



REGIONAL ASSOCIATION II (ASIA)

WORLD CLIMATE PROGRAMME

MEETING OF THE RA II SUB-GROUP ON CLIMATE APPLICATION AND SERVICES (RA II WGCAA-CAS)

**Daegu, Republic of Korea
30 November to 2 December 2010**

FINAL REPORT

**WORLD METEOROLOGICAL ORGANIZATION
2011**

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

- World Climate Research Programme (WCRP)
- Global Climate Observing System (GCOS)
- World Climate Services Programme (WCSP)

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NOTE

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1. Opening of the Meeting

1.1 The Meeting of the RA II Sub-Group on Climate Application and Services (WGCAA-CAS) was held in Daegu, Republic of Korea from 30 November to 2 December 2010 conjointly with the Fifth Technical Conference on Management of National Meteorological and Hydrological Services (NMHSs) in Regional Association II (Asia), “Opportunities and Challenges for Delivery of Weather, Climate and Water Services” (Daegu, Republic of Korea, 29 November to 3 December 2010).

1.2 Dr Kiyoharu Takano, Coordinator of the Sub-Group, opened the session with his welcoming remarks. Dr Zhai Panmao, the Chair of WGCAA expressed his gratitude to all participants for attending the meeting and stressed the importance of holding this meeting for the first time since the Sub-Group was established by the Fourteenth Session of RA II in December 2008. He also stressed that climate issues are of great concern to the world, by referring to extreme weather events such as drought in southwest China, extremely hot summer in Russia and disastrous floods in Pakistan in 2010. At his request, the participants went through a round of self-introductions (List of Participants is given in Annex I). The Sub-Group noted that its member from the Islamic Republic of Iran, Mr M. Habibi, Theme Leader on Climate Research, could not attend the meeting. The Sub-Group also noted that Ms J. Kim is attending the present meeting as an Alternate to Mr I.-C. Shin, Theme Leader in Climate applications and User Liaison. Ms Kim informed the Sub-Group that Korea Meteorological Administration (KMA) would nominate a new person as a Theme Leader for this theme in due course.

1.3 Dr Rupa Kumar Kolli, Chief of World Climate Application and Services Division at WMO Secretariat, provided some background to the formation of WGCAA-CAS, and informed the Sub-Group that it has to complete its tasks on regional as well as national levels according to its established Terms of Reference (Resolution No. 9 (XIV-RA II), reproduced in Annex II) by the next RA II session. He highlighted that climate is a special focus for WMO in the light of the World Climate Conference-3 and the establishment of the Global Framework for Climate Services (GFCS). He affirmed all possible support from the WMO Secretariat to the Sub-Group’s activities.

1.4 Mr Kuniyuki Shida, Programme Manager, Regional Office for Asia and the South-West Pacific, mentioned that regional activities are very important within the strategic framework of WMO, and highlighted the special opportunity provided to the Sub-Group members to interact with RA II Members by co-locating the present meeting with the Fifth Technical Conference on Management of NMHSs in RA II. He requested to Sub-Group to actively interact with participants in the conference and provide input on the conclusions, recommendations and future activities of the Sub-Group to them. He also mentioned that WMO Secretariat will try its best to support the Sub-Group’s activities within available resources.

2. Organizational Matters

2.1 The provisional agenda of the meeting (Annex III) was reviewed by the Sub-Group. Considering that all members of the Sub-Group will participate in Session 3 on “Improving climate services” of the RA II Technical Conference and some of them will make presentations there, the Sub-Group agreed that Session 3 of Technical Conference can be

regarded as the afternoon session of the Sub-Group meeting on the first day. An extract from the final report of the Fifth Technical Conference is provided in Annex IV. In response to Dr Zhai's proposal for a slight adjustment of the agenda for the morning session of the first day, the Sub-Group agreed that Dr Kolli would be requested to make a short presentation on the new structure of the Commission for Climatology (CCI) and that the draft work plan of the Sub-Group prepared by Dr Takano would be discussed.

2.2 Dr Kolli and Dr Takano proposed that the Sub-Group should devote substantial time for discussing Regional Climate Center (RCC) matter, one of the most important issues of the Sub-Group. The Sub-Group agreed that it would focus on discussing RCC matter on the whole of the second day. In this regard, Dr Zhai mentioned that Dr Zhang Zuqiang, Deputy-Director of the Beijing Climate Center (BCC) will join the Sub-Group meeting and report on the progress/update of implementation of BCC on the second day. Dr Kolli mentioned that he would request Dr Saad Mohamad Mohalfi, Permanent Representative of the Kingdom of Saudi Arabia with WMO, participating in the RA II Technical Conference, to join the Sub-Group meeting and report on the present status of preparation of RCC in their country. Keeping in view that there were no representatives from the Islamic Republic of Iran either at the Sub-Group meeting or at the RA II Technical Conference, the Sub-Group noted that there would be no updates on their RCC preparations at the present meeting.

