



WORLD CLIMATE PROGRAMME

WORLD CLIMATE APPLICATIONS AND SERVICES PROGRAMME

REPORT OF THE MEETING OF THE WORKING GROUP ON CLIMATE-RELATED MATTERS FOR REGIONAL ASSOCIATION II (RA II WGRM)

(Tokyo, Japan, 7 – 8 August 2008)

WCASP - No. 76

WMO-TD No. 1470

**WORLD METEOROLOGICAL ORGANIZATION
August 2008**

The **World Climate Programme (WCP)** implemented by WMO in conjunction with other international organizations consists of the following major components:

- World Climate Data and Monitoring Programme (WCDMP)
- World Climate Applications and Services Programme (WCASP)
- World Climate Impact Assessment and Response Strategies Programme (WCIRP)
- Coordination activities within the Climate Agenda (CCA)
- World Climate Research Programme (WCRP)
- Intergovernmental Panel on Climate Change (IPCC)
- Global Climate Observing System (GCOS)

World Meteorological Organization
7bis, av. de la Paix
Case postale 2300
CH 1211 Geneva
Switzerland

Telephone : +41 (0) 22 730 81 11
Telefax : +41 (0) 22 730 81 81
Email: wmo@wmo.int

NOTE

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the World Meteorological Organization concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Editorial Note: This report has for the greater part been produced without editorial revision by the WMO Secretariat. It is not an official publication and its distribution in this form does not imply endorsement by the Organization of the ideas expressed.

**REPORT OF THE MEETING OF
THE WORKING GROUP ON CLIMATE-RELATED MATTERS FOR
REGIONAL ASSOCIATION II
(RA II WGRM)**

(Tokyo, Japan, 7 – 8 August 2008)

WCASP - No. 76

WMO-TD No. 1470

**WORLD METEOROLOGICAL ORGANIZATION
August 2008**

TABLE OF CONTENTS

SUMMARY	i
1. Opening of the Meeting	1
2. Organizational Matters	1
3. Progress Reports of WGCRM	2
3.1 Report by the Chair of WGCRM	2
3.2 Reports by the Rapporteurs	2
4. Regional Climate Centres (RCCs)	3
5. Other climate-related matters in RA II and way forward	6
6. Report to the fourteenth session of Regional Association II (XIV-RA II)	7
7. Other Business	8
8. Recommendations	9
9. Closure of the Meeting.....	9

ANNEXES:

Annex I	-	Agenda
Annex II	-	List of Participants
Annex III	-	Opening Address, Dr Tetsu Hiraki, Permanent Representative of Japan with WMO and Director-General of the Japan Meteorological Agency
Annex IV	-	Report of the Chair of the Ra II Working Group on Climate-Related Matters
Annex V	-	Report of the Rapporteur on Regional Climate Observing Network, Including Liaison with CBS and GCOS
Annex VI	-	Report of the Rapporteur on Regional Climate Data Management, including Data Rescue
Annex VII	-	Report on Regional Climate Applications in Ra II
Annex VIII	-	Climate Information and Prediction Services (CLIPS) and Predictive Capability
Annex IX	-	Report of the Rapporteur on Climate Change Issues, including UNFCCC
Annex X	-	Progress in the Establishment of RCCs
Annex XI	-	Summary Report on the Activities for the Implementation of the RA-II RCC Network
Annex XII	-	Progress Report of Beijing Climate Center (BCC)
Annex XIII	-	Activity Report of the Tokyo Climate Center (TCC)
Annex XIV	-	Application of India Meteorological Department for RCC Designation: Present Status and Future Plan
Annex XV	-	Application of the Mashhad Climate Center (MCC) for RCC Designation: Present Status and Future Plans
Annex XVI	-	Application of North Eurasia Regional Climate Centre for RCC Designation: Present Status and Future Plans
Annex XVII	-	Regional Climate Outlook Forum Activities in RA II

SUMMARY

A meeting of the Regional Association II (RA II) Working Group on Climate-Related Matters (WGCRM) was held from 7 to 8 August 2008 at Japan Meteorological Agency (JMA) Headquarters, Tokyo, Japan. The meeting was formally opened by Dr T Hiraki, Director-General, JMA, and Permanent Representative of Japan with WMO. As Dr G Zheng (China), Chair, RA II WGCRM, was unable to attend this meeting, at his request, the meeting was chaired by the Vice-Chair of RA II WGCRM, Dr K Kurihara (Japan). The meeting was attended by all the rapporteurs of the WGCRM or their representatives, invited experts from JMA and WMO Secretariat.

The meeting reviewed the work done by RA II WGCRM during the current inter-sessional period, including the implementation of the pilot phase of the establishment of Regional Climate Centre (RCC) network in RA II. China and Japan have already been implementing pilot phases of RCCs for RA II, and have also been collaborating on the development of a joint RCC Network web site as recommended earlier by the RA II WGCRM. The present meeting considered the reports of the two pilot RCCs as well as their joint web site. The Working Group expressed its appreciation of the efforts of China and Japan in their pilot RCC operations as well as their joint web site, and made a number of suggestions for further improvement. The Working Group was apprised by WMO Secretariat of the latest status on the designation process of RCCs, which is expected to be formally approved during the Sixty-first Session of WMO Executive Council in June 2009. The Working Group considered three new applications for RCC designation, from India, Islamic Republic of Iran and Russian Federation and invited them to join the pilot phase of the RCC network in RA II and demonstrate their capabilities to function as RCCs. The Working Group agreed that further assessment of their meeting the RCC designation criteria may be made based on their operations in the pilot phase. The Working Group also agreed that the latest WMO Interim Guidance should be followed more systematically hereafter in dealing with the designation of RCCs in the Region. The Working Group made a number of suggestions to ensure effective usage of the products and services provided by the RA II RCC network.

The meeting considered the progress reports by the various rapporteurs of WGCRM, viz., Regional Climate Observing Networks, Regional Climate Data Management, Regional Climate Applications, Climate Information and Prediction Services (CLIPS) project, Climate Change issues and RCCs. While the Working Group appreciated the ongoing activities on these aspects in the Region, the members felt that additional efforts need to be made to obtain inputs from all the Members to prepare more comprehensive summaries of the activities. For this purpose, the Working Group urged all Members to regularly provide information on their activities relevant to climate related matters, preferably through their respective web sites. The Working Group urged WMO Secretariat to facilitate this process. The Working Group appreciated the efforts of CMA in sustaining the activities of FOCRA II, and agreed that sub-regional RCOFs may also be encouraged to target different sub-regions having similar climate information/outlook needs. The Working Group agreed that opportunities for capacity building may be collected and disseminated in an appropriate manner. The Working Group recognized the need to develop useful climate data products for RA II, including aspects of data rescue, and endorsed a workshop-based approach at which individual Members can use common standard software on their data. The Working Group emphasized the need to produce climate prediction and monitoring products in a user-friendly manner, and the importance of extended range sub-seasonal prediction. The Working Group noted the importance of the forthcoming World Climate Conference-3 (WCC-3), and encouraged all Members of RA II to actively contribute to its success.

1. Opening of the Meeting

1.1 The Meeting of the Working Group on Climate-Related Matters for Regional Association II (RA II WGCRM) opened at 10:00 AM on Monday 7 August 2008 at Japan Meteorological Agency (JMA) Headquarters, Tokyo, Japan. The list of participants is provided in Annex I. Based on the suggestions from the Permanent Representatives of the respective countries with WMO, the alternate experts from China, India, Republic of Korea and Russian Federation attended the meeting representing the original members of RA II WGCRM.

1.2 The meeting formally opened with a welcome address by Dr T Hiraki, Director-General, JMA, and Permanent Representative of Japan with WMO. Dr Hiraki welcomed the participants on behalf of JMA, and thanked the WMO Secretariat for the preparatory work for the meeting. He highlighted the fact that the climate-related issue now attracts much attention worldwide and that National Meteorological and Hydrological Services (NMHSs) are increasingly required to meet social and economic demands for climate-related services. He recalled that significant progress has been made in climate-related activities in RA II, particularly, in the development of the activities of the Regional Climate Center (RCC) Network. He also noted that a number of seminars and workshops have been held in this Region which have contributed to capacity building in climate-related activities. He expressed his hope that the two-day meeting would be successful and fruitful with the support of the participants. Full text of Dr Hiraki's address is provided in Annex II.

1.3 Dr T Toya, Regional Director for Asia and the South-West Pacific, on behalf of Mr M Jarraud, Secretary-General, also welcomed participants and expressed his appreciation and gratitude to Dr T Hiraki, Permanent Representative of Japan with WMO, for hosting the session in Tokyo and for the warm hospitality and excellent arrangements made for the meeting. He extended his gratitude to Japan for its substantial contribution to the Regional Climate Centre (RCC) network in RA II in collaboration with China, and for its generous financial commitment to the World Climate Conference-3 (WCC-3). He also expressed his deep appreciation to Dr G Zheng and Dr K Kurihara, Chair and Vice-Chair, and rapporteurs of the Working Group, for their considerable contributions to the work of the Working Group, in particular in the Regional Climate Centre (RCC) matter. He acknowledged the fact that RA II has always been in the forefront of the development of the RCC network. With reference to the WMO Strategic Plan for 2008-2011 and current RA II Regional Strategic Plans, he expressed his confidence that the outcomes of the session would be of significant input to the updating and revising of the climate-related component of the Strategic Plan for the Enhancement of NMSs in RA II (Asia) and more efficient and cost-effective organization of the fourteenth session of Regional Association II (Asia).

2. Organizational Matters

2.1 As Dr Zheng, Chair, RA II WGCRM, was unable to attend this meeting due to pressing work related to the 2008 Olympic Games at Beijing, China, at his request, the meeting was chaired by the Vice-Chair of RA II WGCRM, Dr Kurihara of Japan. The Chairman made brief introductory remarks concerning the meeting. The Chairman then invited the participants to make brief self-introductions.

2.2 The Chairman invited the members to consider the provisional agenda (see Annex III) with a view to agree to its adoption with suggestions for changes, if any. The Working Group adopted the agenda without any changes, noting that the reports by some of the members would be presented by the respective alternates. It was agreed that Dr R Kolli of WMO Secretariat would act as the rapporteur for the meeting, and assist in the preparation of the draft report.

3. Progress Reports of WGCRM

Report by the Chair of WGCRM

3.1 On behalf of the Chair, RA II WGCRM, Dr Kurihara, Vice Chair and Chairman of the present meeting, presented a report of the activities of the Working Group (see Annex IV), providing an overall perspective of the work done in relation to the assigned Terms of Reference. He expressed his satisfaction that all the WG members or their alternative representatives were present at this meeting, providing strong support to the activities of the Working Group. He made a special mention of the cooperative development of the RA II RCC Network web site by the Beijing Climate Center (BCC) and the Tokyo Climate Center (TCC) and appreciated the collaborative efforts of Dr Yan Yuping of BCC and Ms Kumi Hayashi of TCC in this regard. He also informed the members about the applications from India, Islamic Republic of Iran and the Russian Federation seeking designation of their centres as RCCs. The Chairman apprised the members concerning the decisions of the 60th Session of the WMO Executive Council (EC-LX) relevant to the Working Group. He indicated that the major issues for discussion at this meeting would be consideration of the reports of the rapporteurs of RA II WGCRM, and the RCC issues including the new applications forwarded by RA II president. The report was then briefly discussed by the participants. Mr Rahimi informed the members that Islamic Republic of Iran Meteorological Organization (IRIMO) organized three regional climate change conferences and is going to organize the forth conference in 2009. Dr Yun apprised the members about the training courses organized under the auspices of the Asia-Pacific Climate Center (APCC). The Working Group agreed that all such information may be regularly collected and displayed on RA II RCC Network web site.

Reports by the Rapporteurs

3.2 The different rapporteurs of the Working Group, responsible for specific aspects as outlined in its Terms of Reference, presented their reports of the relevant activities in RA II. The Rapporteur on Implementation of RCCs will, however, presented his report under Agenda Item 4. Each of the reports was discussed by the meeting to identify the achievements, outstanding issues, and related inputs to the Working Group's report to the RA II session.

Report of the Rapporteur on Regional Climate Observing Networks, including liaison with CBS and GCOS

3.2.1 The concerned rapporteur, Mr Liu Wenquan (China), could not attend due to other preoccupations, and submitted his report via email (see Annex V). Mr Jun Yu, representing this rapporteur, presented the salient features of the report. He pointed out that the poor response to the questionnaire sent out to RA II Members to learn and understand the progress of climate observing system in RA II and suggested that further attempts should be made to pursue the matter. Mr Rahimi expressed interest in GCOS regional sessions and requested additional information in that regard. The WG requested WMO Secretariat to facilitate consideration of RA II concerns on GCOS implementation at the forthcoming GCOS-SC meeting in October 2008.

Report of the Rapporteur on Regional Climate Data Management, including data rescue

3.2.2 The concerned rapporteur, Dr G. Srinivasan (India), could not attend due to other preoccupations, and has submitted his report (Annex VI) via email. Dr D S Pai, attending on his behalf, presented the salient features of the report. Dr Pai noted that the report is based primarily on the activities of CMA, JMA and IMD. The members agreed that adequate information is not available on data rescue efforts in RA II. CMA representatives at the

meeting agreed to update their contribution on data rescue. The meeting called for a coordinated approach to handle data management in RA II, which can form part of the priorities for the RCC network under development in the Region. Recognizing that digitizing climate data is a very difficult task, the members expressed the need for development of well-targeted projects on data rescue among countries similar to that being developed for the Mediterranean countries (e.g., MEDARE).

Report of the Rapporteur on Regional Climate Applications

3.2.3 The concerned rapporteur, Mr Sungdae Kang (Republic of Korea), could not attend due to other preoccupations. Dr Won-tae Yun, attending on his behalf, introduced the report (Annex VII), and apprised the members about the technical aspects of the multi-model ensemble (MME) approach. The members appreciated the considerable contributions from APCC in this area as highlighted by him, but suggested that the work done by the NMHSs of RA II needs to be adequately emphasized.

Report of the Rapporteur on CLIPS and Predictive Capability

3.2.4 The concerned rapporteur, Mr Roman Vilfand (Russian Federation), could not attend due to other preoccupations. Dr Vladimir Kryjov, attending on his behalf, presented the salient features of the report. Dr Kryjov mentioned that he received very limited inputs from countries for his report, and requested the cooperation of the members to facilitate additional inputs for this report. He offered to continue seeking inputs from various CLIPS Focal Points, and provide an updated version (Annex VIII) during the course of the preparation of the draft report of the meeting.

Report of the Rapporteur on Climate Change Issues, including UNFCCC

3.2.5 The concerned rapporteur, Mr M. Rahimi (Islamic Republic of Iran), presented the salient features of his report. Members appreciated the comprehensive nature of the report, but suggested that the report may be revised to ensure that the names of the countries are formally mentioned as per WMO norms. Members also suggested that the contributions of the NMHSs in RA II to the UNFCCC processes may be highlighted. Mr Rahimi said that he based his report mainly on the recently released Fourth Assessment Reports (AR4) of the Intergovernmental Panel on Climate Change (IPCC) and agreed to revise the report to reflect the members' concerns and submit to WMO Secretariat for inclusion in the final report (see Annex IX).

3.2.6 The Chair invited members for additional comments or questions pertaining to the reports of rapporteurs in general. The members expressed concern at the lack of inputs from several Members into the reports of the rapporteurs, due to which the reports could not cover the Region in a comprehensive manner. The Working Group agreed that the RA II president may be approached to facilitate a better way of obtaining Members' inputs for the reports. It was also suggested that all RA II Members may be requested to display on their respective web sites updated information on the activities relevant to the subject matters of the rapporteurs in a regular manner, so that the rapporteurs can accomplish their tasks without having to put in too much effort in communications.

4. Regional Climate Centers (RCCs)

4.1 Dr R Kolli, Chief, World Climate Applications and Services Division of WMO Secretariat, briefed the meeting on the background and progress in the implementation of RCCs (see Annex X and Annex X(A)). He also presented to the Working Group the latest draft guidelines for the designation of RCCs prepared by the Secretariat with the help of CCI/CBS experts, taking into account the decisions made through joint CCI-CBS

mechanisms. As per the work plan formulated through CCI-CBS inter-commission processes, the subsequent steps involve review and endorsements by (i) CBS ICT on DPFS, (ii) CCI Management Group, (iii) CBS session and finally (iv) the 61st session of the EC in June 2009 when the first RCCs are expected to be formally designated.

Report of Rapporteur on Implementation of RCCs

4.2 The Rapporteur on Implementation of RCCs in RA II, Dr Koichi Kurihara, (Japan) presented his report outlining the details of the past activities, current status and future plans in the implementation of RCCs in RA II (Annex XI). The members, while taking note of the brisk progress in the pilot phase of RCCs in RA II, agreed that there should be well-defined sub-regional focus for each of the RCCs to ensure a more effective operational implementation. In this context, members felt that some amount of overlap of the targeted sub-regional domains is unavoidable and even desirable. It was emphasized that it is the responsibility of this Working Group to advise the RA II president in the designation process of RCCs in the Region, and also in coordinating their implementation.

Progress/Update of implementation of RCCs in RA II

4.3 China and Japan have already been implementing pilot phases of RCCs for RA II, and have also been collaborating on the development of a joint RCC Network web site as recommended by the previous session of RA II WGCRM. The meeting will consider the reports of the two pilot RCCs as well as the web site.

Report of the Beijing Climate Center (BCC)

4.3.1 Dr Yuping Yan (China) presented a report of the progress of BCC in implementing the pilot phase of an RCC, since the meeting of the WGCRM in April 2007, Beijing, China (see Annex XII).

Report of the Tokyo Climate Center (TCC)

4.3.2 Ms K Hayashi (Japan) presented a report of TCC activities towards the implementation of RCC in pilot phase (see Annex XIII). Ms Hayashi requested the assistance of the Working Group in facilitating a wider use of the products provided on TCC web site. The members took note of the fact that a number of highly recommended functions also form part of RCC activities, which both BCC and TCC might be already performing. More information on such activities was considered to be of interest.

Progress of RCC Network Homepage

4.3.3 The Chair expressed his appreciation to both BCC and TCC for the excellent work in developing and maintaining the RA II RCC Network web site, which is a result of close collaboration between the two centres. He said that the use of the products generated and disseminated by BCC and TCC should be evaluated, and efforts should be made to assess the user needs. He requested BCC and TCC to make detailed analysis of the usage statistics of the joint web site, such as the access profiles by individual countries. Dr Yun pointed out that different RCCs are providing different types of information on the same function, which may create some confusion at the user level. The Chair clarified that it would not be easy to prescribe a common approach at all levels, but that, in due course of time, the RCCs may work towards a standard way of presenting the information. Dr Toya suggested that the RCC concept may be described on the opening page of the web site, and that the links to WMO needs to be updated and enhanced to provide more detailed information. He also suggested that the RA II RCC Network web site should be more prominently shown on the official web sites of BCC and TCC. Mr Rahimi remarked that, as the number of RCCs in

the region increases, there will be greater diversity of the products made available and there should be some way of integrating the information to assist the users. Dr Kolli pointed out that some such attempts are being made at the global level (e.g., WMO El Niño/La Niña Update), but that it may be too early to emulate the approach to regional climate anomalies. Dr Yun suggested that the training programmes being organized by the RCCs may be better coordinated. The Working Group appreciated the various suggestions of the members, and encouraged them to provide their feedback directly to the RCC coordinators with more detailed comments and suggestions for improvement of the web site.

