REGIONAL ASSOCIATION II (ASIA)

TENTH SESSION OF THE RA II MANAGEMENT GROUP

GENEVA, 15 June 2016

FINAL REPORT

WORLD METEOROLOGICAL ORGANIZATION

TENTH SESSION OF THE RA II MANAGEMENT GROUP
(Geneva, Switzerland, 15 June 2016)

1. ORGANIZATION OF THE SESSION

1.1 The tenth session of the RA II Management Group (MG-10) was held at the WMO Headquarters on Wednesday, 15 June 2016 at 12:30 during the sixty-eighth session of the Executive Council. Mr Abdulla Al-Mannai, president of RA II and chair of the Management Group opened the session. The Group adopted the provisional agenda as given in Annex I.

2. MATTERS ARISING FROM THE NINTH SESSION

2.1 The Group recalled that the ninth session of the RA II Management Group (MG-9: Geneva, 27 May 2015) focused mainly on the review of the activities of the RA II subsidiary bodies; outcomes of the sixth Regional Conference on Management of National Meteorological and Hydrological Services in Regional Association II (RECO-6) held in Doha, Qatar, in December 2014; Progress Reports and Work Plans of Working Groups (WG) and implementation and coordination teams; the RA II Operating Plan for 2016-2019; and the sixteenth session of Regional Association II.

2.2 The Group noted that a special report was prepared for the least developed countries in RA II based on a request from the president of RA II during the RECO-6.

2.3 The Group agreed to rename the RA II Task Team on Strategic Operating Planning (TT-SOP) to the ad-hoc Task Team for the development of the RA II Operating Plan 2016–2019 (RA II TT-OP 2016–2019) with the chairpersonship of Mr L.S. Lee of Hong Kong, China. The Group reiterated that the RA II OP 2016–2019 should be based on the challenges and future priorities in the Region, which were identified by the questionnaire survey and discussion at the RECO-6. The Group also requested the RA II OP 2016–2019 retain only the specific deliverables to be implemented especially for the monitoring and evaluation purposes.

3. PROGRESS REPORT OF WORKING GROUPS

3.1 The Group was informed of the activities of the RA II subsidiary bodies including: Working Group on Weather Services (WGWS), Working Group on Climate Services (WGCS), Working Group on Hydrological Services (WGHS) and Working Group on WIGOS/WIS (WG-WIGOS/WIS). The progress reports of respective Working Groups are attached in Annex II.

3.2 On behalf of the chairpersons of RA II WGs/ICTs, the Secretariat presented the highlights of the WG/ICT achievements as given in Annex III.

3.3 The Group requested the Secretariat to update the progress report of WGs in consultation with the chairpersons of WGs and circulate it to the RA II Members for review before the submission to RA II-16.

4. PREPARATION OF THE SIXTEENTH SESSION OF REGIONAL ASSOCIATION II

4.1 The Group was pleased to note that at the kind invitation of the Government of the United Arab Emirates, the sixteenth session of Regional Association II (RA II-16) would be held in Abu Dhabi, United Arab Emirates, from 12 to 16 February 2017 preceded by the seventh session of the Regional Conference (RECO-7) from 10 to 11 February 2017.

4.2 The Group was informed that Members of WMO were notified of the date and place of RA II-16 and requested to send notification of their intention to be represented at the session to the Secretariat by 24 July 2016. A circular letter sent to Members is given as Annex IV.

4.3 The Group was informed of the provisional agenda and tentative work plan of RA II-16 as given in Annexes V and VI, respectively, proposed by the Secretariat. The Group noted that the duration of the session would be shortened to five working days without a day-break from six working days and a break on Sunday at RA II-15. The Group suggested that the titles of the agenda items be more specific for the Region such as "Observations and Data Exchange including satellite system and an agenda concerning interactions with private sectors be included in the provisional agenda of RA II-16. The Group was requested to provide further inputs to the provisional agenda and the tentative work plan.

4.4 The Group agreed that the preparatory MG meeting would be held tentatively in Abu Dhabi, United Arab Emirates in early December 2016. The Group requested the Secretariat to inform the Group of the dates and venue in communication with the host country as early as possible.

4.5 The Group agreed that the detailed arrangements for the preparation and operation of RA II-16 would be discussed at the preparatory MG meeting. The Group requested the Secretariat to prepare the agenda items to be discussed at the preparatory MG meeting in consultation with its members.

4.6 The Group recommended that the new subsidiary body structure be developed for more effective and efficient operations in the Region. The Group requested the chairpersons of WGs/ICTs to submit the proposals on the new structure for the next intersessional period, in consultation with the co-coordinators of Expert Groups as well as the technical departments of the WMO Secretariat, to the preparatory MG meeting for consideration. The Group also encouraged the participation of chairpersons of WGs/ICTs and some co-coordinators of EGs in the meeting, if necessary, for more in-depth discussion on the agenda items.

4.7 The Group discussed the possible ideas for more effective and efficient operation of the session including limited translation of in-session documents. The Group noted that the translation of in-session documents to official working languages would be necessary when the documents contain sensitive issues or substantial changes are made in the documents.

4.8 The Group was briefed by Mr Xu Tang, Director of the Weather and Disaster Risk Reduction Services Department, of a tentative plan for two side meetings during RA II-16 on **Multi-Hazard Early Warning Systems (MHEWS) and** *Severe Weather Forecasting Demonstration Project* (*SWFDP*) in RA II.

5. RA II OPERATING PLAN 2016–2019

5.1 The Group noted that Cg-17 decided to establish regional operating plans and other implementation plans, as necessary, addressing agreed strategic priorities

from a regional perspective and ensuring the engagement of Members in focused activities aimed at achieving the Expected Results of the WMO Strategic Plan.

5.2 The Group recalled that MG-9 reiterated that the RA II Operating Plan (OP) 2016–2019 should be based on the challenges and future priorities in the Region, which were identified by the questionnaire survey and discussion at the RECO-6. The Group also requested the RA II OP 2016–2019 retain only the specific deliverables to be implemented especially for the monitoring and evaluation purposes.

5.3 The Group noted that a draft RA II OP 2016–2019 containing deliverables and activities has been developed by the ad-hoc Task Team for the development of the RA II Operating Plan 2016–2019 (RA II TT-OP 2016–2019) in consultation with Co-coordinators of Expert Groups and technical departments of the WMO Secretariat as given in Annex VII.

5.4 The Group reviewed the draft RA II OP 2016–2019 in light of the appropriateness of the number of deliverables and activities, priority areas of RA II identified at the regional survey and RECO-6, and the concreteness and feasibility of the proposed activities, and the Group was pleased to endorse the RA II OP 2016–2019 and requested the Secretariat to submit the endorsed RA II OP 2016–2019 for inclusion in the WMO-wide Operating Plan 2016–2019

5.5 The Group commended the substantial work conducted by the RA II TT-OP 2016–2019, especially Mr L.S. Lee, chairperson of the Task Team and the chairpersons of the WGs/ICTs for the development of the draft RA II OP 2016–2019 with the assistance of relevant technical departments of the WMO Secretariat.

5.6 The Group requested the chairpersons of WGs/ICTs to develop a work plan for 2016–2017 based on the endorsed RA II OP 2016–2019.

6. REGIONAL ACTIVITIES in 2016–2019

6.1 The Group reviewed the budgeted regional activities in 2016–2019 proposed by the Secretariat as given in Annex VIII.

6.2 The Group was informed that WMO/JMA SIGMET Workshop would be organized in Tokyo, Japan from 27 to 30 June 2016 with a view to assisting aeronautical meteorological service providers in the Asia/Pacific Region in improving the competency of their aeronautical meteorological forecasters in meeting effectively the international requirements for issuance of SIGMET information.

6.3 The Group was pleased to note that an EG-WIGOS meeting and a WIGOS Workshop for West Asia were tentatively planned to be organized in the second half of 2016 for the strengthening of the observing capability of West Asia to meet the current challenges in weather and climate services.

6.4 The Group encouraged the chairpersons of WGs/ICTs to organize more videoconferences to enhance the communication among the members for the successful implementation of the mandates based on the RA II OP 2016–2019.

7. OTHER BUSINESS

7.1 The Group was informed of the vacancy of RA II vice-president and the election to be conducted by correspondence after the EC-68.

7.2 The Group noted that it would be advisable for RA II to consider providing a venue for exchanging experiences and best practices on the current status and future plan on the issuance of the impact-based forecasting by 1) organizing a new expert group on impact-based forecasting or by 2) holding a working-level workshop on the matter or by 3) including a side event at the RA II-16.

8. CLOSURE OF THE SESSION

8.1 Mr Abdulla Al-Mannai, president of RA II, thanked all the participants for their fruitful discussion and expressed his satisfaction with the outcomes made in the session. He also thanked the Secretariat for the arrangements of the session.

8.2 The tenth session of the RA II Management Group was closed at 13:30 on 15 June 2016. The list of participants is attached as Annex IX to this report.

ANNEX I

TENTH SESSION OF THE RA II MANAGEMENT GROUP

(Geneva, Switzerland, 15 June 2016)

AGENDA

1. Organization of the Session
2. Matters arising from the Ninth Session
3. Progress report of the Working Groups
4. Preparation of the sixteenth session of Regional Association II (RA II-16)
5. RA II Operating Plan 2016–2019
6. Regional Activities in 2016–2019
7. Other Business
8. Closure of the Session

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ANNEX II

WMO Regional Association II (Asia)
Progress Reports of Working Groups

June 2016

CONTENTS

Working Group on Weather Services (WGWS)

B.L. Choy
Hong Kong Observatory

1. Introduction

This report summarizes major activities in association with the expert groups, viz Expert Group on Aeronautical Meteorological Services Delivery (EG-AeM), Expert Group on Operational Forecasting (EG-OF) and Expert Group on Public Weather Services (EG-PWS), during the period 2013-14.

2. Working Group Structure

The Working Group is composed of Expert Group on Aeronautical Meteorological Services Delivery (EG-AeM), Expert Group on Operational Forecasting (EG-OF) and Expert Group on Public Weather Services Delivery (EG-PWS). Each EG consists of two co-coordinators and several theme leaders.

3. Terms of Reference

The terms of reference of the Working Group on Weather Services (WGWS) are as follows:

(a) To coordinate and support the work of the expert teams in Aeronautical Meteorology in the Region in cooperation with the Commission for Aeronautical Meteorology;

(b) To coordinate all activities related to the GDPFS, including the Emergency Response Activities, and PWS in the Region in cooperation with the Commission for Basic System;

4. Membership

Expert Group on Aeronautical Meteorological Services Delivery (EG-AeM)

EG-AeM		
Co-Coordinators	Mr Boon-leung Choy	Hong Kong, China
	Ms Marina Petrova	Russian Federation
Theme Leader in QMS Implementation and Maintenance	Ms Jie Shao	China
Theme Leader in Competency Assessment	Mr Manoj Kumar Bhatnagar	India
Theme Leader in Meteorological Support to Air Traffic Management and Provision of SIGMETs	Mr Jun Ryuzaki	Japan

Expert Group on Operational Forecasting (EG-OF)

EG-OF		
Co-Coordinators	Mr Yuki Honda	Japan
	Ms Irina Zaytseva	Uzbekistan
Theme Leader in Operational Forecasting Process and Support	Ms Sunitha D. Santhamma	India
	Mr Vo Van Hoa	Viet Nam
Theme Leader in Operational Predictions from sub-seasonal to longer-time scale	Mr Suhee Park	Republic of Korea
Theme Leader in Emergency Response Activities	Mr Masami Sakamoto	Japan

Expert Group on Public Weather Services Delivery (EG-PWS)

EG-PWS		
Co-Coordinators	Mr Lap-shun Lee	Hong Kong, China
	Dr Muhammad Hanif	Pakistan
	Dr Evgeny Vasilyev	Russian Federation
Theme Leader in Socio-economic Benefits of Meteorological and Hydrological Services	Mr Jinjun Pan	China
Theme Leader in Delivery of Warning Services	Mr Chuanhai Qian	China
Theme Leader in Education and Public Outreach related to PWS	Mr Ikhyun Cho	Republic of Korea

4. Expert Group on Aeronautical Meteorological Services Delivery (EG-AeM)

A meeting of the expert group was held during 10-12 November 2014 in Hong Kong, China. Apart from the Co-coordinators and the Theme Leaders, three additional experts from other Members of RA II were invited to the meeting. Although two of the participants, including the Theme Leader in Competency Assessment (India) and an invited expert (Kazakhstan), were unable to attend the meeting in the end, the meeting still had a reasonable sub-regional representatives of RA II (China; Hong Kong, China; Japan; Kuwait; Russian Federation; Thailand).

Four major areas were discussed during the meeting, they were (i) Review of the outcome of the conjoint ICAO MET Divisional and WMO CAeM meeting in July 2014, (ii) Status of implementation of high priority items in RA II, (iii) Proposal for regional follow up actions and (iv) Coordination of regional aeronautical meteorological services delivery events. Generally speaking, the NMHSs in RA II had great discrepancies in capabilities; while some of them were working on exciting new developments, some of the others were still having

deficiencies in the provision of METAR, TAF and SIGMET. This could be one of the reasons why the progress of implementing Quality Management and Competency Assessment Systems, each of these requiring considerable knowledge and skills for sustainable development, was below expectation for the region as a whole when compared with more advanced regions like RA VI. This may also impact the regional ability to face the upcoming challenges in the provision of aeronautical meteorological services for the future global air navigation system. One of the participants had showcased the positive outcome of twinning, arranged through bilateral agreement, in removing deficiencies of NMHS. The possibility of having more twining/mentoring activities in RA II would be further explored. The Group noted that International Training Courses on Aeronautical Meteorology Service were organized annually by RTC-Beijing in partnership with the Civil Aviation Administration of China since 2012.

For more advanced NMHSs in RA II, activities to study and develop new technologies to support the future air navigation system had been started in close co-ordination with relevant Expert Teams of WMO Commissions and ICAO. They had also demonstrated their current abilities to provide new services including space weather and regional hazardous weather advisory services. At the same time, the participants were aware of the evolving requirements of users for the provision of sub-regional aviation meteorological services in a global sense, and the rise of the big data concept which made the value of data and value-added services diverge further. It was recognized that partnership among NMHSs through MOU or bilateral agreements may be able to extend the capabilities of individual NMHS to better serve the global needs of aviation users and worth further exploration.

The work plans of the Theme Leaders for 2013-16 were amended in accordance to the outcome of the meeting. The meeting also considered it essential to review the Terms of Reference of EG-AeM in response to the outcome of the conjoint meeting. However, since a master plan would be discussed at the upcoming meeting of the management group of CAeM in 2015, the meeting agreed to postpone the discussion until the outcome of the CAeM-MG became available.

During RECO-6, the co-coordinators summarized the outcomes of the meeting and would like to propose new points for possible inclusion to the WMO existing challenges and priorities on Meteorological Service for Aviation.

Please refer to Annex I-1 for the Action Item Log for follow up actions of the EG-AeM meeting, Annex I-2 for the updated Work Plan for EG-AeM (2013-16) and Annex I-3 for the proposed new points to be included in the challenges and priorities on Meteorological Service for Aviation.

5. Expert Group on Operational Forecasting (EG-OF)

The major activities for EG-OF involved those conducted by the Theme Leader on Emergency Response Activities. These include the development of a concise guidance of the nuclear environmental emergency response (EER) service and distribution to all Members of RA II, conduction of a survey by questionnaire jointly with WMO RAP Office to ask the non-registered members about their interest in the nuclear EER service, and RSMC

Beijing, Obninsk and Tokyo to continue their efforts in maintaining contact information for the registered members.

Please refer to Annex II-1 for the report by the Theme Leader on Emergency Response Activities for 2014 and Annex II-2 for the updated Work Plan for EG-OF (2013-16).

The EG-OF is supposed to address issues mainly related the Global Data-Processing and Forecasting Systems (GDPFS) to assist the RA II Members to improve their operational forecasting services. While many EGs conducted the survey to capture the status of RA II in their related fields, the WMO Technical Progress Report on GDPFS and NWP Research is the best source to obtain such status information on GDPFS. However, the number of Members who submit this Progress Report is less than 10 every year. Although the EG-OF decides not to conduct a survey since it would load extra work to Members, it makes the EG-OF identify issues on GDPFS in RA II. The EG-OF will keep encouraging Members to submit the Progress Report to improve the current situation.

During the period 2015-2016, the EG-OF will focus on the following three activities: (1) support the implementation of two sub-regional projects in Southeast Asia and South Asia (Bay of Bengal) of the Severe Weather Forecasting Demonstration Project (SWFDP), (2) further promote the use of NWP data and products for the betterment of operational forecasting services, and (3) assist Members in preparation for the replacement of the Manual on GDPFS (WMO-No.485).