3. Briefing on Recent WMO initiatives on Climate Applications and Services, including the Global Framework for Climate Services (GFCS)

3.1 Dr Kolli gave an overview of the new structure adopted by CCI at its fifteenth session in Antalya, Turkey in February 2010. CCI's work will be mainly carried out by four Open Panels of CCI Experts (OPACEs) established under its new structure (for further details, see http://www.wmo.int/pages/prog/wcp/ccl/index_en.html), in close alignment with the emerging GFCS. He also referred to data sharing issues, quality control and management of climate data, capacity building for climate services, and developing climate indices for various sectors, etc. as some of CCI priorities in supporting the implementation of GFCS. He informed the Sub-Group about the recommendation of CCI to conclude WMO's Climate Information and Prediction Services (CLIPS) project and transition its activities into the GFCS. He also updated the Sub-Group on a WMO's new initiative to develop a Global Seasonal Climate Update (GSCU) on real-time basis and the technical issues being addressed by CCI including the proposed launch of its pilot phase (for further details, see <http://www.wmo.int/pages/prog/wcp/wcasp/GSCU.html>). He referred to the recent World Climate Research Programme (WCRP)/CCI joint session, and highlighted the importance of research-operations linkages.

4. Review of WGCAA-CAS activities

4.1 Opening Remarks by the Coordinator of WGCAA-CAS

4.1.1 Dr Takano briefed the meeting on the overall strategy for the work of the Sub-Group, and presented the draft Action Plan that he had prepared. The Action Plan covers five major topics, namely, "General matters", "CLIPS including RCCs and RCOFs", "Climate Applications and User Liaison", "Climate Monitoring, Climate Watch and Climate Change" and "Climate Research". Among them, Dr Takano emphasized the importance of the designation process of RCCs and also that of the user interface.

4.1.2 As background information before the theme leaders of the Sub-Group made their presentations, Dr Takano briefly introduced the main issues of the themes and pointed out that each thematic area corresponds to each of the four operative components of the GFCS. In this sense, the Sub-Group recognized that Sub-Group's activities have considerable potential to contribute to GFCS implementation.

4.2 Implementation of RCCs and RCOFs in RA II

4.2.1 Considering that WMO has been actively promoting the establishment of RCCs around the world, the Sub-Group agreed that all the candidate institutions who expressed intent to seek formal RCC designation should be encouraged to commence the pilot phase at the earliest to demonstrate their capabilities. The Sub-Group requested BCC and TCC, who have already been designated as WMO RCCs, to provide guidance in this regard.

4.2.2 The Sub-Group recognized that, although traditional purpose of Regional Climate Outlook Forums (RCOFs) is to exchange information and views on seasonal forecasts among forecasters from the countries concerned and to develop consensus-based outlooks, the RCOF process should be sufficiently flexible by including related activities such as user interaction, training sessions, etc.

4.2.3 The Sub-Group appreciated the contributions of the Joint Meeting for the Seasonal Prediction of the East Asian Winter Monsoon regularly being held in November every year for the past few years, involving the four countries China, Japan, Mongolia and Republic of Korea. After some discussion, it was agreed that the Joint Meeting be requested to transform itself to function as a RA II sub-regional RCOF, after obtaining due consensus among the participating countries.

4.2.4 Further establishment of sub-regional RCOFs was encouraged to target different sub-regions having similar climate information/outlook needs. Dr Kolli suggested that Southeast Asia and Middle East could be candidates for new sub-regional RCOFs. As for resources problem, he mentioned that WMO's Voluntary Cooperation Programme (VCP) funding as well as other projects for RCOF operations may be pursued.

4.2.5 The Sub-group appreciated the successful and sustained operations of the Forum on Regional Climate Monitoring, Assessment and Prediction for RA II (FOCRAll) organized by China since 2005. Dr Takano suggested that FOCRAll may be regarded as a general assembly among the all the sub-regional RCOFs in RA II in the future.

4.3 User Interface for Climate Services

4.3.1 The Sub-Group noted the need to encourage exchange of good practices and sharing of experiences in the application of climate information among NMHSs and to strengthen user-provider interaction.