Examination of the Eligibility of Candidate RCCs in RA II

4.4 The Working Group noted that the president of RA II invited proposals from Members of RA II for establishing RCCs as per the existing guidelines. The Working Group agreed that the applications received so far would be considered in accordance with the applicable guidelines, with the aim to make appropriate recommendations to the president of RA II on the eligibility of the proposed centres in meeting the required criteria, and advise on further action to be taken in this regard.

4.4.1 On behalf of the Chair of WGCRM, Dr Kurihara briefly reported on the current status of implementation of RCCs in RA II, including the application process for additional RCC proposals. He also briefed the members on the recent developments in WMO designation procedures, highlighting the aspects relevant to RA II. The Working Group took note of the interim guidelines prepared by WMO Secretariat following the outcomes of the CCI-CBS interactive processes to guide the process of determining the eligibility for designation as RCCs.

4.4.2 In support of the application of India Meteorological Department (IMD) for designation as RCC, Dr D S Pai briefed the meeting on the present status and future plan of India in implementing an RCC (see Annex XIV for a detailed report). He clarified that, while the National Climate Centre (NCC) of IMD is presently focusing on meeting the national needs, concerted efforts are being made to expand the services to other Members in the sub-region in the near future, and also to develop multi-model ensemble (MME) approach to seasonal prediction. Dr Kolli suggested that the WMO Regional Training Centre (RTC) also could be used to meet the requirements of training functions for the RCC. The Chair remarked that the monsoon circulation all around the Himalayan belt is extremely important for Asian climate, and thanked the NCC of IMD for their regular reports which are very useful. He appreciated the excellent work being done by IMD in climate monitoring as well as prediction, and encouraged them to expand the services to other Members in the Region.

4.4.3 In support of the application of Mashhad Climate Center (MCC) for designation as RCC, Dr M Rahimi briefed the meeting on the present status and future plan of the Islamic Republic of Iran in implementing an RCC (see Annex XV). In response to queries related to his report, he clarified that MCC is providing climate information for 10 ECO region countries. The Chair suggested that the needs and requirements of the countries should also be considered while generating the climate information as a potential RCC. Dr Kolli said that GPC products should be used, and that more detailed information should be provided on the methods and models employed by RCCs.

4.4.4 In support of the application of North Eurasia Climate Centre (NEACC) for designation as RCC, Dr V Kryjov briefed the meeting on the present status and future plan of NEACC in implementing an RCC (see Annex XVI). Dr Kryjov mentioned that climate monitoring of land snow cover and sea ice also forms part of their activity, but based on the observations of other related institutions. In terms of administrative structure of NEACC, he informed the members that NEACC is managed by 8 directors and one representative each of the CIS countries. He mentioned that NEACC functions as a multi-institutional virtual

centre. Both deterministic and probabilistic predictions are generated by NEACC, but dissemination is mainly by way of probabilistic products. Dissemination is mainly done through the Hydromet Centre web site. Mr Yu suggested that the RMTM-Moscow could also be used to contribute to the training function of the RCC proposed by NEACC. Mr Yu also suggested that the various facilities used by the proposed RCCs should be within the WMO framework, and based on mutually agreed formal arrangements. There was some discussion on the positioning of NEACC in the sub-region and its relationship with ROSHYDRMET. Dr Kryjov clarified that NEACC is a virtual centre operating through an inter-governmental mechanism within the Commonwealth of Independent States (CIS).

4.4.5 The meeting then discussed the proposals to determine the eligibility of the respective centres. While the members agreed that the latest version of the WMO Interim Guidelines need to be followed for assessing the applications, but since these were not available to the applicants at the time of preparing their applications, the earlier guidelines may also be consulted. Dr Toya also proposed that sustainability of the RCC operations and funding arrangements may need to be considered in this context. However, the members agreed that only the capability to perform the functions need to be considered at this stage, and the centres could be asked to commence a pilot phase for one or two years which can provide a clearer basis for their eventual designation. After detailed discussions on various aspects of each of the applications, the Working Group agreed that IMD NCC, MCC and NEACC may be encouraged to participate in the RA II RCC Network in a pilot mode, and closely work with BCC and TCC. As and when appropriate arrangements are made to commence this pilot phase, this may be suitably reported/incorporated on the RA II RCC web site jointly hosted by BCC and TCC. The Working Group also agreed that the WMO Interim Guidelines should be followed more systematically hereafter in dealing with the designation of RCCs, and requested WMO Secretariat to facilitate the communication of the Interim Guidelines to all interested Members. Mr Yu also suggested that the pilot phase of RCCs needs to be more clearly defined. The Chair requested BCC and TCC to help the three new applicants in launching the pilot phase. The Working Group agreed that concerted efforts should be made to closely involve the users of RCCs, including the NMHSs within the Region and the application sectors at different levels, in the design and implementation of climate prediction and services.

Future plan for RCC Network in RA II.

4.5 The meeting also considered the overall aspects of the implementation of RCC network in RA II, taking into account the already functioning pilot phases and others expected in the near future. The meeting discussed on the various steps needed to establish a full-fledged RCC network on RA II, and agreed on the appropriate recommendations to the forthcoming Fourteenth Session of RA II on the subject.

5. Other climate-related matters in RA II and way forward

Regional Climate Outlook Forums (RCOFs) in RA II

5.1 Dr R Kolli briefed the members on the recent developments on RCOF activities worldwide, highlighting the important role played by RCOFs in regional networking and user liaison, and their potential role in supporting adaptation to climate change (see Annex XVII). He also informed the Working Group on a global review of RCOFs being coordinated by WMO in November 2008. The meeting considered the existing RCOF activities in RA II, and discussed on how the activities can be further enhanced. The Working Group expressed much appreciation to CMA for successfully sustaining FOCRAII activities, and agreed that these should be enhanced with additional sub-regional RCOFs. In this context, the members noted the joint KMA/CMA/JMA meetings for Northeast Asian region, and the role of the Islamic Republic of Iran in sub-regional networking for climate information in west Asia. The

Working Group urged all those concerned that concerted efforts be made to evolve these existing activities into operational sub-regional RCOFs and emphasized the need to involve users in RCOFs.

Capacity building activities on climate-related matters in RA II

5.2 Dr T Toya provided information on the implementation of WMO capacity building activities including the Voluntary Cooperation Programme (VCP) and the United Nations Development Programme (UNDP) projects and human resources development activities related to the World Climate Programme (WCP) in RA II.

5.2.1 The working group was pleased to note the technical cooperation activities and human resources development activities carried out to support the climate-related matters in Region II through UNDP, VCP, Regular Budget and Trust Fund cooperation activities. The meeting noted that, during 2004-2008, two Members in RA II had received support for the provision of CLIWARE Climate Database Management System (CDMS). However, as of 31 July 2008, six VCP requests for the provision of climate database management systems and climate data rescue submitted by six Members of RA II have not received full support.

5.2.2 The working group recalled that Cg-XV (May 2007) decided that as in the fourteenth financial period, the fields of cooperation covered by the VCP during the fifteenth financial period shall include the establishment of observing and data-processing, archiving and management facilities necessary for the WCP; and the support to activities within the WCASP. The meeting encouraged donors in the region to continue and further enhance the technical cooperation activities for the implementation of the climate-related projects in Region II in accordance with the priorities allocated by the XIII-RA II session. In this connection, and in view of Cg-XV decision that special assistance should be provided to new Members as well as the Least Developed Countries (LDCs), the working group agreed on the need for support in particular for Afghanistan, Bangladesh, Bhutan, Cambodia, Lao Peoples Democratic Republic, Myanmar and Yemen.

5.2.3 The meeting recognized that a number of seminars and workshops had been organized in RA II to enhance climate-related activities including operational climate monitoring/prediction, CLIMSOFT training, CLIPS training, and other training courses. To facilitate the increased participation of Members in various potential opportunities of capacity building on climate-related matters in RA II, the group agreed to develop a consolidated list of the recent seminars and workshops as well as of planned training opportunities related to climate matters.

5.2.4 The group agreed to review and propose to the XIV-RA II session the revision of the priorities for technical cooperation and human resources development activities in support of the climate-related activities in Region II, taking into account the on-going process of the revising the current Regional Strategic Plan for NMSs.

6. Report to the fourteenth session of Regional Association II (XIV-RA II)

6.1 Dr T Toya briefed the Working Group about the salient aspects of the forthcoming fourteenth session of the Regional Association II (XIV-RA II) scheduled to be held at Tashkent, Uzbekistan, from 5 to 11 December 2008. The meeting was informed of the salient aspects of the session including the review of the implementation of the Regional Strategic Plan for the Enhancement of the NMSs in RA II; revision and updating of and integration into a Regional Strategic Plan; reform concept of XIV-RA II; and expected role of WGCRM.

6.2 The working group noted with appreciation the preliminary analysis of the Survey on the Basic Capability of NMSs in Regional Association II (Asia), which reported great progress in general during the survey period from 2005 to 2008. Operational observing networks were very much enhanced in the region, in particular RBCN stations in Pakistan and Turkmenistan. There has been a small improvement in the provision of monthly/seasonal climate prediction and in monitoring climate change and variability. Less than 50% of Members have drought monitoring and warning systems. With reference to the survey of GCOS station status being carried out by the Rapporteur on Regional Climate Observing Network, including liaison with CBS and GCOS, the group suggested to coordinate the results of RA II Survey on the Basic Capability of NMSs with the RA II GCOS questionnaire responses.

6.3 The meeting further noted that the Advisory Working Group at its ninth session (Geneva, June 2008) considered that the current RA II Strategic Plans should be revised to specify clear objectives and concrete and specific regional expected outcomes under each relevant WMO Strategic Plan Expected Result. The meeting agreed that the WGCRM Chair, vice-chair and rapporteurs actively contribute to some of the regional expected outcomes and deliverables, by reviewing and proposing priority needs and activities for climate-related matters in RA II.

6.4 The meeting considered the preparation and reporting mechanism of the WGCRM to be submitted to XIV-RA II in light of the planned provisional Agenda and Work Plan of the session. The working group members agreed to prepare and submit one consolidated report by the Chair of WGCRM containing reports by individual rapporteurs.

6.5 The meeting was informed of possible restructuring of future work of RA II Working Groups based on the WMO Strategic Plan Expected Results, and considered the necessary steps to propose the draft resolution including Terms of Reference and memberships of the WGCRM.

7. Other Business

The Chairman invited the members to raise other matters for discussion, if any, relevant to the Working Group's activities. Dr Kolli briefed the members about the forthcoming World Climate Conference 3 (WCC-3) and encouraged members to widely disseminate the information and actively contribute to its success. The Working Group agreed that all efforts should be made to ensure an appropriate reflection of issues relevant to RA II at WCC-3.

8. Recommendations

Based on the various discussions as part of the meeting agenda, the Working Group agreed on the following recommendations:

1. WMO Secretariat may be requested to provide assistance in securing the responses from all the Members of RA II for input to Rapporteurs' reports.
2. WMO Secretariat may request Members of RA II to provide and update information on RA II WGCRM related activities on their respective web sites.
3. The Rapporteur on GCOS may review the survey results of RAP on GCOS matters. GCOS Secretariat may be consulted to obtain information on their activities in RA II.
4. Efforts need to be made to develop high-resolution gridded daily rainfall and temperature data set for RA II, using a workshop-based approach at which individual Members can use standard software on their data to generate gridded data for their countries.
5. The recent reanalysis data products generated by JMA (JRA-25) may be encouraged to be widely used.
6. Climate prediction and monitoring products should be produced in a user-friendly

- manner. Also guidance needs to be provided to users to understand the products.
7. Extended range prediction (11 to 30 days) is important and needs to be promoted, using both empirical and dynamical approaches, as appropriate.
 8. Interactive user interfaces may be developed to provide climate prediction products to enable users to package their own data products.
 9. Opportunities for capacity building may be collected and disseminated in an appropriate manner. Chair/WGCRM may take a lead on this.
 10. While sustaining the activities of FOCRA II, sub-regional RCOFs may be encouraged to target different sub-regions having similar climate information/outlook needs. VCP funding for RCOF operations may be pursued.
 11. All further consideration of RCC designation related issues should be based on the WMO Interim Guidelines and any subsequent updates to them.
 12. RCC Home Page hosts may evaluate the use of their products and identify possible improvements that may be required in their effective usage.
 13. Efforts should be made to provide guidance to NMHSs in accessing and using RCC products.
 14. Member survey as per the Interim Guidance may be done to assess the requirements in RA II.
 15. RA II WGCRM appreciates the keen interest of the three applicants to be designated as RCCs, and encourages them to join the Pilot phase of RA II RCC Network to demonstrate their capabilities. Further assessment of their capabilities may be made based on their operations in the pilot phase.
 16. The Working Group notes the importance of WCC-3, and encourages all Members of RA II to actively contribute to its success..

9. Closure of the Meeting

The Working Group thanked JMA and the local coordinators for hosting the meeting and making excellent arrangements. The Chair of the meeting concluded the discussions and closed the meeting on 8 August 2008.

AGENDA

1. Opening of the Meeting
2. Organizational Matters
3. Progress Reports of WGCRM
 - 3.1 Report by the Chair of WGCRM
 - 3.2 Report by the Rapporteurs (except Rapporteur on Implementation of RCCs)
 - 3.2.1 Rapporteur on Regional Climate Observing Networks, including liaison with CBS and GCOS (Mr Liu Wenquan, China)
 - 3.2.2 Rapporteur on Regional Climate Data Management, including data rescue (Mr G. Srinivasan, India)
 - 3.2.3 Rapporteur on Regional Climate Applications (Dr Wontae Yun, Republic of Korea)
 - 3.2.4 Rapporteur on CLIPS and Predictive Capability (Dr Vladimir Kryzhov, Russian Federation)
 - 3.2.5 Rapporteur on Climate Change Issues, including UNFCCC (Mr M. Rahimi, Islamic Republic of Iran)
4. Regional Climate Centers (RCCs)
 - 4.1 Report by WMO including the background and progress in implementation of RCCs
 - 4.2 Report by Rapporteur on Implementation of RCCs in RA II (Dr Koichi Kurihara, Japan)
 - 4.3 Progress/Update of implementation of RCC in RAI
 - 4.3.1 Report of the Beijing Climate Center (BCC)
 - 4.3.2 Report of the Tokyo Climate Center (TCC)
 - 4.3.3 Progress of RCC Network Homepage
 - 4.4 Examination of the Eligibility of Candidate RCCs in RA II
 - 4.4.1 Report by the Chair of WGCRM
 - 4.4.2 Present Status and Future Plan of India
 - 4.4.3 Present Status and Future Plan of Islamic Republic of Iran
 - 4.4.4 Present Status and Future Plan of North Eurasia Climate Centre (NEACC)
 - 4.4.5 Discussion
 - 4.5 Future plan for RCC Network in RA II
5. Other climate-related matters in RA II and way forward
6. Report to the fourteenth session of the Regional Association II (XIV-RA II)
7. Other Business
8. Closure of the Meeting

LIST OF PARTICIPANTS

China

Dr Y. YAN
National Climate Center
China Meteorological Administration
(CMA)
46 Zhongguancun Nandajie
Haidian District
100081 BEIJING

Tel: (86 10) 6840 6662
Fax: (86 10) 6217 9859
Email: yanyp@cma.gov.cn

Mr J. YU
Department of International Cooperation
China Meteorological Administration
(CMA)
46 Zhongguancun Nandajie
Haidian District
100081 BEIJING

Tel: (86 10) 6840 6662
Fax: (86 10) 6217 4797
Email: yj@cma.gov.cn

India

Dr D.S. PAI
India Meteorological Department
Ganesh Khind Road, Shivaji Nagar
PUNE 411005

Phone: (9120) 2553 5877
Fax: (9120) 2589 3330
E-mail: dspai@imdpune.gov.in

Islamic Republic of Iran

Mr M. RAHIMI
Islamic Republic of Iran Meteorological
Organization (IRIMO)
P.O. Box 13185-461
TEHRAN

Tel: (9821) 660 70038
Fax: (9821) 660 70005
E-mail: mrahimi_2001@yahoo.com

Japan

Dr K. KURIHARA
Japan Meteorological Agency
1-3-4 Otemachi, Chiyoda-ku
TOKYO 100-8122

Tel: (81 3) 3211 8406
Fax: (81 3) 3211 8406
Email: ko_kurihara@met.kishou.go.jp

Republic of Korea

Dr W-T. YUN
Climate Prediction Division
Korea Meteorological Administration
45, Gisangcheong-gil
Dongjak-gu
SEOUL 156-720

Tel: (82 2) 2181 0472
Fax: (82 2) 2181 0489
Email: wtyun@kma.go.kr

Russian Federation

Dr V. KRYJOV
Hydromet Centre of Russia
11-13 Bol. Predtechensky Pereulok
123242 MOSCOW

Tel: (82 2) 2181 0472
Fax: (82 2) 2181 0489
Email: kryjov@yahoo.co.uk

Invited Experts

Dr K. Takano
Climate Prediction Division
Global Environment and Marine
Department
Japan Meteorological Agency
1-3-4 Otemachi, Chiyoda-ku
TOKYO 100-8122
Japan

Tel: (81 3) 3211 8406
Fax: (81 3) 3211 8406
Email: tcc@climar.kishou.go.jp

Ms K. Hayashi
Tokyo Climate Center
Climate Prediction Division
Global Environment and Marine
Department
Japan Meteorological Agency
1-3-4 Otemachi, Chiyoda-ku
TOKYO 100-8122
Japan

Tel: (81 3) 3211 8406
Fax: (81 3) 3211 8406
Email: tcc@climar.kishou.go.jp

WMO SECRETARIAT

7bis, Avenue de la Paix
CP 2300
CH-1211 GENEVA 2
Switzerland

Dr T. TOYA
Director
Regional Office for Asia and the
South-West Pacific
Development and Regional Activities Dept.

Tel: (41 22) 730 8252
Fax: (41 22) 730
Email : Ttoya@wmo.int

Dr R. KOLLI
Chief
World Climate Applications and Services
Division
Climate Prediction and Adaptation Branch
Climate and Water Department

Tel: (41 22) 730 8377
Fax: (41 22) 730 8042
Email : Rkolli@wmo.int

**Opening Address
by Dr Tetsu HIRAKI
Permanent Representative of Japan with WMO
and
Director-General of the Japan Meteorological Agency**

Good morning,
Distinguished participants,
Dr Toya and Dr Kolli of the WMO Secretariat,
Ladies and gentlemen,

It is my great pleasure and honor to deliver the opening address at the beginning of the Meeting of the Working Group on Climate-Related Matters in Regional Association II of WMO.

First of all, on behalf of JMA, I would like to extend a warm and cordial welcome to all the participants in the meeting, from China, India, Iran, Republic of Korea, Russian Federation and the WMO Secretariat. It is a pity that Dr Zheng Guoguang, Chair of the Working Group and Administrator of the China Meteorological Administration could not attend this meeting because of unavoidable circumstances, but I hope the meeting will be successful with the cooperation of the participants here.

The climate-related issue now attracts much attention worldwide. National Meteorological and Hydrological Services are increasingly required to meet social and economic demands for climate-related services.

This Working Group was re-established at the thirteenth session of the Regional Association II held in Hong Kong, China in December 2004 to address this issue. Over the last four years, there has been significant progress in climate-related activities in this Region. In particular, it is worth noting that the RA II has made remarkable development in the activities of the Regional Climate Center Network.

This Working Group has also promoted training and capacity-building activities. A number of seminars and workshops have been held in this Region including the sessions of the Forum on Regional Climate Monitoring, Assessment and Prediction for Asia and Joint Meetings for the Seasonal Prediction of the East Asian Monsoon. These activities have contributed to capacity building in climate-related activities.

This meeting will summarize the activities in the area of climate in the RA II, and its outcome will be reported to the fourteenth session of the RA II to be held in December this year. I hope this two-day meeting will be successful and fruitful.

