World Meteorological Organization **XIV-RA II/INF. 7**
REGIONAL ASSOCIATION II (ASIA)

Date: 2.XII.2008

FOURTEENTH SESSION
Tashkent, Uzbekistan
5 to 11 December 2008 Original language: English

Report of the Rapporteur on Regional Aspects of the Aeronautical Meteorology Programme in Region II

C.M. SHUN
Hong Kong, China

1. Background

1.1 This report is submitted by Mr C.M. Shun of Hong Kong, China, vice-president of the Commission for Aeronautical Meteorology (CAeM), who is also the RA II Rapporteur on Regional Aspects of the Aeronautical Meteorology Programme. It highlights a number of very important issues on AeM which need the urgent attention of Members in the Region.

1.2 Under the new structure of CAeM established by its thirteenth session in 2006, three Expert Teams, one on Education and Training (ET/ET), one on Customer Relations (ET/CR), and one on the New Terminal Weather Forecast (ET/NTF), were set up to focus on AeM activities that were not duplicated by any other WMO constituent body. In addition, an Expert Network (EN) is coordinated by a chair and vice-chair, coordinating the responses to requests by Members, partner organizations and users for all matters not covered by the Expert Teams. The president of CAeM has also taken on the responsibility of coordinating cross-cutting activities, while the vice-president has taken on the role as an advice-provider to Members and user organizations requesting information.

2. Quality Management System for Aeronautical Meteorological Services

2.1 The ICAO requirement for the implementation of a Quality Management System for meteorological services to aviation is described in Doc. 6 on Emerging Issues and Specific Challenges. The following paragraph only highlight activities of the AeMP in the Region destined to help Members in fulfilling these requirements.

2.2 To further assist developing and least developed countries to meet the QMS standards, a number of seminars had been organized, including the *WMO Seminar on Quality Management in the Provision of Meteorological Services to Aviation* held in Hong Kong, China, 22-25 November 2005, and the *ICAO/WMO Seminar on Quality Management for Aeronautical Meteorological Services* held in Nairobi, Kenya, 17-19 May 2006. A QMS pilot project is also being implemented in the Tanzania Meteorological Agency with the objective that the documentation developed during that process would be shared with other developing countries with a view to facilitating and expediting QMS implementation.

3. Training and WMO-No. 258

3.1 The meeting is invited to note the issues stemming from the application of WMO-No. 258 Supplement No.1 to personnel working in the service of aviation, which are again given in Doc. 6.

3.2 As part of the AeMP efforts in supporting Members to train their staff to the required skill and competence, and in line with the provisions made in WMO-No. 258 and its Supplement No.1, the CAeM ET/ET is tasked to provide access to the best available aeronautical training and guidance material sourced from around the world. These resources can be found at the CAeM training Website at http://www.caem.wmo.int/moodle/ and ET/ET would encourage all RA II Members to utilize and advertise this site as widely as possible. The materials are primarily in English although there is a French section and there are plans to also source some Spanish language resources through the U.S. COMET Program.

3.3 At the April 2008 ET/ET meeting at the South African Weather Service HQ in Pretoria, the team agreed on the importance of encouraging greater regional involvement in helping to achieve the team's objectives. Mr Chris Webster of the New Zealand Met Service, acting core member of the team, has been assigned responsibility for coordinating input from RA II so in addition to advertising the CAeM training Website, the team would also like to invite Members to submit the following for potential inclusion on the Website:

- Aviation meteorology training materials e.g. presentations, papers, web-links etc.;
- Aviation weather related case studies.

Please submit any resources that you may have to Mr Webster at chris.webster@metservice.com.

4. Pilot Projects in RA II

4.1 The following two pilot projects on AeM were established for RA II in 2004 and 2006 respectively:

(a) RA II Pilot Project to Develop Support for Developing Countries in AeMP established by the thirteenth session of the RA II in 2004, with a Website for the pilot project (http://www.aamets.org/) set up by China for semi-operational use by RA II Members in March 2007;

(b) CAeM Pilot Project on Aviation-weather Disaster Risk Reduction (ADRR) established by the thirteenth session of the CAeM in 2006, with a Website for the pilot project (http://www.adrr.weather.gov.hk/) set up by Hong Kong, China in September 2007 for access by aviation stakeholders and Members for evaluation and decision-making.