4.3.2 Considering that dialogue with users is encouraged in regional levels using the opportunities of RCOF and that the most important target fields of users will be agriculture and hydrology, the Sub-Group strongly recommended that a session of user interface be set up in future FOCRA II sessions. In case of resource constraints, the Sub-

Group felt that at least some key Chinese user representatives in the field of agriculture and hydrology could be invited to the session.

4.3.3 The Sub-Group agreed that it should establish appropriate coordination mechanisms with the RA II Sub-Group on Agrometeorology (WGCAA-AgM) and the RA II Working Group on Hydrological Forecasts and Assessments (WGH).

4.3.4 The Sub-Group recognized that regional bodies representing user sectors, such as the regional offices of Food and Agriculture Organization (FAO), World Health Organization (WHO), etc. should be actively involved in the RCOF process, and their interaction with NMHSs should be encouraged.

4.3.5 The Sub-Group agreed that National Climate Outlook Forums (NCOFs) would provide excellent platforms for user engagement with climate services at the national level. The Sub-Group further agreed to develop a short two-page document on the concept of NCOFs in the context of RA II, disseminate it to NMHSs in RA II and call for pilot projects on NCOFs.

4.3.6 It was also recognized that climate service users are from various sectors and they may not have opportunities to interact on common climate concerns. From this point of view, the Sub-Group agreed that NCOFs could provide an opportunity for effective dialogue with and among users and for providing a common understanding of climate services to users.

4.4 Research-operations linkages

4.4.1 Dr Takano briefed the Sub-group on the cooperation mechanism between operational climate service providers and research sectors that he proposed at the WCRP Climate Variability and Predictability (CLIVAR) Project's Asian-Australian Monsoon Panel (AAMP) Workshop held in Busan, Republic of Korea in June 2010.

4.4.2 As an example of research-operations linkage in Japan, Dr Takano referred to the Advisory Panel on Extreme Climatic Events, consisting of 10 prominent experts from universities and research institutes. The Panel was established to discuss extreme climatic events that are mainly caused by variations in the atmospheric general circulation and continue for a long time (about two weeks or more).

4.4.3 Considering that predicting monsoon onset, intraseasonal oscillations, Arctic Oscillation, etc. are still considered to be complex problems, the Sub-Group noted that the operational community needs more inputs from the research community in these areas.

4.4.4 Dr Mohalfi emphasized the need for greater involvement of developing countries in international collaborative research efforts, and to enhance the participation of research experts in the Sub-Group's activities.

4.5 Climate Monitoring and Assessment

4.5.1 Ms Irina Zaytseva reported on the monitoring activities relevant to climate change and climate variability in Uzbekistan, focusing on Aral Sea drying out. She also reported

investigation on the impacts of climate change on agro-climatic and water resources, etc. The Sub-Group noted that NMHSs, through comprehensive climate monitoring and assessment, have considerable potential to contribute to adaptation to climate change on the national scale. In this sense, the Sub-Group agreed that Ms. Zaytseva's report gave a good direction in developing a strategy for national-scale climate monitoring and assessment.

4.5.2 The Sub-Group requested Ms Zaytseva to summarize climate conditions in RA II once a season by listing the available information sources, to provide a gateway of monitoring products of each country in RA II. It also requested her develop status reports on climate monitoring activities of NMHSs in RA II, with support from the Coordinator. The Sub-Group recognized that this activity will contribute to the GSCU monitoring aspects.

4.5.3 Considering that many NMHSs do not know about Climate Watch sufficiently, the Sub-Group recognized that it has to consider the possibility of relevant pilot projects in order to facilitate Climate Watch activity in RA II. The Sub-Group also recognized that Climate Watch should contain such information as climate monitoring and climate outlook for five to ten days.

5. Regional Climate Centers (RCCs) in RA II

5.1 Progress/Update of implementation of RCCs in RA II

5.1.1 Dr Zuqiang Zhang reported progress on capacity-building and services in BCC mainly focused on developing an objective identification technique for regional extreme weather and climate events, developing the second generation of Climate System Model, and the 5-year development plan (2010-2014) of BCC.

5.1.3 As to the next FOCRA II, Dr Takano mentioned that he is discussing with BCC the possibility of holding a joint workshop of FOCRA II and AAMP.

5.1.4 Mr Ishihara reported on the activities of TCC such as operational activities for LRF, operational climate monitoring, and training in the use of operational RCC products in accordance with the RCC mandatory functions.

5.1.5 Dr Zhai commented that TCC monitoring activity including re-analysis project is very unique. Dr Kolli proposed that the sub-regional consensus forecast agreed at FOCRA II be updated on TCC website. Dr Kolli also proposed that TCC homepage be restructured in accordance with the RCC mandatory functions so that candidate RCCs can easily understand what kind of services they should provide as RCCs.