Before closing my address, I would like to express my sincere appreciation to the WMO Secretariat for the preparatory work for this meeting.

Finally, your stay in Tokyo is short, but I hope that you will enjoy the Japanese hospitality and have a chance to get a sense of the Japanese culture and tradition during the stay.

Thank you very much for your attention.

**REPORT OF THE CHAIR OF THE RA II WORKING GROUP
ON CLIMATE RELATED MATTERS**

by K Kurihara (Japan)

Development and Implementation of the RCC Network in RA II

After the thirteenth session of RAll in Hong Kong in 2004, in accordance with a resolution of the meeting, the Chair of RA II WGCRM in cooperation with WG members developed the first draft of “Guidelines on the Eligibility of the Regional Climate Centers (RCCs)” (hereafter “Guidelines”) and “Designation Procedures for the Establishment of the RCC Network in RA II (hereafter “Designation Procedures”).

These two documents were submitted by Chair to the President of RA II in mid-November, 2005. The President of RA II endorsed and distributed the “Designation Procedures” and “Guidelines” to the Members in RA II to invite interested institutions to apply for RCC. Following that progress, the Beijing Climate Center (BCC) of the China Meteorological Administration (CMA) and the Tokyo Climate Center (TCC) of the Japan Meteorological Agency (JMA) applied to serve as the RCC in RA II with the submission of their present status and implementation plan for RCC functions.

The WGCRM meeting in April 2007 considered the presentations made by BCC and TCC on their status and future plans for the implementation of the RCC network, and agreed to recommend to the President of RA II that both BCC and TCC be designated as RCCs. To that effect, the meeting requested the President of RA II to submit a report on the above recommendation to the Fifteenth Congress of WMO. The President was also requested to urge CCI and CBS to take action, as appropriate, on the designation of those Centers as RCCs in RA II.

The meeting endorsed an Implementation Plan of the RCC Network in RA II. In accordance with the Implementation Plan, BCC and TCC have established a joint portal site at <http://www.rccra2.org>, linked to the websites of BCC, TCC, NMHSs in RA II and other related institutions.

The meeting took cognizance of the fact that the Islamic Republic of Iran Meteorological Organization (IRIMO), India Meteorological Department (IMD) and the North Eurasian Climate Centre (NEACC) established by the NMHSs of the Commonwealth of Independent States (CIS) had also shown interest in the RCC status. The meeting agreed that WGCRM should consider the applications by other Members of RA II, if submitted in the future.

The CCI Implementation and Coordination Team (CCI ICT) which met from 9-11 October 2007 in Geneva agreed on definitions of RCCs and RCC-Networks, and that the terms RCC and RCC-Network would be exclusively used for centers designated by WMO

under the Manual on the Global Data-processing and Forecasting Systems (Volume 1, Global Aspects) (the GDPFS Manual). Roles and responsibilities of RCCs and RCC-Networks were identified in two categories: mandatory functions that would be common to all designated RCCs and RCC-Networks, and highly recommended functions. It was decided that RCCs and RCC-Networks will be considered, in the GDPFS Manual, as a type of Regional Specialized Meteorological Center (RSMC), and will be 'centers in a cooperative effort', a concept already defined in the GDPFS Manual. The CCI ICT established a technical expert group, with CCI and CBS representation, to address and resolve remaining issues, and to develop the amendments required for the GDPFS Manual to support formal WMO designation of RCCs or RCC-Networks, and established a work plan for this activity.

The CCI-CBS Intercommission Technical Meeting was held in Geneva from 21-22 January 2008. A comprehensive set of amendments was developed for the GDPFS Manual, including criteria for the set of mandatory functions for RCCs and RCC-Networks. Following finalization of the report for the session, the proposed amendment will be submitted to the CBS Expert Team on LRF and then the CBS ICT on the Data Processing and Forecasting System. Any suggested CBS modifications will be reviewed and then submitted to the next session of CBS (March 2009) for endorsement. CBS will submit the proposed amendment to WMO Executive Council in 2009 for approval.

Climate-Related Seminars and Workshops in RA II

WGCRM actively promotes academic exchange and training activities within RA II. Over the last year, a number of climate-related seminars and workshops were held including the Forum on Regional Climate Monitoring, Assessment and Prediction for Asia (FOCRA II), cosponsored by CMA and WMO and Eighth Joint Meeting of Seasonal Prediction on the East Asian Winter Monsoon by KMA. In addition, training courses, such as "BCC Climate Products Interpretation and Application", "Wind and Solar Energy Resources Measure and Assessment", "Regional climate model training" were conducted. BCC is also implementing their visiting scholarship program. JMA has conducted a Group Training Course in Meteorology on an annual basis since 1973. This year, the renamed training course "Reinforcement of Meteorological Services" will be conducted from September to December inviting eight participants from eight countries. JMA will also hold the ninth Joint Meeting of Seasonal Prediction on the East Asian Winter Monsoon jointly with a training seminar on use of the data and products for long-range forecast in early November 2008.

The Mashhad Climate center (MCC) has organized International Climate Outlook Forum for ECO region countries since 2005. The participants included experts of these countries and member of other country such as Iraq. The North Eurasia Regional Climate Center (NEACC) developed the joint Program on Strategy for Hydrometeorological Security of CIS countries. The International Conference on Hydrometeorological Security was held in 2006.

Global Producing Centers (GPCs)

At the extraordinary session of CBS held in Seoul in September 2006, nine Global Producing Centers (GPCs) of Long-Range Forecast including Beijing, Seoul and Tokyo, were recommended, and approved by the 59th session of the Executive Council in June 2007.

A Workshop of GPC held in Seoul in September 2007 considered the establishment of a Lead Center for Long-Range Forecast Multi-Model Ensemble prediction (LC-LRFMME). With a view to further discussions by the CBS Expert Team on Extended and Long-Range Forecasting (CBS-ET-ELRF), the workshop refined the needs and functions of the LC-LRFMME and made recommendations for a phased approach to the development of these activities.

At the meeting of CBS-ET-ELRF held in Beijing, China in April 2008, the Team recommended that KMA/NCEP be designated a Lead Center for LRFMME with responsibilities that include maintenance of a web portal of GPC and MME products. The revised functions for Lead Centers of LRFMME were recommended for submission to CBS (scheduled for early 2009) to be included in the Manual on the GDPFS.

World Climate Conference – 3 (WCC-3)

Fifteenth World Meteorological Congress (Geneva, Switzerland, May 2007) approved the organization of World Climate Conference-3 (WCC-3) in collaboration with other UN system agencies and partners. The Conference aims to respond to the need of users and sectors worldwide to reduce natural disasters, enhance food security and adapt to climate variability and change as spelled out in the Bali Action Plan, the Nairobi Work Programme and the Hyogo Framework for Action on Disaster Risk Reduction. It is also expected to contribute to the 15th session of the Conference of Parties to the United Nations Framework Convention on Climate Change (UNFCCC COP-15) and initiatives to support adaptation to climate variability and change.

WMO has established an International Organizing Committee for WCC-3 (WIOC) with a broad geographical representation. Five experts (China, India, Islamic Republic of Iran, Japan and Russian Federation) serve on WIOC from RA II. WMO organized the first meeting of the International Organizing Committee on a WCC-3 (WIOC-1) (Geneva, February 2008). The most significant issues that concerned the meeting were related to the title of the conference, putting more attention at WCC-3 on the needs of users, in contrast to the capabilities of users; and secondly the scope of the science agenda with primary focus on seasonal to interannual predictions as compared to long-term climate projections, though prediction out to multi-decades is within the scope of the WCC-3 where appropriate. The meeting by and large agreed that multi-decadal prediction should be an important part of the conference programme. The dates for WCC-3 were confirmed on 31 August – 4 September 2009.

**REPORT OF THE RAPPORTEUR ON
REGIONAL CLIMATE OBSERVING NETWORK,
INCLUDING LIAISON WITH CBS AND GCOS**

By L Wenquan (China)

1. Related Activities and Main Work in the past 3 years

As a member of WGCRM, I have paid more attention on the activities on regional climate observing network and liaison with CBS and GCOS in RAIL in the past 3 years, include:

- 1) Participated in Regional Climate Centre assessment, and assisted the Chairperson to modify the Guidelines on the Eligibility of RCCs.
- 2) Attended the meeting of WGCRM in Beijing Apr. 2006, and presented a report related to dealing with relevant aspects of GCOS, CBS, and the present status of RA II Climate Observing Systems (RA II COS).
- 3) Made a questionnaire (see Annex V(A)) to learn and understand the progress of climate observing system in RAIL, and sent to RA II members.
- 4) Follow up the implementation plan of GCOS and CBS from WMO website.

2. GCOS Station Status in RAIL at Present

In RAIL, there are 35 members and there are 6 members returned the questionnaire by 15 July, 2008. Unfortunately, there 14 members cannot get the questionnaire mail smoothly.

According to the returned questionnaire and related website, there are 261 stations of GCOS-Surface Network (GSN) in RAIL, which is 25.5% of global 1023 stations by Feb.2008; and there are 30 stations of GCOS Up-Air Network (GUAN) in RAIL, which is 18.2% of global 165 stations; and there are 25 stations of Global Air Watch (GAW) in RAIL, which is 24.3% of global and regional 103 stations. In a word, there is a small change contrast with 2005.

Table: GCOS Station Status of Global and RAIL (By Feb.2008)

<i>GCOS Station</i>	<i>Global</i>	<i>RAII</i>	<i>Percentage (%)</i>
GSN	1023	261	25.5
GUAN	165	30	18.2
GAW	103	25	24.3
Total	1291	316	24.5

According to the returned questionnaire, all of stations can upload observing data in time and fully.

3. Members' Main Activities

CHINA:

- Climate Observing System: China have launched "China Climate Observing System (CCOS) implementation Scheme" by China Meteorological Administrator (CMA) and other 6 administrators on Nov. 2007. In this implementation Scheme, there are more than 240 climate observatories to be designed in 16 key observing area, and there are 5 test observatory constructing and modifying at present.

- **RCC Construction:** In 2007, according to all responsibilities and functions as one of the potential WMO Regional Climate Centers (RCC) in the Regional Association II (Asia), Beijing Climate Center (BCC) has unceasingly made substantial efforts in actively improving its scientific and technical capabilities for regional and global climate monitoring, prediction and product delivery. Such requested functions as operational services, coordination, data services, training and capacity building and the research and development have been further developed. WMO East Asian Monsoon Activity Center (EAMAC) and WMO Global Producing Center for Long Range Forecasts (GPC-LRF) are both in good operation. At present, BCC can provide as many as 48-member multi-model ensemble prediction and their interpretation and evaluation. The most probability prediction on surface temperature and precipitation can be issued by tercile. The monthly/seasonal prediction was systemically verified and evaluated. The monitoring and diagnosis system on Northern Hemisphere blocking high and daily Asian monsoon monitoring system have been established. In addition, the second generation of BCC's Atmospheric General Circulation model AGCM 2.0.1 has been developed. The precipitation/temperature downscaling techniques has also been developed by using BCC's historical hindcast data and prediction products, which had been applied experimentally in east of China and Islamabad of Pakistan. Furthermore, wind and solar energy resource assessment had made a great process. In addition, BCC hosted a series of national operational consultation meeting, such as "Joint Meeting of Spring Sand/Dust Storm Prediction in 2007", "2007 Mid Summer Climate Outlook Consultation Meeting" and "2007-2008 National Consultation Meeting on Climate Outlook"; Successfully hosted "Annual Academic Meeting of BCC Third Training Course on Wind and Solar Energy Resources Measure and Assessment"; hosted and jointly organized a series of international meetings and seminars, such as "Third Session of the Forum on Regional Climate Monitoring, Assessment and Prediction for Asia (FOCRAll) (April 2007) ", "RAII WGCRM Meeting Convened in Beijing(7 to 8 April 2007)" , "The Sino-German Workshop on Conceptual and Integrated Modelling in Climate-system, Geoecosystem and Watershed Management (CIMCGWM)) 18 to 21 June, 2007)", "The Fourth International Seminar on Climate System and Climate Change (ISCS) (16-27 July 2007)" , "Regional Seminar on Climate Change-Mitigation and Adaptation(22-26 October 2007)". In the other, BCC had been implemented successfully "the 2006-2007 international visiting scholar programme", and updated timely the website of BCC and WMO RAll regional climate center, the web sites had remarkable effects, received high appraisalment from many international meteorological departments. It helps promoting and extending international cooperation for BCC.

JAPAN:

- **Extended- and long-range EPS:** In January, new elements of GPV data (700 hPa temperature and its anomaly) were added to one-month prediction, which have been made available to registered NMHSs. One-month ensemble prediction system (EPS) was upgraded in March 2008. The main improvements include an increase in the vertical resolution of the atmospheric model from 40 to 60 layers, modifications to the physical parameterization of the model, and refinement of initial land conditions (climatology) used in hindcast experiments. As a result of upgrading to the new EPS model (V0803C), forecast errors in wind fields in the troposphere and temperature fields in the middle-high latitudes have decreased in comparison with the previous model (V0703C).
- **Capacity building:** JMA has conducted annual training courses in meteorology for experts of National Meteorological and Hydrological Services (NMHSs) since 1973 as

one of a number of courses provided by the Japan International Cooperation Agency (JICA). The training course in 2008 will be held from September to December with emphasis on the operational use of numerical weather prediction, satellite meteorology and climate information. In a climate information session, staff members of the Climate Prediction Division will give lectures on climate system monitoring, long-range forecasting, El Niño outlook and global warming projection. As a follow-up of the Training Course on Interpretation of Climate Products and Climate Downscaling held at the Malaysian Meteorological Department (MMD) in October 2007, JMA plans to conduct a hands-on training for climate data communications and climate forecasting in July and September.

- International conferences and workshops: The Third WCRP International Conference on Reanalysis took place in January 2008 in Tokyo with more than 250 participants from 21 countries worldwide. A seminar on climate and seasonal prediction meeting on East Asian winter monsoons is scheduled for autumn 2008 in Tokyo.
- TCC website and products: The TCC website was renewed in March 2008. As one of new contents, downscaled prediction products for one-month probabilistic prediction in Southeast Asia were made available. In February, TCC made all figures and tables from 1979 onwards available including atmospheric circulation maps and cross sections using JRA-25 and JCDAS data. A new publication, Annual Report on Climate System 2007 was published in April 2008, covering topics on extreme climate events around the world as well as a summary of the climate system in 2007.

Other Members:

- Republic of Korea hosted “The Eighth Joint Meeting of Seasonal Prediction on East Asian Winter Monsoon”(17-19 October 2007).
- Other members’ specialist attend some meetings related GCOS plan and CBS.

4. Questions to be concerned

In the future, WMO will push kinds of observing system to one synthesis observing system, and lots of new categories data such as satellite data will be use more and more. In addition, data exchange will be more frequently and more new assimilation methods can be applied in to climate model in the coming years. How to adapt to this new trend, climate observing system construction and data change will face a new challenge. Some questions should be concerned in advance, for example:

- For new instruments and new data, how we can maintain the data continuity, usability and relativity as usual?
- For kinds of data from different departments, how we can get the better quality control scheme and standardized database?
- How to get the best observing system on Climate change in the unified designing between different department (administrator)? Such as Ocean Hydrology and water resources, Environment, Agriculture, and some temp research observing systems etc.
- How to exchange effectively among different climate related databases?

5. Suggestion

To enhance the communication among rapporteurs in the RAIL, it is an efficient path to set up a communication platform via member website.

**QUESTIONNAIRE ON
THE GLOBAL CLIMATE OBSERVING SYSTEMS (GCOS)
IN REGIONAL ASSOCIATION II**

The purpose of this questionnaire is to assess the status of implementation of the Global Climate Observing Systems (GCOS) in Regional Association II (RA II). Results of this survey will be reported to the fourteenth session of RA II through the Chairperson of the Working Group on Climate Related Matters (WGCRM) in RA II.

NAME OF MEMBER: _____

INFORMATION OF THE PERSON FILLING OUT THIS FORM:

Title: _____

Name: _____

Organization: _____

Address: _____

Telephone: _____

Fax: _____

Email: _____

Date: _____

(Signature of Permanent Representative)

QUESTIONNAIRE FORM

Member of RA II:

ITEMS	PAST & PRESENT			PLAN		
	2005	Present	Data Transfer(%)	Up to 2010	After 2010	Data Transfer(%)
GCOS Station Number						
GSN Station Number						
GUAN Station Number						
GAW Station Number						
Highlights Native Actions on GCOS since 2005	such as meeting or seminar, plan or implemental scheme, etc.					
Highlights International Actions on GCOS since 2005	such as attend international meeting or other related actions.					
Other related actions	such as liaison with CBS, data use, numerical model development or other related actions.					

You may attach extra papers.

REPORT OF THE RAPPORTEUR ON REGIONAL CLIMATE DATA MANAGEMENT, INCLUDING DATA RESCUE

By G Srinivasan (India)

1. Background

Development of climate products, applications and services requires high quality Climate data, and their associated metadata made available in easily accessible digital formats. In the past decade or so, the requirements of climate change and needs for developing seasonal-to inter-annual prediction systems have increased the importance of climate data. Climate data are also required for for verification of seasonal-to-interannual forecasts and to generate future climate scenarios. Long-term climate monitoring, particularly from the point of view of occurrence of extreme events for disaster preparedness is also requires consistent and quality checked climate data-sets at finer spatial scales. Incorporating digitized climate data and metadata into regional databases suitable for enhanced quality control and analysis can benefit both regional and global climate studies and substantially improve our understanding of climate change.

2. Activities related to Data Management

The fifth CLIMSOFT training workshop was held in Ha Noi, Viet Nam, from 12 to 30 November 2007. As was the case with the Brazzaville workshop, this was followed back to back by a seminar on Climate Data Homogenization and Climate Change Indices, from 3 to 7 December 2007. The workshop was attended by participants from the following countries: Bhutan, Cambodia, Fiji, Laos, Maldives, Myanmar, Nepal, Sri Lanka, Thailand, Democratic Republic of Timor Leste (East Timor) and the Socialist Republic of Viet Nam.

The JMA's long-term historical Sea Surface Temperature analysis data (COBE-SST) has been available since April 2006 from the TCC website (http://okdk.kishou.go.jp/MRCS_SV12sstdata/aboutgpv_e.htm). The JRA-25 data (see section 6-1) has been available since July 2006 at the JRA-25 official website (http://jra.kishou.go.jp/index_en.html).

The Tokyo Climate Center (TCC) of the Japan Meteorological Agency (JMA) launched a new website (<http://ds.data.jma.go.jp/tcc/tcc/index.html>) in March 2007. As one of the new services offered via the site, an online web-based interactive climate database called *ClimatView* was made available, enabling users to view and download data on monthly mean temperatures and monthly total precipitation derived from CLIMAT reports.

In order to develop a downscaling technique for one-month prediction, it is necessary to build a high-quality and long-term surface weather observation dataset at as many points as possible. TCC developed an integrated and quality-checked surface climate database for Asia-Pacific region. This database integrated the daily observation of temperature (maximum/mean/minimum) and precipitation from five data sources; APN (the Asia-Pacific Network for Global Change Research), ASEAN (the ASEAN Compendium for Climate Statistics projects), GAME (the GEWEX Asian Monsoon Experiment-tropics), GSN (the GCOS Surface Network) and SYNOP report received through GTS. After quality-checked by investigating internal consistency, temporal and spatial outliers, and by comparing with the independently reported monthly values, those data were merged into single integrated dataset. The dataset covers the period from 1 January 1961 to 31 December 2005, and the daily climatological normals were calculated for the base period from 1971 and 2000. The number of stations, where the daily climatological normal was available in the Southeast

Asian region, was about 200 for temperature and 300 for precipitation, which is two to three times as many as the previous one. This database was used in developing a statistical downscaling technique, and will be also used for upgrading weekly extreme climate monitoring in the region.