The progress of these pilot projects are presented in the following paragraphs, based on inputs from the project coordinators.

Pilot Project to Develop Support for Developing Countries in Aeronautical Meteorology Programme

4.2 The Pilot Project to Develop Support for Developing Countries in Aeronautical Meteorology Programme aims at developing and producing numerical weather guidance products helpful to aviation weather service and suited to the circumstances of the developing countries in the Region. The pilot project is steered by a Coordination Group comprising experts from participating Members, with Ms Jiao Meiyan of China serving as coordinator. Representatives of ICAO and the two World Area Forecast Centres (WAFCs) also participated as observers. Ten RA II Members participated in the project: Cambodia, China, Hong Kong – China, Islamic Republic of Iran, Japan, Lao People's Democratic Republic, Mongolia, Myanmar, Nepal, and Yemen.

4.3 From project inception in December 2004 to early April 2005, a list of the guidance products proposed to be made available for the Pilot Project was drawn up in consultation with members of the Coordination Group. On 1 August 2005, a test version of the Pilot Project Website providing a suite of guidance products of numerical model output was launched by the China Meteorological Administration (CMA), in collaboration with the Meteorological Division of the Civil Aviation Administration of China (CAAC), for trial use and review by members of the Coordination

Group. After refining the guidance products based on feedback from the Coordination Group, the Pilot Project Website (http://www.aamets.org/) became semi-operational on 6 March 2007.

4.4 To facilitate the use of the guidance products on the Pilot Project Website, a VCP training seminar was organized by CMA in collaboration with CAAC in Beijing, China during 6-8 March 2007. Financial assistance was provided by China and WMO for participants in need. Participants from 10 RA II Members (Cambodia, Kazakhstan, Lao People's Democratic Republic, Maldives, Myanmar, Nepal, Pakistan, Russian Federation, Sri Lanka, and Thailand) attended the seminar. China, Hong Kong – China, Japan, UK, ICAO and WMO provided lecturers for the seminar. The progress of the Pilot Project was also presented at the ICAO Asia/Pacific SIGMET Seminar held in Bangkok, 11-13 July 2007, which was attended by participants from 16 Asia/Pacific Member countries and IATA.

4.5 In 2008, the Pilot Project Website was enhanced with the following products:

(a) Selected SIGWX forecast charts from the World Area Forecast System (WAFS);
(b) Monthly performance indicators of the NWP guidance;
(c) Additional weather radar composites over various regions of China; and
(d) Fog and cloud classification products based on the FY-2C and FY-2D geostationary meteorological satellites.

A list of the guidance products currently available on the Pilot Project Website is given in Annex I.

4.6 Furthermore, at the request by Lao People's Democratic Republic, additional guidance was provided on the preparation of TAF for four airports (Vientiane, Luangprabang, Pakse and Savannakhet). TAF guidance products based on model output statistics (MOS) of the operational global NWP system of CMA was generated from historical meteorological data provided by the Department of Meteorology and Hydrology of Lao People's Democratic Republic. In August 2008, the guidance products became available on the Pilot Project Website for use by Lao People's Democratic Republic. Similar technical assistance could be extended to the other LDCs.

4.7. In the coming year, the following enhancements of the RA II Pilot Project Website are planned:

(a) Upgrade the guidance products using the new operational global T639 NWP system of CMA and introduce tropical cyclone NWP ensemble forecast products;
(b) Introduce new aeronautical meteorological products such as monitoring of visibility, high wind and tropical cyclone, and display of AMDAR data;
(c) Enhance aeronautical meteorological warning products including new SIGMET guidance, improved forecasting techniques for icing and turbulence, and route-specific forecasts of aeronautical meteorological elements;
(d) Extend the coverage of the duststorm, fog and cloud classification products;
(e) Further improve the user-friendliness, product display and response time of the Website;
(f) Add user feedback mechanisms including discussion forum on the Website.

