operational Space Weather communities.

ANNEX II
Annex to paragraph 9.2 of the general summary

AERONAUTICAL METEOROLOGY PROGRAMME PLAN 2010–2014

Purpose and scope

The purpose of the Aeronautical Meteorology Programme (AeMP) is to assist Members, through an internationally coordinated programme, in their efforts to further the application of meteorology to meet the evolving needs of aviation. The scope of the programme, in the framework of WMO's role of facilitating international coordination and cooperation, covers improvements to the provision of operational meteorological information required by the aviation industry (including the requirements specified by Technical Regulations [C.3.1]) to ensure the safety, regularity and efficiency of air navigation, and to the provision of meteorological assistance and expertise to non-real time aviation activities.

Main long-term objective

The main long-term objective of the AeMP is to ensure the worldwide, reliable provision of good quality, timely, cost-effective, sustainable and responsive meteorological services to users throughout the world in support of safe, regular, efficient and environmentally sustainable aviation operations.

Identified Top-level Priorities

The Commission considers the following three areas as its top priorities against which success will be measured based on associated Key Performance Indicators (KPI):

- Members' implementation of QMS in compliance with ICAO Annex 3, Amendment 75.
  - KPI: Number of Members compliant.

- Development of a competency framework to assist Members in meeting Aeronautical Meteorological Personnel (AMP) Standards.
  - KPI: Number of Members with AMP Standards implemented.

- Development of a conceptual model for 'NTF' to be provided to the Conjoint WMO/ICAO Meeting for consideration.
  - KPI: Proposal for a new service supported by ICAO and the user community put forward at the ICAO/WMO Conjoint Meeting in 2014.

Implementation activities 2010–2014

The implementation of the programme includes the assisting Members by the following activities:

(a) Education and Training

Activities will include:

- Facilitating compliance with Aeronautical Meteorological Personnel qualification and competency requirements through the provision of training and guidance resources, in collaboration with WMO DRA/ETR department and ICAO;
- Provision and update of reviewed training and resource material on the http://www.caem.wmo.int/moodle Website in multiple languages;
- Provision of experts and expertise to conduct training;
- Secretariat organization and facilitation of training events;
- Provision of guidance on the use and interpretation of existing and developing nowcasting and short-range forecasting techniques and systems for the diagnosis and assessment of aviation impact variables;
- Provision of any required training dealing with new products and services including changes to WAFS products;
- Provision of regional or local training workshops on the implementation of QMS, in conjunction with ICAO;
- Development and implementation of evaluation tools for co-sponsored in-person training both pre- and post-event.

(b) Improved services, governance and partnership

Activities will include:

- Secretariat conducting missions in support of Members experiencing difficulties in areas such as cost recovery, quality management system implementation and modernization of services;
- Assembling and making available information on economic benefits of aeronautical meteorology, e.g. from case studies;
- Assembling and making available information on evaluation of aeronautical meteorological products and services;

- Develop enhanced guidance on aviation weather service management – best management practices in areas such as QMS, cost recovery, customer relations, risk management, performance management, verification, and safety management. Improvement of SIGMET provision;
- Development of WMO methodological guidance for aeronautical forecast verification;
- Revise WMO-No. 49 with a view to make it complementary with ICAO SARPS;
- Support cooperative studies on Aerodrome Meteorological Observation and Forecast with relevant ICAO groups;
- Contribute to design and population of the Country Profile Data Base.

(c) Assist Members in applying new developments in aeronautical meteorological services

Activities will include:

- Assessment and reporting of the impacts of NextGen and SESAR on AeM services;
- Study of services in the field of aeronautical climatology requested by IATA;
- Providing information on value-added services being provided or planned in other Members and the revenue generated by such services;
- Assessing the needs of aviation with respect to Space Weather in conjunction with CBS and ICAO;
- Facilitating access to expertise for advice.

(d) Collaborate with ICAO on the design and assessment of a new terminal weather forecast

Activities will include:

- Development and demonstration of the New Terminal Forecast to Members and ATM;
- Development of Annex 3 model templates for the implementation of services to ATM with a view to worldwide adoption in 2014.

(e) Ensure aeronautical meteorology interests are taken into account and capabilities made available in cross-cutting activities and other constituent bodies of WMO

Activities will include involvement in cross-cutting activities including:

- Quality Management Systems;
- Least Developed Country Programme;
- Natural Disaster Prevention and Mitigation Programme;
- IPY follow-on;
- GEOSS (CBS);
- AMDAR;
- Observations (CBS, CIMO);
- WIGOS (CBS);
- WIS (CBS);
- Codes (CBS);
- Website (Secretariat);
- IPCC;
- Gender Issues;
- Regional Programme;
- Other interactions with technical commissions.

(f) Ensure that WMO Members' interests are represented in ICAO regional planning, study and operations groups

Activities will include:

- Support WMO Secretariat representation on appropriate groups by providing relevant input;
- Advising the WMO Secretariat on issues in relation to ICAO matters, including Annex 3 revision;
- Providing where necessary a Commission advisor to assist the Secretariat representative (e.g., ICAO's Air Navigation Services Economics Panel (ANSEP), and the Committee on Aviation Environmental Protection (CAEP).

(g) Review Members' capabilities for aeronautical meteorological service provision with a view to identifying and quantifying benefits from the AeMP

Reviews will be conducted at least once every two years, possibly through the medium of the developing WMO Country Profile Database capability, in order to:

- Assess progress on the delivery of services;
- Asses progress on the implementation of QMS, etc.;
- Assess existing training activities in order to better target education and training support.