6. Expert Group on Public Weather Services (EG-PWS)

Communication among the Co-coordinators and Theme Leaders of the EG-PWS was mainly made through email exchange in 2013. A meeting of the EG-PWS was held in Doha on 3 December 2014 and a teleconference was held on 25 March 2015. In 2013, the work plan of EG-PWS for 2013-16 was formulated. Some of the proposed tasks were the development of guidelines on assessment of socio-economic benefits and communication with stakeholders. However, it was later found that similar guidelines were being prepared under other WMO programmes. Therefore, the EG-PWS would put more focus on the recommendations given in “The WMO Strategy for Service Delivery and its Implementation Plan” published by WMO in 2014. In this regard, the EG-PWS planned to organize a training workshop/seminar for RA II Members in 2015 on the enhancement of public weather service delivery.

Some of the activities on PWS carried out in this Region during 2013 and 2014 are summarized as follows. Two training workshops on public weather services were organized under the WMO/CBS Severe Weather Forecast Demonstration Projects (SWFDP). The first one was held in Macao, China from 15 to 19 April 2013 with participants from Cambodia, Lao, Thailand, Viet Nam, India, Maldives, Myanmar, Sri Lanka, Pakistan, Nepal, Bhutan, and others. The second one was held in Manila, Philippines from 9 to 13 June 2014 with participants from Cambodia, Laos, Thailand, Vietnam, and others. In addition, a Voluntary Cooperation Programme (VCP) training workshop on “Effective Media Communication” was organized in Hong Kong, China in December 2013 for Bhutan, Cambodia, China, Islamic Republic of Iran, Republic of Kazakhstan, Republic of Korea, Thailand and The United Arab Emirates. The workshop covered media communication in different phases of significant

weather events, through various channels including the traditional media like TV and radio as well as new media like the social media. There were practical sessions of weather presentation on TV and radio, which offered each participant hands-on experience together with expert feedback.

Please refer to Annex III for the updated Work Plan for EG-PWS (2013-16).

7. Pilot projects for RA II

All four pilot projects were in the implementation phase. Please refer to Annex IV for the updated Work Plan for Pilot Projects (2013-16).

8. Conclusion

After some deliberation, WGWS activities have started to gain momentum and associated works will move into top gear in 2015-16. More interactions among Members in RA II, Theme Leaders, Co-coordinators and Chairs with Expert Teams of WMO Commissions are expected. A WMO Google Group for WGWS has been set up and hopefully this could improve the sharing of information among different stakeholders.

WMO Regional Association II (Asia) Expert Group on Aeronautical Meteorological Services Delivery
Action Item Log

First meeting of the WMO RA II EG-AeM (Hong Kong, China, 10-12 November 2014)					
Action Item No.	**Action Item**	**Team Member Responsible**	**Target Date for Completion**	**Completed**	**Comments on Status of Outstanding Action Items**
1	Prepare an inventory showing existing collaborations among NMHSs in RA I	All members	On-going	N/A	
2	Revise EG-AeM work plan on QMS	Theme Leader on QMS Co-coordinators EG-AeM	Revision to be completed before RECO-6. Actions to be completed before congress		[30 Nov 2014] RA II work plan for 2013-16 updated
3	Secretariat to consider provide assistance including fact finding visits to those (QMS) Group A Members if reliable responses are not available	Secretariat	On-going	N/A	
4	Revise EG-AeM work plan on Competency Assessment	Theme Leader on Competency Assessment Co-coordinators EG-AeM	Revision to be completed before RECO-6. Actions to be completed before		[30 Nov 2014] RA II work plan for 2013-16 updated

			congress		
5	Further enhance the CAeM website to make online guidelines and information on competency assessment more accessible	Secretariat	End of 2014		
6	Request CAeM ET-GOV, as a high priority action, to provide some guidance (e.g. a plan on how to change the cost recovery model) on cost recovery in global scale	Secretariat Co-coordinators of EG-AeM	TBD		Need to consult Co-Chairs of ET_GOV to determine the schedule
7	Revise EG-AeM work plan on SIGMET	Theme Leader on SIGMET Co-coordinators of EG-AeM	Revision to be completed before RECO-6. Actions to be completed before congress		[30 Nov 2014] RA II work plan for 2013-16 updated
8	Contact DRA to confirm funding to initiate the preparation SIGMET workshop in Q1 2016	Theme Leader on SIGMET Co-coordinators of EG-AeM	ASAP		
9	Provide a contact point from RA VI for experience sharing on harmonization of SIGMET	Secretariat	ASAP		
10	Request ET-ETC to provide clear guidance on the necessary steps to be undertaken by Members and relevant training institutions to facilitate national implementation actions and resource planning	Co-coordinators of EG-AeM	TBD		Need to consult Co-Chairs of ET-ETC to determine the schedule

11	Follow up with the RA II focal point on the development of AMDAR Regional Implementation Plan (A-RIP)	China Co-coordinators of EG-AeM	ASAP		
12	Collect information on setting up of new / extension of national AMDAR programmes to cover data sparse areas on regional and sub-regional scale	All EG-AeM members	ASAP		
13	Request ET-ISA to prepare, on the schedule of implementation, a FAQ and/or practical guide on the implementation of AvXML	Co-coordinators of EG-AeM	TBD		Need to consult Co-Chairs of ET-ISA to determine the schedule
14	Gather national experience / examples / studies on effect of (climate) changes which may affect aviation operation and provide to ET-ASC for their study	All EG-AeM members	On-going	N/A	
15	Holding of a conference to raise the awareness of future challenges of aviation meteorological services	RA II MG / WGWS	RA II Session		
16	Hold teleconference on follow up items	All EG-AeM members	On-going	N/A	

Work Plan of EG-AeM (2013-16):

Task #	Reference	Task	Key Deliverable	Activity	2013	2014	2015	2016	Responsible	Status
AeM-1	EG-AeM (ToR(i))	a) Identify regional resource persons b) Identify regional national focal points of QMS c) Conduct a survey on the current implementation status of and challenges in maintaining QMS of each member (RKO: 1.2.5)	a) List of regional resource persons b) List of regional national focal points of QMS c) Survey report on current implementation status of and challenges in maintaining QMS in RA II	a) Identify regional resource persons b) Identify regional national focal points c) Carry out a survey on the current implementation status of and challenges in maintaining QMS of each member		X	X		Co-coordinators and Theme Leader in QMS Implementation and Maintenance	A restricted scope survey had been conducted in Jun 2014 and the results presented at the EG-AeM meeting.
AeM-2	EG-AeM (ToR(i))	a) Facilitate assistance from regional resource persons through twinning, etc. b) Conduct RA II workshop(s) on implementation and/or maintenance of QMS (RKO: 1.2.5, 6.3.3)	RA II workshop(s) on implementation and/or maintenance of QMS	a) Facilitate assistance from regional resource persons thorough twinning, etc b) Hold RA II workshop(s) on implementation or maintenance or both depending on the outcome of the survey			X	X	Co-coordinators and Theme Leader in QMS Implementation and Maintenance	

AeM-3	EG-AeM (ToR(ii))	a) Identify regional resource persons b) Identify regional national focal points of Competency Assessment c) Conduct a survey on the current implementation levels and maintaining the Competency Assessment programme. (RKO: 1.2.4)	a) List of regional resource persons b) List of regional national focal points of Competency Assessment c) Survey report on current implementation levels, with identified challenges in implementation and means to overcome the challenges .	a) Identify regional resource persons b) Identify regional national focal points of Competency Assessment c) Conduct a survey on the current implementation levels and maintaining the Competency Assessment programme.		X	X		Co-coordinators, Theme Leader in Competency Assessment, Regional Training Centers and Volunteer Experts	A draft survey form had been discussed at the EG-AeM meeting.
AeM-4	EG-AeM (ToR(ii))	a) Facilitate assistance from regional resource persons through twinning, etc b) Conduct RA II Workshop on Competency Assessment of AMP (RKO 1.2.4)	Enhanced awareness of members on Competency Assessment	a) Facilitate assistance from regional resource persons through twinning, etc. b) Conduct RA II Workshop on Competency Assessment of AMP			X	X	Co-coordinators, Theme Leader in Competency Assessment, Regional Training Centers and Volunteer Experts	
AeM-5	EG-AeM (ToR(ii))	Development of guidance material (RKO 1.2.4)	Guidance material on Competency Assessment of AMP for the members of the RA II region	Identify the good practices and cases to demonstrate the implementation schedule and develop a guidance material for use by the members of the region			X	X	Co-coordinators, Theme Leader in Competency Assessment and Volunteer Experts	

AeM-6	EG-AeM (ToR(iii))	Conducting a survey on current status of MET support to ATM (RKO: 1.2.2)	Survey on current status of MET support to ATM in each member	Carry out a survey annually on the status of implementation and planning in each member		X	X	X	Co-ordinators and Theme Leader in MET support to ATM and SIGMET issuance	Being arranged. To be conducted in close coordination with relevant ICAO offices
AeM-7	EG-AeM (ToR(iii))	Development of a portal web site for information sharing (RKO: 1.2.2)	Portal web-site on MET support to ATM in RA II	a) Develop a portal web-site which can be accessed via internet b) Update relevant information on MET/ATM, including best practices		X			Co-ordinators and Theme Leader in MET support to ATM and SIGMET issuance	
AeM-8	EG-AeM (ToR(iii))	RAII workshop for MET/ATM improvement (RKO: 1.2.2)	RA II workshop for MET/ATM improvement	a) Hold a workshop on MET support to ATM b) Conjoint work with relevant ICAO and WMO groups, such as ICAO APAC MET/R TF, WMO ET-ISA			X		Co-ordinators and Theme Leader in MET support to ATM and SIGMET issuance	
AeM-9	EG-AeM (ToR(iii))	Development of RA II guidelines on the establishment of MET support to ATM (RKO: 1.2.2)	RA II guidelines on the establishment of MET support to ATM	a) Develop RAII guidelines with reflecting outcomes of the workshop b) Consider necessary coordination with relevant ICAO and WMO groups, such as ICAO APAC MET/R TF, WMO ET-ISA				X	Co-ordinators and Theme Leader in MET support to ATM and SIGMET issuance	

AeM-10	EG-AeM (ToR(iii))	Presentation at the TECO in RAII session in 2016 ・	Introduction of regional status and practices of MET support to ATM	a) Introduce examples of best practices of MET support to ATM b) Present regional status and practices of MET support to ATM				X	Theme Leader in MET support to ATM and SIGMET issuance	
AeM-11	EG-AeM (ToR(iii))	Survey on current status and issues on issuance of SIGMET information (RKO: 1.2.1)	Survey on current status of SIGMET issuance in each member	a) Carry out a survey on the status of implementation and planning in each member		X	X	X	Co-ordinators and Theme Leader in MET support to ATM and SIGMET issuance	Being arranged. To be conducted in close coordination with relevant ICAO offices
AeM-12	EG-AeM (ToR(iii))	Development of a portal web site for information sharing (RKO: 1.2.1)	Portal web-site on SIGMET issuance in RA II	a) Develop a portal web-site which can be accessed via internet b) Update relevant information on SIGMET issuance, including best practices		X			Co-ordinators and Theme Leader in MET support to ATM and SIGMET issuance	
AeM-13	EG-AeM (ToR(iii))	RA II workshop for SIGMET improvement (RKO: 1.2.1)	RA II workshop for SIGMET improvement	a) Hold a workshop on SIGMET issuance b) Conjoint work with relevant ICAO groups, such as ICAO APAC MET/H TF, ICAO METWSG			X		Co-ordinators and Theme Leader in MET support to ATM and SIGMET issuance	To contact WMO DRA office for possibility of funding the workshop

AeM-14	EG-AeM (ToR(iii))	Development of RA II guideline for issuance of SIGMET (RKO: 1.2.1)	RA II guidelines on the SIGMET issuance	a) Develop RA II guidelines with reflecting outcomes of the workshop b) Consider necessary coordination with relevant ICAO groups, such as ICAO APAC MET/H TF, ICAO METWSG			X		Co-ordinators and Theme Leader in MET support to ATM and SIGMET issuance	
AeM-15	EG-AeM (ToR(iii))	Provide input to relevant ICAO groups, e.g. ICAO APAC MET/H TF, ICAO METWSG (RKO: 1.2.1)	Input to ICAO groups for their consideration of ICAO regional/global guidelines on SIGMET issuance	a) Provide input to ICAO groups b) Consider further coordination				X	Co-ordinators and Theme Leader in MET support to ATM and SIGMET issuance	
AeM-16	EG-AeM (ToR(iii))	Presentation at the TECO in RAII session in 2016	Introduction of regional status and practices of improvement of SIGMET issuance	a) Introduce examples of best practices of improvement of SIGMET issuance b) Present regional status and practices of improvement of SIGMET issuance				X	Theme Leader in MET support to ATM and SIGMET issuance	

Challenges and Priorities of EG-AeM

CHALLENGES:

Noting the efforts demonstrated by some NMHSs in Regional Association II through their twinning/mentoring programmes to further AeM-related implementation process at the regional/subregional level, the Members should be encouraged to work more proactively in light of the recent ICAO/WMO recommendations to develop GANP and ASBU specific plans of actions, sharing the knowledge/practices and tuition to the Members requiring assistance and advice.

PRIORITIES:

Increase the Members' awareness of the new types of AeM related products and services following the newly adopted ICAO/WMO recommendations to upgrade the existing scientific and technological capabilities in the Members, enabling enhanced service delivery within the period up to 2028 and onwards, and urge them for immediate actions to develop and implement modernization programmes in support of GANP and ASBU developments.

Report by the Theme Leader in Emergency Response Activities for 2014

Masami SAKAMOTO, Japan Meteorological Agency

Executive Summary

A concise guidance of the nuclear environmental emergency response (EER) service was developed by the theme leader in emergency response activities (TL-ERA), and was distributed to all members in the Regional Association II (RA II: Asia). A questionnaire survey to ask the non-registered members about their interest in the nuclear EER service was also conducted by TL-ERA and WMO RAP Office. RSMCs (Beijing, Obninsk, and Tokyo) in RA II continued their efforts to maintain contact information for the registered members.

1. Background

This report summarizes the activities in 2014 by the theme leader in emergency response activities (TL-ERA), who is responsible for the emergency response activities (ERA) in the Regional Association II (RA II: Asia) as a member of the Expert Group on Operational Forecasting (EG-OF). The main objectives of the activities by TL-ERA are;

1) monitoring of the provision of products and services by the designated global data-processing and forecasting system (GDPFS) centres within the framework of ERA,

2) advising on evolving requirements for ERA operational systems and services.

2. Distribution of a Concise Guidance on the EER services.

According to the action plan of EG-OF for the 2013 – 2016 period, a concise guidance material on the WMO environmental emergency response (EER) services was prepared by TL-ERA. The material was peer reviewed by the members of the CBS expert team on ERA (ET-ERA) and the relevant experts in RA II (Mr. W. M. Ma of Hong Kong Observatory and Dr. S. Kim of NIMR/KMA). The material was distributed to the international advisers of the members in RA II by the director of RAP office Dr. Park on 7 October. The material covers the following basic issues;

- the basic framework of the EER service
- how to interpret the EER products
- how to request the EER products
- GTS message WNXX01 IAEA (the early warning by IAEA)
- frequently asked questions and answers
- references
- the contact information of the WMO Secretariat

The objective of this activity is to provide better understanding of the EER service. Such understanding is necessary when the national meteorological and hydrological systems (NMHSs) interpret EER products and when NMHSs ask for the EER service.

3. A Questionnaire Survey for the non-Registered Members

A questionnaire survey to ask the non-registered members regarding their interest in the EER service was conducted by TL-ERA and WMO RAP office. Since the EER service is provided only to the registered members, it is very important and essential to understand interest of NMHSs and to suggest them the registration. The questionnaire was distributed by the director of RAP office on 8 October. The objective of this activity is to explore potential interest of the non-registered members and to suggest the registration when necessary.

On 23 September WMO DPFS office distributed a Secretary-General's letter (issued on 19 September) to ask for the registration of the contact information for the EER service. This letter exchange by DPFS office was proposed at the meeting of ET-ERA in Washington October 2013, and was done simultaneously with RA II's questionnaire survey to attain the collaborative effect. Incidentally DPFS office had done a similar letter exchange independently of any regional activities in March 2012, however there was no additional registration in RA II at the time.

As a result of the cooperative efforts this time by RA II and DPFS office, an additional registration from Kuwait was obtained. The permanent representative (PR) of State of Kuwait replied the contact information to WMO Secretariat. The deputy director general of the Maldives meteorological service kindly responded to the questionnaire in RA II and informed that the Maldives meteorological service does not have an immediate interest in the EER service so far.

4. Email / Fax Tests

RSMCs in RA II continue the effort to confirm the email and fax communication for the EER service since 2010. As a result of the efforts by RSMCs Beijing, Obninsk, and Tokyo, the reachability to the registered NMHSs in RA-II is more than 95%, and nearly 80% of the registered members specify their operational contact points appropriately. To maintain such a good result, RSMCs are encouraged to continue their efforts.