CAeM Pilot Project on Aviation-weather Disaster Risk Reduction (ADRR)

4.8 The CAeM Pilot Project on Aviation-weather Disaster Risk Reduction (ADRR) aims at assisting NMHSs in RA II in disaster risk reduction and to facilitate aviation stakeholders in their operational planning and decision-making. The Pilot Project was undertaken by the Hong Kong Observatory (HKO), other interested Members in the Region, airlines, ICAO and the WMO secretariat to study:

(a) The feasibility of providing on an operational basis aviation weather forecasts and warnings in particular for severe convection, floods and tropical cyclones in close cooperation with all aviation stakeholders;
(b) The skill of such forecasts and warnings for 24-48 hours ahead;
(c) The benefits to aviation in particular and in general to the population in the regions affected by natural disasters.

4.9 After project inception in December 2006, HKO interacted with local users and reviewed previous weather disasters affecting airport operations. This revealed that the tropical cyclone was the most dominating weather bringing economic loss to flight operations at the Hong Kong International Airport (HKIA). The Pilot Project therefore focused on the tropical cyclone initially. In early 2007, HKO developed the project outline and obtained support and feedback from local airlines, pilots, airport authority, civil aviation authority and the government search and rescue organization.

4.10 Based on the user's feedback, a website (http://adrr.weather.gov.hk) was launched by HKO in September 2007 for trial use and evaluation by Members in RA II and local aviation users. The Website contained the following products:

(a) Tropical cyclone warnings issued by weather services in China, Hong Kong - China, Japan and the Philippines;
(b) Advisories/warnings issued by the Tropical Cyclone Advisory Centre of Japan and the Joint Typhoon Warning Centre of USA;
(c) NWP forecasts of the European Centre for Medium-Range Weather Forecasts (ECMWF) and China Meteorological Administration (CMA) including ensemble products;
(d) Satellite imageries; and
(e) SIGMET and advisories.

To demonstrate how the products could be utilized for operational decision-making by aviation users at an airport, the following weather information for HKIA was also included on the Website:

(f) Weather Summary for HKIA;
(g) Take-off forecast for HKIA; and
(h) Weather information of HKIA alternates.

4.11 In mid-2008, the products on the ADRR Website were also made available on the CAeM ET/NTF website (see para. 5.2 below) to demonstrate the potential use of the extended 24-48 hour forecasts of tropical cyclones in the New Terminal Forecast (NTF) initiative. In the third quarter of 2008, a survey was conducted jointly with WMO through the use of web-based questionnaire (see Annex II) to collect feedback from Members and aviation users so that further enhancements and improvement could be pursued prior the full operational use of the Pilot Project website. A total of 29 completed questionnaires from 28 organizations were received (6 WMO Members, 22 aviation users including airlines, airport management, civil aviation authority, and search and rescue organization). The results are summarized below:

(a) 68% rated the performance of the products as 'good' (the other categories being 'acceptable' (29%) and 'improvement required' (3%));
(b) 57% considered the products provided good benefits to aviation, and in general to the population in the regions affected by natural disasters;
(c) 96% considered the 24-48 hour forecast as good or acceptable, with the 0-24 hour forecasts receiving more 'good' ratings (78%) than the 24-48 hour forecasts (48%); and
(d) Among the potential enhancements, the highest priority was given to the addition of forecasts for other hazardous weather such as heavy rain (89%), addition of strike probability ensemble forecasts from other meteorological centers (54%) and extension of forecast area to the entire Western North Pacific Ocean (32%).

4.12 Apart from the above indicators, the feedback from the aviation users was generally positive. For example, an IFALPA representative commented that “I think that this is extremely helpful for planning purposes and enabling crews to avoid, as far as possible, typhoon areas in flight and providing essential information on the typhoons that may be affecting (or about to affect) destination or alternate airports”, whereas an IATA representative responded that “I am very happy with the information and presentation of the ADRR products, particularly the Weather Summary for HKIA”. Other user’s feedback pertains to enhancing the presentation of products, coverage, resolution and accuracy of the forecasts, as well as including products from other centres.

4.13 From the above survey results, it is apparent that the ADRR Pilot Project is considered beneficial to aviation, and in general to the population in the regions affected by natural disasters. The skill of the tropical cyclone forecasts and warnings for 24-48 hours ahead available on the Pilot Project Website is also considered good or acceptable. Enhancements to the Website will be considered for implementation in the coming year based on the user’s feedback. Following the plan of the Pilot Project, with support of WMO and the regional association, training and documentation to share best practices with Members will be arranged with a view to extending the Pilot Project to other airports in the Region.