5.2 Present Status and Future Plan of Candidate RCCs in RA II

5.2.1 Dr Vladimir Kryzhov reported resent status and future plan of the North Eurasia Climate Center (NEACC) activity in accordance with the mandatory functions of RCC.

5.2.3 Dr Kolli proposed that NEACC should organize an RCOF and prepare a consensus outlook for the region and that some kind of implementation plan has to be developed.

5.2.4 Mr Arvind Srivastava reported on the present status and future plan of India Meteorological Department National Climate Centre (IMD-NCC) in implementing an RCC. He mentioned that they are mainly interested in monsoon activity and introduced the first South Asian Climate Outlook Forum (SASCOF) held in April 2010. He also mentioned about their plans for a training workshop for capacity building in seasonal forecasting using statistical techniques for South Asian countries.

5.2.5 IMD-NCC and NEACC were requested to submit their letters of intent to establish RCC to President of RA II by January 2011 in order to start the pilot phase formally. The Sub-Group agreed that the pilot phase period should be one to two years.

5.2.6 The Sub-Group agreed that it should receive a progress report from a candidate RCC once six months during a pilot phase so that the Sub-Group will be able to examine whether their functions and activities meet the criteria for RCC mandatory functions. After the pilot phase, the Sub-Group will prepare a document on the result of the examination of the eligibility to be submitted to President of RA II.

5.2.7 Dr Mohalfi reported on their Jeddah Global Information System Centre (GISC) Southwest Asia Project including the RCC Jeddah Project, supported by Meteo-France International (MFI). He provided a roadmap for GISC and its capability. He also mentioned that they started the infrastructure development for RCC Jeddah in October 2010. The Sub-Group advised him to consult with Dr Jean-Pierre Ceron in Meteo-France, who is one of the co-chairs of OPACE 3 which is responsible for RCC implementation.

5.2.8 Noting that there is no update at the present meeting on Iran's efforts to implement an RCC, the Sub-Group requested Dr Takano to pursue the matter through correspondence.

5.3 Operational practices of RCCs including GPC-RCC-RCOF-NMHS linkages and CCI/CBS guidance

5.3.1 The Sub-Group noted that the CLIPS Focal Point network has not been functional for several years, and that their responsibilities were also not well-defined. Considering that communications among WMO, RCC, NMHSs are essential for improving climate services in RA II, the Sub-Group agreed that the focal point network should be revitalized. It was therefore suggested that WMO Secretariat may formally request all RA II Members to nominate/update their respective focal points for climate services (preferably a relevant operational expert) and prepare a list of such focal points for RA II. Dr Takano proposed that TCC could maintain and update the list regularly once a year.

5.3.2 The Sub-Group recognized that RA II, being in the forefront of the implementation of RCCs with two WMO RCCs already designated, has an important responsibility to contribute to the standardization of operational practices, and their promotion within the NMHSs. In this regard, the Sub-Group agreed that access to digital data products, popularizing RCC products including through brochures, user feedback mechanisms, etc. are some of the important aspects to be addressed in enhancing GPC-RCC-RCOF-NMHS linkages. The Sub-Group also recognized that FOCRAII and TCC training seminar are good opportunities to exchange opinions among the NMHSs concerned.

6. Capacity building for climate services in RA II

6.1 Dr Kolli gave a short presentation on the capacity building component of GFCS. He showed a global perspective for capacity building focused on training aspect. He mentioned that, for the implementation of GFCS, rough estimates indicated that a minimum of 3000 new staff would need to be trained globally.

6.2 Considering that WMO Regional Training Centers (RTCs) usually train meteorologists and RCOFs also provide some capacity building opportunities essentially focusing on seasonal forecast, Dr Kolli suggested that such efforts should be enhanced by designing separate training modules for different categories of climate services and different training fields will be necessary in order to make the training effective. The Sub-Group noted that there had been apparently no coordination mechanism among the various training initiatives so far, and emphasized the need to avoid duplication of effort in this regard. Further, the Sub-Group agreed that training events based on standardized tools and practices would have greater potential for sustainable uptake.

6.3 In the context of cost-effective and sustainable training initiatives, Dr Kolli highlighted the advantage of modern remote training approaches. In particular, he referred to “Moodle” and “COMET” as useful examples being considered by WMO to promote remote training activities globally. He also mentioned the possibility of certification mechanism for climate services similar to that for aviation meteorological services, that could be considered as part of CCI strategy for capacity building for climate services.