The current (as of 26 November 2014) statuses of the members are;

i. Registered and reachable members (28 members)

i.a) with the operational contact point information specified (23 members):

Bahrain, Bangladesh, China, Hong Kong, Islamic Rep. of Iran, Japan, Kazakhstan, Kyrgyzstan, Macau, Mongolia, Myanmar, Oman, Pakistan, Rep. of Korea, Rep. of Uzbekistan, Rep. of Yemen, Russian Federation, Saudi Arabia, Sri Lanka, State of Kuwait, Tajikistan, Thailand, UAE,

i.b) without the operational contact point information specified (5 members):

India, Iraq, State of Qatar, Socialist Rep. of Viet Nam, Turkmenistan,

ii. Registered but not reachable member (one member):

Democratic People's Rep. of Korea,

iii. Non-registered members (6 members):

Afghanistan, Bhutan, Cambodia, Lao, Maldives, Nepal.

5. Other business

The assistant director of the Hong Kong Observatory Mr. K. C. TSUI visited the Japan Meteorological Agency on 16 Oct 2014, and discussed the EER activities in the region with TL-ERA. TL-ERA provides him the latest information of the EER activities including the ERA activities in RA II, the coordination among RSMCs in RA II, and the activities relating to the ET-ERA. Mr. TSUI shared his opinions on the EER activities.

6. Plans for 2015

To understand situation of NMHSs and to monitor of the user requests for the EER service, a user request survey for the registered members will be conducted in 2015 or in 2016. The fax / email tests by RSMCs will continue.

Work Plan of EG-OF (2013-16):

Task #	Reference	Task	Key Deliverable	Activity	2013	2014	2015	2016	Responsible	Status
OF-1	EG-OF (ToR(iv))	Monitoring of the provision of products and services by designated RA II GDPFS Centres within the flamework of the Emergency Response Activities (ERA). (RKO[1]: N/A)	a) Improve the provision measures for the products and services by designated RSMCs for the registered RA II members b) Explore of potential registration of non-registered member states.	Carry out email / fax tests to improve reachability for the registered NMHSs and organizations in RA II.	Done	Done	X	X	RSMCs in RA-II, and Theme Leader in Emergency Response Activities	On going
OF-2	EG-OF (ToR(iv))			Carry out questionaries for non-registerd RA II members.		Done	X		Theme Leader in Emergency Response Activities and WMO Secretariat	
OF-3	EG-OF (ToR(iv))	Advising on evolving requirements for ERA operational systems and servies (RKO[1]: N/A)	a) Provide better understanding of the standard products and the joint statement of ERA. b) Monitor of the user requests for ERA to improve the activity.	Provide registered RA II members and related organizations with a concise guidance for the standard products and the joint statement of ERA.		Done	X		Theme Leader in Emergency Response Activities and WMO Secretariat	
OF-4	EG-OF (ToR(iv))			Carry out user request survey using questionnaires for registered members and potential users			X	X	Theme Leader in Emergency Response Activities and WMO Secretariat	

[1] The co-coordinator of EG-OF advised that there were no pertinent items on the list related to the activities. He was looking forward to have relevant items included under RKO 3.1 of the RA II Strategic Operating Plan in future.

Work Plan of EG-PWS:

Task #	Reference	Task	Key Deliverable	Activity	2013	2014	2015	2016	Responsible	Status
PWS-1	EG-PWS (ToR(iii). (ix))	Identification of Useful Meteorological and Hydrological Products for Public Weather Service Delivery (RKO: 1.2.12, 2.1.10)	Meteorological and hydrological Products	Development of Products (2014). Identify dissemination procedure (2015). Development and maintenance of portal (2016)			X	X	Co-coordinators	
				Case studies of best practices on socio-economics benefits of service delivery by NMHS			X		Theme Leader in Socio-economic Benefits of Meteorological and Hydrological Services	
				A multilayered sustainable system for dissemination of early warnings			X	X	Theme Leader in Delivery of Warning Services	
				Identification of material for vulnerable communities education and awareness (2015), Developing the outlines of material for WMO consideration (2016)			X	X	Theme Leader in Education and Public Outreach related to PWS	

PWS-2	EG-PWS (ToR(iii))	Demonstration of socio-economic benefits (SEB) of weather, climate and water services (RKO: 1.2.12)	Assessment of SEB of weather, climate and water services	Implementation of socio-economic studies and evaluations at regional level based on the recommendation of the book on methodologies for assessing SEB being prepared by WMO in collaboration with the World Bank			X	X	Co-coordinators, Theme Leader and Volunteer Experts in Socio-economic Benefits of Meteorological and Hydrological Services	
PWS-3	EG-PWS (ToR(vi))	Establish strategy for communication with stakeholders and regional organizations (RKO: 7.2.1)	a) Enhanced visibility of activities and priorities of NMHS; b) Enhanced communication with stakeholders and with regional organizations	Implementation of recommendations at regional level given by the guideline on communication with stakeholders and regional organizations being prepared by WMO CBS/OPAG-PWS ET/COPE			X	X	Co-coordinators, Theme Leader in Delivery of Warning Services and Volunteer Experts under EG-PWS	
PWS-4	EG-PWS (ToR(ix))	Preparation of a guideline for development and implementation of public education programme (RKO: 2.1.10)	Guideline for development and implementation of public education programme	Draft a guideline for development and implementation of public education programme			X	X	Co-coordinators, Theme Leader and Volunteer Experts in Education and Public Outreach related to PWS	

				Finalize and publish the guideline				X	Co-coordinators, Theme Leader and Volunteer Experts in Education and Public Outreach related to PWS	
PWS-5	EG-PWS (ToR(v))	Enhanced capability of public weather services (RKO: 3.1.5)	Enhancement of Members' capability in public weather services	Assistance in the SWFDP Training Workshop on Public Weather Services held in Macao, China in April 2013 for Cambodia, Lao, Thailand, Vietnam, India, Maldives, Myanmar, Sri Lanka, Pakistan, Nepal, and Bhutan	Done				Co-coordinators	
				Assistance in the SWFDP Training Workshop on Public Weather Services held in Manila, Philippines in June 2014 for Cambodia, Laos, Thailand and Vietnam		Done			Co-coordinators	
				Organization of VCP training workshop on "Effective Media Communication" in Hong Kong, China in December 2013 for Bhutan, Cambodia, China, Islamic Republic of Iran,	Done				Co-coordinators	

				Republic of Kazakhstan, Republic of Korea, Thailand and The United Arab Emirates						
				Organization of training workshop/ seminar for RA II Members on the enhancement of public weather service delivery			X	X	All Co-coordinators, Theme Leaders, and Volunteer Experts	
PWS-6	EG-PWS (ToR(ii)&(iii))	Mainstreamed service delivery as contained in "The WMO Strategy for Service Delivery and Its Implementation Plan"	Assessment Reports of service delivery development of Members	Encouraging and assisting Members to complete questionnaire on level of service delivery and/or to prepare the assessment reports of service delivery development; Helping to manage the flow of information and the exchange of knowledge and best practices; Facilitating/developing pilot projects and twinning/mentoring activities of Members			X	X	All Co-coordinators, Theme Leaders, and Volunteer Experts	

Work Plan of RA II-15 Pilot Projects (2013-16)

Task #	Reference	Task	Key Deliverable	Activity	2013	2014	2015	2016	Responsible	Status
PP-1	RAII-PP-NWP (RA II-14 Resolution 6 and RA II-15 Resolution 14)	Invite experts from RA II and beyond to provide face-to-face training and hands-on practicals on NWP modelling and data assimilation	Training workshop for RA II members (under the framework of WMO Voluntary Cooperation Programme) on data assimilation and mesoscale ensemble forecasting	a) Organize RA II training workshop on data assimilation and mesoscale ensemble forecasting b) Promote data and technical exchange between participants		X			KMA HKO	On-going
		Facilitate the sharing of experience and expertise between RA II members on NWP, data assimilation and ensemble prediction system.	a) Survey result on the usefulness of the ACNF website in NWP development and applications b) Enhancement of the web-based portal "Asian Consortium for NWP Forecasts (ACNF)" to include resources and support on post-processing of NWP and ensemble prediction system products as well as data assimilation techniques.	a) Conduct survey to collect users' feedback on the usefulness of the ACNF website in NWP development and applications b) Enhance ACNF web portal based on users' feedback c) Consolidate training materials and source codes from RA II training workshop and put online for subsequent reference and discussions		X	X			a) The Asian Consortium for Numerical Forecasts (ACNF) was established to promote technical exchange between members regarding NWP development. b) A dedicated web-portal has been set up, providing NWP products for RA II countries, technical support on NWP as well as forum for discussion. c) Two community models, GRAPES and NHM, are made available to all members for running through sharing of model codes by CMA and JMA respectively.

PP-2	RAII-PP-AMDAR (RA II-15 Resolution 16) (RKO 7.1.2)	Understand RA II Members' readiness to collect and apply AMDAR data	Survey report on RA II Members' readiness to collect and apply AMDAR data	a) Identify contact points of RA II Members b) Conduct on-line survey		X			CMA CAAC HKO	Analysing results of a survey conducted by ET-ABO. Follow-up enquiries being arranged.
		Invite experts from WMO ET-ABO and other experts to provide face-to-face training on establishment of AMDAR programme and application of AMDAR data	RA II workshop on the establishment of a national AMDAR programme and application of AMDAR data to enhance weather forecasting and warning services	a) Conduct a workshop for RA II Members			X (early 2015)			The International Training Course on Aeronautical Meteorology Services was organized by the WMO Regional Training Center (RTC) in Beijing, China, sponsored by CMA, co-sponsored by the Civil Aviation Administration of China (CAAC) in Beijing, China from 8 to19 June 2015.It focused on the application of AMDAR data.
		Facilitate the sharing of experience in the collection and application of AMDAR data	On-line discussion forum with active participation of RA II Members and an Internet webpage to showcase the benefit of AMDAR data in weather forecasting and warning service	a) Set up an Internet webpage and a discussion forum b) Consolidate training materials and feedbacks and put them on the discussion forum for subsequent reference c) Invite contact points of RA II Members, members of WMO ET-ABO, and other interested			X (early 2015)			

				parties to join the forum						
PP-3	RAII-PP-MWF (RA II-15 Resolution 17)	a) Identifying reliable sources of NWP products and means of post-processing to support NMHSs in provision of medium range forecasts. b) Understand current capacity and limitations in RA II Members in provision of medium range forecasts using NWP model products;	Survey report on RA II Members' status on using NWP model products, post-processing techniques and provision of medium range weather forecasts.	a) Identify contact points of RA II Members b) Conduct survey (on-line or submission of survey form through email)		X	X (Early 2015)		HKO KMA	a) Available sources of NWP products have been identified such as global NWP model outputs from KMA to support NMHS in providing medium range weather forecasts. b) A survey will be conducted to collect Members' feedbacks on current status, limitations, post-processing techniques required in provision of medium range forecasts using NWP model products. c) A resource inventory on the methods on verification and validation of NWP-based weather forecasts to be formulated to assist the Members in using the model or its post-processed products for medium range

										weather forecasts.
		a) Assist NMHSs in applying NWP products and post-processing methods to generate medium range forecast, in compliance with the needs of NMHSs to be supported; b) Identify methods and assist NMHSs in verification and validation of NWP-based weather forecasts;	Web page with resources on NWP products and post-processing tools for access by RA II Members	a) Set up web page / online resources b) Engage contact points of RA II Member to actively participate in the development and exchange of knowledge through online forum / knowledge-based portal. c) Explore means to disseminate model-based official weather forecasts via WWIS website			X (to mid 2016)			

		To promote sharing of experience in NWP product application, post-processing techniques among Members of RA II especially developing country Members;	Where possible, training workshop on use of NWP products and post-processing techniques in provision of medium range weather forecasts. Establishment of project website for sharing of experience.	a) Where possible, conduct training workshop for RA II Members b) Arrange trial dissemination of NWP-based official weather forecasts in the medium range on WWIS. c) Consolidate training materials and feedbacks on project website for RAII Members' reference and for promoting on-going development in RA II Members				X (late 2016)		
PP-4	RAII-PP-WARNING (RA II-15 Resolution 18)	Understand current situation and identify issues on data format for tropical cyclone warnings/advisories among RA II Members	Survey report on data format of tropical cyclone warnings/advisories currently in use by RA II Members	a) Identify contact points of RA II Members b) Conduct on-line surveys c) Analyze results		X	X		HKO	Survey form is under preparation for collecting data format of tropical cyclone warning/advisories in use by RAII members

		Identify a possible solution to arrive at a common data format for tropical cyclone warnings/advisories for RA II Members	Report on feasibility of converting RA II Members' tropical cyclone warnings/advisories into common data format	a) Identify a suitable common data format for use in tropical cyclone warnings/advisories b) Propose technical solution in converting RA II Members' tropical cyclone warnings/advisories into the common data format				X		

Progress report on the Working Group on Climate Services (WGCS)

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1 Introduction

The WMO RA II Working Group on Climate Services (WGCS) was established considering that the Regional Association II (RA II) should continue to play an important and active role in the implementation of WMO regional activities in the field of climate services including agrometeorological services, with particular attention to matters relevant to implementation of the Global Framework for Climate Services in the Region. WGCS will work on climate and agrometeorological issues laid out in the terms of references in close cooperation with WMO's Technical Commissions, in particular, the Commission for Climatology (CCl) and the Commission for Agrometeorology (CAgM).

2 Working Group Structure

The Working Group is composed of Expert Groups for Climate Services (EG-CS) and Expert Group for Agrometeorology (EG-AgM). Both EG-CS and EG-AgM consist of two co-coordinators and five theme leaders. In addition, a number of volunteer experts who are expected to assist the tasks of each Expert Team have also been registered.

3 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 and the Agricultural Meteorology Programme and, in particular, to assist and advise the president of RA II on matters relevant to implementation of the Global Framework for Climate Services in the Region;
(b) To cooperate with the Commission for Climatology and the Commission for Agricultural Meteorology and other WMO bodies on activities related to climate services;
(c) To undertake and to coordinate activities relating to climate services as listed in the EG-CS and EG-AgM, respectively;
(d) To report, through the chair of the WGCS, to the president of RA II on an annual basis on activities relative to the above terms of reference.

4 Membership of Working Group

Expert Group on Climate Services (EG-CS)

EG-CS	Name	Country
Co-Coordinators	Mr Akihiko Shimpo	Japan
	Dr Ghulam Rasul	Pakistan
Theme Leader in User Liaison and Applications of Climate Information and Products for Climate Risk Management and Adaptation to Climate Change	Dr Ali Karem Kadhum	Iraq
Theme Leader in QMS Implementation and Operation of Regional Climate Centres	Mr Peiqun Zhang	China
Theme Leader in Operational Regional and National Climate Outlook Forums	Dr A. K. Srivastava	India
Theme Leader in Climate Monitoring and Climate Watch	Ms Yuliya Plotnitskaya	Uzbekistan
Theme Leader in Climate Research for Development	Ms Yuping Yan	China

Expert Group on Agrometeorology (EG-AgM)

EG-AgM	Name	Country
Co-Coordinators	Dr N. Chattopadhyay	India
	Dr Alexander Kleshchenko	Russian Federation
Theme Leader in Agrometeorological Training Needs	Ms Feruza Rakhmanova	Uzbekistan
Theme Leader in Soil Moisture Monitoring	Ms Xuefen Zhang	China
Theme Leader in Drought Preparedness and Management Strategies	Mr Mir Hazrat	Pakistan
Theme Leader in Seasonal Climate Forecast Applications for Agriculture	Mr Liuxi Mao	China
Theme Leader in Socio-economic Impact of Agrometeorological Information	Mr Kamalesh Kumar Singh	India

5 Development of Work Plan

A work plan for the WG-CS was developed by co-coordinators of Expert Group on Climate Services and Expert Group on Agrometeorology, with the help of theme leaders and the WMO secretariat. The work plan for the WG-CS was submitted to the WMO Secretariat in December 2013.

The work plan was developed mainly based on the deliverables outlined in the RA II Strategic Operating Plan, terms of reference of the Expert Groups. The plan consists of: (1) Tasks; (2) Key deliverables; (3) Activities; (4) Timelines and (5) Responsible Theme Leaders/Co-coordinators.

Nine tasks for EG-CS and five tasks for EG-AgM were established in the work plan and each task includes several relevant activities. Theme leaders of EG-CS and EG-AgM are expected to take a role in the said activities with the support of, and coordination with, co-coordinators.

6 Expert Group on Climate Services

6.1 Implementation and development of RCCs

Currently, three WMO Regional Climate Centers (RCCs) have been operating in RA II. The Beijing Climate Center (BCC) of the China Meteorological Administration (CMA) and the Tokyo Climate Center (TCC) of the Japan Meteorological Agency (JMA) were formally designated as WMO RCCs in RA II in 2009, and the North Eurasia Climate Centre (NEACC) coordinated by ROSHYDROMET, Russian Federation was also formally designated as WMO RCC in RA II in 2013. These RCCs have conducted a variety of RCC-related activities, including the dissemination of climate data/products and the organization of training workshops for capacity development in accordance with RCC mandatory functions. A portal site regarding RCCs in RA II is available (http://www.rccra2.org/). India began a demonstration phase as a candidate RCC in May 2013. Iran and Saudi Arabia have expressed interest in hosting WMO RCCs.