5. Regional Cooperation in RA II

5.1 The good progress of the pilot projects and favourable feedback from the users demonstrate that regional cooperation will be the way to go in building the capacities of NMHSs in the provision of AeM services in the Region. In particular, the provision of technical assistance on the preparation of TAF for four airports of Lao People's Democratic Republic based on model output statistics (MOS) and historical meteorological data provided by the Department of Meteorology and Hydrology of Lao People's Democratic Republic sets a very good model to build on.

5.2 Growing needs for new and improved products for aviation and air traffic management (ATM) resulted from the demand to improve safety in rapidly increasing air traffic and also from the demand for more efficient air traffic operations in all parts of the world, while limiting the effects of aviation on the environment. In this connection, ICAO and several national and regional air traffic authorities and projects, for example US NextGen and the European Single European Sky ATM Research, sought to restructure and extend services to aviation on a sub-regional basis. The long-standing plan of migration of the traditional alphanumeric codes for aeronautical purposes to the table driven code (BUFR) is also being reviewed by CBS and CAeM in coordination with ICAO, to take into consideration the needs of the aviation industry in the transition from Aeronautical Information Service (AIS) to Aeronautical Information Management (AIM) in which other codes are being considered, e.g. XML, WXXM, etc. Within the CAeM, ET/NTF is focusing on developing new terminal forecast products which could be provided by NMHSs to support more efficient ATM and decision-making by aviation stakeholders. Prototype products are already available for evaluation by aviation users on a web-based platform established by Hong Kong, China for the Expert Team (http://www.ntf.weather.gov.hk/).

5.3 At the same time, in response to the long-standing deficiencies of a number of Meteorological Watch Offices (MWOs) in the provision of SIGMET in the Region, ICAO is studying the re-structuring of the provision of SIGMET by regional or international centres to overcome these deficiencies. In the light of the regional cooperation demonstrated by the RA II Pilot Project to Develop Support for Developing Countries in AeMP, the model of provision of technical assistance to developing countries through cooperation and collaboration between neighbouring countries, on a regional or sub-regional level, should be extended to address this and similar issues without delay.

5.4 The above developments would have an impact on the role of NMHSs of individual countries in delivering AeM services and also possibly on the budget of the NMHSs, as aviation services were an important part of the services they delivered. That meant that maintaining that service could be critical for many NMHSs to the upkeep of their overall meteorological infrastructure.

5.5 With the above in mind, Cg-XV passed Resolution 17 (Cg-XV) – Aeronautical Meteorology Programme in May 2007, requesting presidents of regional associations to create regional groups to deal specifically with services to aviation in each Region. In the CAeM, we believe this step is crucial to the continuing provision of service to aviation interests and the president of CAeM had sent a letter to the president of RA II in late 2007 on the establishment of a AeM regional group in RA II, with the possibility of it being a joint group with RA V noting the need for this regional group to maintain very close coordination with its counterpart under the Asia/Pacific Region of ICAO. The draft Terms of Reference of this AeM regional group can be found in Annex III.

6. Cost Recovery

6.1 The 2008 Survey on the Basic Capability of NMSs in RA II carried out in January–May 2008 has revealed that cost recovery is implemented by aeronautical meteorological services in less than one third of the Members of RA II. The availability of the updated version of WMO-No. 904 *Guide on Aeronautical Meteorological Services Cost Recovery – Principles and Guidance,* finalized by the ET/CR, will greatly help Members in pursuing cost recovery for their aeronautical. Meteorological services. The ET/CR would continue to give every possible support to Members in their quest for cost recovery.

6.2 Member should note that cost recovery would be particularly instrumental in supporting the establishment of QMS for aeronautical meteorological services (see para. 2 above) and training activities in the field of aeronautical meteorology, in particular when conducted in cooperation with ICAO, which are fully eligible for cost recovery. Provisions for the latter should be considered by Members in the process of negotiating a cost recovery mechanism noting the currently very small WMO budget in aeronautical meteorological training.