3. Data Rescue Activities

Data rescue is an ongoing process. It involves preservation of all data which are at risk of being lost due to deterioration of the medium.

Data Rescue Activities in China (CMA)

China has taken up a project under which experiments on data scanning through electronic scanning and digital Optical Character Recognition (OCR) were carried out. OCR did not give satisfactory results for handwritten manuscripts. Only 30% of the old climatological records have been digitized, of the rest 22% are being digitized and 48% are yet to worked on. China has taken steps for refreshing the media and to be at par with the latest available technology. It is expected that by 2015 CMA will rescue and digitize all data on old records and switch to online service.

Data Rescue Activities in India (IMD)

Proposed Scheme: The main aim of data rescue scheme is to digitize all the available climatological data which are in manuscript form and put them in easily accessible and presentable format. This involves mainly data keying and keeping scanned images of the data sheets. This work will be taken up at each Regional Meteorological Centre, as well as the National Data Centre (NDC) at Pune. There will be about 15 – 20 types of data forms. About 24.4 million records of various types of data are to be keyed in under this project.

Digitization of old Weather Charts: A large number of analyzed weather charts of different sizes (ranging from A0 to A4 size – containing vital information on synoptic structure of various weather systems) charts are available in IMD's archives. These very old analyzed charts were being suitably bound and kept at a safe place. With the passage of time these charts have become very faint and brittle. It is therefore essential that these charts are transferred onto magnetic / electronic media for permanent archival and easy referral as early as possible. Once these charts are transferred and stored on electronic media they could be made available for reproduction as well as re-analysis as and when desired. Hence a project was undertaken to scan these charts and store them on electronic media.

Initially a pilot project of photographing 15,000 analyzed weather charts carried out was successfully completed. Following this, the main job for photography of another 100,000 charts with storage media and retrieval software by a remote user was undertaken. The firm contracted to do this work has digitally photographed these charts and installed NAS storage media along with software for retrieval. At present, the information has been put on local network and is getting fine-tuned through user feedback. Soon this will be made available on a public URL for large groups of users.

Future Plan: It is necessary to take stock of the manuscripts available at each regional office and their status and inventory has to be prepared to assess the actual volume of the work involved. There is need to create a mechanism that all forms of data collected and sent are digital and available on inter-operable or uniform formats.

4. CCL ET on Rescue, Preservation and Digitization of Climate Records

WMO organized the first meeting of the Expert Team on 'Rescue, Preservation and Digitization of Climate Records under Commission for Climatology (CCI) OPAG 1. The meeting was held in Bamako, Mali from 13 – 15 May, 2008. The meeting highlighted the importance of quality control and homogenization for climate studies. The role of data archival and rescue was emphasized for complementing the length of available time-series. Two members from the RA II region, China and India, participated in the meeting and reported on activities. Some recommendations that may be of relevance to the region include:

- A. There is guidance material prepared by the Australian Bureau of Meteorology concerning Document Records Management for small NMHSs, that may of use.
- B. Prioritizing data sets that are at risk and requiring immediate attention to ensure that they are not lost.
- C. Developing guidance an standards on preserving and accessing digital images
- D. Raise awareness among international and national funding agencies on key and essential importance of developing long term climate datasets.
- E. There are several efforts at global level from which climate data and rescue efforts at regional level can benefit from. Therefore, it is essential to avoid duplication of efforts and take coordinated steps.

5. Summary and Recommendations

Workshops conducted have been very useful in providing training to participants on different aspects of climate data analysis, such as data homogeneity and the importance of metadata. They have also helped in collating information relevant for assessing climate change in a region.

The capacity of NMHSs in the region varies greatly, as does the availability of data. In terms of data available, it is reported that some participating countries had records extending for a century or more, while others only had data for the last 5 or 10 years. In some cases archives from former colonial countries may provide scope to extend some of those records. Software packages such as CLIMSOFT, RclimDex and RHTest software have been reported to be useful and there is need to update, evolve and continue building such tools. There is also a need for enhancing the numbers of such capacity building activities in the region, so as to create awareness for preserving data in easily accessible form and with sufficient Meta information.

REPORT ON REGIONAL CLIMATE APPLICATIONS IN RA II**By W Yun (Republic of Korea)**

WMO fosters the effective application of climate knowledge and information for the benefit of society in various sectors. Regional climate change and climate variability have various impacts on the socio-economic activities in the region. Recent climate fluctuations have demonstrated to many decision makers in weather-sensitive industries that climate variability has significant economic impacts. The impacts increase as the socio-economic activities become varied, complex and active. One major challenge to the NMHSs is to provide the weather sensitive industries with timely and accurate forecasts and warnings of hazardous weather. The need for improving longer-term forecasting systems, particularly, to predict flood and droughts that could lead to disasters is a high priority in the region.

The advanced seasonal climate prediction can be enormously beneficial in national planning, e.g., in the areas of water resources management, disaster management, and agricultural planning and food production. The availability of improved models for seasonal climate prediction, and the development of ensemble prediction techniques, may provide the potential for the practical application of seasonal prediction.

One of the WMO roles, is to ensure that GPCs' products are fully used to provide prediction data to WMO Member Countries, through their national meteorological services, to contribute to disaster prevention and mitigation (like severe climatic conditions), and to contribute to better socio-economic planning that accounts for variable climatic conditions. Towards achieving this goal, enhanced cooperation among GPCs is highly necessary. The fifteenth WMO Congress in 2007 agreed that some GPCs could serve as collectors of global LRF data to build Multi Model Ensemble (MME), and requested standards for MME products be developed. Congress requested also that the global LRF products be made available to as many Regional Climate Centres and National Meteorological Centres as possible for purpose of enabling them to perform their tasks. CBS-DPFS/ET-LRF recommended to CBS that KMA/NCEP be designated as a Lead Centre for LRFMME with responsibilities that include maintenance of a web portal of GPC and MME products.

Activities as Regional Climate Centres

The Climate Centres in Regional Association II have seriously developed and improved its LRF system and could deliver many various seasonal products for climate applications. Climate Applications Performed by Centres in various sectors.

Tokyo Climate Center (TCC) was established in April 2002 in the Headquarters of the Japan Meteorological Agency (JMA). TCC has conducted climate-related services with the main purpose of assisting National Meteorological and Hydrological Services (NMHSs) in Asia and Pacific regions in the long-range forecast and climate monitoring. JMA has provided consolidated climate information to the public, decision makers and researchers through publication of the "Monthly Highlights on Climate System". This report contains diagnostic information on current climate conditions with emphasis on climate in Japan, world climate, extra-tropical circulation, tropical circulation and convection, oceanographic conditions, and snow/ice coverage with the time scales from 5 days to decades. As one of the new services via TCC website, an online web-based interactive climate database called "ClimatView" was made available, enabling users to view and download data of monthly mean temperatures and monthly total precipitation derived from CLIMAT reports.

Beijing Climate Center (BCC) was established in March 2003, based on the National Climate Centre (NCC) of China Meteorological Administration (CMA), which was founded in January 1995, in order to meet the increasing requirements of social-economic activities on natural disaster mitigation related to climate anomalies and extreme climate events from domestic relevant communities to other National Meteorological and Hydrological Services (NMHSs) in Asia as well. Since its establishment, BCC has been engaged in its capacity building on provision of climate-related services and issuance of operational products of monitoring, diagnostics, long range forecast and assessments on regional and global climate to Asian communities through its websites (<http://bcc.cma.gov.cn> in English and <http://ncc.cma.gov.cn> in Chinese). BCC also provides operational data services to support climate monitoring, analysis and prediction in the web-based interactive way or on requirements of users.

North Eurasia regional Climate Centre (NEACC) was established by the Intergovernmental Council for Hydrometeorology of the Commonwealth of Independent States (CIS – Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, the Russian Federation, Tajikistan, Turkmenistan, Uzbekistan and Ukraine) at its 18th Session held in Dushanbe, Tajikistan, 4-5 April 2007, with the aim to provide regional climate related services to CIS countries. The 19th Session of CIS Intergovernmental Council for Hydrometeorology held in Obninsk, Russian Federation, 16-17 October 2007, adopted the Status of North Eurasia regional Climate Centre. At the current stage NEACC is a virtual multi-institutional centre comprising several institutions from Roshydromet:

National Climate Centre (NCC), Pune of the India Meteorological Department (IMD) has been functioning since 1995, carrying out many India specific climate related activities like Climate Monitoring and Analysis, Climate Data Management, Climate Research and Climate Prediction (Seasonal Forecasts). NCC is bringing out climate diagnostic bulletins regularly and different climate data products are prepared for the user community. Operational Seasonal forecast for rainfall over the country is another important activity of the NCC. As a part of recent major modernization activities undergoing in IMD, efforts are going on to widen the activities of the centre so that in the near future it can cater the needs of the entire south Asian region. Brief information regarding the present activities, future plans and needs of the center provided here.

The APEC Climate Center (APCC), established officially in Nov. 2005, has been issuing climate diagnostics and seasonal forecast guidance every month based on the climate multi-model ensemble (MME) methods. These MME predictions are the result of multi-institutional co-operation within the APEC region; 15 Tier-2, and 2 Tier-1 dynamical seasonal forecasts are made available to the APCC from 15 National Hydro-Meteorological Centers/Research Institutes of eight APEC member economies to facilitate the APCC MME forecasts. The ongoing development projects at APCC for future needs include an MME-based drought prediction system, and a user-friendly online climate information tool kit (CLIK) that can be used for customized applications such as regional downscaling or generating a customized MME online. These activities at APCC are directed towards the sustainable development of APEC economies through enhancement of human security against extreme weather and climate, and shed light on the adaptive measures for inadvertent climate change.

CLIMATE INFORMATION AND PREDICTION SERVICES (CLIPS) AND PREDICTIVE CAPABILITY

By V Kryjov (Russian Federation)

Current Status

Web Site for RCC Network at RA II

A website for the Regional Climate Center Network at RA II (<http://www.rccra2.org/detail/index.htm>) has been operated jointly by Tokyo Climate Center (TCC) and Beijing Climate Center (BCC) since June 2007.

Climate Information Services

Climate information services in RA II include a number of web-sites operated by practically all regional NMHSs, RCCs and international climate centers which provide data from climate monitoring based on station data and reanalysis fields as well as some textual reviews of the recent climate conditions.

It should be especially noted that a joint project between Japan Meteorological Agency (JMA) and the Central Research Institute of Electric Power Industry on the long-term global atmospheric reanalysis known as *Japanese 25-year Reanalysis (JRA-25)* was completed in March 2006. The data assimilation system used in JRA-25 is operated as the JMA Climate Data Assimilation System (JCDAS). Both JRA-25 and JCDAS data (1979–present) are available through the JRA-25 official website (http://jra.kishou.go.jp/index_en.html).

BCC routinely provides the public with the climate monitoring, analysis, and prediction data as well as BCC model product data through BCC's Website and a series of special reports such as "ENSO report", "Eastasian monsoon report", "Snow cover report" and "Climate System Monitoring Bulletin", both in printed form and on Website of BCC. Also Asian and global drought monitoring and the global climate extremes monitoring are provided daily and monthly respectively through BCC website.

The Climatological Information Services webpage of the Hong Kong Observatory, Hong Kong, China, launched in 2006 provides climatological information as well as monthly and yearly review of weather in Hong Kong. The "Climate Change" webpage launched in 2007 provides information on the scientific basis of climate change, results of trend analyses of meteorological parameters, as well as projections for temperature and rainfall in Hong Kong in the 21st century.

Uzhydromet (Uzbekistan) performs permanent climate monitoring by the data received from 79 meteorological stations of Uzbekistan. 10-day and monthly climatic data on 21 stations, included in RSCN are transferred to WDC GAS. Monthly climatic data on 12 stations are transmitted to WMO. Climatic reviews for the various periods (season, year) are made.

All public authorities, government bodies, branches of economy and population are systematically maintained with all kinds of information on weather and climate. On the basis of coordinated plans – schemes about 900 organizations (public authorities – 190, divisions of the Ministry of Agriculture and Water Economy – 275, the enterprises of a fuel and energy complex – 53, controls by water resources – 39, the industrial enterprises – 50, etc. are served

Long Range Forecasting

Within RA II region there are three recognized by WMO Global Producing Centers (GPC), namely, GPC-Beijing, GPC-Seoul, GPC-Tokyo. In addition, at its meeting held in Beijing, China, April 2008 CBS Expert Team on Extended and Long Range Forecasting (ET/ELRF) recommended to WMO CBS that WMC-Moscow be recognized as GPC.

The centers produce LRF products with global and regional coverage. The minimum set of forecast products includes one month to three month forecast fields of temperature and precipitation interpreted in terms of probability of tercile categories with zero to one month lead time. Forecast fields are available via the centers' web sites.

Since the report presented in Busan September 2007 the BCC has been making progress in improving oceanic condition qualities in BCC's seasonal prediction system based on ocean-atmosphere coupled models by involving more ocean observation in the global data assimilation system (GODAS) of BCC. Beside regular observation of ocean from GTS, more ARGO data downloaded routinely every month from its special website have been launched into BCC's GODAS. And as a result, it is improved on the prediction of Nino index, as well as the temperature anomalies of sub-surface. More cases assessments are undertaking.

BCC is in the process of preparing upgrading its seasonal prediction system, which commenced on the development of BCC new climate system model (BCC_CSM) since 2005. This system is being developed as an integrated modeling system for LRF through to decadal and climate change time predictions. The time of upgrading of new BCC seasonal prediction system is estimated around 2010.

It should be especially noted and appreciated that along with LR for Japan stations, JMA (RCC-Tokyo) issues station LR forecasts of temperature and precipitation for South East Asia downscaled from GCM forecast fields and posts them on the web-site making them available for the NMHSs of the region.

Theoretical studies and practical experience of the recent decade yield that essential improvement in the reliability of the long range prediction can be achieved by combining of the different models called the multi-model ensemble (MME) system.

In 2007, WMO Lead Centre for Long-Range Forecast Multi-Model Ensemble Prediction (Korea Meteorological Administration (KMA), Seoul, Korea) co-hosted by KMA and NCEP started its work (<http://www.wmolc.org>). In the nearest future, the Center will be available to routinely issue multi-model ensemble seasonal forecasts and disseminate them via its web-site. CBS ET/ELRF at its meeting held in Beijing, China, in April 2008, refined the functions of the Center. Revised functions for Lead Centers of LRFMME were recommended for submission to the forthcoming CBS meeting to be held in 2009 for inclusion in the Manual on the GDPFS.

The KMA was appreciated for its efforts in the establishment of an international MME LRF institution – Asia-Pacific Economic Cooperation (APEC) Climate Center (APCC) in Busan, Korea. Nowadays, APCC operates the largest in the world multi-model ensemble system. It routinely issues multi-model ensemble rolling three-month global and regional forecasts on the monthly basis and disseminates them via its web-site and by e-mail messages directly to NMHSs. In 2008, APCC has started a pilot project on computation of multi-model ensemble six-month forecasts.

Outlook of the annual rainfall and number of tropical cyclones entering 500 km of Hong Kong were issued in March each year. Since March 2006, seasonal forecasts based on outputs of

a regional climate model and the forecast products of other major climate centres were disseminated to the public via the Observatory's website. Since June 2008, the Observatory is experimenting on quantitative monthly forecast of the total rainfall and mean temperature of Hong Kong as well as tropical cyclone activity in the South China Sea based on the outputs of a suite of global-regional climate model for internal reference. In March 2008, the Observatory published its updated projections for the temperature in Hong Kong in the 21st century, in the light of the revised global projections in the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), which was published in 2007.

Uzhydromet issues monthly forecasts on the basis of a synoptic method (Multanovsky method). Advisory forecasts of monthly average values of temperature and precipitation for 1 to 3 months are made on the basis of statistical interpretation and analog method.

Regional Climate Forums

It should be especially noted and appreciated that Forum on Regional Climate Monitoring, Assessment and Prediction for Asia (FOCRAll) is annually held under the auspices of China Meteorological Administration (CMA) in Beijing, China. The Fourth Session FOCRAll was held in April, 2008. Representatives from most of regional NMHSs participate at and contribute to the work of Forum.

CMA-JMA-KMA spring and autumn joint meetings on summer/winter East Asia Monsoon are held twice a year. This year a seminar on East Asian winter monsoons is scheduled for autumn 2008 in Tokyo.

A Guangdong-Hong Kong-Macao Workshop on Climate Prediction was organized by the Hong Kong Observatory in July 2007. The Observatory participates in regional climate forums held in Guangdong and Beijing, China on a regular basis. The Observatory provided support in the organization of the International Conference on Climate Change held in Hong Kong in May 2007, by serving as members of the organizing and technical committees.

Training

BCC has been engaged in providing group training courses in meteorology and climatology in collaboration with the CMA's Training Center and Nanjing University of Information Science and Technology (former named Nanjing Institute of Meteorology, also designated by WMO as East-Asian Regional Training Center) for training NMHS staff in SI forecasting methods and characteristics. In addition, BCC provided training courses on interpretation and application of dynamical climate model products and numerical simulation technology on wind energy resource assessment. Since 2004, BCC has held International Seminar on Climate System and Climate Change every summer, focusing training on regional climate model and ocean data system assimilation. BCC has basic training facilities, including a group of experienced experts on climate prediction.

Besides basic training, BCC has organized "Training workshop on application on SI forecast by downscaling dynamical climate model output" and provided training with experimental operation by BCC-models products during the Forums on Regional Climate Monitoring, Assessment and Prediction for Asia (FOCRAll) since 2005. BCC also provides visitor scholarship for staff of Asian NMHSs for special assistance on cooperation and exchange of SI forecast methods between NMHSs since 2005.

JMA has conducted annual training courses in meteorology for experts of National Meteorological and Hydrological Services (NMHSs) since 1973 as one of a number of courses provided by the Japan International Cooperation Agency (JICA). The training course in 2007 was held from September to December with emphasis on the operational use of numerical weather prediction, satellite meteorology and climate information. In a climate

information session, staff members of the Climate Prediction Division gave lectures on climate system monitoring, long-range forecasting, El Niño outlook and global warming projection.

The *Training Course on Interpretation of Climate Products and Climate Downscaling* was held at the Malaysian Meteorological Department (MMD) in October 2007. At the invitation of MMD, TCC's staff members attended the Training Course for lectures on various topics including JMA's numerical/seasonal prediction models, ensemble prediction system and making guidance, statistical downscaling, access to GPV data and its application using R Language, and reanalysis data (JRA-25) and its application.

KMA annually operates the Expert Program for Climate Prediction in Asia-Pacific for NMHS specialists from developing countries under the auspice of the Korea International Cooperation Agency (KOICA) starting from 2006. Korea invites every year staffs from NMHSs to the Expert Programme for Climate Prediction in Asia-Pacific. This regional technical cooperation programme, organized by Korea Meteorological Administration (KMA) and financially supported by Korea International Cooperation Agency (KOICA), aims at providing the opportunity to individuals to gain the first hand knowledge and skill on climate prediction and at enabling them to put what they have learned into use for the development of their countries.

In 2007, five staffs from Indonesia, Mongolia, Peru, Philippines and Viet Nam took part in this three-month Programme on 2 August-30 October. At KMA headquarters, the participants were introduced to a wide range of climate related subjects as well as how to utilize the data visible on the website (www.wmolc.org) dedicated for the WMO Global Producing Centre for Long-Range Forecast (GPC) Seoul and the WMO Lead Centre for LRF Multi-Model Ensemble (MME) Prediction, which GPC Seoul is co-hosting with GPC Washington, to be officially recognized at the forthcoming CBS meeting.