Some newly developed climate products have been made available on their website and TCC has implemented a new seasonal forecasting system in operation.

- Forecast Products of ENSO Indices and Related Dynamical Diagnosis from BCC's System of ENSO Monitoring, Analysis and Prediction (SEMAP2.0) (RCC Beijing - BCC)
  - The products of SEMAP2.0 consist of ENSO indices including two new indices for the two types of El Niño such as NEPI (NINO Eastern Pacific index) and NCPI (NINO Central Pacific index) as well as the traditional ones, and related dynamical diagnosis based on ENSO feedback processes. The products are updated monthly with maximum lead time of one year.

- Introduction of a new seasonal ensemble prediction system (RCC Tokyo - TCC)
  - The JMA Seasonal Ensemble Prediction System (EPS) is used to produce three-month and warm/cold season predictions as well as for El Niño monitoring and outlook work in TCC. JMA upgraded its Seasonal EPS in June 2015 and products based on the new Seasonal EPS have been available via the TCC website. Changes in the new version of the JMA Seasonal EPS include enhanced resolution, improved physics in the model's atmospheric and oceanic components and the introduction of an interactive

sea ice model. Verification of re-forecasts (hindcasts) shows that this new system has higher predictive skill than old one for three-month, warm/cold season and El Niño predictions.

- Upgrade of the Interactive Tool for Analysis of the Climate System (iTacs) (RCC Tokyo - TCC)
  - The new version will have a renovated Graphical User Interface (GUI) to reduce network traffic and user burdens. These upgrades are expected to provide iTacs users with a more convenient operational environment and to be more useful in application.

In addition to the products above, it is noted that NEACC developed some products over Arctic region such as monthly-seasonal forecasts of basic meteorological parameters from two Russian hydrodynamical models and are available on the NEACC website (password protected as well as other products related with seasonal forecast).

6.2 Progress in the implementation of RCOFs

In RA II, Regional Climate Outlook Forums (RCOFs) are convened regularly. These include:

- the Regional Climate Monitoring, Assessment and Prediction for Regional Association II (FOCRA II) coordinated by China since 2005,
- the South Asian Climate Outlook Forum (SASCOF) coordinated by India since 2010,
- the North Eurasian Climate Outlook Forum (NEACOF) coordinated by NEACC since 2011,
- the East Asia winter Climate Outlook Forum (EASCOF) coordinated by Japan, Mongolia and Republic of Korea since 2013, and
- ASEAN Climate Outlook Forum (ASEANCOF; including some RA V Members) since 2013.

In 2015, the following RCOF sessions were held.

Name	Dates	Venue	Participants
SASCOF-6	21-22, April	Dhaka, Bangladesh	Experts of NMHSs from South Asian countries and international experts
FOCRAII-11	11-13, May	Beijing, China	More than 90 experts from 20 WMO Members including 14 RA II Members (China; DPR of Korea; Hong Kong, China; Japan; Kazakhstan; Lao PDR; Macao China; Maldives; Mauritius; Mongolia; Pakistan; Republic of Korea; Russian Federation; Thailand)
ASEANCOF-4	21-22, May	Jakarta, Indonesia	Experts of NMHS from ASEAN countries and international experts
WinSASCOF-1	14-16,	Chennai,	Experts of NMHSs from South Asian

	October	India	countries and international experts
EASCOF-3	3-5, November	Seoul, Republic of Korea	More than 50 experts from China, Japan, Mongolia and Republic of Korea
NEACOF-9	10-12, November	Moscow, Russian Federation	45 experts from 9 NMHSs of CIS countries (Armenia; Azerbaijan; Belarus; Kazakhstan; Kyrgyzstan; Moldova; Russian Federation; Tajikistan; Uzbekistan)
ASEANCOF-5	18-19, November	Singapore	Experts of NMHS from ASEAN countries and international experts

In 2016, the following RCOF sessions were held.

Name	Dates	Venue	Participants
FOCRAII-12	7-9, April	Guangzhou, China	Experts of NMHS in RA II Members and international experts
SASCOF-8	25-26, April	Colombo, Sri Lanka	Experts of NMHS from South Asian countries and international experts
NEACOF-10	May	(via internet)	Experts of NMHS from CIS countries

6.3 User interface for climate services

There is a recognized need to encourage the exchange of good practices and the sharing of experiences in the application of climate information among NMHSs and to strengthen user-provider interaction. Some RCOFs including FOCRAII and SASCOF have provided such opportunities by inviting experts from user sectors, such as agriculture and health, to the meeting and by listening to their needs for climate information.

6.4 Pilot Project on Information Sharing on Climate Services

For the successful implementation of GFCS, it is important to share good practices and lessons learned, including experienced project management capabilities, to develop projects and improve climate services by NMHSs as well as to avoid duplication and minimize the risk of failure. The WMO RA II's fifteenth session decided to establish a pilot project on information sharing on climate services. The project aims at sharing information on climate services and best practices of climate information among NMHSs in the region for the successful implementation of GFCS. TCC has been designated as Lead for the project to establish and maintain a dedicated website.
TCC has operated the dedicated website launched in March 2014 (http://ds.data.jma.go.jp/tcc/pilot/) and carried out the second questionnaire investigation in August 2015, aiming to update on the website and to enhance the information about the concrete examples or good practices of the utilization of

climate information. Based on the information received, TCC is planning to update this website.

6.5 Capacity development activities for climate services

A number of capacity development activities, such as training events and expert visits have been conducted in the region organized by WMO Regional Training Centres, RCCs (BCC, NEACC and TCC) and some NMHSs. Such events have also been held in conjunction with RCOFs including FOCRAII, SASCOF and NEACOF. Many of these events have been conducted on a practical basis so that trainees could apply what they learnt to their operational climate services soon after returning to home countries.
Some examples of capacity-development activities (training events) conducted in 2015 are shown below.

Events/Activities	Dates	Venue	Organizer	Participants
TCC Training Seminar on Global Warming Projection Information	26-30, January	Tokyo, Japan	TCC	13 experts from NMHSs of Asia-Pacific region
Expert visit on the generation of global warming prediction information	25-27, March	Bangkok, Thailand	TCC	12 experts of the Thai Meteorological Department
Capacity Building Training Workshop on Seasonal Prediction (followed by SASCOF-6)	19-20, April	Dhaka, Bangladesh	IMD	Experts of NHMSs from South Asian countries
International Training Course on Global Framework for Climate Services (followed by FOCRAII-11)	14-22, May	Beijing, China	RTC Beijing	25 experts of 18 NMHSs including those from 9 Members in RA II (DPR of Korea; Hong Kong, China; Lao PDR; Macao, China; Maldives; Mauritius; Mongolia; Pakistan; Thailand)
Expert visit on the generation of global warming prediction information	23-26, June	Sri Lanka, Colombo	TCC	12 experts of the Department of Meteorology of Sri Lanka
Twelfth International Seminar on Climate System and Climate Change	20-31, July	Lanzhou, China	BCC	More than 100 experts from 10 WMO Members including 5 RA II Members (Kyrgystan; Mauritius; Myanmar; Pakistan; Thailand)
TCC Training Seminar on One-month Forecast	16-20, November	Tokyo, Japan	TCC	15 experts from NMHSs of Asia-Pacific region

In addition to the activities above, it is noted that the Regional Consultation meeting on climate services in the North-Eurasian countries was held in Sochi, Russian Federation on 19-20 October 2015. This regional consultation meeting aimed to

integrate efforts of experts from NMHSs in the region with users of climate information from the priority areas of the GFCS for the purpose defining priorities for more effective production and use of global, regional and national climate and forecasting information by all interested parties in climate-sensitive sectors in all North-Eurasian countries. It resulted in: (i) enhanced understanding of the needs for climate services in different user sectors; (ii) clear understanding of capacity development needs to implement the GFCS at regional and national levels; (iii) strategic guidance on institutional arrangements, partnerships and processes required to operationalize the GFCS at the regional and national level.

6.6 CCl and RA II activity

The Management Group of the WMO Commission for Climatology (CCl-MG) invited the representatives of the working group on climate or climate issues in RAs to the second meeting of the CCl-MG held in Madrid, Spain from 27 to 30 October 2015, so that the Chair of WGCS in RA II participated in the meeting. At the meeting, it is recognized that sharing information among CCl and the working groups on climate or climate issues in RAs are important to enhance activities at the regional level.

7 Expert Group on Agrometeorology

7.1 CAgM and RA II activity

The meeting of the CAgM implementation coordination team (ICT) was held in Romania (Bucharest) at 7 – 9 October 2015. The principal items of the meeting were:

- Progress in Agricultural Meteorology Programme
- Review the Terms of Reference of ICT
- Review of International Collaborations
- Global Initiatives in Agro-meteorology (GIAM)
- Review of Regional Working Groups / Task Teams
- Review and Discussion of Focus Area Activities and others

The meeting of RA II Expert Group on Agro-meteorology “Strengthening of agro-meteorological activity in RA II countries” was held in India (Puna) at 9 – 10 November 2015. The directions of the discussion on the meeting were:

- Weather and Climate Services for Agro-meteorology
- Agrometeorological products for Agro-meteorological Services
- Capacity Building & Impact Assessment

An International Conference on Weather/Climate Modeling and Remote Sensing Applications for Sustainable Agriculture and Food Security Community was held in Jeju, Republic of Korea from 25-28 November 2014. Over 85 participants attended this conference from the co-host organizations of WMO, KMA/NIMR, WWRP, GEO, SNU/NCAM, and NUIST. Prior to this conference, there was a workshop between DWD and KMA on GCI/WIS interface development and potential backup for GISCs.

7.2 Progress in Agricultural Meteorology Programme

CAgM ICT noted the need to develop standards and guidelines for in-situ agricultural meteorological measurements, especially for soil moisture, which can improve agricultural meteorological products and for the development of integrated in-situ and remote sensed products and information for Members. For this porpose it was suggested to establish and coordinate a Soil Moisture Demonstration Project (SMDP) to develop these standards, guidelines and activities which would also contribute to the objectives of the WMO Integrated Global Observing System (WIGOS) and the Global Framework for Climate Services (GFCS).

In the previous years the big project deals with bioclimatic potential of Russian regions was successfully finished and the results were submitted to Russian Ministry of Agriculture. Now the bioclimatic potential of a region is used for sharing finance support between local authorities. It is necessary to emphasize that some big insurance companies also interest in that parameter to have some real background for a insurance rate during agricultural insurances.

7.3 Nations Drought Management Policies for Asia-Pacific

Economic and Social Commission for Asia and Pacific (ESCAP) as other organizations of UN system is involved in providing help, knowledge transfer and relevant activities in developing drought monitoring and early warning systems. At the end of October 2015 the Session of the Intergovernmental Consultative Committee on the Regional Space Applications Programme for Sustainable Development and the Session of Disaster Risk Reduction were held in Thailand. The topics of the agenda included all types of natural disasters, such as drought, floods and others events related to agriculture. Representatives from more than 40 countries took part in the above meetings. It is worth mentioning that the ESCAP report for 2015 “Disasters without Borders” was presented and discussed on those sessions. Some new products derived from satellite information should be very useful for agro-meteorology and agriculture.

The Center of Drought Monitoring established in 2002 within National Institute on Agricultural Meteorology of Russia continued a big operational work aimed at Drought Monitoring on the territory of CIS. The base of this work is the field information in the form of 10 days messages from the network of agro-meteorological and synoptic stations as well as remote sensing data from meteorological satellites. The drought monitoring conducted from the beginning of May till the end of September. The estimates of harvest losses from drought were calculated in 2015.

7.4 Capacity development

Higher education and training is being offered to meteorologists, agro-meteorologists and climatologists at Geography Departments of some universities in Russia. There is no specialized division for Agrometeorology, however, Russian State Agrarian University, Moscow Agricultural Academy and National Institute on Agricultural

Meteorology have carried out the training of some new agro-meteorologists from Russia and CIS countries. The batch of students has successfully finished last year.

7.5 Climate services for farmers

JMA has conducted joint research with the National Agriculture and Food Research Organization since 2011, aiming to promote the use of climate information in agricultural sector. This developed the two-week forecasts to reduce the damage of low/high temperature injury of paddy field rice and the sophisticated prediction information of flowering date of wheat, leading to effective control of Fusarium head blight.

7.6 Farmer Awareness Programme

India Meteorological Department (IMD) is organizing Farmers Awareness Programme (FAP) in the country by inviting farmers from nearby villages and exposing them to weather and climate issues that affect agricultural production on their farms. The objective of the FAP was to make farmers aware on benefits of agromet advisories towards becoming self-reliant and well informed on weather conditions. At present FAP has been organized at 135 locations during last 5 years.

7.7 Dissemination of Agromet Advisories to the farmers

Dissemination of agromet advisories to the farmers is done through different multi-channel systems such as All India Radio (AIR) and Doordarshan, private TV and radio channels, newspaper and internet, SMS and IVR (Interactive Voice Response Technology), being made on wider scale. Agromet Advisories are also being disseminated in both Regional and English languages through “Kisan SMS”, a portal (http://farmer.gov.in/advs/login.aspx) launched by the Ministry of Agriculture, Government of India during July 2013. 11.50 million farmers are benefitted by this services directly. Weather forecast and advisories under alerts and warnings through SMS now enable the farmers in planning of farming operations to minimize and/or control damage of crops under the adverse weather conditions. Also IMD in collaboration with Agromet Field Units is sending alerts to the farmers in case of extreme weather events like cyclone, hailstorms, heat waves etc.

Pakistan Meteorological Department has launched a mobile sms service for farmers specially for wheat and cotton crops providing them weather information about rain, wind and heat stress for next five days. During wheat harvesting and threshing season such forecasts are extended to 10-days with special emphasis on dry spell and wind conditions. For cotton at flowering and onward, forecasts are limited to 3-days focusing on rain, humidity and wind speed for spraying of chemicals. A 6-line telephone service for farmers and general public is dedicated to get weather forecast for any district. This is automatically operated system which recognizes speech of caller and accordingly picks up forecast of asked district from numerical prediction model forecast fields.

7.8 Operational Agromet advisory Service Bulletin based on Extended Range Weather Forecast and National Agromet Advisory Service

Bulletin based on Monthly Weather Forecast

To help the farmers to cope with climate risks and uncertainties and effectively use seasonal to inter-annual climate forecasts, IMD in collaboration with Indian Institute of Tropical Meteorology (IITM), Pune and Central Research Institute for Dryland Agriculture, Hyderabad started issuing AAS Bulletins based on extended range weather forecast and monthly weather forecast Bulletin on experimental mode during southwest monsoon 2015.

Working Group on Hydrological Services (WGHS)

Sung Kim
Korea Institute of Civil Engineering and Building Technology

1. Introduction

At the fifteenth session of the RA II in December 2012, the establishment of the WMO RA II Working Group on Hydrological Services (WGHS) was decided.

2. Working Structure

The working group is composed of one Chairperson, one Vice-chairperson and eight theme leaders.

3. Terms of Reference

The terms of reference of the Working Group on Hydrological Services (WGHS) are as follows:

(a) To provide assistance and advice to the president of the Association on all questions pertaining to the regional aspects of the Hydrology and Water Resources Programme;

(b) To engage in and monitor the implementation of water-related activities documented in the RA II Strategic Operating Plan;

(c) To undertake activities relating to the Hydrology and Water Resources Programme as listed below;

- Strengthening the capability of Members to assess their water resources: water resources assessment, its variability and use (surface water including reservoirs and groundwater);
- Improve accuracy and timeliness of forecasting floods of different cause and origin through enhanced cooperation between National Meteorological Services and National Hydrological Services, within the context of the WMO Flood Forecasting Initiative;
- Hydrological aspects of drought, including drought monitoring, and assessment of water scarcity and deficits;
- Hydrological responses to climate variability and change and promotion of the use of climate information by water managers;
- Improved accuracy of hydrometric and sediment observations including space-based technologies;
- Sediment disasters and mass movements (flood and rainfall induced);

(d) To cooperate with the Commission for Hydrology and other WMO bodies on activities and projects related to hydrology and water resources;

(e) To seek cooperation with other regional bodies and organizations on issues related to the Hydrology and Water Resources Programme;

(f) To actively contribute to the Global Framework for Climate Services through dedicated components in the identified theme areas of work during the next intersessional period 2013–2016;

(g) To undertake activities related to the transfer of technology through the Hydrological Operational Multipurpose System and capacity-building in a cross-cutting manner;

4. Membership

Chairperson WGHS	Dr Sung Kim	Republic of Korea
Vice-chairperson WGHS	Mr Muhammad Riaz	Pakistan
Theme Leader in Water Resources Assessment	Ms Ge Gao	China
	Ms Hwirin Kim	Republic of Korea
Theme Leader in Flood Forecasting	Dr Sergey Borshch	Russian Federation
Theme Leader in Hydrological Aspects of Drought	Ms Irina Dergacheva	Uzbekistan
Theme Leader in Hydrological Responses to Climate Variability and Change and Promotion of the Use of Climate Information by Water Managers	Mr Guoqing Wang	China
	Dr Thuc Tran	Viet Nam
Theme Leader in Improved Accuracy of Hydrometric and Sediment Observations including Space-based Technologies	Mr Youngsin Roh	Republic of Korea
Theme Leader in Sediment Disasters and Mass Movements	Dr Tai-Hoon Kim	Republic of Korea

5. Working Group meeting

5.1 The first session
The first session of the Working Group on Hydrological Services (WGHS) of the WMO Regional Association II (Asia) was held in Seoul, Republic of Korea, from 30 September to 2 October 2014 with the following agenda.