6.4 Dr Takano suggested TCC Training seminar and FORCRA II are good opportunities for capacity building. He stressed that TCC training seminar is conducted on a practical basis so that trainees can use what they learned in the seminar soon after they go back to home country.

6.5 The Sub-Group recognized that WCRP academic aspect is necessary in capacity building, and therefore AAMP experts should be more involved in the climate training activities in RA II.

7. Work plan for RA II WGCAA-CAS for the intersessional period 2008-2012

7.1 The Sub-group made some modifications to the draft Action Plan based on discussions over the past three days. The final version of the Action Plan is shown in ANNEX V.

8. Other climate related matters in RA II

8.1 The meeting requested Dr Takano to submit a report on Sub-Group’s activity to President of RA II so that President can report to the forthcoming Sixteenth Session of World Meteorological Congress (May-June 2011) and RA II next session to be held later in 2012.

8.2 The Sub-Group also agreed that the Theme Leaders would submit their respective annual reports to the Coordinator by the end of November each year.

9. Conclusions and Recommendations

9.1 The Sub-Group agreed that conclusions and recommendations of the meeting are included in the Action Plan.

10. Closure of the Meeting

10.1 Dr Zhai and Dr Takano expressed their gratitude for having fruitful discussions and thanked WMO Secretariat for helping the Sub-Group by making valuable comments on most of agenda items of the meeting. They also thanked Russian and Indian members for sharing information on their preparations for the pilot phase for establishing RCCs.

10.2 On behalf of the WMO Secretariat, Dr Kolli thanked all participants of the meeting and welcomed the advanced action plan of the Sub-Group developed and agreed in the meeting. Finally, he mentioned that he recognizes RA II is pioneering the RCC concept and designation process of establishing RCCs.

10.3 The Meeting of the RA II Sub-Group on Climate Application and Services (WGCAA-CAS) closed on the evening of 2 December 2010.

LIST OF PARTICIPANTS

1. Members of RA II WGCAA-CAS and invited experts

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Resolution 9 (XIV-RA II)
RA II WORKING GROUP ON CLIMATE SERVICES,
ADAPTATION AND AGROMETEOROLOGY

REGIONAL ASSOCIATION II (ASIA),

Noting:

- (1) The Report of the Meeting of the Working Group on Climate-Related Matters for Regional Association II (WMO/TD-No. 1382, WCASP-No. 73), Beijing, China, 7–8 April 2007,
- (2) The Report of the Meeting of the Working Group on Climate-Related Matters for Regional Association II (WMO/TD-No. 1470, WCASP-No. 76), Tokyo, Japan, 7–8 August 2008,
- (3) The report of its Working Group on Agrometeorology,
- (4) The *Abridged Final Report with Resolutions of the Fifteenth World Meteorological Congress* (WMO-No. 1026), including its Resolution 13 (Cg-XV) – World Climate Applications and Services Programme, including the CLIPS project, and references therein,
- (5) The *Abridged Final Report with Resolutions of the Thirteenth Session of Regional Association II (Asia)* (WMO-No. 981), including its Resolution 7 (XIII-RA II) – Working Group on Climate-Related Matters in Region II,

Considering that Regional Association II should continue to play an important and active role in the implementation of WMO regional activities in the field of climate and agrometeorological services,

Decides:

- (1) To establish a Working Group on Climate Services, Adaptation and Agrometeorology (WGCAA) with the following terms of reference:
 - (a) To provide assistance and advice to the president of Regional Association II on all matters pertaining to the regional aspects of the relevant components of the World Climate Programme (WCP) and the Agricultural Meteorology Programme (AMP);
 - (b) To identify the best means of meeting the needs in the Region for information on climate and agrometeorology;
 - (c) To undertake activities relating to WCP and AMP as listed in items (2) and (3) below, respectively;
 - (d) To cooperate with the Commission for Climatology and the Commission for Agricultural Meteorology and other WMO bodies on activities related to climate services, adaptation and agrometeorology;
 - (e) To seek cooperation with other regional bodies and organizations on issues related to WCP and AMP;
- (2) To establish two sub-groups within WGCAA, as follows:
 - (a) Sub-Group on Climate Applications and Services (WGCAA-CAS);
 - (b) Sub-Group on Agrometeorology (WGCAA-AgM);
- (3) To designate, within WGCAA-CAS, the following climate experts from the Region to serve on RA II WGCAA and contribute to its work, including attendance of its meetings, and to lead the activities in their respective theme areas as follows:
 - (a) I.-C. Shin (Republic of Korea), in Climate Applications and User Liaison;
 - (b) V. Kryzhov (Russian Federation), in CLIPS including Regional Climate Centres and Regional Climate Outlook Forums;