The course continued at APEC Climate Center (APCC), located in Busan, at which the participants joined the seasonal MME forecast activities with focus on its verification and application to their countries. In addition, the participants took part in the WMO/KMA GPCs Workshop on Lead Centre for LRF MME Prediction and APCC Symposium, jointly held in Busan on 18-20 September, and the 8th Joint Meeting for the Seasonal Prediction of the East Asian Winter Monsoon held in Seoul on 17-19 October.

In 2008, nine staffs from NMHSs in the Region will be invited to participate in this Programme in September-November.

Nowadays, only the centers in RA II, which is able to provide the training on up-to-date multi-model ensemble long-range forecasting is WMOLC-LRFMME (Seoul, Korea) and APCC (Busan, Korea). *Training Course on Regional Downscaling for Asia-Pacific Region using APEC Climate Center Global Seasonal Climate Prediction* for NMHS specialists from developing countries co-funded by APN (Asia-Pacific Network for Global Change Research) and APCC will be held at APCC, Busan, Korea, in September-November, 2008. Specialists from Korea, New Zealand, Russia, Vietnam, the Philippines and Thailand will get hand-on experience of downscaling prediction, using data from 15 GCMs provided by APCC. A suite of computer software will be developed by each participant, which can perform regional climate prediction for their specific target regions based on APCC MME seasonal forecasts for the purpose of implementation at NMHSs. The efforts of APN and APCC in the provision of training in up-to-date MME long-range forecasting technology for the NMHSs' specialists should be highly appreciated.

Hong Kong Observatory invited several renowned scientists, including Dr. John Roads, Prof. Gabriel Ngar Cheung Lau, Prof. Jacques Derome, Prof. Yihui Ding, and Dr. William Ka Ming Lau to give lectures to Observatory staff on a wide range of topics covering climate change, ENSO, Asian monsoon and seasonal forecasting.

To promote general awareness and understanding on climate change, in 2007, the

Observatory produced an educational package on climate change for school children in Hong Kong. Moreover, more than 70 talks on climate change were conducted for schools and other organizations in Hong Kong during 2007-2008.

Some Considerations on the CLIPS' Tasks in the RA II

1. Improvement of the LR prediction quality, especially for the extra-tropics.
 - improvement of the GCMs and input data quality
 - improvement of the post-processing methods
 - development of regional methods and methods of downscaling
2. Finding of some reasonable equilibrium between LR prediction lead/forecast time and prediction skill for different regions and adjustment of regional operational forecasts to this lead/forecast time
3. Improvement of “assimilation” of climate forecasts by NMHSs
 - training of NMHS specialists in interpretation of LRF products
 - training of NMHS specialists aiming on transferring of development of regional methods and methods of downscaling from GPCs and RCCs to climate prediction institutions of NMHSs
 - widening of sub-regional climate forums focused on sub-regional LR forecasts and their interpretation

Report of Rapporteur on Climate Change Issues, including UNFCCC

By M Rahimi (Islamic Republic of Iran)

1. Introduction

There are 35 Members in WMO Regional Associations (Asia) RA II including Afghanistan, Bahrain, Bangladesh, Bhutan, Cambodia, China, Democratic People's Republic of Korea, Hong Kong (China), India, Islamic Republic of Iran, Islamic Republic of Iraq, Japan, Kazakhstan, Kuwait, Kyrgyzstan, Lao People's Democratic Republic, Macao (China), The Maldives, Mongolia, Myanmar, Nepal, Oman, Pakistan, Qatar, Republic of Korea, Russian Federation, Saudi Arabia, Sri Lanka, Tajikistan, Thailand, Turkmenistan, United Arab Emirates, Uzbekistan, Viet Nam, and Yemen. Two countries are Annex-I parties of UNFCCC (Japan and Russian Federation) and other 33 are Non-Annex I parties.

2. Regional characteristics

Asia is the most populous continent. Its total population in 2002 was reported to be about 3,902 million, of which almost 61% is rural and 38.5% lives along 100 km of the coast. The coastline of Asia is 283,188 km long. From the view point of climate change, Asia can be divided into seven sub-regions, namely North Asia, Central Asia, West Asia, Tibetan Plateau, East Asia, South Asia and South-East Asia (IPCC, 2007).

North Asia, located in the Boreal climatic zone, is the coldest region of the northern hemisphere in winter. One of the world's largest and oldest lakes, Baikal, located in this region contains as much as 23,000 km³ of freshwater and holds nearly 20% of the world surface freshwater resources.

Central and West Asia include several countries of predominantly arid and semi-arid region. *Tibetan Plateau* can be divided into the eastern part (forest region), the northern part (open grassland), and the southern and central part (agricultural region).

East Asia stretches in the east-west direction to about 5,000 km and in the north-south to about 3,000 km including part of China, Japan and Korea.

South Asia is physiographically diverse and ecologically rich in natural and crop-related biodiversity. The region has five mega polis of the world, out of 20.

South-East Asia is characterized by tropical rainforests, monsoon climates with high and constant rainfall, heavily-leached soils, and diverse ethnic groups.

3. Current situation of Climate change in Asia

3.1 Observed climate trends and variability

Past and present climate trends and variability in Asia are generally characterized by increasing surface air temperature which is more pronounced during winter than in summer. Increasing trends have been observed across the seven sub regions of Asia. The observed increases in some parts of Asia during recent decades ranged between less than 1°C to 3°C per century. Increases in surface temperature are most pronounced in North Asia. Interseasonal, interannual and spatial variability in rainfall trend has been observed during the past few decades all across Asia. Decreasing trends in annual mean rainfall are observed in Russia, North-East and North China, coastal belts and arid plains of Pakistan, parts of North-East India, Indonesia, Philippines and some areas in Japan. Annual mean rainfall exhibits increasing trends in Western China, Changjiang Valley and the South-

Eastern coast of China, Arabian Peninsula, Bangladesh and along the western coasts of the Philippines.

3.2 Observed changes in extreme climatic events

In South-East Asia, extreme weather events associated with El-Niño were reported to be more frequent and intense in the past 20 years. Significantly longer heat wave duration has been observed in many countries of Asia, as indicated by pronounced warming trends and several cases of severe heat waves. Generally, the frequency of occurrence of more intense rainfall events in many parts of Asia has increased, causing severe floods, landslides, and debris and mud flows, while the number of rainy days and total annual amount of precipitation has decreased. However, there are reports that the frequency of extreme rainfall in some countries has exhibited a decreasing tendency. Increasing frequency and intensity of droughts in many parts of Asia are attributed largely to a rise in temperature, particularly during the summer and normally drier months, and during ENSO events. Recent studies indicate that the frequency and intensity of tropical cyclones originating in the Pacific have increased over the last few decades. In contrast, cyclones originating from the Bay of Bengal and Arabian Sea have been noted to decrease since 1970 but the intensity has increased. In both cases, the damage caused by intense cyclones has risen significantly in the affected countries, particularly India, China, Philippines, Japan, Vietnam and Cambodia, and Islamic Republic of Iran.

3.3 Hydrology and water resources

Rapid thawing of permafrost and decrease in depths of frozen soils (4 to 5 m in Tibet) due largely to rising temperature has threatened many cities and human settlements, has caused more frequent landslides and degeneration of some forest ecosystems, and has resulted in increased lake-water levels in the permafrost region of Asia.

In drier parts of Asia, melting glaciers account for over 10% of freshwater supplies. Glaciers in Asia are melting faster in recent years than before, as reported in Central Asia, Western Mongolia and North-West China, particularly the Zerafshan glacier, the Abramov glacier and the glaciers on the Tibetan Plateau. As a result of rapid melting of glaciers, glacial runoff and frequency of glacial lake outbursts causing mudflows and avalanches have increased. A recent study in northern Pakistan, however, suggests that glaciers in the Indus Valley region may be expanding, due to increases in winter precipitation over western Himalayas during the past 40 years.

In parts of China, the rise in temperature and decreases in precipitation, along with increasing water use have caused water shortages that led to drying up of lakes and rivers. In India, Pakistan, Nepal and Bangladesh, water shortages have been attributed to rapid urbanization and industrialization, population growth and inefficient water use, which are aggravated by changing climate and its adverse impacts on demand, supply and water quality. In arid Central and West Asia, changes in climate and its variability continue to challenge the ability of countries in the arid and semi-arid region to meet the growing demands for water. Decreasing precipitation and increasing temperature commonly associated with ENSO have been reported to increase water shortage, particularly in parts of Asia where water resources are already under stress from growing water demands and inefficiencies in water use.

3.4 Oceans and coastal zones

Global warming and sea-level rise in the coastal zone of Boreal Asia have influenced sea-ice formation and decay, thermo abrasion process, permafrost and the time of river freeze-up and break-up in recent decades. The coastlines in monsoon Asia are cyclone-

prone with ~42% of the world's total tropical cyclones occurring in this region. The combined extreme climatic and non climatic events caused coastal flooding, resulting in substantial economic losses and fatalities. Wetlands in the major river deltas have been significantly altered in recent years due to large scale sedimentation, land-use conversion, logging and human settlement. Coastal erosion in Asia has led to loss of lands at rates dependent on varying regional tectonic activities, sediment supply and sea-level rise. Salt water from the Bay of Bengal is reported to have penetrated 100 km or more inland along tributary channels during the dry season. Severe droughts and unregulated groundwater withdrawal have also resulted in sea-water intrusion in the coastal plains of China.

Over 34% of the vast and diverse coral reefs of Asia that are of immense ecological and economic importance to this region particularly in South, South-East and East Asia are reported to have been lost in 1998, largely due to coral bleaching induced by the 1997/98 El Niño event. The destructive effects of climate change compound the human induced damages on the corals in this region. A substantial portion of the vast mangroves in South and South-East Asian regions has also been reportedly lost during the last 50 years of the 20th century, largely attributed to human activities. Evidence of the impacts of climate-related factors on mangroves remains limited to the severe destruction of mangroves due to reduction of freshwater flows and salt-water intrusion in the Indus delta and Bangladesh.

3.5 Natural ecosystems

Increasing intensity and spread of forest fires in Asia were observed in the past 20 years, largely attributed to the rise in temperature and decline in precipitation in combination with increasing intensity of land uses. During the last decade, 12,000 to 38,000 wild fires annually hit the boreal forests in North Asia affecting some 0.3 to 3 million hectares. Recent studies have also shown a dramatic increase of fires in Siberian peatlands (of which 20 million ha were burnt in 2003) linked to increased human activities combined with changing climate conditions, particularly the increase in temperature. Fires in peatlands of Indonesia during the 1997 to 98 El Niño dry season affected over 2 million ha and emitted an estimated 0.81 to 2.57 PgC (Petagram (10^{15} grams) carbon) to the atmosphere. In the past 10 years about 3 million ha of peatland in South-East Asia have been burnt, releasing between 3 to 5 PgC, and drainage of peat has affected an additional 6 million ha and released a further 1 to 2 PgC. As a consequence of a 17% decline in spring precipitation and a rise in surface temperature by 1.5°C during the last 60 years, the frequency and aerial extent of the forest and steppe fires in Mongolia have significantly increased over a period of 50 years. The 1997/98 ENSO event in Indonesia triggered forest and brush fires in 9.7 million hectares, with serious domestic and trans-boundary pollution consequences. Thousands of hectares of second growth and logged-over forests were also burned in the Philippines during the 1997/98 ENSO events. With the gradual reduction in rainfall during the growing season for grass, aridity in Central and West Asia has increased in recent years, reducing growth of grasslands and increasing bareness of the ground surface. Increasing bareness has led to increased reflection of solar radiation, such that more soil moisture is evaporated and the ground has become increasingly drier in a feedback process, thus adding to the acceleration of grassland degradation. Wetlands in Asia are being increasingly threatened by warmer climate in recent decades. The precipitation decline and droughts in most delta regions of Pakistan, Bangladesh, India and China have resulted in the drying up of wetlands and severe degradation of ecosystems. The recurrent droughts from 1999 to 2001, as well as the building of an upriver reservoir and improper use of groundwater, have led to drying up of the Momoqe Wetland located in the Songnen Plain.

3.6 Biodiversity

Biodiversity in Asia is being lost as a result of development activities and land degradation (especially overgrazing and deforestation), pollution, over-fishing, hunting,

infrastructure development, species invasion, land-use change, climate change and the overuse of freshwater. Though evidence of climate-related biodiversity loss in Asia remains limited, a large number of plant and animal species are reported to be moving to higher latitudes and altitudes as a consequence of observed climate change in many parts of Asia in recent years. Changes in the flowering date of Japanese Cherry, a decrease in alpine flora in Hokkaido and other high mountains and the expansion of the distribution of southern broad-leaved evergreen trees have also been reported.

3.7 Human health

A large number of deaths due to heat waves – mainly among the poor, elderly and laborers such as rural daily wage earners, agricultural workers and rickshaw pullers – have been reported in the Indian state of Andhra Pradesh, Orissa and elsewhere during the past five years. Serious health risks associated with extreme summer temperatures and heat waves have also been reported in Siberian cities. In South Asia, endemic morbidity and mortality due to diarrheal disease is linked to poverty and hygiene behaviour compounded by the effect of high temperatures on bacterial proliferation. Diarrheal diseases and outbreaks of other infectious diseases (e.g., cholera, hepatitis, malaria, and dengue fever) have been reported to be influenced by climate-related factors such as severe floods, ENSO-related droughts, sea-surface temperatures and rainfall in association with non-climatic factors such as poverty, lack of access to safe drinking water and poor sewerage system.

4. Situation of RA II members regarding UNFCCC

Over a decade ago, most countries joined an international treaty – the United Nations Framework Convention on Climate Change (UNFCCC) – to begin to consider what can be done to reduce global warming and to cope with whatever temperature increases are inevitable. The Convention on Climate Change sets an overall framework for intergovernmental efforts to tackle the challenge posed by climate change. It recognizes that the climate system is a shared resource whose stability can be affected by industrial and other emissions of carbon dioxide and other greenhouse gases. Under the Convention, governments:

- gather and share information on greenhouse gas emissions, national policies and best practices
- launch national strategies for addressing greenhouse gas emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries
- cooperate in preparing for adaptation to the impacts of climate change

The Convention enjoys near universal membership, with 192 countries having ratified.

4.1 Ratification

Since 1994 that the Convention entered into force, 11 members of RA II ratified the convention in 1994. In 1995 12 other members ratified the convention. In 1996, 5 members ratified the convention and in 2000 one member (Kyrgyz Republic) ratified the convention. 4 members have not yet ratified the convention and 2 members (Hong Kong and Macao) have special conditions as the Government of the People's Republic of China has decided that the Kyoto Protocol to the United Nations Framework Convention on Climate Change shall provisionally not apply to the Hong Kong, China Special Administrative Region and the Macao, China Special Administrative Region of the People's Republic of China. The ratification situation of convention by RA II members were shown in Table 1.

Table1. Status of the convention ratification by RA II members

1994	1995	1996	2000	Special ratification	Not ratified
Bangladesh China India Japan Maldives Mongolia Nepal Pakistan R.of Korea Sri Lanka Uzbekistan	Bahrain Bhutan Korea Kuwait Lao Myanmar Oman Russian Federation Saudi Arabia Thailand Turkmenista n Vietnam	Cambodia I.R. of Iran Qatar Yemen UAE	Kyrgyz Republic	Hong Kong Macao	Afghanistan Iraq Kazakhstan Tajikistan
11	12	5	1	2	4

4.2 Focal points

Each party has national focal points in UNFCCC. In RA II, 6 focal points are ministry of foreign affairs. Only in Saudi Arabia focal point is Petroleum organization. 20 members have appointed environment ministries as focal point. Also there are no focal points for Afghanistan, Iraq, Kazakhstan, Tajikistan, Korea, R. of Korea, Uzbekistan, Hong Kong, and Macao. They are also designated national authorities (DNA) for Clean Development Mechanism (CDM).

4.3 National communications

All Parties must report on the steps they are taking or envisage undertaking to implement the Convention (Articles 4.1 and 12). In accordance with the principle of “common but differentiated responsibilities” enshrined in the Convention, the required contents of these national communications and the timetable for their submission are different for Annex I and non-Annex I Parties. Each non-Annex I Party shall submit its initial communication within three years of the entry into force of the Convention for that Party, or of the availability of financial resources (except for the least developed countries, who may do so at their discretion).

Most of the 41 Annex I Parties submitted their first report (known as a “national communication”) in 1994 or 1995 and their second in 1997–1998. The fourth national communications were due on 1 January 2006. Regarding annex1 parties of RA II, Japan and Russian federation have submitted initial, second, third, and fourth national communications. Also they submitted 3 “In Detail Reports” (IDR) and also demonstrable progress reports.

One hundred and thirty-four out of 150 non-Annex I Parties have now submitted their initial national communications. Among RA II members, Republic of Korea has submitted second national communication also. Afghanistan, Iraq, Kazakhstan, Tajikistan, Hong Kong, and Macao have not submitted national communication since they have not ratified the convention. All other members (26 members) have submitted their initial national communication and working on second national communication.

5. Situation of countries regarding Kyoto Protocol

More recently, a number of nations approved an addition to the treaty: the Kyoto Protocol, which has more powerful (and legally binding) measures. Among RA II members 28 members were entered into force of Kyoto Protocol in year 2005 and just 1 member (Bahrain) entered into force in year 2006. Afghanistan, Iraq, Kazakhstan, and Tajikistan have not entered in to force as they have not ratified the convention.

6. Contribution of RA II countries in AR4

The Fourth Assessment Report "Climate Change 2007" prepared in 4 volumes (as follows) by contributing 450 Leading Authors, 800 Authors and 2500 expert reviewers from 130 countries during 6 years of work and finished in 2007.

- 1- Working Group I Report "The Physical Science Basis"
- 2- Working Group II Report "Impacts, Adaptation and Vulnerability"
- 3- Working Group III Report "Mitigation of Climate Change"
- 4- The AR4 Synthesis Report

Authors from RA II members have contributed in preparing all parts of this report. The number of authors is shown in table2. Of course the more experts from RA II countries were contributed in preparing IPCC reports as expert reviewer.

Table2: the number of authors from RA II countries in preparing AR4

Country	WG I	WG II	WG III	Total
China	13	13	16	42
Japan	18	7	16	41
India	6	11	10	27
Russian Federation	6	8	5	19
Bangladesh		5		5
I.R. of Iran	2	1	1	4
Thailand	2		1	3
Republic of Korea	2			2
Vietnam		2		2
Mongolia		1		1
Saudi Arabia	1			1
Sri lanka	1			1
Korea	1			1
Total	51	49	49	149

7. Recommendations

1. Within the UN system the WMO has unique responsibility for coordinating activities related to climate prediction, monitoring, scientific research and assessment and is able to draw on the collective resources of the NMHSs of its 188 Members in carrying out these, and its other responsibilities. While the NMHSs are not always directly involved in the policy aspects of climate change they make huge contributions to global monitoring and have a rather under-utilized capability to contribute to regional climate change impact assessment and adaptation strategy preparation. As the IPCC plans for future assessment work we encourage the IPCC to involve more the NMHSs in this work. Experts from WMO community, including those from NMHSs and academic institutions, may be drawn further into the work of IPCC.

2. We note that research into climate change, including into adaptation strategies that would be consistent with sustainable development, require adequate data, and that often the essentials of a climate monitoring system do not exist in these areas. The relevant global initiatives to deal with climate change may support WMO in working to establish improved monitoring in these regions as a precursor to filling the research gaps that have been identified in IPCC AR4.