(h) Aviation and climate change

- Provide information on the impacts of aviation on the environment and the potential impacts of climate change on aviation.

Supplementary Funding

Members are encouraged to identify activities within their respective Regions that may be suitable for external funding, either through cost recovery or through other resource mobilization opportunities, such as from Members or global aid programs. Activities with clear safety outcomes are the most likely to attract external funding. Access to external funding will require a good consultative framework with the user community and other stakeholders and the development of detailed and costed project proposals. An example of an activity suitable for external funding may be missions to LDCs to assist in implementation of cost recovery mechanisms and QMS.

APPENDIX

LIST OF PARTICIPANTS

1. Officers of the session

President	Carr McLeod (Canada)
Vice-president	C.M. Shun (Hong Kong, China)

2. Representatives of WMO Members

Argentina	
Antolín Ernesto Moral	Delegate
Armenia	
Levon Levonyan	Delegate
Australia	
Geoffrey Moynihan	Principal Delegate
Michelle Hollister (Ms)	Delegate
Susan O'Rourke (Ms)	Delegate
Austria	
Michael Ableidinger	Delegate
Azerbaijan	
Nazim Huseynov	Delegate
Belgium	
Benny Ooms	Principal Delegate
Bart Nicolai	Delegate
Botswana	
Masego Matlhaga (Ms)	Principal Delegate
British Caribbean Territories	
Glendell De Souza	Principal Delegate
Canada	
Steve Ricketts	Principal Delegate
Kent Johnson	Alternate
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Jiao Meiyan (Ms)	Principal Delegate
Bi Baogui	Alternate
Hu Jiamei (Ms)	Delegate
Jiang Yifang (Ms)	Delegate
Qu Xiaobo	Delegate
Xu Jianliang	Delegate
Zhang Zhongfeng	Delegate
Zhao Surong (Ms)	Delegate
Denmark	
Søren Olufsen	Delegate
Egypt	
Mohamed Nageib M. Salah El-Dein	Principal Delegate
Mohamed Saad M. Ismaeil	Alternate

Finland	
Jukka Julkunen	Delegate
Kari Österberg	Delegate
France	
Stéphanie Desbios (Mrs)	Principal Delegate
Gabon	
Arlette Mackosso (Mrs)	Principal Delegate
Ghana	
Amos Tettey Narh	Delegate
Hong Kong, China	
C.M. Shun	Principal Delegate
C.M. Cheng	Alternate
P.W. Chan	Delegate
P. Cheung	Delegate
B.L. Choy	Delegate
C.Y. Hong	Delegate
C.C. Lam (Ms)	Delegate
Sharon S.Y. Lau (Ms)	Delegate
Olivia S.M. Lee (Ms)	Delegate
L.O. Li	Delegate
P.W. Li	Delegate
C.K. So	Delegate
Sandy M.K. Song (Ms)	Delegate
W.K. Wong	Delegate
Hungary	
Valéria Sándor (Mrs)	Principal Delegate
Iceland	
Theodor F. Hervarsson	Principal Delegate
India	
M.K. Bhatnagar	Principal Delegate
Ireland	
David Murphy	Principal Delegate
Israel	
Nir Stav	Principal Delegate
Italy	
Romito Angelo	Principal Delegate
Japan	
Akira Tabata	Principal Delegate
Jun Ryuzaki	Alternate
Kazakhstan	
Nurlan A. Berdaliyev	Principal Delegate
Bakhijan E. Bishimov	Delegate
Gulsagida M. Jigitcheyeva	Delegate
Libyan Arab Jamahiriya	
Ashur A. Dbaer	Principal Delegate
Luxembourg	
Claude Alesch	Principal Delegate

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António Viseu — Principal Delegate
C. Ku Chi Meng — Delegate

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Che Gayah Ismail — Principal Delegate

Mongolia
Janchiv Enkhbold — Delegate

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Brahim El Messaoudi — Delegate
Abderrahim Mouhtadi — Delegate

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John Heijnen — Alternate

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Matthew Ruglys — Alternate

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Abubakr Baqazi — Delegate
Badee Khayyat — Delegate

Serbia
Predrag Petković — Delegate

Singapore
Chin Ling Wong — Principal Delegate
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Shakeer Baig Principal Delegate

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Faruk İpek Delegate

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Faith Chiramba (Ms) Alternate

3. President of technical commission

Fredrick Branski President, Commission for Basic Systems

4. Scientific lecturers

Neil Gordon
Julian Hunt

5. Representatives of international organizations

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Jean-Paul Makosso
Siméon Zoumara

Network of European Meteorological Services (EUMETNET)
Doug W. Johnson

European Organization for the Safety of Air Navigation (Eurocontrol)
Kenneth Reid

International Air Transport Association (IATA)
Anthony Houston

International Civil Aviation Organization (ICAO)
O. Turpeinen

International Federation of Air Line Pilots' Associations (IFALPA)
Brian J. Greeves

International Federation of Air Traffic Controllers' Associations (IFATCA)
Philip Parker

6. Other participants

Dorinel Visoiu (Romania)
Abdul W.A. Samad Al Hammadi (United Arab Emirates)

7. WMO Secretariat

Michel Jarraud
Geoffrey B. Love
Herbert Puempel
Jeff Wilson
Scylla Sillayo
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