(a) Opening of the Meeting
(b) Adoption of the agenda and organization of work

(c) Review of activities since previous WG session (including meetings of CHy, Presidents of Technical Commissions and Presidents of Regional Associations)
(d) Modes of operation of the WGHS (including Task Teams)
(e) Consideration of decisions of RA-II-15, CHy-14, Cg-16 and relevant ECs
(f) Work programme
(g) Field trip
(h) Cooperation with other international organizations
(i) Other business
(j) Adoption of the report and closure of the session

The final report of the meeting is available at http://www.wmo.int/pages/prog/hwrp/RA2/documents/RA-II_WGH_2014_FINAL_REPORT.pdf.

5.2 The second session
The second session of the Working Group on Hydrological Services (WGHS) of the WMO Regional Association II (Asia) was held in Gyeongju, Republic of Korea, from 14 to 16 April 2015 with the following agenda.

(a) Opening of the Meeting
(b) Adoption of the agenda and organization of work
(c) Review and adjustment of work programme
(d) Presentations for WWF7 Regional Session and main messages
(e) Next meeting
(f) Adoption of the report and closure of the meeting

The final report of the meeting is available at http://www.wmo.int/pages/prog/hwrp/RA2/RAII-WGH-Gyeongju.php

6. WORK PROGRAMME

6.01 Two different styles for the Working Group work plan were presented to participants and were discussed at length. It was decided that the best approach would be to adopt the work plan used by the current CHy Advisory Working Group members, with slight modifications agreed to by participants.

6.02 Mr KIM also presented on the RA II Operating Plan for 2012-2015. He stressed the importance of considering the deliverables indicated therein related to hydrology and water resources and that the WGHS work plans should be supportive of achieving them.

6.1 Chairperson

6.1.1 The Terms of Reference of the WGHS is provided in Resolution 10 (RA II-15). The objective of the WGHS is to contribute to the implementation of the WMO Strategic Plan and the RA-II Strategic Operating Plan 2012-2015. The focus will be

on producing the Expected Results associated with three of the five Strategic Thrusts, namely: Improving service quality and service delivery; Advancing scientific research and application, as well as development and implementation of technology; and Strengthening capacity building.

6.1.2 As per the Terms of Reference of the WGHS as established by Resolution 10 (RA II-15), the WGHS will develop its implementation plan in consultation with the president and the Management Group of the Association, with reference to the key performance indicators/targets and action plans under the respective expected results of the RA II Strategic Operating Plan. The WGHS will undertake work on the various theme areas under the charge of the Working Group.

6.1.3 According to the Terms of Reference of the WGHS Chairperson provided in Resolution 10 (RA II-15), the work plan is developed to accomplish the responsibilities as follows.

6.2 Vice-Chairperson

6.2.1 The work plan of the Vice-Chairperson includes his roles and activities that will be conducted during the intersessional period. The work plan was developed by Mr Jan Muhammad KHAN in close collaboration with the Chairperson Mr Sung KIM.

6.2.2 Recommendations were submitted by December 2015 as follows:

(a) Request may be made to WMO to establish a mechanism to take-up the" Trans - boundary Real time Flood data (flow discharge and Rainfall) sharing" issue with United Nations under the umbrella of Regional Cooperation among the countries to improve the flood forecasting capabilities of the downstream countries at regional level. Pakistan is a peculiar example where most of the River Watersheds or the upper Catchment of Rivers are across the borders in India. Therefore, if a suitable system is established for the transboundary Hydro met data sharing (Flow discharge and rainfall), it will make tremendous improvement in flood forecasting at downstream country.
(b) WMO may also be requested to help its member countries in enhancing the flood forecasting capabilities in provision of Customized High Resolution Rainfall Prediction models coupling with rainfall runoff and routing models.
(c) WMO may further be requested to help its member countries, especially the least developed countries in strengthening the Gauges Network (Rains, flow level) to improve the performance of the models.
(d) Floods in Pakistan is a permanent seasonal hazard due to its geographical position. So there is a dire need to enhance the capacity of Early warning System in terms of Software, High Resolution Precipitation Rainfall runoff Model for upstream of Rim stations and strengthening of Hydro-meteorological Data Network.

6.3 Water Resources Assessment

6.3.1 The overall objective of work on water resources assessment is to provide useful and accurate information to facilitate decision making by a variety of users. Improvements on capabilities to assess water resources will focus on two aspects. First is regarding the technological aspects of assessing the availability of basin-wide water resources, including climate predictions. The second is to assist in furthering the implementation of water resources assessment.

6.3.2 The main task of the work plan is to improve approaches and models of water resources assessment. These will be used to analyse basin-wide water resource surpluses and deficits in real time and to consider climate prediction and climate change scenarios of potential future states. Tools (test version) to undertake dynamic water resources assessment will be applied to a demonstration basin and will be expanded to member countries. The information system, such as database and metadata catalogues of water availability, will be built to facilitate the provision of the related information to users. Based on results from pilot tests, guidance will be developed in the fields of data collection, models and methods of water resource assessment, and knowledge based on adaption to the changes in water availability. Training courses and workshops will be conducted for capacity improvement of the members of RA II.

6.3.3 To expand the abilities of the water resources assessment approaches and their application, it is desirable for the WGHS members to apply the tools in their countries and provide feedback to the theme leader.

6.4 Flood Forecasting

6.4.1 The basic direction of RA-II activities in the area of flood forecasting during the last intersessional period has been connected to the realization of the Flood Forecasting Initiative (FFI). The WMO Flood Forecasting Initiative is the basic implementation framework related to hydrological forecasting and flood management. The main task of FFI is improve the capacity of meteorological and hydrological services to jointly deliver timely and more accurate products and services required in flood forecasting and warning and to further collaboration with disaster managers, active in flood emergency preparedness and response. The goal of this task is to improve interaction and understanding of meteorologists and hydrologists in the effective use of numerical weather forecasts in hydrological modelling for flood forecasting.

6.4.2 In a number of National Meteorological and Hydrological Services there is valuable experience in creating Flood Forecasting Systems based on sharing of meteorological and hydrological data and model outputs. Hydrologists and meteorologists take part in the development of these systems in common. However many flood forecasting systems have separate meteorological and hydrological modelling systems. In such cases, numerical weather forecasts are used as input to the hydrological modelling systems. When approached in this manner, it is necessary to develop requirements for the meteorological forecasts to mesh with the spatial and time resolution requirements of hydrological models, resulting in hydrological

forecasts. Hence, it would be helpful to have general recommendations on the requirements of numerical weather forecasts for use in flood forecasting.

6.4.3 Now there are many meteorological models at the global, meso-, and regional scales which are used in flood forecasting systems. Some hydrological modelling systems are making use of ensemble meteorological forecasts. This leads to the development of ensemble hydrological forecasts. Sometimes, such hydrological forecasts have high variance, reflective of the uncertainty in the meteorological forecasts. In addition, analyses can be conducted to ascertain the deterministic error of each ensemble element, for example over the previous thirty day period, using this deterministic signal to provide a weighting on the confidence of the forecasted ensemble elements. This results in improvements in the accuracy of hydrological forecasts.

6.4.4 The Flash Flood Guidance System (FFGS) has been developed by the Hydrologic Research Center in San Diego (USA) under the direction of Dr K. Georgakakos. The Flash Flood Guidance System (FFGS) project with global coverage was endorsed by Resolution 21 (Cg-XV) as a Flood Forecasting Initiative component that had been developed by the WMO Commission for Hydrology (CHy) jointly with the WMO Commission for Basic Systems (CBS) and in collaboration with the US National Weather Service, and the Hydrologic Research Center in San Diego. This system provides a very useful tool for establishing guidance on the possibility of threats of flash floods occurring on small basins. The Flash Flood Guidance System is being implemented with the assistance of the USAID/OFDA, and it is now being used in several countries.

6.4.5 Currently there are two projects being implemented in RA II. These are the Mekong River FFGS and the South Asia FFGS. It would be beneficial to further expand the number of countries in RA II (Asia) being covered by the Flash Flood Guidance System. To assist in this regard, it would be advantageous to:

(a) disseminate broadly the experiences and benefits obtained through the use of the FFGS in various countries throughout the world; and

(b) investigate the potential use of FFGS in Central Asian countries and facilitate its understanding by operational hydrologists in the region.

6.4.6. Flood management effectiveness depends not only on quality and timeliness of the hydrological forecast, but also on the ability of users to understand and use the various forecast products. Over the last decade, advances have been made in the use of probabilistic hydrological forecasts. The utility of such forecasts is highly related to the training of experts in their use, and such forecasts have greatly enhanced the utility of flood forecasting in the area of flood management. To further advance the use of probabilistic forecasts and their utility in flood management, it is recommended that effort be undertaken to prepare guidance and training material on the use of hydrological forecasts (including probabilistic forecasts) in flood management.

6.5 Hydrological Aspects of Drought

6.5.1 There have been recent developments in the establishment of an Integrated Drought Management Programme (IDMP) in association with the Global Water Partnership and WMO, based on and inspired by the development and success of the Associate Programme on Flood Management (APFM). Measures, such as establishing comprehensive early warning systems, improving seasonal forecasts and increasing the awareness of the public, can contribute to enhancing societal resilience and in supporting more robust planning and investment decisions, including the reduction of the consequences from droughts. In accordance with Operating Plan for the Enhancement of National Meteorological and Hydrological Services (NMHSs) in Regional Association II (ASIA) 2012-2015, there are deliverables to be achieved for the theme area of hydrological aspects of drought. Efforts will focus on: improving monitoring and early warning of hydrological drought; enhancing preparedness to predict and manage hydrological droughts; and provision of knowledge to assist decision making.

6.5.2 With respect to monitoring and warning systems for drought, it is understood that monitoring and analysis of situations leading to hydrological drought is the methodological basis for the development of early warning system for drought. Within this, the difficulty lies in determining the onset of drought. In the context of timely response and the development of preventive measures, indicators for the determination of the onset of hydrological droughts are critical and urgently needed. In addition, assessing the sufficiency of the existing hydrometeorological monitoring system is also an important factor.

6.5.3 Major activities addressed in the work plan include:

(a) Development of indicators for the determination of the onset of hydrological drought.

- Collection, analysis and systematization of data to identify indicators for the determination of the onset of hydrological droughts;
- Identify the types of hydrological drought that are typical for the Asian region
- Study of the conditions of formation of hydrological drought

(b) Preparation of guidance material for the development of drought monitoring networks.

- Gathering information about the status of drought monitoring networks in Asian region
- Identification of gaps and needs of the National Meteorological and Hydrological Services to improve the drought monitoring networks.

6.5.4 Enhancing preparedness is, in part, dependent on improving prediction capabilities. This, in turn, will help manage hydrological droughts and provide increased knowledge for decision making. This Theme Leader will review and synthesise national guidance materials to assist in managing droughts.

6.6 Hydrological Responses to Climate Variability and Change and Promotion of the Use of Climate Information by Water Managers

6.6.1 In the context of climate change, climate-related disasters, including storms, floods, inundations, flash floods, and droughts, are likely to increase in intensity and frequency. As well, it is possible that such events might become more difficult to forecast. At the same time, the demand for information about climate and climate change is increasing, as is the need for adaptive measures. There is an urgent and growing need to translate climate and climate change information into actions appropriate for sectors/locations, especially for water resources management.

6.6.2 The activities of Theme 4 include: (1) Assessment of change in climate extremes; (2) Climate projections; (3) Assessment of potential impacts of climate extremes and climate change on water resources of selected river basins; (4) Translating climate and climate change information into actions in water resources development and management for selected river basins; (5) Compilation of reports; and (6) Experience sharing and lesson learned. It is anticipated that participating countries will work independently to develop its case study, following the activities of the work plan. The Theme Leaders will compile reports from participating countries to prepare an overall synthesis report.

6.6.3 The work plan has been developed not just for a single country but rather for all countries within RA II (Asia). It is strongly recommended that member countries participate and contribute to the study. Theme Leaders will work with each participating country so that efforts follow a common template.

6.7 Improved Accuracy of Hydrometric and Sediment Observations including Space-based Technologies

6.7.1 HSC is a specialized hydrological survey organization funded by the Government of Korea. The main mission of HSC is to provide hydrological data for the Republic of Korea. Mr Roh, as theme leader, will provide a technical report or manual about real-time discharge measurement, sediment measurement and development of rating curves using HSC's technical Know-How. Several case studies will be provided.

6.7.2 The first activity is to document the Integrated Real-time Discharge Measurement System (IRDIMS). This will include its design, construction, operating system software, and quality control (QC) system. IRDIMS produces real-time discharge for hydrometric sites at over 50 sites throughout Korea using an automated production system. The second activity is to prepare a technical report documenting the approaches taken for sediment. The final activity is to provide a report outlining procedures for developing the optimal rating curve taking into consideration the various conditions (weir, backwater, vegetation and tidal etc.) that can occur in the field.

6.8 Sediment Disasters and Mass Movements

6.8.1 The main goal of the Sediment Disasters and Mass Movements theme is to develop the Integrated Management Platform that consists of systems, policies and international cooperation. It has three different perspectives on sediment disasters. These include: (1) issuance of landslide/debris flow warning and consistently improving upon them; (2) improvement in capacity for water-related disaster management; (3) optimization of disseminating sediment disasters related information.

6.8.2 The warning for landslide/debris flow is an essential part of this project, and it has three substantial activities which have ascending priority. These are: (1) collection of information, review and development of materials for assessment of sediment disasters, and their dissemination; (2) investigate warning technologies based on adaptive concepts; and (3) generate sediment disasters risk maps. Increasing capability for water-related disaster management will result from close collaboration of countries within RA II (Asia). Activities to further dissemination and cooperation are, as follows, with ascending order of importance: (1) attending seminars on sediment disasters in order to communicate and further cooperation among member countries and related organizations; (2) sharing and bringing related technologies to developing and least developed countries. And finally, this project would try to effectively and efficiently distribute sediment disaster-related information to communities, governments and people living in hazardous areas. Such information will include methodologies and related policies that can greatly assist reduction of risk for those most affected.

6.8.3 The key objective of this project is to generate a platform which is applicable to not only developed but also developing and least developed countries. This process recognizes the important gaps in understanding scientific processes and in the level of technological capacities that can exit at the country and community level. The effort will strive to overcome these differences in capabilities.

7 Work plan

7.1 The work plans of all members present were reviewed and adjusted as required during the 2nd meeting. The revised work plans appear herein. The work plans of those members who were absent, namely Messrs Muhammad Riaz and Tran Thuc, and Ms Irina Dergacheva, were revised by Mr Sung Kim through correspondence with said members following the conclusion of the meeting. All revisions to their work plans are sent to all the members and also contained progress status herein.