References:

<http://www.ipcc.ch>

<http://unfccc.int>

<http://www.wmo.int>

PROGRESS IN THE ESTABLISHMENT OF RCCS

By WMO Secretariat

1. WMO has formally sought to define and establish Regional Climate Centres (RCCs) since the thirteenth World Meteorological Congress (Cg-XIII, May 1999). A summary of major milestones and achievements and relevant references, up to decisions made at the fifteenth World Meteorological Congress (Cg-XV, May 2007), are documented in the Annex to this item.

2. The Commission for Climatology Implementation Coordination Team (CCI ICT) which met 9-11 October 2007 in Geneva, Switzerland, with representation from the regional Working Groups on climate-related matters and of the WMO World Weather Watch and the CBS, agreed on definitions of RCCs and RCC-Networks, and also agreed that the terms RCC and RCC-network would be exclusively used for centres designated by WMO under the Manual on the Global Data Processing and Forecasting System (Volume 1, global aspects) (the 'GDPFS Manual'). Roles and responsibilities of RCCs and RCC-Networks were identified in two categories: mandatory functions that would be common to all designated RCCs or RCC-Networks, and highly desirable functions. It was decided that RCCs and RCC-Networks will be considered, in the GDPFS manual, as a type of Regional Specialized Meteorological Centre (RSMC), and will be 'centres in a cooperative effort', a concept already defined in the GDPFS manual. These decisions underpin the concept that RCCs and RCC-Networks will be centres of excellence, with uniformity of service around the globe in their mandatory functions. The CCI ICT established a technical expert group, with CCI and CBS representation, to address and resolve remaining issues, and to develop the amendments required for the GDPFS manual to support formal WMO designation of RCCs or RCC-Networks, and established a workplan for this activity.

3. The CCI-CBS Intercommission Technical Meeting was held on schedule (21-22 January 2008, Geneva, Switzerland), and achieved its goals. A comprehensive set of amendments was developed for the GDPFS manual, including criteria for the set of mandatory functions for RCCs and RCC-Networks. Following finalization of the report for the session, implying agreement by both CCI and CBS representatives on the content, style and format of the amendment, the proposed amendment was submitted to the CBS Expert Team on LRF (ETLRF), which met in Beijing in April 2008. The ETLRF reviewed the amendments and approved them with slight modifications. The matter will now be taken up by the CBS ICT on the Data Processing and Forecasting System, scheduled to meet in October 2008 in Canada. Any suggested CBS modifications will be reviewed and undertaken by the Intercommission expert group, and approved by the CCI Management Group. The president of the CCI will submit the proposed amendment to the upcoming session of CBS (November 2008) for endorsement. CBS will submit the proposed amendment to WMO Executive Council in 2009 (EC-LXI) for approval. CCI and CBS recognise the importance of adherence to the timeframe identified by the CCI ICT, in order to support the wishes of the members to have the first RCCs designated at EC-LXI in 2009.

4. The 60th session of WMO Executive Council noted the CCI-CBS work plan for development of the amendments to the CBS Manual on the Global Data Processing and Forecasting System (GDPFS) (Vol. 1, Global Aspects) that would allow WMO designation of Regional Climate Centres by EC-LXI in June 2009. Recognizing the importance of RCC designation to Members in this timeframe, the Council endorsed the CCI/CBS inter-commission mechanism and the deadline for the completion of the amendment of the Manual on the GDPFS. The Council urged GPCs and Regional Associations to support the climate activities of pilot RCCs and RCC-Networks. The Council noted with appreciation that

a new document of interim guidance on Establishment and Designation of WMO Regional Climate Centres has been developed and urged that all Members and Regional Associations use this interim guidance in all RCC planning and in developing RCC pilot projects until the final Guidelines are published following decision by EC-LXI (2009).

REFERENCES:

1. Report of the CCI Implementation Coordination Team (October 2007)
2. Draft report of the CCI-CBS Intercommission Technical Meeting on Designation of RCCs (January 2008)
3. Report of the CBS Expert Team on LRF (April 2008).

BACKGROUND TO WMO RCC CONCEPT (Cg-XIII, 1999 through Cg-XV, 2007)

A1 At the Thirteenth World Meteorological Congress (May 1999), Members were urged to define the requirements for, and objectives and responsibilities of regional and global centres to support operational national climate services; to define the use of existing regional structures and institutions; and to involve regional associations and other partners in the development of the concept of Regional Climate Centres (RCCs). An Inter-Commission Task Team on Regional Climate Centres (ICTT-RCC) was set up (Res. 2/EC-LII, 2000) with members from the Technical Commissions for Climatology (CCI), Agricultural Meteorology (CagM) and Basic Systems (CBS) and several other members including regional representatives. The second iteration of the ICTT included representatives as well from CAS and Chy. The results of their efforts were documented in WCASP No. 52, May 2001, and WCASP No. 54, March 2002 and presented at WMO EC sessions and at the Fourteenth World Meteorological Congress in May 2003. These sessions noted that RCC responsibilities should not duplicate or replace those of NMHSs; that establishment of RCCs should follow the steps set up for designation of RSMCs; and that the procedures for designation of RCCs needed to be defined. The range of Regional Climate Centre Functions developed by the ICTT-RCC was published in WCASP No. 52.

A2 A meeting on the organization and implementation of RCCs (Geneva, 27-28 November 2003), developed Guidelines for the Establishment of RCCs. These Guidelines (WCASP No.62) covered, amongst other things, determination of requirements for an RCC; possible structures, the designation procedure as per the CBS Manual on the Global Data Processing and Forecasting System (Vol 1, global aspects), and establishment of centres by regional associations without formal WMO designation. The Guidance recognized that the requirements of NMHSs for RCC functions may vary from region to region, and that RCC functions for a region may be undertaken within a single centre, or may be distributed amongst various centres, or nodes, in a Regional Climate Centre Network.

A3 Subsequent to the 2003 meeting on organization and implementation of RCCs, most regions have considered implementation of RCC(s) or an RCC network. At the fifteenth World Meteorological Congress in May 2007 (Cg-XV), RA II indicated that the Beijing Climate Centre (BCC) and Tokyo Climate Centre (TCC) would be recommended as components of the RA II network of RCCs, each of these centres being a multi-functional centre fulfilling a wide range of tasks in all 5 areas of RCC potential functions. In late 2007, the Russian Federation established a North-Eurasian Regional Climate Centre (NEA-RCC). In August 2007, the RA VI Working Group on Climate-related matters sought applications from members for establishment of a 4-node RA VI RCC Network, to cover areas of activity specialization for Long-range Forecasting; Climate Monitoring; Climate Data; and Climate Applications. RA V, at its fourteenth session (Adelaide, Australia, May 2006) noted its intentions to continue to fulfil its requirements for regional climate activity in a distributed system with 4 nodes (Melbourne, Australia; Auckland, New Zealand; Singapore (ASEAN); and Hawaii, USA). In 2004, RA IV developed and considered a virtual RCC model that would strengthen the capacities of institutions already serving the region, with services including training, data services, coordination of climate services, etc. No official request for establishment of an RA IV RCC has yet been made to WMO. The Working Groups on Climate-related Matters of Ras I and III have discussed RCC implementation, but have not yet issued surveys to gauge regional interest in needs for, or offers to host, RCC functions.

A4 Cg-XV (May 2007) approved the establishment of nine Global Producing Centres (GPCs) along with the definitions of GPCs, description of their roles and a minimum set of products, for amendment to the Manual on the Global Data-Processing and Forecasting

System (GDPFS) (Vol I). Cg-XV requested that the global LRF products be made available to as many RCCs and NMCs as possible for purpose of enabling them to perform their tasks, and further requested that CBS and CCI collaborate to develop the minimum set of functions and services required of RCCs, in order to support their official designation and inclusion in the Manual on the GDPFS (Vol I). Cg-XV noted that ongoing coordination would be required to ensure that operational products from the GPCs meet the requirements for seasonal forecasting services provided by RCCs and NMHSs, and that RCCs would need assistance for training users, and requested that GPCs identify and provide suitable experts for interpretation and use of GPC LRF products, verification techniques (e.g. local verification of RCC-generated products and applications).

REFERENCES:

1. Abridged Final Report with Resolutions of the Thirteenth World Meteorological Congress (WMO-No. 902, section 3.2.5...(May 1999)
2. General Summary of the session of the Inter-Commission Task Team on Regional Climate Centres (WMO-TD No. 1070, WCASP-No. 52) (May 2001)
3. Report of the Second Session of the Inter-Commission Task Team on Regional Climate Centres (WMO-TD No. 1107, WCASP No. 54)(March 2002)
4. Abridged Final Report with Resolutions of the Fourteenth World Meteorological Congress (WMO-No. 960, sections 3.1.3, 3.2.0, 3.2.5 and Resolution 11(Cg-XIV) (May 2003)
5. Proceedings of the Meeting on Organization and Implementation of Regional Climate Centres (WMO-TD No. 1198, WCASP – No. 62) (November 2003)
6. Proceedings of the Meeting of the RA-II Working Group on Climate-Related Matters including CLIPS (WMO-TD No. 1261) (October 2004)
7. Final Report of the Joint Expert Teams on Long-Range Forecasting (infrastructure and Verification), CBS OPAG on Data Processing and Forecasting Systems (April 2006)
8. Report of the Working Group on Climate-Related Matters of RA VI (October 2006)
9. Report of the Meeting of the Working Group on Climate-Related Matters for Regional Association II (WMO-TD No. 1382) (April 2007)
 - a. Abridged Final Report with Resolutions of the Fifteenth World Meteorological Congress (WMO-No. 1026, (May 2007).

**SUMMARY REPORT ON THE ACTIVITIES
FOR THE IMPLEMENTATION OF THE RA-II RCC NETWORK**

By K Kurihara (Japan)

1 The background and progress in implementation of the RCC Network in RA-II

- 1.1 The thirteenth session of the WMO Regional Association II (Hong Kong, December 2004) decided to take immediate steps to implement a Regional Climate Centre (RCC) Network in RA-II on a pilot basis (XIII-RA II Resolution 9). The session also decided to establish a Working Group on Climate-Related Matters (WGCRM) in RA-II (XIII-RA II Resolution 7), one of whose terms of reference is to advise the President of RA-II on all matters concerning the implementation of RCC activities in RA-II.
- 1.2 Following the above Resolutions, the WGCRM (Dr. Zheng Guoguang, chairperson of WGCRM) developed the "Guidelines on the Eligibility of RCCs" and the "Designation procedures for the establishment of the RCC Network", and submitted them to the President of RA-II in November 2005. The President of RA-II sent a letter to RA-II Members inviting their applications for RCC status.
- 1.3 In response to the above letter, the China Meteorological Administration (CMA) and the Japan Meteorological Agency (JMA) formally applied for RCC status.
- 1.4 Following the application of CMA and JMA for RCC status, WGCRM held in Beijing in April 2007 examined the eligibility of the Beijing Climate Center (BCC) of CMA and the Tokyo Climate Center (TCC) of JMA as RCCs, and discussed the establishment and implementation of the RCC Network in RA-II, i.e. identifying the participating institutions to the RCC Network and the host institution of the RCC Network homepage. The meeting agreed to recommend to the President of RA II that both BCC and TCC be designated as RCCs. The meeting took cognizance of the fact that the Islamic Republic of Iran Meteorological Organization (IRIMO) and India Meteorological Department (IMD) had also shown interest in the RCC status, but had not yet formally applied. Furthermore, the meeting noted that the North Eurasian Climate Centre (NEACC) established by the NMHSs of the Commonwealth of Independent States (CIS) has recently approved their joining of the RA II RCC Network and is planning to formally apply to participate in the network. WGCRM prepared a report on the implementation of the RCC Network in RA-II and submitted it to the President of RA-II.
- 1.5 At the Fifteenth World Meteorological Congress in May 2007, President of RA II indicated that BCC and TCC would be recommended as components of the RA II network of RCCs, each of these centres being a multi-functional center fulfilling a wide range of tasks of RCC potential functions.
- 1.6 BCC and TCC jointly established the RCC Network homepage in June 2007, which has been operated by BCC.

- 1.7 The CCI Implementation Coordination Team (CCI ICT) which met 9-11 October 2007 in Geneva, with representation from the six regional Working Groups on climate-related matters and of the WMO World Weather Watch and CBS, agreed on definitions of RCCs and RCC-Networks, and also agreed that the terms RCC and RCC-Network would be exclusively used for centres designated by WMO under the Manual on the Global Data Processing and Forecasting System (GDPFS) (Volume 1, global aspects).
- 1.8 A CCI-CBS Intercommission Technical Meeting on Designation of RCCs held in Geneva, on 21–22 January 2008, reviewed and revised the draft amendments to the Manual on GDPFS. These were based on the principle of least interference to the Manual, and on the decisions of the CCI ICT. The final set of amendments, as agreed by all participants of the CCI-CBS Intercommission Technical Meeting, and slightly reviewed and approved by the CBS Expert Team on Extended and Long-range Forecasting (ET-LRF) held in Beijing, China, in April 2008.

2 Perspectives of the establishment of the RCC Network in RA-II

- 2.1 WGCRM meeting will examine the eligibility of institutions which have intention to serve as RCCs in RA II, i.e. IMD, IRIMO and NEACC.
- 2.2 WGCRM will prepare a document on the result of the examination of the eligibility to President of RA II for report to the Fourteenth session of RA II.
- 2.3 The final version of the amendments to the Manual on the GDPFS (Vol. 1, global aspects) for designation of RCCs will be submitted for consideration of CBS at its next session to be held in early 2009, and if approved, CBS will submit the amendment to EC-LXI (2009) for its approval for implementation.

3 Brief summary of the activity reports of BCC and TCC for the RCC Network in RA-II

- 3.1 Summary of the relevant activities by CMA (BCC)

Operation:

1. At present, BCC can provide as many as 48-member multi-model ensemble prediction and their interpretation and evaluation. The most probability prediction on surface temperature and precipitation can be issued by tercile.
2. The monthly/seasonal prediction was systemically verified and evaluated in terms of WMO Long Range Forecast Standard Verification System (WMO-LRFSVS) .
3. The monitoring and diagnosis system on Northern Hemisphere blocking high and daily Asian monsoon monitoring system have been established. They are specific products of BCC developed aiming at Asian monsoon region.

Research and Development:

1. The second generation of BCC's Atmospheric General Circulation model has been developed. The simulation of climate change in 20th century have been carried out.
2. The precipitation/temperature downscaling techniques has also been developed by using BCC's historical hindcast data and prediction products, which had been

applied experimentally in east of China and Islamabad of Pakistan.

Coordination:

A website for the Regional Climate Center Network at RA II (<http://www.rccra2.org/detail/index.htm>) has been in good operation jointly run by Tokyo Climate Center (TCC) and Beijing Climate Center (BCC) since June 2007.

Forum on Regional Climate Monitoring, Assessment and Prediction for Asia (FOCRAll) is annually held under the auspices of China Meteorological Administration (CMA) in Beijing, China. The Fourth Session FOCRAll and Fifth session of International Seminar on Climate System and Climate Change was held in April and July, 2008, respectively.

The Regional Seminar on Climate Change-Mitigation and Adaptation sponsored by Swedish Meteorological and Hydrological Institute (SMHI), Swedish International Development Cooperation Agency (Sida) was hosted by BCC. It's the first time for BCC undertaking high-level international training courses. The successful seminar benefited for BCC's training on climate change to meet with international requirement, presenting recent research fruits of China climate change, exchanging and cooperation between national and international experts on climate change.

3.2 Summary of the relevant activities by JMA (TCC):

The Tokyo Climate Center (TCC) of JMA, established in April 2002, has conducted activities related to major functions of the RCC Network in RA-II. In particular, a variety of climate monitoring and prediction products are operationally provided through the TCC website (<http://ds.data.jma.go.jp/tcc/tcc/index.html>), such as seasonal forecast, climate system monitoring, El Niño monitoring and prediction, and the global warming projection products.

TCC has issued a quarterly newsletter, *TCC News*, since 2005 including TCC's activities and climate-related feature articles (<http://ds.data.jma.go.jp/tcc/tcc/news/index.html>). *Monthly Highlight on Climate System* has also been made available since the March issue in 2007 through the TCC website (<http://ds.data.jma.go.jp/tcc/tcc/products/clisys/highlights/index.html>) as a monthly bulletin in the PDF format focusing on monthly highlights of monitoring results.

TCC has organized some training workshops and capacity building activities for NMHS's experts and coordinated research and development activities including development of statistical downscaling techniques for deriving detailed probabilistic prediction for observation stations.

In 2008, a number of improvements in climate-related services have been made including the upgrade of one-month ensemble prediction system and the establishment of JRA-25 Atlas website.

PROGRESS REPORT OF BEIJING CLIMATE CENTER (BCC)

By Y Yan (China)

Since WMO RAIWGCRM in April 2007, Beijing, China, BCC's main progresses are as follows:

Operation:

1. At present, BCC can provide as many as 48-member multi-model ensemble prediction and their interpretation and evaluation. The most probability prediction on surface temperature and precipitation can be issued by tercile.
2. The monthly/seasonal prediction was systemically verified and evaluated in terms of WMO Long Range Forecast Standard Verification System (WMO-LRFSVS).
3. The monitoring and diagnosis system on Northern Hemisphere blocking high and daily Asian monsoon monitoring system have been established. They are specific products of BCC developed aiming at Asian monsoon region.

Research and Development:

1. The second generation of BCC's Atmospheric General Circulation model has been developed. The simulation of climate change in 20th century have been carried out.
2. The precipitation/temperature downscaling techniques has also been developed by using BCC's historical hindcast data and prediction products, which had been applied experimentally in east of China and Islamabad of Pakistan..

Coordination:

A website for the Regional Climate Center Network at RA II (<http://www.rccra2.org/detail/index.htm>) has been in good operation jointly run by Tokyo Climate Center (TCC) and Beijing Climate Center (BCC) since June 2007. Forum on Regional Climate Monitoring, Assessment and Prediction for Asia (FOCRAll) is annually held under the auspices of China Meteorological Administration (CMA) in Beijing, China. The Fourth Session FOCRAll and Fifth session of International Seminar on Climate System and Climate Change was held in April and July, 2008, respectively.

The Regional Seminar on Climate Change-Mitigation and Adaptation sponsored by Swedish Meteorological and Hydrological Institute (SMHI), Swedish International Development Cooperation Agency (Sida) was hosted by BCC. It's the first time for BCC undertaking high-level international training courses. The successful seminar benefited for BCC's training on climate change to meet with international requirement, presenting recent research fruits of China climate change, exchanging and cooperation between national and international experts on climate change.

ACTIVITY REPORT OF THE TOKYO CLIMATE CENTER (TCC)

By K Hayashi (Japan)

1. TCC website and products

The Tokyo Climate Center (TCC) of the Japan Meteorological Agency (JMA) launched a new website (<http://ds.data.jma.go.jp/tcc/tcc/index.html>) in March 2007. As one of the new services offered via the site, an online web-based interactive climate database called *ClimatView* was made available, enabling users to view and download data on monthly mean temperatures and monthly total precipitation derived from CLIMAT reports. *Monthly Highlights on Climate System*, focusing on monthly highlights of the climate, atmospheric circulation and oceanographic conditions, has been available on the website since April 2007.

The TCC website was renewed in March 2008. As one of new contents, downscaled prediction products for one-month probabilistic prediction in Southeast Asia were made available (<http://ds.data.jma.go.jp/tcc/tcc/products/guidancetst/>).

In February, TCC made all figures and tables from 1979 onwards available including atmospheric circulation maps and cross sections using JRA-25 and JCDAS data

A new publication, *Annual Report on Climate System 2007* was published in April 2008, covering topics on extreme climate events around the world as well as a summary of the climate system in 2007.