- (c) T. Spektorman (Uzbekistan), in Climate Monitoring, Climate Watch and Climate Change;
- (d) M. Habibi (Islamic Republic of Iran), in Climate Research;
and to designate K. Takano (Japan) as the coordinator of WGCAA-CAS;
- (4) To designate, within WGCAA-AgM, the following agrometeorological experts to serve on RA II WGCAA and contribute to its work, including attendance of its meetings, and to lead the activities in their respective theme areas as follows:
 - (a) N. Chattopadhyay (India), in Forecasting and Assessment of Crop and Soil Conditions;
 - (b) I. Gringof (Russian Federation), in Agrometeorological Information for enhancing Grassland Productivity;
 - (c) S. Bazgir (Islamic Republic of Iran), in Coping with Impacts of Natural Disasters on Agriculture;
 - (d) Mao Liuxi (China), in Use of Improved Tools for Operational Agrometeorology;
 and to designate G. Rasul (Pakistan) as the coordinator of WGCAA-AgM;
- (5) To designate in accordance with Regulation 32 of the WMO General Regulations Zhai Panmao (China) as chairperson of the Working Group;

Requests the chairperson of the Working Group:

- (1) To develop a Working Group implementation plan in consultation with the president and Management Group of the Association, with reference to the key performance indicators/targets and action plans under the respective expected results of the Strategic Plan for the Enhancement of National Meteorological and Hydrological Services in Regional Association II (Asia) (2009–2011), to undertake work on the various theme areas under the charge of the Working Group;
- (2) To participate in the relevant sessions of WMO constituent bodies and expert groups, when invited, representing the regional interests in relation to climate applications and services and on agrometeorology and to coordinate the WGCAA activities with the Commission for Climatology, the Commission for Agricultural Meteorology and other relevant regional working groups;
- (3) To submit to the president of the Association an annual report by 31 December every year and a final report in time for presentation to the next session of the Association, both copied to the WMO Secretariat, with inputs from the coordinators and theme leaders under the Working Group;

Urges Members concerned to provide full support to the experts nominated in order to ensure that they are able to fulfil the tasks assigned to them.

Note: This resolution replaces Resolutions 7 (XIII-RA II) and 15 (XIII-RA II), which are no longer in force.

AGENDA

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3. Briefing on Recent WMO initiatives on Climate Applications and Services, including the Global Framework for Climate Services (GFCS)
4. Review of WGCAA-CAS Activities
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 - 4.3 User Interface for Climate Services
 - 4.3.1 Report by the Theme Leader in Climate Applications and User Liaison
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 - 4.4.1 Report by the Theme Leader in Climate Research
 - 4.4.2 Discussion
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5. Regional Climate Centers (RCCs) in RA II
 - 5.1 Progress/Update of implementation of RCCs in RA II
 - 5.1.1 Report of the Beijing Climate Center (BCC)
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 - 5.1.3 Discussion
 - 5.2 Present Status and Future Plan of Candidate RCCs in RA II
 - 5.2.1 Present Status and Future Plan of India
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 - 5.2.3 Present Status and Future Plan of North Eurasia Climate Centre (NEACC)
 - 5.2.4 Present Status and Future Plan of Saudi Arabia
 - 5.2.5 Discussion
 - 5.3 Operational practices of RCCs including GPC-RCC-RCOF-NMHS linkages and CCI/CBS guidance
6. Capacity building for climate services in RA II

7. Work plan for RA II WGCAA-CAS for the intersessional period 2008-2012
8. Other climate related matters in RA II
9. Conclusions and Recommendations
10. Closure of the Meeting

Note: The Sub-Group will also participate in session related to climate services in the Fifth Technical Conference on Management of National Meteorological and Hydrological Services (NMHSs) in Regional Association II (Asia), "Opportunities and Challenges for Delivery of Weather, Climate and Water Services" (Daegu, Republic of Korea, 29 November to 3 December, 2010).