WORKPLAN: Chairperson of WGHS **Sung KIM**

Actions	Activities	Outputs	Resources	Milestones	Linkages	Progress
• Represent WGHS as and when required, (e.g. at MG and EC) • Attend meetings of chairpersons of Working Groups • Other duties as required of chairpersons WGHS (see General Regulation 168 (b))	1. In his capacity as Hydrological Adviser, to assist the president of RA II in accordance with the duties stipulated in Regulation 168 (b) of the WMO General Regulations	• Hydrology and Water Resources issues remain a key aspect of the work of RAII • NMHSs are assisted in fulfilling their roles and responsibilities • WGHS is adequately represented within the RAII environment •	• Resources are provided to meet the needs of the theme leaders in doing the work of the Working Group • Secretariat support	• Meetings and other activities according to the WMO Schedule of Meetings • Report at WGHS meetings • Report at MG Sessions • Report to RAII-16 (2016)	• WGHS • RAII • MG • EC	• On-going
• Chair theme leaders meetings of the WGHS to develop implementation plan • Report to MG meeting for consultation • Submit report	2. To develop a Working Group implementation plan in consultation with the president and the Management Group of the Association, with reference to the key performance indicators/ targets and action plans under the respective expected results of the RA II Strategic Operating Plan, to undertake work on the various theme areas under the charge of the Working Group	• WGHS implementation plan	• Resources are provided to meet the needs of the theme leaders in doing the work of the WGHS	• WGHS meeting (Sept. 2014) • WGHS implementation plan (Oct 2014) • Report at MG Sessions for consultation and submit a report to RA II president (2014)	• WGHS • RA II • MG	• Attended RA II Management Group meeting in Doho - Dec 2014

Actions	Activities	Outputs	Resources	Milestones	Linkages	Progress
• Attend EC meeting if required • Develop WGHS work plan in consideration of CHy and other regional WGHS activities • Organize WGHS meeting	3. To participate in Executive Council sessions, when invited, representing the regional interests in relation to hydrology and water resources and to coordinate the WGHS activities with the Commission for Hydrology and other regional Working Groups on Hydrology	• Meeting report • WGHS implementation plan	• Resources are provided to meet the needs of the theme leaders in doing the work of the WGHS	• WGHS meeting (Sept 2014) • WGHS implementation plan (Oct 2014) • Report at MG Sessions for consultation and submit a report to RA II president (2014)	• WGHS • RAII • MG	• Oct 14 Meeting Report of WGHS and implementation plan • Reported to RA II MG Dec 2014 and submitted report
• Develop WGHS activity report with input from theme leaders	4. To submit to the President of the Association every year an Annual Report by 31 Dec and a final report in time for presentation to the 16th Session of the Association, both copied to the WMO Secretariat, with inputs from theme leaders under the Working Group	• WGHS activity report	• Resources are provided to meet the needs of the WGHS theme leaders	• Submit annual report to RA II President and WMO Secretariat (Dec 2014 and 2015) • Submit final report to RAII president and WMO Secretariat (2016)	• WGHS • RAII • WMO	• Dec 2014 report submitted

WORKPLAN: Vice Chairperson of WGHS (RA II) **Muhammad RIAZ**

Activities	Actions	Outputs	Resources	Milestones	Linkages	Progress
1. To assist the chairperson WGHS in accomplishing his work related to the group activities	• As delegated by the chairperson	• Not specified	• As appropriate	• As appropriate	• Chairperson	• On-going
2. To review the reports sent by various Theme leaders through the Chairperson	• Summary of review	• Report	• Chairperson • Theme Leaders • RA II Secretariat • CHy	• Not specified	• Chairperson • Theme Leaders • RA II Secretariat • CHy	• On-going
3. To review and develop the Hydrological Parts of S.O.P.	• Review if required	• Review report	• RA II Strategic Operation Plan • RA II MG	• Not specified	• Chairperson	
4. To put up suggestions and collaboration in strengthening of Flood Forecasting & Warning System amongst Member States	• Review related reports	• Suggestions	• Theme Leaders reports in RA II • CHy report	• Submission of report by 2016	• RA II • WGHS • CHy	• Submitted Report (Dec 2015)
5. To assist the Chairperson on matters related in combating marine pollution	• Review S.O.P. and some suggestions	• Suggestions	• S.O.P	• Suggestions by the end of 2014	• S.O.P • WGHS	

WORKPLAN: Water Resource Assessment **GAO Ge and Hwirin KIM**

Activities	Actions	Outputs	Resources	Milestones	Linkages	Progress
1. Assessment of basin-wide water resources availability, including use of climate predictions (3.3.2)	• Prepare assessment and outlook of basin-wide availability water surplus and deficits on a national level in a regional context including the use of climate scenarios. (Priority C)		• RA II		• RA II • CHy	
2. Assessment of basin-wide water resources availability, including use of climate predictions (3.3.2)	• Set up knowledge base to adapt to changes in water resources availability (trends, outlook) (Priority A)	• Report related to the case studies	• RA II • Research documents	• Develop new system by Dec 2015 • Collection case studies by July 2016 • Evaluate model performance by Sept 2016 • Final report on new model in Nov 2016	• RA II • AWG	• Case studies being collected • Developed a pilot system (Dec 2015)
3. Implementation of Water Resources Assessment (WRA) (3.3.3)	• Provide guidance materials for WRA linking to Climate extended range prediction - Downscaling - monthly and seasonally prediction WRA models - WRA (Priority B)	• Guidance for WRA	• China • Korea	• Provide draft technical report in Nov 2016	• RAII • CHy	
4. Development of national and regional capacity building programmes and related training activities for hydrological services (3.3.4)	• Provide training material for a training course related to the advances in WRA: - Downscaling methods for extended range prediction - Data collection - WRA methods - WRA Information system (Priority B or C)	• Training Course	• WMO Regional Training Center in Nanjing	• Training Course in Jun 2016		

WORKPLAN: Flood Forecasting **Sergey BORSHCH**

Activities	Actions	Outputs	Resources	Milestones	Linkages	Progress
1. Improvement in hydrological warnings capability through enhanced and effective cooperation with other NMHSs (2.1.1)	• To prepare recommendations on the use of numerical weather prediction outputs in flood forecasts (Priority A) • Document approaches to ascertain the deterministic error of each ensemble element of a NWP output, for example over the previous thirty day period, using this deterministic signal to provide a weighting on the confidence of the forecasted ensemble elements (Priority A) • Use WMO FFI as platform [for a and b above] (Priority A) • Organize training course for Members (Priority C)	• Recommendations on the use of NWP outputs in flood forecasting systems • Document on the approaches to establishing the deterministic error in NWP outputs and for their use in establishing enhanced accuracy of hydrological forecasts	• HMC of Russia	• Gathering of background material and documents on the FFI and associated activities - January 2015 • Preparation of Draft Recommendations – Oct 2015 • Gathering of materials - September 2015 • Develop system for 3 rivers • Operational testing of system June-Sept 2015 • Preparation of Draft Report on procedures – February 2016	• OPACHE's • International Flood Initiative – WMO	• Background material and documents on the FFI and associated activities were gathered. Preparation of 1st draft of Recommen-dations on the use of numerical weather prediction outputs in flood forecasting is in progress. The 1st part of the Draft Recommendations for the long-term hydrological forecasting has been prepared. • Gathering of materials on the approaches to establishing the deterministic error in NWP outputs with the purpose for their use in establishing enhanced

Activities	Actions	Outputs	Resources	Milestones	Linkages	Progress
						accuracy of hydrological forecasts is in progress.
2. Issuance of flood, flash and urban warnings and constantly improving upon them (2.2.5)	• To document experiences in the use of the Flash Flood Guidance System (FFGS) in various countries by reviewing use of the Flash Flood Guidance System (FFGS) in the various countries (Priority A) • To investigate the potential use of FFGS in Central Asian countries and facilitate its understanding by operational hydrologists in the region (Priority A) • To develop recommendations on use of hydrological forecasts (including probabilistic forecasts) in flood management (Priority A) • Develop user-oriented flood forecasting products (Priority C) • Conduct missions to Members in developing countries or least developed countries (Priority C)	• Report documenting experiences, including recommenda-tions on approaching implementation of FFGS and its use • Recommended path forward for advancing the adoption of the FFGS in Central Asia. • Conduct kick-off meeting of senior meteorologists and hydrologists within Central Asia on the FFGS project • Report containing recommenda-tions on use of hydrological forecasts (including probabilistic forecasts) in flood management, based on experiences of Roshydromet	• Working meeting with hydrologists and meteorologists of the Central Asia countries on use the FFGS in operative hydrological practice • Funding for kick-off meeting for Central Asia FFGS	• Background material and documents on the FFGS and associated activities - May 2015 • Preparation of Draft Document – July 2015 • Discussions with potential collaborating NMHSs in Central Asia - May 2015 • Preparation of Draft Recommendations – July 2015 • Conduct kick-off meeting - May 2015 • Report prepared by March 2016		
3. Improvement in capacity	• Organize a workshop [or two	• Increased	• Resources to	• Training session on	• APFM	• The

Activities	Actions	Outputs	Resources	Milestones	Linkages	Progress
for water-related disaster management (hydrological extremes) [with theme on hydrological droughts] (2.1.3)	workshops] on the provision of input and support to disaster management [on community-based flood and drought management including participation of NMHSs, emergency services and disaster management groups] (Priority B)	capacity for water-related disaster management	conduct necessary workshops through collaboration with APFM and IDMP	Integrated Flood Management dealing with development of community capacity - Sept 2016 • Training session on Integrated Drought Management dealing with development of community capacity – November 2016	• IDMP • NMHSs • WMO	development of the plan to organize bilateral Russia-China training sessions is in progress (to take place in Moscow in April 2016)

Activities	Actions	Outputs	Resources	Milestones	Linkages	Progress
1. Monitoring and Warning Systems for Droughts (2.3.1.)	(a) Develop indicators for the determination of the onset of hydrological droughts: - Collection, analysis and systematization of data to identify indicators for the determination of the onset of hydrological droughts - Identify the types of Hydrological drought is characteristic of the Asian region - Study of the conditions of formation of hydrological drought (Priority A)	• Report on the Indicators for the determination of the onset of hydrological droughts	• WGHS RA II • OPACHE Uzbekistan experts • Materials for IDMP • Materials for HMNDP	• Preparing of the data and information to develop indicators for the determination of the onset of hydrological droughts - Oct 2015 • Draft Report – Dec 2015	• OPACHE's • WGHS • RAII • WMO	
	(b) Prepare guidance for the development of drought monitoring networks : - Gathering information about the status of drought monitoring networks in Asian region - Identification of gaps and needs of the national hydrometeorological services to improve the drought monitoring networks (Priority B)	• Guidance materials for the development of drought monitoring networks	• WGHS RAII • OPACHE Uzbekistan experts • Materials for IDMP • Materials for HMNDP	• Information for the development of drought monitoring networks – April 2016 • Draft Report - May 2016	• OPACHE's • WGHS • RAII • WMO	
2. Enhanced preparedness to predict and manage hydrological droughts and knowledge for decision making (3.4.1.)	(a) Document national guidance materials to manage droughts: - survey on current status - analysis - identify good practice (Priority C)	• Guidance materials to manage droughts	• WGHS RAII • OPACHE Uzbekistan experts • Materials for IDMP • Materials for HMNDP	• Draft Report - July 2016 • Report - Sept 2016	• OPACHE's • WGHS • RAII • WMO	

WORKPLAN: Assessment of Changes in Climate Extremes, their Impacts on Water Resources, and Translating Climate Information into action in Water Resources Management **WANG Guoqing and TRAN Thuc**

Activities	Actions	Outputs	Resources	Milestones	Linkages	Progress
1. Improvement in adaptation capacity of water resources systems in a changing climate (2.1.2) 2. Assessment of basin-wide water resources availability, including use of climate predictions (3.3.2) 3. Improvement in capacity for water-related disaster management (Hydrological extremes) (2.1.3)	• Assessment of changes in climate - Data and method of climate study: Data inventory, climate variables, methods – (Priority A) - Trend of some climate variables: temperature, rainfall and other extremes – (Priority A) - Changes in atmospheric circulation affecting climate extreme: e.g., Monsoon, typhoon and tropical depression, El Nino and Southern Oscillation – (Priority C) - Change in climate affecting natural physical environment: e.g., drought, extreme rainfall, flood, sea water level – (Priority C)	• Assessment report on climate change for participating countries	• WGHs • WMO Secretariat • NHRI, China • CMA, China • IMHEN, Vietnam • Other countries	• Report to be submitted (May 2015) • Reports to: AWG-II • Documents as required • Workshop if needed	• WGHs • RA2 • WMO Secretariat • CHY	• In progress
	• Conduct climate projections – (Priority A) - Statistical downscaling - Dynamic downscaling	• Climate change scenarios for participating countries		• Report to be submitted (May 2015)		
	• Assessment of potential hydrological impacts of climate change on water resources of some selected river basins – (Priority A) - Temperature - Rainfall - Evapotranspiration - Flood and inundation - Drought - Water Resources	• Report on the impacts of climate extremes and climate change to water resources		• Report to be submitted (Dec 2015)		

Activities	Actions	Outputs	Resources	Milestones	Linkages	Progress
	• Translating climate and climate change information into actions in water resources development and management – (Priority A) • Case study for a selected	• Report of case study		• Report to be submitted (Feb 2016)		
4. Development of national and regional capacity building programs and related training activities for hydrological service (3.3.4)	• Synthesize report from individual reports from participating countries in the RA II – (Priority A)			• Report to be submitted (May 2016)		
	• Lessons learnt and experience sharing – (Priority B)					

WORKPLAN: Improved Accuracy of Hydrometric and Sediment Observations including Space-based Technologies **Youngsin ROH**

Activities	Actions	Outputs	Resources	Milestones	Linkages	Progress
1. Reliability of quality control procedure applied on data collected from hydrological stations (2.2.1)	- Assess the performance of hydrometric instruments and techniques of observations (Priority C)					
	- Prepare documentation for the inter-comparison of instruments and methods of observation (Priority C)					
2. Hydrometric measurements with quality and accuracy (2.2.2)	- Provide guidance on the use of appropriate instruments and methods of observation in diverse conditions (Priority A) - Collection of existing technical information in IRDMIS ➢ Measurement instrumentation (ADVM) ➢ Methods of discharge calculation ➢ Construction and operation of IRDIMS - Case study on measurement by IRDMIS (52 sites) ➢ Measurement of tidal influenced discharge ➢ Measurement under backwater conditions caused by weirs, sluice gates, and river junctions ➢ Evaluation of measurement results ➢ Development of index velocity ratings - Writing Technical report about construction and management by field characteristics	• Provide Technical report and guideline to design, install and operate facilities for Integrated Real-time Discharge measurement system(IRDIMS) • Software System and manual for data QC and evaluation of IRDIMS • Technical report	• Republic of Korea(ROK)	• Provide Technical report and guideline with case studies - Nov 2016 • Collection of the existing technical information of IRDIMS - Dec 2015 • Collection of construction, measurement cases and management of IRDIMS (52 sites more) - Dec 2015 • Writing technical report about construction and management by field characteristics - Nov 2016	• CHy • ROK	• Collection of technical information 1. Status of ADVM - Classification of ADVM and its characteristics of measurement - Types of installation of ADVM depending on flow conditions 2. Calculation of discharge -Comparison of IVM & VPM - Sensitivity analysis on parameters of calculation - Establishment of index velocity from ADVM measurement and its

Activities	Actions	Outputs	Resources	Milestones	Linkages	Progress
						assessment 3. Construction and operation of IRDIMS - Status of development of control system of IRDIMS - Status of construction and operation of IRDIMS station in Korea • Case study 1. Tidal effected area - Analysis on characteristics of flow in 3 typical tidal effected stations, Hangang (Yellow sea), Hadong(South Sea), Pohang(East sea), from IRDIMS measurements 2. Back water effected area - Analysis on characteristics of flow in GUPO st. under back water from gate operation of sluice gate in estuary of Nakdong-river

Activities	Actions	Outputs	Resources	Milestones	Linkages	Progress
						3. Development of index rating - Development of index & mean velocity relationship based on 52 sites in Korea - Assessment of index rating - Development of software tool for index rating including process on data handling, analysis and assessment
	- Improve sediment measuring techniques (Priority B) - Collection of existing technical information ➢ The status of existing sediment measurement techniques ➢ The status of new technologies and their applications ➢ The status of analysis methods - Case studies on sediment measurements under various conditions (15 - 20 sites) ➢ Analysis of river construction effect on characteristics of sediment load, focused on 4 major river projects in Korea ➢ A comparative analysis on sediment load by sequence of rainfall event - Writing Technical report about sediment measurement method and analysis of field characteristics	- Technical report on sediment measurement methods	- Republic of Korea (ROK)	- Provide technical report and guideline with case studies - Nov 2016	- CHy - ROK	

Activities	Actions	Outputs	Resources	Milestones	Linkages	Progress
	- Assess the accuracy and use of space-based observation (Priority C)					
3. Calculation of run-off with quality and accuracy (2.2.3)	• Focus on the development of rating curve - Collection of existing technical information (Priority B) ➢ On major procedures for rating curve development ➢ On tools for rating curve development - Case analysis with various field conditions ➢ On development of rating curves when backwater conditions exist (weir, junctions) - Writing technical report on rating curve development	• Report on methods to develop rating curves	• Republic of Korea (ROK)	• Provide Technical report and guideline with case studies - Nov 2016	• CHy • ROK	
	• Detect trends and variability in selected river basin in the region (Priority C)					
	• Provide guidelines for calculating runoff data accuracy (Priority C)					
4. Establishment of Quality Management Frameworks for Hydrology using current guidance materials for hydrology and water resource management (3.3.3)	• Encourage and facilitate exchange and training on relevant know-how (Priority C)					
5. Development of national and regional capacity building programmes and related training activities for hydrological services (3.3.4)	• Encourage and facilitate exchange and training on relevant know-how (Priority C)					

WORKPLAN: Sediment Disasters and Mass Movements **Tai-Hoon KIM**

Activities	Actions	Outputs	Resources	Milestones	Linkages	Progress
1. Issuance of landslide/debris flow warnings and consistently improving upon them	• Collect and disseminate materials for assessment of sediment disasters (Priority A) • Investigate warning technologies based on adaptive concepts (Priority B) • Generate sediment disasters risk map (Priority C)	• Guidance materials for implementation of adaptive sediment disasters risk management tools with identification, reduction and evacuation	• Republic of Korea (ROK) • National Disaster Management Institute (NDMI)	• Case study report for present systems for sediment disasters management - May 2015 • Analyzing models for the integrating system - Oct 2015 • Report for adaptive sediment risk management tools - Aug 2016	• SOP 2.2.6 • RA II • WMO Secretariat • ROK (MPSS)	• Case study report for present systems for sediment disasters management - May 2015 • Analyzing models for the integrating system - Oct 2015
2. Improvement in capacity for sediment disaster management (2.1.3 in OP)	• Attend seminars on sediment disasters in order to communicate and cooperate among member countries (Priority A) • Share and bring related technologies to developing countries (Priority B)	• Workshop on the provision of sharing knowledge for sediment disasters (e.g. attend workshop of TC DRR) • ODA projects which transplant knowhow to developing countries	• Republic of Korea (ROK) • National Disaster Management Institute (NDMI) • WMO/ESCAP Typhoon Committee, Disaster Risk Reduction (TC DRR)	• Report for feasibility survey for ODA projects by April 2016 • Attend Workshop of TC DRR on May 2015 • Strategy plan for distributing adaptive sediment risk management tools - Oct 2016 • Submission draft to MG for review (TBA)	• SOP 2.1.3 • RA II • WMO Secretariat • TC DRR • ROK (MPSS and KOICA)	• Report for feasibility survey for ODA projects by April 2016 • Attend Workshop of TC DRR on May 2015s

Activities	Actions	Outputs	Resources	Milestones	Linkages	Progress
3. Optimization of disseminating sediment disasters related information	• Collect and analyse disseminating methodologies and related policies for sediment disasters information that alarm people not to be involved to the designated areas	• Standard Operation Plans for sediment disasters information by public broadcasting system and other media (e.g., Facebook, Twitter, etc.)	• Republic of Korea (ROK) • National Disaster Management Institute (NDMI)	• Summary report for present disseminating codes and regulations by June 2015 • Report about the effective disseminating framework by Dec. 2015	• Above SOP • RA II • WMO Secretariat • TC DRR • ROK (MPSS)	• Summary report for present disseminating codes and regulations • Report about the effective disseminating framework

8. World Water Forum Participation

8.1 Organization

During the first WGHS session in Seoul, members agreed to propose a session for the 7th World Water Forum (WWF7) held in Gyeongju, Republic of Korea, from 14 to 16 April. The WGHS chairperson submitted the proposal to participate the Regional Session of WWF7, and the proposal was accepted. The government of Republic of Korea supported WGHS members' participation.