2. JRA-25 Atlas

JMA and the Central Research Institute of Electric Power Industry (CRIEPI) jointly conducted the Japanese 25-year Reanalysis (JRA-25) project for five years from 2001. Maps of annual, seasonal and monthly averaged climate fields of various meteorological variables from the JRA-25 products have been archived as the JRA-25 Atlas, which is available at <http://ds.data.jma.go.jp/gmd/jra/atlas/eng/atlas-tope.htm>.

3. Extended- and long-range EPS

JMA's one-month ensemble prediction system (EPS) was upgraded in March 2007, introducing new climatology of aerosol optical depth based on satellite observation and an improved cumulus convection scheme. For three-month and warm/cold season predictions, a new atmospheric model (GSM0703C) was introduced, consisting of a low-resolution version of the model used in the one-month prediction described above. The number of ensemble members increased from 31 to 51 and uncertainty in prescribed sea surface temperature (SST) was considered in addition to uncertainty in the initial condition.

In January, new elements of GPV data (700 hPa temperature and its anomaly) were added to one-month prediction, which have been made available to registered NMHSs.

One-month ensemble prediction system (EPS) was upgraded in March 2008. The main improvements include an increase in the vertical resolution of the atmospheric model from 40 to 60 layers, modifications to the physical parameterization of the model, and refinement of initial land conditions (climatology) used in hindcast experiments. As a result of upgrading to the new EPS model (V0803C), forecast errors in wind fields in the troposphere and temperature fields in the middle-high latitudes have decreased in comparison with the previous model (V0703C).

4. ODAS and El Niño prediction system

Since 1999, JMA's Meteorological Research Institute (MRI) has been developing a new Ocean Data Assimilation System (ODAS) named MOVE (Multivariate Ocean Variational Estimation) and an ocean prediction model named MRI.COM (MRI Community Ocean Model). A new ocean analysis system and a coupled ocean-atmosphere prediction model (JMA/MRI-CGCM) were put into operation in March 2008.

5. Global warming projection

JMA has implemented a projection of the atmospheric and oceanic climate around Japan toward the end of this century with a regional coupled ocean-atmosphere model developed in JMA/MRI and an improved version of the global coupled ocean-atmosphere model, named MRI-CGCM2.3.

Both the global and regional features of the projected climate and ocean currents will be published as *Global Warming Projection Volume 7* in March 2008.

6. RCC and GPC

TCC as well as the Beijing Climate Center (BCC) of the China Meteorological Administration (CMA) applied for Regional Climate Center (RCC) status at WMO RA II. At the Working Group on Climate-Related Matters (WGCRM) at RA II held in Beijing in April 2007, the Group recommended to the President of RA II that both BCC and TCC be designated as RCCs. In June 2007, a website for the Regional Climate Center Network at RA II (<http://www.rccra2.org/detail/index.htm>) was established in close cooperation with BCC.

JMA was designated as one of the Global Producing Centers (GPC) of Long-Range Forecasts (LRF) for the WMO at an extraordinary session of the WMO's Commission for Basic Systems (CBS) in 2006, and was approved as a GPC at the 59th session of the Executive Council of the WMO held in May 2007.

7. Capacity building

JMA has conducted annual training courses in meteorology for experts of National Meteorological and Hydrological Services (NMHSs) since 1973 as one of a number of courses provided by the Japan International Cooperation Agency (JICA). The training course in 2008 will be held from September to December with emphasis on the operational use of numerical weather prediction, satellite meteorology and climate information. In a climate information session, staff members of the Climate Prediction Division will give lectures on climate system monitoring, long-range forecasting, El Niño outlook and global warming projection.

The *Training Course on Interpretation of Climate Products and Climate Downscaling* was held at the Malaysian Meteorological Department (MMD) in October 2007. At the invitation of MMD, TCC's staff members attended the Training Course for lectures on various topics including JMA's numerical/seasonal prediction models, ensemble prediction system and making guidance, statistical downscaling, access to GPV data and its application using R Language, and reanalysis data (JRA-25) and its application. As a follow-up of the *Training Course*, JMA conducts a hands-on training for climate data communications and climate forecasting in July and September.

8. International conferences and workshops

The *Third WCRP International Conference on Reanalysis* took place in January 2008 in Tokyo under the initiative of the World Climate Research Programme (WCRP), the Japan Meteorological Agency (JMA), the Central Research Institute of Electric Power Industry (CRIEPI) and the University of Tokyo. The Conference was attended by 260 participants from 21 countries worldwide.

A training seminar on application of products for long-range forecast, jointly with seasonal prediction meeting on East Asian winter monsoon is scheduled for early November 2008 in Tokyo.

APPLICATION OF INDIA METEOROLOGICAL DEPARTMENT FOR RCC DESIGNATION: PRESENT STATUS AND FUTURE PLAN

By D S Pai (India)

1. Background

The India Meteorological Department (IMD) has been providing various climate related services to the country, since 1985, through its National Climate Centre (NCC) situated in Pune. The centre has been carrying out many India specific climate related activities like Climate Monitoring and Analysis, Climate Data Management, Climate Research and Climate Prediction (Seasonal Forecasts). NCC is bringing out climate diagnostic bulletins regularly and different climate data products are prepared for the user community. Operational Seasonal forecast for rainfall over the country is another important activity of the NCC. As a part of recent major modernization activities undergoing in IMD, efforts are going on to widen the activities of the centre so that in the near future it can cater the needs of the entire south Asian region. Brief information regarding the present activities and future plans of the center is provided here.

2. The present activities of the NCC

(i) *Climate monitoring and analysis:* Prepares and publishes monthly, seasonal and annual climate diagnostic bulletins for Indian region regularly. Detailed special monsoon reports are also being published every year.

(ii) *Seasonal forecasts:* Prepares operational seasonal forecasts for winter (Jan- March) precipitation, monsoon season (Jun to Sept) rainfall and northeast monsoon (October-December) rainfall. The main approach used for preparing these forecasts is statistical method. The forecast issued for monsoon season includes seasonal rainfall forecast for the country as a whole and four rainfall homogeneous regions of the country and July rainfall forecast for the country as a whole. The centre also prepares experimental extended range forecasts for the monsoon rainfall. Recently, the centre has implemented a dynamical prediction system based on an atmospheric GCM (Seasonal Forecast model of the Experimental Climate Prediction Centre (ECPC), USA) and experimental monthly and seasonal forecasts for the monsoon season are prepared using this system.

(iii) *Data services and Climate data products:* IMD has long time series of various climate data in its archive. Data rescue and data services are mainly provided by National Data Center (NDC) at Pune. NCC generates many climate data products for smaller spatial and temporal scales for the user community. These data products include daily gridded ($1^\circ \times 1^\circ$) rainfall and temperature data over Indian region, district wise normal for various surface parameters, grid point marine climate summaries for Indian Ocean region etc.

(iv) *Research and Development:* Research projects on climate variability and predictability studies for the Indian Region have been carried out. Major emphasis has been given to monsoon which contributes 75-90% of the annual rainfall over most parts of the country. Empirical models for the long range and extended range prediction of the monsoon rainfall have been developed. Studies have also been conducted on the links of regional climate variability with ENSO and global circulation features and climate change issues over the Indian region. The centre prepares and issues annual climate summary for the country. The center has published number of research reports.

(v) *Training and capacity building:* The Central Training Institute of IMD at Pune is one of the WMO RMTCs. Regular training courses, refresher courses and specialized training courses for the IMD personnel as well as personnel from various national and international organizations are being conducted here in various branches of meteorology. NCC provides support in terms of resource persons for various training programs of RMTc.

(vi) Web services: IMD, Pune is hosting a web site since last year for the user community (www.imdpune.gov.in). The web site provides various information such as daily weather information, real time satellite pictures, short range forecasts, agricultural advisories, farmers, details of surface instruments, air pollution monitoring, cyclone tracks over Indian Ocean etc. Seasonal forecasts and climate diagnostic bulletins issued by NCC are also available in this web site.

3. Future Plans

Present efforts are focused on improving and broadening the scope of India specific climate services. Once entire system is in place and more experience is gathered, efforts will be made to extend the services to entire south Asia.

- (i) To run atmospheric general circulation model operationally every month to generate monthly and multi-monthly forecasts for rainfall and temperature and provide forecast outlooks for smaller spatial scales. Generation of hind casts for at least last 20 years and preparation of verification statistics of the as per the SVS guidelines. We may extend this service to entire south Asia.
- (ii) It also planned to run coupled ocean atmospheric model subsequently to prepared experimental extended and long range forecasts of rainfall and temperatures.
- (iii) To develop area specific seasonal forecast for both rainfall and temperature based on statistical recalibration of GCM outputs. We may extend this service to entire south Asia.
- (iv) To prepare monthly and seasonal outlooks for the south Asian region based on the ensemble model outputs from the center and that from the GPCs. The climate outlook will be made available to the users through the web site.
- (v) The center has prepared daily grid point (1x1) rainfall data over Indian region for the period 1951 to 2007. The data are being updated regularly. Recently the centre also prepared daily grid point (1x1) surface air temperature anomaly data over the Indian region for the period 1969-2005. These data can be used for recalibration of the model output as well as verifying the skill of the dynamical models. It is also planned to prepare grid point data of the other parameters over the region.
- (vi) Train the personal in the use and interpretation of multi-model ensemble forecast.
- (vii) Research projects on the regional climate variability and change and their impacts.

**APPLICATION OF THE MASHHAD CLIMATE CENTER (MCC) FOR RCC DESIGNATION:
PRESENT STATUS AND FUTURE PLANS**

By M Rahimi (Islamic Republic of Iran)

1. Operational function

(a) Provide interpretation and assessment of relevant output products from global prediction centers

Present status

Currently MCC provides seasonal forecasts of 3-5 monthly every two months over Islamic Republic of Iran and 10 ECO region countries including Kazakhstan, Uzbekistan, KyrgyzStan, Tajikistan, Turkmenistan, Azerbaijan, Afghanistan, Pakistan, Turkey, and I.R. of Iran.

Future plan

- 1. Improvement of the seasonal forecast, evaluation skill and data assimilation processes.*
- 2. Changing from parallel processing system to installation of a supercomputer and high speed processing Lab.*

(b) Generate and distribute tailored products to meet NMHS needs including seasonal outlooks etc.

One-month Forecast:

Present status

MCC provides a tercile probability forecasts for precipitation and temperature.

Future plan

MCC is planning to produce high resolution climatic data using downscaling techniques.

Three-month Forecast:

Present status

MCC provides a tercile probability forecasts for precipitation and temperature.

Future plan

MCC is planning to produce high resolution climatic data using downscaling techniques.

(c) Undertake product verification, including hind cast verification of the tools, and the necessary exchange of basic data Verification results according to WMO LRF_SVS:

Present status

MCC is providing verification results of the 3 months seasonal forecast of precipitation and surface temperature.

Future plan

Providing high resolution data of hind cast and observations.

Provide the necessary data, including both hind cast and observation for verification:

Present status

MCC is planning to get hind cast and observation data over 10 ECO region countries for applying in verification processes.

Future plan

Using new methods of verification

(d) Provide climate analysis, monitoring

The analysis and monitoring products of maximum/mean/minimum temperature and precipitation in Asia

Present status

MCC routinely provides climate analysis and monitoring products of the maximum/mean/minimum temperature and precipitation for 1, 10, 20, and 30 days means. The products are updated daily. MCC also provides the preliminary monitoring products on global weather/climate extreme events.

Future plan

It is planned to improve the monitoring and analysis products related to anomaly and extreme events of global climate and to provide new generation products.

The special climate analysis and monitoring products focused on ENSO, Eurasian snow cover, Asian monsoon, drought, and other severe weather and climate events:

Present status

MCC routinely provides a series of special reports such as “ENSO report” and “Climate System Monitoring Bulletin”, both in printed form and on Website of MCC. Also drought monitoring and the global climate extremes monitoring for ECO countries are provided monthly respectively through MCC website.

Future plan

It is planned to improve the products further in accuracy and more frequently updating.

(e) Provide climate advisories in coordination with NMHS

Present status

MCC provides climate advisories and coordination with the NMHS of other countries in ECO region and climate centers such as Hadley Center, IRI by organizing regional and international workshops and products dissemination.

Future plan

It is planned to improve climate information explanation during providing climate advisories and strengthen coordination and cooperation with the NMHSs in ECO region.

(f) Undertake climate Database Management

Present status

MCC provides the public with the climate monitoring, analysis, and prediction data through MCC’s Website.

Future plan

It is planned to improve the capability of database service on managing and providing climate monitoring and prediction data.

2. Coordination function

(a) Develop systems to facilitate harmonization and assistance in the use of Seasonal and Interannual (SI) Forecast products

Present status

Network for using SI forecast products is set up between MCC and the provincial meteorological agencies in ECO region. Training courses on SI forecast methods and products have been given to these country staffs by MCC.

Future plan

It is planned to expand the network to the countries of Asian region, set up feedback information system in order to better use SI forecast products.

(b) Assist coordination with end users, including the organization of workshops and other forums on users' needs (Regional Climate Outlook Forum)

Present status

International Climate Outlook Forum for ECO region countries has been organized by MCC since 2005. The participants included experts of these countries and member of other country such as Iraq. Meeting with end users were also included in the Forums. MCC also provides training courses to the users for improving their capacities for climate service and application of climate products. In addition, the questionnaires of climate application products are distributed through the website and emails in order to get feedbacks from the end-users and improve more tailored climate products.

Future plan

It is planned to organize other workshops and training courses to meet users' needs.

(c) Assist the introduction of climate information and predictions into early warning and disaster prevention systems

Present status

Various drought and flood indices using different type of observation data including satellite data have been introduced into the drought and flood early warning and disaster prevention systems established by MCC. The systems provide the media and policy makers with relevant information on a routine basis. In addition, since 2001, MCC has provided climate prediction and meteorological condition analysis on drought and drought monitoring.

Future plan

It is planned to introduce climate information into Flood early warning system and cyclones (typhoons) early warning and disaster prevention systems.

3. Data services function

(a) Assist the rescue of climate data sets

Present status

Climate database of surface and upper air on different time scales over Islamic Republic of Iran and the region were set up. The grid-point drought and flood data were derived from historical documentary records in Islamic Republic of Iran and historical data were achieved and published.

Future plan

MCC is going to provide technical assistance in rescuing climate data from ice cores, tree rings and historical climate documentary records and continue with the assistance on the rescue of climate data sets.

(b) Provide climate database and archiving services

Present status

MCC provides archiving services for monthly mean surface air temperature, precipitation data over Islamic Republic of Iran and advises on data quality management.

Future plan

MCC is going to provide monthly mean air pressure data over Islamic Republic of Iran and the monthly mean surface air temperature, precipitation as well as air pressure data in Asian area.

(c) Provide advice on data quality management

Present status

MCC are involved in some of quality management projects of National Meteorological Information Center, which ensures the continuous discussion on and provision of scientific advices of data quality control issues.

Future plan

MCC will continue to provide advice on data quality management.

4. Training and capacity building function

(a) Train NMHS staff in SI forecasting methods and characteristics to assist NMHSs to strengthen their services Have access to basic training facilities:

Present status

MCC has been engaged in providing group training courses in meteorology and climatology in collaboration with the scientific and research institutes and Universities of information Science and Technology for training NMHS staff in SI forecasting methods and characteristics. In addition, MCC provided training courses on interpretation and application of dynamical climate model products. Since 2003, MCC has held International Seminar on Climate System and Climate Change, focusing training on regional climate model and ocean data system assimilation. MCC has basic training facilities, including a group of experienced experts on climate prediction.

Future plan

MCC is going to provide training courses on numerical simulation technology on wind energy resource assessment. It is planed to continue and strengthen the group training course.

Training NMHS staff in SI forecasting methods and characteristics to assist NMHSs to strengthen their services

Present status

Besides basic training, MCC has organized “workshop on climate modeling” and provided training on numerical model forecasting. MCC also provides training workshop for staff of NMHSs of ECO.

Future plan

It is planed to continue and strengthen the special training such as model products downscaling and SI forecast methods to assist NMHSs staff in Asia.

(b) Assist the training of end-users on the application and impact of SI Forecast products

Present status

The experts of MCC educated and trained on the application and effects of SI forecast products through different media, including newspapers, TV and internet.

Future plan

More workshops or seminars will be organized by MCC to put forward the application of SI forecast products to assist the training the end-users on the application of SI forecasts products and impact assessments

(c) Assist the introduction of appropriate decision models for end-users, especially as related to probability forecasts

Future plan

It is planned to develop decision-making models related to probabilistic forecasts

(d) Assist technical capacity building on NMHS level

Present status

A number of national and international conferences and seminars were organized by or collaborated with MCC successfully, including the "Third regional and first national conference on climate change" and "Iran-Korea joint workshop on climate modeling". MCC has international academic exchanges and collaboration with institutions in other countries.

Future plan

MCC will continue to assist in technical capacity building through collaborative research

5. Research and development function

(a) Study climate variability, predictability and impact in the Region

Present status

MCC has extensive activities on using statistical methods and Climate System Models to study climate variability and predictability for monthly, seasonal to inter-annual forecast.

Future plan

MCC intends to further develop its research tools to study impacts on socio-economical system and ecological system and assessments of climate change Impacts on socio-economic and ecological systems in the Region.

(b) Develop tools for objective climate analysis and prediction Develop tools for objective climate analysis for Asia

Present status

MCC has been developing and validating statistical methods and Climate System Models for objective climate analysis in Islamic Republic of Iran.

Future plan

It is planned to develop validating statistical methods and Climate System Models for objective climate analysis in Asia.

Develop climate modeling system for Asia

Future plan

MCC is going to develop climate modeling system, such as RegCM and Precis for Asia.

(c) Develop and/or validate regional models and methods of downscaling of global output products

Present status

MCC has been developing and validating statistical and hybrid statistical/dynamical downscaling methods for monthly and seasonal forecast.

Future plan

It is planned to strengthen research for developing downscaling techniques in collaboration with domestic universities and institute as well as international experts.

(d) Undertake application research, and assist in the specification and development of sector specific products

Present status

MCC has provided assessment information for the national projects, such as "Study and assessment of climate change by using climate modeling", "Climate and roads safety", "seasonal prediction". In addition, MCC has collaboration with Korea meteorology about "Application of long term weather prediction to sustainable water resources". A number of sector specific products such as impact of climate/weather conditions on human health have been developed.

Future plan

It is planned to strengthen research in specification and development of sector specific products, for example, agriculture, water resources, and climate resources.

(e) Promote studies of the economic value of climate information

Present status

Several studies have been carried out to assess the economical value of climate information under historic climate.

Future plan

MCC will enhance the studies on the subject by extending the studies into the climate change area.

APPLICATION OF NORTH EURASIA REGIONAL CLIMATE CENTRE FOR RCC DESIGNATION: PRESENT STATUS AND FUTURE PLANS

By V Kryjov (Russian Federation)

Introduction

North Eurasia regional Climate Centre (NEACC) was established by the Intergovernmental Council for Hydrometeorology of the Commonwealth of Independent States (CIS) at its 18th Session held in Dushanbe, Tajikistan, 4-5 April 2007, Resolution No. 1.5/18 with the aim to provide regional climate related services to CIS countries.

CIS Intergovernmental Council for Hydrometeorology was established on 8 February 1992 by intergovernmental agreement between Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, the Russian Federation, Tajikistan, Turkmenistan, Uzbekistan and Ukraine. CIS Intergovernmental Council for Hydrometeorology is recognized by WMO as a structure providing a framework to organise co-operative programmes between its Members in the various fields of basic hydrometeorological activities such as observing systems, data processing and forecasting, training, research and development. Through these programmes the Members develop their collective capability to provide hydrometeorological services for the CIS countries. CIS Intergovernmental Council for Hydrometeorology works on the basis of its own long-term Program of development of hydrometeorological activity for the period from 2006 to 2010.