(Extract from the final report of the Fifth Technical Conference on Management of Meteorological and Hydrological Services in Regional Association II (Asia))

5. IMPROVING CLIMATE SERVICES (INCLUDING GFCS ACTIVITIES, AND ADAPTATION TO CLIMATE VARIABILITY AND CHANGE) [CORRESPONDS TO NEW WMO SP EXPECTED RESULT 3] (Topic III)

5.1 Dr R.K. Kolli (WMO) delivered a presentation on the Global Framework for Climate Services (GFCS). He outlined the pre-requisites for climate services; the flow of the climate information system; the WMO's strategy for supporting societal response to climate variability and change; and the current climate-related operational activities including Regional Climate Centres (RCCs) and Regional Climate Outlook Forums (RCOFs). Dr Kolli informed the Conference of the outcomes of the World Climate Conference-3 (WCC-3) held in Geneva in August/September 2009 and introduced a global framework for climate services with the timeline towards the deliberation at the WMO Sixteenth Congress in May/June 2011. He concluded that: (a) there is limited use of climate information and it is important to find ways for all countries to cope with climate variability and change through improved access to climate information and prediction/projection products and the use of risk management techniques; (b) climate adaptation and climate-related risk management require multidisciplinary/ international collaborations and cross-disciplinary/international exchange of information; and (c) WMO is looking forward to the GFCS as a major step forward in systematically providing climate information for decision making at various levels of climate sensitive sectors.

5.2 Dr K. Takano (Japan), Coordinator of RA II Sub-Group on Climate Applications and Services (WGCAA-CAS), provided the current status of climate information system in RA II in relation to the GFCS. It was emphasized that NMHSs should play an important role in the GFCS, especially in the Climate Services Information System (CSIS), one of components of the GFCS. Dr Takano also highlighted the importance of regional cooperation for effective climate services of NMHSs. Various ongoing efforts in RA II were reported to the Conference, such as the establishment of new RCCs in addition to the existing RCCs, i.e., the Beijing Climate Centre (BCC) and the Tokyo Climate Centre (TCC), and activities of Regional/Sub-regional Climate Outlook Forums (RCOFs). In conclusion, he stressed that these activities should be further strengthened.

5.3 Dr Zhang Zuqiang (China) reported on the status of climate application and services in China, including the monitoring on the basic climate condition and the climate hazard, the application of climate information to some key eco-societal sectors, e.g., agriculture, water resources, transportation and human health. The efforts of Beijing Climate Centre (BCC), a designated Regional Climate Centre for RA II by WMO, on disseminating its routine climate products to the NMHSs of RA II, hosting the FOCRA-II annually since 2005 and providing the training opportunities through the visiting scholarship programme to the relevant Members in RA II were also presented. In recent two years, BCC has made some noticeable progress on its own capacity building. An objective identification technique for regional extreme weather and climate events has been developed and applied to the drought monitoring of China. Progress on the establishment of the second generation of climate system models has been achieved in BCC and is applying in the IPCC AR5.

5.4 Dr C.-K. Park (Republic of Korea) made a presentation on advances in climate information

services of KMA. He introduced the climate products and services of KMA which employs advanced information technology. He further underscored the role of KMA in promoting international cooperation in the domain of climate information and services.

5.5 Dr S.M. Mohalfi (Saudi Arabia) delivered a presentation on climate change and extreme events in the Arabian Peninsula. He described the weather patterns and systems prevailing in the Arabian Peninsula. He further described the main meteorological hazards and gave a few examples of climate change induced water- and weather-related disasters affecting this region.

5.6 Mr A.K. Srivastava (India) introduced the history, structure and climate services of the India Meteorological Department. He further described the initiatives taken by India to promote its leading role in providing weather and climate forecasts in the Region.

5.7 Dr V. Khan (Russian Federation) introduced the activities of the North Eurasia Climate Centre (NEACC), which was recently established with the aim to provide climate related services for NMHSs of CIS countries. It was designated to have function of an RCC in RA VI as a LRF node provider. NEACC also intends to be an RCC in RA II fulfilling all necessary requirements. She emphasized that for fulfilling all mandatory functions as RCC for CIS countries, NEACC should develop additional activities to improve climate services for NMHSs.

5.8 Dr V. Kryzhov (Russian Federation) reported the current status and future plans of the Climate Information and Prediction Services (CLIPS) in RA II. He described the mathematical approach for generating long-range climate prediction. He asserted poor predictability in a combination with large uncertainty (confidence intervals) in estimated verification scores because of too short verification series.

5.9 The Conference, in reviewing the outcomes of the meeting of the RA II Sub-Group on Climate Applications and Services (WGCAA-CAS), which was held conjointly with the Technical Conference, made the following conclusions and recommendations:

- (a) As the establishment of the Global Framework for Climate Services (GFCS) was decided at WCC-3 (2009),
 - NMHSs should play an important role in the GFCS, especially in the Climate Services Information System (CSIS) since NMHSs are the closest to users;
- (b) To support NMHSs' services,
 - RCCs are encouraged to improve their products to meet NMHSs' requirements;
 - RCCs are encouraged to contribute to the information exchange not only between NMHSs and RCCs but also among NMHSs through websites and training activities;
 - All RCC candidates are encouraged to join the pilot phase of RA II RCC group to demonstrate their capabilities as soon as possible;
 - Further establishment of sub-regional RCOFs is encouraged to target different sub-regions having similar climate information/outlook needs;
- (c) For the provision of tailored climate information from NMHSs to users,
 - Dialogue with users is encouraged in national and regional levels using the opportunity of RCOF and National COF. A session of user interface is recommended to be set up at RCOF;
 - Dialogue with users will be focused on agriculture and hydrology as a first step. For this purpose, WGCAA-CAS proposes to establish an appropriate coordination mechanism with the Sub-Group on Agrometeorology (WGCAA-AgM) and the

Working Group on Hydrological Forecasts and Assessments (WGH);

- It is encouraged to exchange good practices in the application of climate information and to strengthen user-provider interaction. RCOF and RCC homepage may be used for this purpose;

(d) To promote cooperation with research communities,

- A joint workshop with research communities at RCOF is encouraged.

ACTION PLAN of WGCAA-CAS

General

- Members of WGCAA-CAS should keep close contact.
- WGCAA-CAS manages a list of Focal points of NMHSs in RA II and updates it every year.
- NMHSs are requested to prepare annual activity reports on such occasions as FOCRA II.
- Annual activity report of WGCAA-CAS should be produced, reported and circulated and published in website.

CLIPS including RCCs and RCOFs

RCC activities

- To support NMHSs, continued activities of RCCs are encouraged.
- Improvements of RCC products to meet NMHSs' requirements are encouraged.
- It is encouraged that RCCs contribute to information exchange not only between NMHSs and RCCs but also among NMHSs through HP and training activities.

Designation process of RCCs

- Designation process of RCC should be carried out smoothly.
- The designation process of RCC should be in accordance with the WMO Technical Document *'How to Establish and Run a WMO Regional Climate Centre (RCC)'* (WCASP-No. 80, WMO-TD No. 1534).
- All candidates are encouraged to join the pilot phase of RA II RCC group to demonstrate their capabilities as soon as possible. BCC and TCC will help four applicants launch the pilot phase.
- IMD-NCC and NEACC are requested to submit their letters of intent to establish RCC to the president of RA II by Jan. 2011 and send a copy to WMO Secretariat and WGCAA-CAS.
- The pilot phase period will be one to two years. Further assessment of their capabilities will be made based on their operation in the pilot phase during the period.
- After the pilot phase, WGCAA-CAS will examine the eligibility of institutions which have intention to serve as RCCs in RA II, i.e. IMD-NCC, IRIMO-NCC, NEACC and PME, and prepare a document on the result of the examination of the eligibility to be submitted to President of RA II.

Extension of Sub-regional RCOF

- Continued activities of FOCRA II and SASCOF will be encouraged and WGCAA-CAS should be informed.
- "Joint Meeting for the Seasonal Prediction of the East Asian Winter Monsoon" is recommended to function as a WMO RA II sub-regional RCOF after obtaining consensus among the participating countries.
- Further establishment of sub-regional RCOFs is encouraged to target different sub-regions having similar climate information/outlook needs. VCP funding as well as other projects for RCOF operations may be pursued.

Climate Applications and User Liaison

- Dialogue with users is encouraged in national and regional levels using the opportunity of

RCOF and National COF.

- A session of user interface is recommended to be set up in the next FOCRA II and user representatives such as agriculture and hydrology be invited to the session.
- Dialogue with users will be focused on agriculture and hydrology as a first step. For this purpose, WGCAA-CAS proposes to establish an appropriate coordination mechanism with the Sub-Group on Agrometeorology (WGCAA-AgM) and the Working Group on Hydrological Forecasts and Assessments (WGH).
- It is encouraged to exchange good practices in the application of climate information and to strengthen user-provider interaction. RCOF and RCC-homepage may be used for this purpose.
- A short document on concept of the National COF should be developed by WGCAA-CAS and the document be disseminated to NMHSs in RA II and call for pilot projects on NCOF.

Climate Monitoring, Climate Watch and Climate Change

- RCCs should support activities relevant to Climate Watch by NMHSs.
- WGCAA-CAS facilitates climate monitoring in NMHSs and lists up status reports on climate monitoring in NMHSs
- To facilitate Climate Watch activity, WGCAA-CAS considers the possibility of relevant pilot projects.
- Extreme events and climate change monitoring information is encouraged to be provided by RCCs and NMHSs.

Climate Research

- Cooperation between WGCAA-CAS and WCRP/CLIVAR regional Panels should be strengthened.
 - Joint workshop with research communities at RCOF is encouraged.
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