Annexes: 3

_____

Annex I

List of Guidance Products Available on RA II Pilot Project Website (www.aamets.org)

Product Type	**Product Name**
Flight Meteorological Documentation	Significant Weather Forecasts
	Upper Wind & Temperature
	Aeronautical Meteorology Reports
Aeronautical Forecast Products	Icing and Turbulence
	Tropopause Height and Temp
	Maximum Wind Height and Temperature
	0°C Height
Guidance Material for TAF	Official City Forecasts
	Guidance Material
	Guidance Material for Laos
Convective Parameter	Convective Parameters
	Relative Humidity
Synoptic Analysis	Surface Weather Map Analysis
	Upper-air Weather Map Analysis
Dust storm	Dust-storm Monitoring
	Dust-storm Forecast
Radar Image	China
	Northeast China
	North China
	Northwest China
	Hong Kong
	Bei Jing (China)
	Shang Hai (China)
	Zhen Zhou (China)
	Guang Zhou (China)
	Urumchi (China)
	Japan
	Korea
	Thailand
Satellite Image	Infrared
	Visible
	Water－Vapour
	Satellite－derived Wind
	Heavy fog monitoring
	Dust-storm monitoring
	Cloud classification
Monthly RMSE of T213	Temperature 24h Forecast (250hPa)
	Wind 24h Forecast (250hPa)

Annex II

Survey on WMO CAeM Pilot Project
"Aviation-weather Disaster Risk Reduction" (ADRR) Website

Survey Items	Information/ products useful? G = good A = acceptable I = improvement required			Remarks or areas for improvement (*please provide details below*)
1. Overall quality of the TC forecasts				
(a) presentation aspects (e.g. colour, legibility)				
i. "TC forecast track"	□ G	□ A	□ I	
ii. "Objective Forecast"	□ G	□ A	□ I	
(b) forecast area – currently between 10-30N 105-125E	□ G	□ A	□ I	
2. Skill of the TC forecasts for:				
i. 0-24 hr ahead	□ G	□ A	□ I	
ii. 24-48 hours ahead	□ G	□ A	□ I	
3. Usefulness of the other products				
i. HKIA weather summary	□ G	□ A	□ I	
ii. HKIA alternates	□ G	□ A	□ I	
iii. Takeoff forecasts (HKIA)	□ G	□ A	□ I	
iv. SIGMET/Advisories	□ G	□ A	□ I	
v. Satellite pictures	□ G	□ A	□ I	
4. Timeliness of products	□ G	□ A	□ I	
5. User friendliness of web interface for access of information	□ G	□ A	□ I	
6. (a) Overall benefits of website to:				
i. flight planning	□ G	□ A	□ I	
ii. aviation risk reduction	□ G	□ A	□ I	
6. (b) How is the information being used by your organization, e.g. in decision-making related to runway changes, crosswind landing minima, etc?				
7. Overall benefits to aviation in particular, and in general to the population in the regions affected by natural disasters	□ G	□ A	□ I	

8. Priority on possible enhancements to the website:	High	Mid	Low	Suggestions of other enhancements:
i. extension of forecast area to the entire Western North Pacific Ocean	□	□	□	
ii. extension of forecast area to the Bay Of Bengal and the Arabian Sea	□	□	□	
iii. addition of strike probability ensemble forecasts from other meteorological centres	□	□	□	
iv. addition of forecasts for other hazardous weather, e.g. severe convection, heavy rain, flooding	□	□	□	
9. Other comments/ suggestions on the pilot project				

Annex III

WORLD METEOROLOGICAL ORGANIZATION
==========

CAeM MANAGEMENT GROUP

(Paris, France, 8-12 October 2007)

_____

AeM Regional Group

Terms of Reference

1. Study new and evolving user requirements in aeronautical meteorological services in the region;

2. Perform gap analysis between the user requirements and current capabilities of Members providing aeronautical met services in the region, and identify deficiencies and shortcomings;

3. Develop regional strategies to respond to these requirements, including the future MET support for global ATM and Collaborative Decision Making, keeping in view of the development of NextGen and SESAR;

4. Enhance cooperation among Members at regional and sub-regional levels in training, building of sustainable capacity, providing assistance to Members and foster technical cooperation to overcome deficiencies and seek enhancements; identify ways to facilitate sharing of information among Members in the region;

5. Coordinate with (relevant) PIRG and aviation stakeholders to develop the implementation plans for aeronautical meteorology and assist in their implementation in the region;

6. Report progress and issues to the Regional Associations and the Management Group of CAeM;

7. Address the issues of funding for regional activities and identify relevant sources.

_____