8.2 Session Title

Hydrological Services in Asia under Rapidly Changing Conditions

8.3 Session Coordinator and Partners

Organization		Focal Point	Country	Role
Session Coordinator	Korea Institute of Civil Engineering and Building Technology (KICT)	Dr. Sung Kim	Republic of Korea	Organizer
Session Co-Coordinator	World Meteorological Organization	Dr. Paul PILON	UN	Speaker
	Han River Flood Control Office, Republic of Korea	Mr. Ha-joon PARK	Republic of Korea	Opening remarks
Session Group	World Meteorological Organization	Dr. Paul PILON	UN	Speaker
	World Meteorological Organization (Vice president of CHy)	Mr. Zhiyu LIU	UN	Moderator, Closing remarks
	Nanjing Hydraulic Research Institute	Dr. Guoqing WANG	China	Speaker
	Hydrological Center of Russia	Dr. Sergey BORSHCH	Russia	Speaker
	National Disaster Management Institute, Ministry of Security and Public Administration	Dr. Tai-Hoon KIM	Rep. of Korea	Speaker
	National Climate Center China Meteorological Administration	Ms. Ge GAO	China	Panel
	Han River Flood Control Office	Ms. Hwrin KIM	Rep. of Korea	Speaker
	Hydrological Survey Center	Dr. Youngsin KIM	Rep. of Korea	Panel
	Federal Hydrological Institute	Dr. Wolfgang GRABS	Germany	Panel

8.4 Session description

The Hydrological Services in the Asia Pacific Region has experienced rapidly changing hydrological conditions more than any other region related to human-induced changes including population, land use changes and water use demands. Adding to complexity is the experience of a changing climate resulting in generally higher variability of available

freshwater resources.
As a result of these conditions the Hydrological Services is becoming increasingly important and needs improvements of practices regarding hydrological data observation and management, flood prediction and forecasts, water resources assessments, drought management, sediment mass movement and others.
The objectives of the session are to explore the on-going hydrological efforts to improve hydrological practices in Asia region and provision of the opportunities to develop collaborating projects among the Asia Pacific countries. The session contributes to improve the hydrological services as well as to accomplish the proposed targets of the forum in the region.

8.5 Outputs

The objectives of the session are to explore the on-going hydrological efforts to improve hydrological practices in Asia region and provision of the opportunities to develop collaborating projects among the Asia Pacific countries. Outputs are hydrological practices for the rapidly changing conditions which can be informed and disseminated among countries in the Asia Pacific region. In addition, a development of framework for effective collaboration are achieved through WMO RA-II WGHS.

Working Group on WMO Integrated Global Observing System and WMO Information System (WG-WIGOS/WIS)

CHEN Yongqing
China Meteorological Administration

1. Introduction

In the fifteenth session of Regional Association II which was held in Doha, Qatar, from 13 to 19 December 2012, the Regional Association II Working Group on WMO Integrated Global Observing System and WMO Information System (WG-WIGOS/WIS) was re-established to bear the responsibility of facilitate the accomplishing of missions of WIGOS and WIS.

Some activities have been carried out by the working group since RA II -15.

2. Working Group Structure

The Working Group is composed of Expert Group on WIGOS (EG-WIGOS) and Expert Group on WIS (EG-WIS). Both EG-CS and EG-AgM consist of two co-coordinators and several theme leaders. In addition, a number of volunteer experts who are expected to assist the tasks of each Expert Team have also been registered.

3. Terms of Reference

(a) To monitor and coordinate the implementation of WIGOS and WIS in the Region; propose measures for improvements, especially for overcoming gaps, deficiencies and inconsistencies in the implementation of these systems; and promote active involvement of the Members of the Region in the implementation of these systems;

(b) To advise on and provide overall technical guidance, assistance and support to the Members of the Region for the implementation of WIGOS and WIS at the regional and national levels;

(c) To promote capacity-development and outreach activities to assist Members in the implementation of WIGOS and WIS;

(d) To liaise with the relevant RA II Working Groups on matters related to WIGOS and WIS implementation;

(e) To advise the president of the Association on matters concerning the implementation of WIGOS and WIS in the Region;

(f) To provide the president of the Association with recommendations for presentation under appropriate agenda items in sessions of technical commissions, joint sessions of the presidents of technical commissions and presidents of regional associations, and the Executive Council;

4. Membership

Expert Group on WIGOS (EG-WIGOS)

EG-WIGOS		
Co-Coordinators	Mr Yongqing Chen	China
	Dr Jaegwang Won	Republic of Korea
Theme Leader in Implementation and Updating of R-WIP	Mr Yoshiro Tanaka	Japan
Theme Leader in Implementation of EGOS-IP	Mr Yatian Guo	China
Theme Leader in Standard and Best Practice	Dr Seongchan Park	Republic of Korea
Theme Leader in Observational Requirements and Regional Network	Mr D. K. Malik	India
	Mr Abdulqaleq Ali Ali	Iraq
Theme Leader in Data Availability and Quality of Observations	Mr Yoshihisa Kimata	Japan
Theme Leader in Surface-based Remote Sensing for Disaster Risk Reduction	Mr Feng Li	China
	Dr Oleg Pokrovsky	Russian Federation
Theme Leader in Satellite Data, Products and Training	Mr Tomoo Ohno	Japan
	Dr Dohyeong Kim	Republic of Korea

Expert Group on WIS (EG-WIS)

EG-WIS		
Co-Coordinators	Ms Xiang Li	China
	Mr Kenji Tsunoda	Japan
Theme Leader in Data Communication Techniques and Structure	Dr Sunghoi Huh	Republic of Korea
Theme Leader in Data Representation and Metadata	Ms Jitsuko Hasegawa	Japan
Theme Leader in WIS-GTS operations, including Early Warning	Dr Shyamlal Singh	India
	Mr Aleksandr Soloveychik	Uzbekistan
Theme Leader in Climate Data Management/Data Rescue	Mr Hongzheng Zhang	China

Theme Leader in Integrated Global Data Dissemination System	Mr Kang Gao	China

5. Completing of membership Working Group on WIGOS and WIS

In accordance with resolution 11 of RA II-15, there are an Expert Group on WIGOS (EG-WIGOS) and an Expert Group on WIS (EG-WIS) under WG-WIGOS/WIS. Each of these two expert groups consists of two Co-Coordinators and some Theme Leaders and Volunteer Experts. Mr. Yongqing Chen (China) and Dr. Jaegwang Won (Republic of Korea) were approved to be Co-Coordinators of EG-WIGOS in the session, and meanwhile, Ms. Li Xiang (China) and Mr. Kenji Tsunoda (Japan) were approved to be Co-Coordinators of EG-WIS.

Co-coordinators of EG-WIGOS and EG-WIS initially proposed the lists of Theme leaders (areas) of EG-WIGOS and EG-WIS in accordance with Terms of reference (TOR) of EG-WIGOS and EG-WIS, the R-WIP-II approved by XV-RA II, as requested by the WMO secretariat.

The theme areas of EG-WIGOS focus mainly on how to carry out main projects in the R-WIP-II. The list of Theme leaders (areas) of EG-WIGOS is as follows,

(a) Theme leader in Implementation and Updating of R-WIP;

(b) Theme leader in Implementation of EGOS-IP;

(c) Theme leader in Standard and Best Practice;

(e) Theme leader in Observational Requirements and Regional Network;

(f) Theme leader in Data Availability and Quality of Observations;

(g) Theme leader in Surface-based Remote Sensing for Disaster Risk Reduction;

(h) Theme leader in Satellite Data, Products and Training.

The Theme areas of EG-WIGOS focus mainly on coordinating and promoting WIS implementation, operation and services, including GTS and IGDDS, and data management in RA II. The list of Theme leaders (areas) of EG-WIS is as follows,

(a)Theme Leader in Data Communication Techniques and Structure

(b)Theme Leader in Data Representation and Metadata

(c) Theme Leader in WIS-GTS operations, including Early Warning

(d)Theme Leader in Climate Data Management/Data Rescue

(e)Theme Leader in the Integrated Global Data Dissemination System

Then, Theme Leaders of both EG-WIGOS and EG-WIS were nominated by members and finally decided by the management group (MG-7) in May 2013.

The Theme Leaders are expected to lead the activities in their respective theme areas in close coordination with the Members in the Region, monitoring the key performance indicators/targets concerned, and reporting progress of development and implementation to the Expert Group Co-Coordinators concerned.

After that, Volunteer Experts for EG-WIGOS and EG-WIS were also nominated by members finally approved by President of RA II in October 2013.

Therefore, the WG-WIGOS is composed of two co-coordinators, 10 theme leaders and 13 Volunteer Experts, while the WG-WIS is composed of two co-coordinators, 6 theme leaders which and 12 Volunteer Experts.

6. Drafting the Work Plan of Working Group

As requested by WMO secretariat, a work plan for the WG-WIGOS/WIS was developed by coordinators of Expert Group on WIGOS and Expert Group on WIS, with the

help of theme leaders and WMO secretariat. The work plan for the WG-WIGOS/WIS has been submitted to WMO secretariat by the end of October 2013.

The work plan is developed mainly based on the deliverables outlined in the RA II Strategic Operating Plan, the terms of reference of the Expert Group, and the projects listed in the R-WIP-II, and would like to outline the main tasks which will be carried out by the Working Group before the next session and key deliverable, activity, expected accomplishing time and responsibility.

Nine tasks for EG-WIGOS were established in the work plan and each task includes several activities which will be accomplished in the expected years. Most of activities will be implemented through the RAII WIGOS projects and RA II members under the initiative of key regional players. The theme leaders of EG-WIGOS have responsibility to track and promote the execution of these activities and projects. Key deliverables for EG-WIGOS in the work plan are as follows,

(a) A new version of R-WIP-II will be developed in 2015
(b) Portal to share progress EGOS IP implementation in RA II will be available in 2015
(c) A portal on standards and best practices will be available in 2015
(d) Collaborative working mechanism toward integrated surface-based remote sensing observations in the East Asia for operational monitoring and forecasting severe weather will be established.
(e) Technical support for instrument maintenance and calibration by experts from RICs will be provided.
(f) ISO/IEC 17025 certification will be obtained.
(g) Report on status on QC/QA procedures and site management in RA II will be available.
(h) Reports on status on meteorological instruments, calibration and training in Regional Association II will be available.
(i) Capacity in use of satellite data/products and facilitation of training datasets and tool boxes will be improved.
(j) The systematic Near Real Time monitoring of sand and dust storm will be carried out in SDS-WAS Asia Node.
(k) RBSN and RBCN will be updated.

Seven tasks for EG-WIS were established in the work plan and each task includes several activities which will be accomplished in the expected years. The theme leaders of EG-WIS have responsibility to carry out or promote these activities. Key deliverables for EG-WIS in the work plan are as follows,

(a)RA II- WIS-IP (2013: first version, 2014-2016: review and update)
(b) Status and Plans of RMTN in RA II (2014-2016)
(c) Amendments of Volume II of the manual on the GTS in RA-II (2016)
(d) Status Report of Data Representation and Metadata in RA II (2014-2016)
(e) Status Report of the implementation of WIS service and WIS monitoring in RA II (2014-2016)
(f) Status Report of the Climate Data Management/Data Rescue in RA II (2014-2016)
(g) Status Report on IGDDS in RA II (2014-2016)

Each theme leader in the expert group, supported by volunteer experts if available, will bear responsibility for one or several tasks in the plan which is relevant to his or her theme area and will submit report to co-coordinators of the expert group as required.

7. Develop and Publish RA II Regional WIS Implementation Plan

The fifteenth session of RA II reviewed the draft RA II Regional WIS Implementation Plan, and agreed that fully implementing WIS in the Region was an essential step toward the efficient implementation of WIGOS, GFCS and other priority areas.

The fifteenth session of RA II agreed that the virtual WIS Implementation Project Office should continue to refine the plan, and encouraged WIS centers, in particular GISCs to provide resource toward completing the implementation plan.

EG-WIS co-coordinators drafted a work plan on developing RA-II WIS Implementation Plan in April, 2013, and a Task Team for reorganizing and finalizing the RA-II WIS-IP (the coordinator of EG-WIS) was established in May, 2013. Members came from GISCs and GISC candidates, which included Beijing, Jeddah, New Delhi, Seoul, Tehran, Tokyo and DCPC/NC Bangkok, Doha and Karachi.

Based on the previous progress and outcome of developing of RAII-WIS-IP during 2011-2012, the Task Team reorganize and compile the draft of RAII-WIS-IP in September, 2013.

The draft RAII-WIS-IP was completed and distributed to the WIS focal points of RA II members and the WMO secretariat for comments in September, 2013.The draft was reviewed by the Chairperson of WG-WIGOS/WIS of RA-II October, 2013.

The final version of RA-II WIS-IP (available at: http://wis.wmo.int/file=653) was submitted to the President of RA-II for approval November, 2013 and was approved by the President of RA-II in December, 2013.

8. Monitoring progress on implementation of WIGOS and WIS

Theme leaders of EG-WIGOS and EG-WIS are responsible for the monitoring of progress on each project of IP-WIGOS and WIS in close cooperation with the contact person of main players of the Project.

8.1 Status of implementation of WIGOS

The implementation of R-WIP-II will mainly rely on seven RAII WIGOS projects listed in the R-WIP-II. Seven project contact persons provided progress information to the co-coordinator of EG-WIGOS. The progress for each project is listed as bellow.

8.1.1 Project No. I- Monitor and review the Implementation of EGOS- IP in RA II

Accomplishments

A portal for sharing the national progress of EGOS-IP implementation was established by CMA Meteorological Observation Centre (MOC) and will be tested by the members of RAII. A report template has been prepared by S.T. Chen from Hong Kong, China. The technical scheme of assessing the progress was drafted by CMA MOC. The evaluation indexes were divided into seven aspects: management, integration, observation capacity, products, standardization, data quality and acquisition, cooperation.

Next steps

The report template will be posted to the portal. National focal points on EGOS-IP from members will be invited to test the portal. The national progress report about EGOS-IP

implementation will be requested to upload to the portal. The whole assessment of implementation progress for RA II will be completed in 2016.

8.1.2 Project No. II- Standard and Best Practice Portal, including Technical Documents with Necessary Details in English from all RA II Members

Accomplishments

KMA's domestic project for the standardization of meteorological observation has been evolving since the end of its 1st phase in 2013. By 2015 more than 3,664 domestic sites from 28 agencies including local governments and and governement-owned cooperations, were linked into one system, and more than 85% of the data are collected for the utilization in real time including KMA's 573 sties. However, some agencies' provision rates of data are still less than 30%, and the QC for the collected data is having several problems due to the lack of maintenances. Based on the government policy of ROK, the QCed data are open and utilized by the domestic agencies related with the natural disaster prevention, public broadcast, and local governments.