The 19th Session of CIS Intergovernmental Council for Hydrometeorology held in Obninsk, Russian Federation, 16-17 October 2007, Resolution No. 3.4/19, adopted the Status of North Eurasia regional Climate Centre. At the current stage NEACC is a virtual multi-institutional centre comprising several institutions from Roshydromet:

1. Hydrometeorological Research Centre of the Russian Federation (HMC RF),
2. Institute of Global Climate and Ecology of Roshydromet and Russian Academy of Sciences (IGCE),
3. Research Institute for Hydrometeorological Information – World Data Centre (RIHMI-WDC),
4. Main Geophysical Observatory of Roshydromet (MGO),
5. All Russia Research Institute for Agricultural Meteorology - Centre for Drought Monitoring of CIS Intergovernmental Council for Hydrometeorology,
6. Main Computer Centre of Roshydromet
7. Main Radiometeorological Centre of Roshydromet.

This structure is opened for all other NMHSs of the neighbouring countries interested in.

The NEACC activity is focused on the provision of climate information products and services for the area of North Eurasia, with coverage comprising Kazakhstan, Kyrgyzstan, the Russian Federation, Tajikistan, Turkmenistan, Uzbekistan within RA II (Asia) Region and Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Moldova, the Russian Federation, Ukraine within RA VI (Europe) Region.

Summary of the NEACC current status and future plans

In November 2007 NEACC applied for WMO in order to be recognized as a multifunctional Regional Climate Center within the WMO RCC Network in RA II.

The NEACC has established and currently maintains a website <http://rcc-rus.meteoinfo.ru> in Russian and taking into account that Russian language is convenient for majority of the end-users of the North Eurasia Region; mirror site in English (<http://rcc-eng.meteoinfo.ru>) is partly in operation and partly under construction.

Nowadays, the NEACC operates as a regional climate centre de facto and produces a large number of the products and services assigned to the RCCs. Particularly, seasonal and monthly probabilistic forecasts of temperature and precipitation based on the WMC Moscow (HMC RF) model global outputs are issued operationally and posted on the web-site, with all forecasts being supported by hindcast based verification results; research on climate variability, predictability and development of multi-model ensemble predictive tools are conducted.

In the near future, the NEACC intends to adjust the scope of products and services provided to the requirements of the RCCs. Particularly, to extend the web-site, extend the list of the forecast products provided via the web-site; to implement multi-model ensemble post-processing predictive tools including those for the forecast of climate extremes; etc. Special attention will be paid to coordination and organization of the training and capacity building activity focused on end-users within NMHSs-members of CIS Intergovernmental Council for Hydrometeorology.

Thus, the NEACC is capable to play a role of one of multifunctional regional climate centres within the RCC Network in RA II.

Details of NEACC Current Status and Future Plans

1. Operational function

1.1. Provide interpretation and assessment of relevant output products from global prediction centres.

Current Status:

Output from EPS WMC Moscow (HMC RF) is available routinely. Centre provides interpretation and real time assessment of the forecast fields.

Element: sea level pressure, Z500, near surface air temperature, total precipitation, T850.

Forecast period: four month with zero lead time

Update frequency: monthly

Future plan:

In 2008 EPS will be extended by inclusion of EPS Main Geophysical Observatory (MGO).

1.2. Generate and distribute tailored products to meet NMHS needs including seasonal outlooks etc

1.2.1. One month Forecast

Current Status:

On the basis of output from EPS WMC Moscow 1-month probabilistic forecasts for tercile categories (Global and North Eurasia) are issued.

Element: mean temperature, total precipitation

Forecast period: one month with zero lead time

Update frequency: one month

Future Plan:

The same forecast will be issued each 10 days

Multi-model ensemble forecasts will be implemented. In the nearest future: 2 model ensemble (EPS WMC Moscow and EPS MGO).

1.2.2. Three Month Forecast with zero lead time

Current Status:

On the basis of outputs from EPS WMC Moscow 3-month probabilistic forecasts for tercile categories (Global and North Eurasia) are issued.

Element: mean temperature, total precipitation

Forecast period: three months with zero lead time.

Update frequency: one month

Future Plan:

Multi-model ensemble forecasts will be implemented. The nearest future 2 model ensemble (EPS WMC Moscow and EPS MGO).

1.2.2. Three Month Forecast with one month lead time

Current Status:

On the basis of outputs from EPS WMC Moscow 3-month probabilistic forecasts for tercile categories (Global and North Eurasia) are issued.

Element: mean temperature, total precipitation

Forecast period: three months with one month lead time.

Update frequency: one month

Future Plan:

Multi-model ensemble forecasts will be implemented. The nearest future 2 model ensemble (EPS WMC Moscow and EPS MGO).

1.3. Undertake product verification, including hind cast verification of the tools, and the necessary exchange of basic data

1.3.1. Regularly updated provision of assessments of historical and issued LRF-products (actual predictability).

Current Status:

- Verification (both deterministic and probabilistic versions) is carried out according to the WMO Standardized Verification System for LRF_for 1979 – 2003 (25 years) historical forecasts on the basis of SMIP-2/HFP protocol (same as the real time prediction) and for the real time forecasts.

Elements: mean temperature, total precipitation.

Forecast periods: 1 month;

3 months with zero- and 1-month lead times.

- SMIP-2/HFP seasonal historical and real time forecasts from the EPS of the WMC-Moscow are provided for forecast development and verification to the Asia Pacific Economic Cooperation Climate Center (APCC), Busan, Republic of Korea, on the monthly basis.

- Starting from November 2007, SMIP-2/HFP seasonal historical and real time ensemble forecasts of the WMC Moscow are provided for forecast development and verification to the WMO Lead Centre for multi-model Ensemble Long Range Forecast, Seoul, Republic of Korea, on the seasonal basis

Verifications of global ensemble seasonal forecasts of the WMC Moscow were sent to the WMO Lead Centre for the Long Range Forecast Verification System in Melbourne and posted at their site in March 2008.

Future Plan:

Verifications of global ensemble seasonal forecasts of the WMC Moscow will be sent to the WMO Lead Centre for the Long Range Forecast Verification System in Melbourne on annual basis.

1.3.2. Historical forecast verification (potential predictability)

Current Status:

Results of SMIP-2/HFP historical and real-time ensemble seasonal forecasts of the WMC-Moscow and MGO are provided to APEC Climate Center on monthly basis.

Results of SMIP-2 historical seasonal forecasts of the EPS WMC Moscow were conveyed to the Livermor National Laboratory (USA) and available at the address <http://iridl.ldeo.columbia.edu/expert/SOURCES/.WCRP/.SMIP-2>.

Future Plan:

Update verifications of global ensemble seasonal forecasts of the WMC Moscow as new hindcasts have been computed.

Element: mean temperature, total precipitation

Forecast period: one month and three months

Future Plan:

Verification of two-model ensemble.

Development of region specified verification procedures in addition to WMO LRF_SVS.

1.4. Provide climate analysis, monitoring

1.4.1. The analysis and monitoring of the maximum/mean/minimum temperature and precipitation

Current Status:

For the Northern Hemisphere and North Eurasia both analysis and monitoring are conducted routinely and results are posted on the web-site.

Update frequency: monthly

Future Plan:

It is planned to extend the list of characteristics monitored, particularly, with a set of characteristics of climate extremes.

1.4.2. Special climate analysis and monitoring products focused on ENSO, Eurasian snow cover, Asian monsoon, drought, and other severe weather and climate events

Current Status:

Specialized analysis and monitoring of droughts, floods, snow melt conditions, river ice melt is routinely conducted for Russia.

Update frequency: monthly

Future Plans:

To extend geographical coverage on (at least) whole North Eurasia.

1.5. Provide climate advisories in coordination with NMHS

Current Status:

Analysis and advisories of impacts of observed, predicted and projected climate anomalies on water resource, agriculture, human health and energy industry is provided for Roshydromet (NMHS of Russia)

Update: monthly and more frequently

Future Plans:

It is planned to provide advisories for all the CIS NMHSs.

1.6. Undertake climate Database Management

Current Status:

Surface weather observation of maximum/mean/minimum temperature, precipitation, humidity and wind for Hydrometeorological stations of the North Eurasia as well as a wide list of other environmental variables and characteristics on air pollution, agrometeorological conditions, oceanic state, etc. are collected on the daily basis by the ARRIHMI-WDC.

Future Plan:

Participation in the WMO Information System Pilot Project.

2. Coordination function

2.1. Develop systems to facilitate harmonization and assistance in the use of Seasonal and Interannual (SI) Forecast products

Current Status:

Subjective harmonization of the 1-3 month statistical (basic) forecast and probabilistic forecast derived on the basis of EPS WMC Moscow output.

Future Plan:

Development and implementation of the statistical post-processing methods (including probabilistic methods based on the Bayes Theorem) for harmonization of MME dynamical and dynamical-statistical forecast products from different sources.

2.2. Assist coordination with end users, including the organization of workshops and other forums on users' needs (Regional Climate Outlook Forum)

Current Status:

Future Plan:

The program is under development.

2.3. Assist the introduction of climate information and predictions into early warning and disaster prevention systems

Current Status:

The joint Program on Strategy for Hydrometeorological Security of CIS countries was developed.

The International Conference on Hydrometeorological Security was held in 2006.

Future Plan:

Realisation of the Program on Hydrometeorological Security for CIS countries

Development of the forecast methods of extreme events (probabilistic), compatible with decision supporting systems (see R&D).

3. Data services function

3.1. Assist the rescue of climate data sets

Current Status:

Rescue of data is performed by ARRIHMI-WDC, a member of NEACC.

Future Plans:

To continue the work.

3.2. Provide climate database and archiving services

Current Status:

Database and archiving services (including supporting metadata) are performed by ARRIHMI-WDC and HMC, members of NEACC.

Future Plans:

Participate in the WIS data management regulations development. Migration of data processing and archiving system towards the requirements of WIS.

Upgrade of data processing and archiving facilities in 2008 will result in more efficient and convenient data management.

3.3. Provide advise on data quality management

Current Status:

Homogenization and quality control of long series are performed by ARRIHMI-WDC and HMC, members of NEACC.

Future Plans:

To increase the number of series, update the series, post on the web-site (www.meteo.ru).

4. Training and capacity building function

4.1. Train NMHS staff in SI forecasting methods and characteristics to assist NMHSs to strengthen their services

4.1.1. Have access to basic training facilities

Current Status:

WMO Training Centre for RA II/VI hosted by Roshydromet. On the basis of the center, a system of permanent training operates. This system is intent to meet the requirements of all North Eurasia NMHSs.

Future plan:

Program of training on climate related matters is under development.

4.1.2. Train NMHS staff in SI forecasting methods and characteristics to assist NMHSs to strengthen their services

Current Status:

There are irregular trainings for operational specialists on the basis of the centre.

Future plan:

Program of training on climate related matters is under development.

4.2. Assist the training of end-users on the application and impact of SI Forecast products

Assist the introduction of appropriate decision models for end-users, especially as related to probability forecasts

Current status:

The specialized training Program focused on LRF end-users is under development

Future Plan:

The specialized training program focused on the end-users will be developed.

4.3. Assist technical capacity building on NMHS level

Future Plan:

In 2008: upgrade of computer and telecommunication system in the framework of the World Bank Roshydromet Modernization Project. Enhancement of technical facilities of WMC-Moscow and RSMC Novosibirsk and Khabarovsk.

5. Research and development function

5.1. Study climate variability, predictability and impact in the Region

Current Status:

Studies on climate variability and impacts in the North Eurasia were and are carried out. Particularly, variability of circulation, temperature and precipitation, impacts of AO, NAO and other modes of atmospheric variability were and are carried out. Specialized studies on ENSO impacts on extra-tropical modes of variability, etc.

Future Plan:

To continue the studies on variability, variations, trends, impacts, etc.

In the nearest future: Study on predictability by EPSs of the dominant modes of the Northern Hemisphere circulation variability such as AO, NAO, PNA; study of the influence of background state of tropical ocean (ENSO, IOD, Atlantic) on the predictability over North Eurasia.

5.2. Develop tools for objective climate analysis and prediction

5.2.1. Develop tools for objective climate analysis for Asia

Current Status:

NEACC has various statistical tools developed and under development for climate variability and predictability studies and climate prediction.

Future Plan:

To continue the work.

5.2.2. Develop climate modeling system for Asia

Current Status:

Two atmospheric models: EPS WMC Moscow, EPS MGO

Future Plan:

Coupled model on the basis of EPS WMC Moscow.

5.3. Develop and/or validate regional models and methods of downscaling of global output products

Current Status:

Statistical methods of downscaling appropriate for deterministic approach.

Future plan:

To develop probabilistic methods of downscaling based on the Bayes Theorem.

5.4. Undertake application research, and assist in the specification and development of sector specific products

Current Status:

Various statistical methods linking atmospheric characteristics with needs of agricultural, energetic, etc. sectors

Future Plan:

Development of decision supporting systems focused on different sector needs in collaboration with end-users representing different economic sectors.

5.5. Promote studies of the economic value of climate information

Current Status:

Qualitative studies. The program complex for quantitative estimate economic value of the forecasts is written.

Future Plan:

To conduct a study on regionalisation of the North Eurasia in accordance with economic value of climate information in the versions of perfect forecast and real forecast.

North Eurasia regional Climate Centre in RA II
 Guidelines on the Eligibility and NEACC scores
 (The total possible score is 78)

Functions	Activities	Criteria	score
Operational function	Provide interpretation and assessment of relevant output products from global prediction centres	Product: reliability of EPS products and its reasoning Element: mean temperature, total precipitation Forecast period: three month Update frequency: monthly	3
	Generate and distribute tailored products to meet NMHS needs including seasonal outlooks etc	Product: probabilities for tercile categories in Asia Element: mean temperature, total precipitation Forecast period: one month Update frequency: 10 days	2
		Product: probabilities for tercile categories in Asia Element: mean temperature, total precipitation Forecast period: three month Update frequency: monthly	3
	Undertake product verification, including hind cast verification of the tools, and the necessary exchange of basic data	Products: verification results according to WMO LRF_SVS of at least 20-year hindcasts (same as the real time prediction) Element: mean temperature, total precipitation Forecast period: one month and three months	3
		Provide the necessary data, including both hindcast and observation data for verification	3
	Provide climate analysis, monitoring	Products: the analysis and monitoring products of the maximum/mean/minimum temperature and precipitation in Asia Update frequency: monthly	3
		Products: the special climate analysis and monitoring products focused on ENSO, Eurasian snow cover, Asian monsoon, drought, and other severe weather and climate events Update frequency: monthly	2
	Provide climate advisories in coordination with NMHS	Products: impacts of observed or projected climate anomalies on water resource, agriculture, human health and energy industry Update: monthly	2
	Undertake climate Database Management	Elements: surface weather observation of maximum/mean/minimum temperature, precipitation, humidity and wind Period: daily , pentadly, monthly Update frequency: everyday	3

ANNEX XVI

Coordination function	Develop systems to facilitate harmonization and assistance in the use of Seasonal and Interannual (SI) Forecast products	Possesses an objectively harmonizing system, such as: harmonizing various model products provided by GPCs, harmonizing dynamical and statistical forecast products	2
	Assist coordination with end users, including the organization of workshops and other forums on users' needs (Regional Climate Outlook Forum)	Assist coordination with end users, including the organization of workshops and other forums on users' needs (Regional Climate Outlook Forum)	1
	Assist the introduction of climate information and predictions into early warning and disaster prevention systems	Assist the introduction of climate information and predictions into early warning and disaster prevention system of drought, flood, typhoon, and heat wave	2
Data services function	Assist the rescue of climate data sets	Assist the rescue of climate data sets	3
	Provide climate database and archiving services	Provide monthly mean climate data: surface temperature, precipitation and air pressure	3
	Provide advise on data quality management	Provide advise on data quality management	3
Training and capacity building function	Train NMHS staff in SI forecasting methods and characteristics to assist NMHSs to strengthen their services	Have access to basic training facilities	3
		Train NMHS staff in SI forecasting methods and characteristics to assist NMHSs to strengthen their services	2
	Assist the training of end-users on the application and impact of SI Forecast products	Assist the training of end-users on the application and impact of SI Forecast products and/or climate analysis on one of the following sectors: water resource, agriculture, human health or energy management	2
	Assist the introduction of appropriate decision models for end-users, especially as related to probability forecasts	Assist the introduction of appropriate decision models for end-users, especially as related to probability forecasts	1
	Assist technical capacity building on NMHS level	Assist technical capacity building at NMHS level by providing dedicated fund and/or sending some experts to the NMHS	1
Research and development function	Study climate variability, predictability and impact in the Region	Undertake studies such as: climate variability using historical data, climate predictability using hindcasts and climate impact using historical disaster database	2
	Develop tools for objective climate analysis and prediction	Develop tools for objective climate analysis for Asia	2
		Develop climate modeling system for Asia	2

ANNEX XVI

	Develop and/or validate regional models and methods of downscaling of global output products	Develop and/or validate regional climate models and statistical downscaling methods of global output products	2
	Undertake application research, and assist in the specification and development of sector specific products	Undertake application research, and assist in the specification and development of sector specific products	2
	Promote studies of the economic value of climate information	Promote studies of the economic value of climate information	2

Total: 59

* Each items scored on four category basis as follows

0-----any activities have not been executed nor are planned;

1-----any activities have not been executed yet but are planned in the near future;

2-----some of the requested activities have been executed

3-----all of the requested activities have

REGIONAL CLIMATE OUTLOOK FORUM ACTIVITIES IN RA II**By WMO Secretariat**

1. Regional Climate Outlook Forums (RCOFs), an innovative concept conceived, developed and supported as part of WMO's Climate Information and Prediction Services (CLIPS) project in partnership with the National Meteorological and Hydrological Services (NMHSs), regional climate institutions and other agencies, have completed ten years of successful operation in different sub-regions of Africa and South America. RCOFs in various forms and sizes are now in operation serving more than 10 sub-regions around the world, and concerted efforts are being made to extend the concept to several other regions. The long African experience, coupled with the varied strategies adopted by the other RCOFs suiting their own local needs, will be of immense value to guide and develop such initiatives. RCOF Review 2008, an international expert review meeting on RCOFs being coordinated by WMO, has been conceived in this context, to undertake a comprehensive global review of the RCOF process, share experiences, highlight successes and address the challenges. RCOF Review 2008 is tentatively scheduled to be held in late Autumn of 2008 in Arusha, Tanzania.
2. BCC has been devoting sustained efforts to implement the RCOF activities in RA II, through its annual FOCRAII sessions, which have been successfully held continuously since the last four years. FOCRAII, which is held in early April every year, is fully funded by CMA, and attracts the participation of several member countries of RA II as well as international experts including WMO. It is important to further strengthen and expand the FOCRAII initiative, to meet the needs of RA II Members.
3. FOCRA II presently covers the entire RA II, which is a very large area encompassing vastly varying climatic conditions, and it has been considered essential to develop sub-regional RCOFs that can provide more specific and targeted information. Close coordination between the leading centres in RA II, Members and WMO will be required for taking up such sub-regional activities. Possible groupings that may be considered for developing sub-regional RCOFs are: North Asia, East Asia, West Asia, South Asia and Southeast Asia. The Working Group is invited to consider recommending the development of such sub-regional RCOFs, and urging the leading centres of RA II within these sub-regions to facilitate their implementation.
4. RCOFs need sustained commitments of resources, expertise and operational mechanisms. Adopting cost-effective processes, optimized resource utilization, cost-sharing by Members, extra-budgetary resource mobilization and user-sector participation, etc. can help in meeting such commitments.