Next steps

The web page development for sharing the experience about standards and best practices for enhanced observational data/products utilization has been delayed by the end of 2016. A form to collect the standard and best practices from other members within RA II will be developed and distributed after the next RAII session in 2016. The information collected will be shared through the web page, which will help members to exchange their experiences and know-how.

8.1.3 Project No. III.1 - Observing systems integration for supporting disaster risk reduction - Integration of Surface-based Remote Sensing Data in the East Asia

Accomplishments

Real-time exchange of radar CAPPI products and automated weather station data between Japan and Korea

The Japan Meteorological Agency (JMA) and the Korea Meteorological Administration (KMA) mutually agree to exchange radar CAPPI products and automated weather station (AWS) data in near real-time basis to use for operational purpose. In near real-time, KMA obtains radar 2km-height pseudo CAPPI products of JMA's weather radar stations as well as hourly data of JMA's surface observation network, called the Automated Meteorological Data Acquisition System (AMeDAS). JMA also obtains radar CAPPI products of KMA's weather radar stations as well as most data of KMA's AWSs in near real-time.

JMA succeeded in generating experimentally a two-dimensional grid product of analyzed precipitation over the region of the Republic of Korea using the radar CAPPI data and in-situ precipitation data of AWSs. JMA is now developing a quality control system to remove noise from radar CAPPI products. JMA conducted some experiments for a certain period to investigate the impact of this new analyzed precipitation using JMA's mesoscale NWP system. Although the assimilation of the analyzed precipitation improved precipitation forecasts in some cases, it is also confirmed that the overall precipitation forecast skill degraded. To improve the overall skill, it is inferred that simultaneous assimilation of other humidity observations such as ground-based GNSS data over the Republic of Korea would be essential.

Non-real-time exchange of raw data of Doppler radar between Japan and Korea

JMA and KMA also agree to exchange raw data of their Doppler radars in off-line basis to investigate the benefit of operational use of these data in individual NWP system.

In March 2013, JMA obtained a set of raw data for 5 days of July 2012 on the case of heavy rainfall over Kyushu Island from KMA. It was revealed that a quality control was necessary to use such raw data in a meso-scale NWP system.

Dissemination of ground-based stations of the Global Navigation Satellite Systems on WIS/GTS

Data of ground-based stations of the Global Navigation Satellite Systems (GNSSs) are disseminated on WIS/GTS in real time so that these data are available for operational use. Table 1 shows a list of such ground-based GNSS stations in China, Korea and Japan. At the Joint Meeting of the 12th Asia Pacific Satellite Data Exchange Meeting (APSDEU) and 24th North America / Europe Data Exchange Meeting (NAEDEX) (22-25 October 2012, Met Office, Exeter, U.K.), CMA, JMA and KMA were requested to provide data of more ground-based GNSS stations on GTS. It is, therefore, expected to increase the data amount in the future. However, any significant progress is not observed yet according to the Members' reports to the Joint meeting of 14th APSDEU and 26th NAEDEX (6-9 October 2015, Montreal, Canada).

KMA have established a new system for ground GNSS data collection and QC in 2015 for the improved meteorological utilization, especially for the NWP model. By the end of November 2015, total 57 stations including 7 IGS around Korean Peninsula are linked to the system, and 39 out of them can be converted into bufr format for the NWP usage after the quality control procedure.

Since the technical method to assimilate zenith tropospheric delay data or total precipitable water vapor data of ground-based GNSS stations is established, the data on WIS/GTS can be used for operational purpose.

Table 1 List of Ground-based GNSS Stations whose data are disseminated on WIS/GTS

Country	Station Name	Longitude (East)	Latitude (North)
China	Wuhan(WUHN-MET)	114.36	30.53
	Lhasa(LHAZ-MET)	91.10	29.66
Japan	Usuda(USUD-GOP)	138.36	36.13
Korea	Daejeon(DAEJ-MET)	127.37	36.40

Next steps

Progress of the JMA-KMA projects will be monitored, and the benefit and difficulties of regional exchange of surface-based remote sensing observations will be identified.

In 2015, the data exchange infrastructure between KMA and CMA has migrated from GTS on frame relay to GTS on RMDCN(4Mpbs), which has sufficient capacity for the raw data of both countries' radars exchange. Henceforth, the substantial discussion for the real-time radar data exchange is expected from 2016. Based on the new RMDCN system between KMA and CMA, more detailed bi-lateral discussion on the issues of the real-time radar data exchange will be initiated.

Regarding the GNSS data, the total number of data collection station will be expanded more than 100 by the mid of 2016. KMA is also developing the system for broadcasting the domestic GNSS data in bufr format via WIS/GTS, and it is expected to be finished and operational by the end of 2016.

In the last year of this RA II WIGOS Project, i.e. 2016, a feasible and optimal draft design of integrated surface-based remote sensing observations will be developed based on lessons learnt from these projects.

8.1.4 Project No. III.2 -Observing systems integration for supporting disaster risk reduction - Capacity Building in Radar Techniques in the Southeast Asia

Thai Meteorological Department (TMD) cooperated with JMA for a regional capacity building project on the maintenance and rainfall estimation and forecast by using weather radar initiated by ASEAN/SCMG (Sub-Committee on Meteorology and Geophysics). With the support of Japan-ASEAN Integration Fund (JAIF), the Regional Training Workshop on Weather Radar Basis and Routine Maintenance and Real-Time Radar Rainfall Estimation and Forecasting was held in Bangkok, from 24 February to 7 March 2014, with 20 participants from 7 ASEAN countries (Indonesia, Lao PDR, Malaysia, Philippines, Singapore, Thailand and Viet Nam), together with three experts from JMA, two experts from Japan Radio Company, and one expert from JICA. The workshop was highly successful.

In 2013 and 2014, within the framework of ESCAP/WMO Typhoon Committee, TMD's experts were sent to JMA to discuss and learn techniques on radar echo map composition, data quality control, and precipitation analysis. Currently, radar related techniques used by JMA were being transferred to TMD and TMD made the radar composite network for Thailand, pending the overhaul of the radar operation synchronization of TMD. Further technical transfers including those for quantitative precipitation estimation is underway with the close cooperation between TMD and JMA.

Unfortunately, during ASEAN SCMG's meeting in Vientiane, LAO PDR in September 2014, the meeting was informed on Malaysia's withdrawal from the joint project of ASEAN Radar Composite between Thailand and Malaysia. Thus, it seems very difficult to continue the transboundary radar composite network planned in the R-WIP-II.

8.1.5 Project No. IV - RA II WIGOS Project to Enhance the Availability and Quality Management Support for NMHSs in Surface, Climate and Upper-air Observations

Accomplishments

Based on the mailing list established for the members of coordinating group of RA II Pilot Project to Enhance the Availability and Quality Management Support for NMHSs in Surface, Climate and Upper-air Observations (approved by 14th session of RA II, Tashkent, December 2008), information has been exchanged through the mailing list which was periodically updated.

In 2010, as a pilot project activity, WMO/JMA Survey on Surface, Climate and Upper-air Observations and Quality Management in RA II was implemented to investigate implementing status on meteorological observations by Members. The results of the survey was issued as WMO IOM Report (No. 111) in 2011 and shared by Members. In addition to the Survey, JMA/WMO Workshop on Quality Management in Surface, Climate and Upper-air Observations in RA II (Asia) was held in Japan (July 2010) with 22 participants from 20 Members in the Region.

The survey and workshop revealed that information on calibration of meteorological instruments by Members was required to promote the project, and consequently the WMO/JMA Survey on Meteorological Instruments, Calibration and Training in RA II was

implemented in 2011. Following the survey, JMA/WMO Training Workshop on Calibration and Maintenance of Meteorological Instruments in RA II was held in Japan (Feb 2013) with 13 participants from 13 Members in the Region. The survey was reviewed and issued as WMO IOM report (No.122) in 2015.

As one of the activities of the project, quality of land surface observations in RA II Members is regularly monitored by RSMC Tokyo, by analyzing the differences between the surface observations and the corresponding first-guess fields of 6-hour forecasts of JMA's global model. The monitoring results are shared by Members concerned.

To achieve one of the expected key results (provision of technical support for instrument maintenance and calibration by experts from RICs), experts of JMA/RIC Tsukuba visited the Bangladesh Meteorological Department (BMD) and provided practical on-the-job training on meteorological instrument aiming at establishing the operational calibration system using meteorological standards (barometer and thermometer) donated in the framework of JICA technical cooperation project. The same project schemes are ongoing with Fiji, Sri Lanka, Mozambique and the Philippines.

Next steps

Theme leader developed a draft of the investigation survey on quality assurance and quality control (QA/QC) of meteorological observation by NMHSs in RA II. The survey will be circulated among RA II Members after review and update process by the coordinating group members.

Based on the survey results, theme leader will consider holding a workshop focusing on sharing and transferring skills of QA/QC of meteorological observation.

In addition, theme leader will consider possibilities to contribute to the improvement of availability and quality management of NMHS in RA II.

8.1.6 Project No. V – Developing a Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS) in Asia Node

Accomplishments

The three dust forecast models (from CMA JMA and KMA) haves been continuously operated throughout the year on a daily basis. The models consist of a numerical weather prediction model incorporating on-line parameterizations of all the major phases of the atmospheric dust cycle. It generates forecasts of the following minimum set of variables:

- Dust load (kg•m-2)

- Dust concentration at the surface (μg•m-3)

- Dust optical depth at 550 nm (-)

- 3-hour accumulated dry and wet deposition (kg•m-2)

A web portal to display in real time all SDS models including ECMWF and NCEP forecast products as well as additional information was developed and operational. The web site is http://eng.weather.gov.cn/dust/.

Dust forecast model products verification has been carried out. Data –exchanged list has been identified.

Next steps

CBS-Ext .(2014) noted that the Regional Association II (RA II) strongly encouraged China to realize its plans related to sand and dust storm-related services and recommended

a demonstration of operational forecasting capabilities, to serve Members of the eastern part of RA II in dust monitoring and forecasting.

The meeting of the WMO SDS-WAS Regional Steering Group (RSG) for Asia （2015） agreed with the assessment of Asian-RC technique report, in which researches and users have shown that the existing SDS forecasting models possess the skills to forecast dust episode in Asia and agreed to recommend the Asian-RC, hosted by CMA, to apply for the future RSMC-ASDF representing Asian node, as suggested by all member countries

8.1.7 Project No. VI - RA II WIGOS Project to Develop Support for NMHSs in Satellite Data, Products and Training

Accomplishments

Issuance of newsletters to RA II Members.

Quarterly newsletters have been issued to share recent satellite-related information on topics such as imagery data, products and training. The newsletters listed below contained brief reports on relevant meetings, product development report, news on successful launch of new satellites and information on preparations for the Himawari-8/9 satellite series of JMA and Geo-KOMPSAT-2A of KMA. For example, in the vol.5/No.4, JMA introduced the first images captured by Himawari-8 new-generation geostationary meteorological satellite, which was launched on 7 October 2014.

Vol. 4/No. 1, April 2013
Vol. 4/No. 2, June 2013
Vol. 4/No. 3, November 2013
Vol. 4/No. 4, December 2013
Vol. 5/No. 1, March 2014
Vol. 5/No. 2, August 2014
Vol. 5/No. 3, October 2014
Vol. 5/No. 4, December 2014
Vol. 6/No. 1, March 2015
Vol. 6/No. 2, June 2015
Vol. 6/No. 3, October 2015
Vol. 6/No. 4, December 2015
Vol. 7/No. 1, March 2016

All the newsletters in the past are available at the following RAII WIGOS Project webpage: http://www.jma.go.jp/jma/jma-eng/satellite/ra2wigosproject/ra2wigosproject-intro_en_jma.html

5th Asia/Oceania Meteorological Satellite Users' Conference (AOMSUC) and VLab training event

The fifth AOMSUC was held in Shanghai, China from 19 to 21 November 2014. The conference was hosted and sponsored by CMA and was co-sponsored by JMA, KMA, AuBOM, WMO and GEO. The conference was preceded by a two day training event at CMA training facilities and brought together participants from Region II and V. The most

impressive topic of presentation was the future plan of top-notch geostationary satellite imagers which would bring the high-improvement of temporal and spatial resolution of observation compared to current imagers. The close cooperation among satellite operators for making synergy effect with those dense networks of geostationary satellite observation over Asia/Oceania region are needed to get great benefits of all.

6th Asia/Oceania Meteorological Satellite Users' Conference and training event

The sixth AOMSUC was held in Tokyo, Japan from 9 to 13 November 2015. The conference was hosted and sponsored by JMA and was co-sponsored by CMA, KMA, ROSHYDROMET, AuBOM, WMO and GEO. The two day training event was also held with participants from Region II and V.

In addition, the Third Meeting of the Coordinating Group of the WMO Regional Association II (Asia) WIGOS Project to Develop Support for National Meteorological and Hydrological Services (NMHSs) in Satellite Data, Products and Training was held at the JMA headquarters in Tokyo, Japan, on 14 November 2015, following the AOMSUC-6. The progress of the WIGOS Project was reviewed and the work plan 2015-2016 was discussed in the meeting by the participants of RA II Members and observers of RA V Members.

Next steps

The new generation geostationary meteorological satellite, Himawari-8, began operation in July 2015, and FY-4A and GEO-KOMPSAT-2A plan to be operational in the near future. Therefore, supportive activities for preparation of satellite data users to the new generation of geostationary meteorological satellites need to be carried out. The Project will support preparations of the NMHSs in RA II especially those in developing countries including LDCs to the new satellites. It will involve user trainings, guidance to upgrade processing software and hardware, information and tools. The activities of the Project will include the following.

- Identifying and regularly documenting region-oriented requirements for satellite data access and exchange using the regional requirements template in collaboration with WMO's global survey in 2016,
- Facilitating user preparedness of satellite data for the new-generation geostationary meteorological satellites such as Himawari-8, FY-4A and GEO-KOMPSAT-2A through user trainings, guidance to upgrade processing software and hardware, information and tools,
- Establishing a close coordination with the RA V Task Team on Satellite Utilization,
- Issuance of quarterly newsletters will also continue and seek feedback on utility.

KMA will host the seventh AOMSUC in Korea in 21~28 October, 2016. More details about the conference are registered at http://nmsc.kma.go.kr/aomsuc7/main.jsp. A two day

training event is also planned at the time of the conference. It will be planned to focus the utilization of new satellite data. This RA II WIGOS Project will cooperate in it with KMA.

The fourth meeting of the Coordinating Group of the RA II WIGOS Project will be held in 2016 on the occasion of the seventh AOMSUC.

In May 2016, during WMO EC-68, an official ceremony for an agreement on the AOMSUC will be held in Geneva with 7 PR (Australia, China, India, Indonesia, Japan, Republic of Korea, Russian Federatio).

8.1.8 Collaboration of RA-II and RA-V for future regional WIGOS projects

The Joint RA-II/RA-V Workshop on WIGOS for Disaster Risk Reduction was held in Jakarta, Indonesia, 12-14, October 2015, to seek synergies for the increase of data availability, geographic coverage, timeliness and quality of observations in the region, primarily those relevant for weather watch and nowcasting activities. The participants in the Workshop decided to propose two joint projects as follows.

a) A "Joint RA-II/RA-V WIGOS Satellite Data Project" aiming at
   (i) strengthening the capabilities of all Members to use geostationary satellite images and derived products in support of Disaster Risk Reduction,
   (ii) developing a protocol for the NMHSs in the project countries to request event-driven rapid-scan imagery for their respective national areas of interest

b) A "Joint RA-II/RA-V WIGOS Radar Data Project" aiming at
   (i) improvement of data quality of existing radars,
   (ii) development and expansion of national radar networks,
   (iii) near real time international exchange of radar data, and
   (iv) development of «sub-regional» radar data centre(s);

8.2 Status of implementation of WIS

8.2.1 WIS centres

With the framework of WMO Information System, WIS centres (GISC, DCPC, and NC) have been established by WMO members complying with the WIS technical requirements. As of November 2015, there are 7 GISCs[2] (6 are operational: 86%), 29 DCPCs (26 are endorsed: 90%) with 37 NCs in Regional Association II (RA II). 35 out of 37 NCs in RA-II decided their principal GISC in 2012, after that remaining two NCs decided their principal GISC. To facilitate the implementation and operation of WIS in RA II, there are various capacity building activities provided by the GISCs, which includes 8 on-site trainings and WIS workshops run by GISC Beijing, 1 workshop organized by GISC Jeddah, 2 workshops organized by GISC Seoul, 1 workshop organized by GISC Teheran, and 4 workshops organized by GISC Tokyo, in the course of 2014-2015.

8.2.2 WIS componets

As the WIS core network, RMDNC-NG managed by ECMWF has been completed on its migration at the last May, 2014. GISC Beijing, Jeddah, Moscow, New Delhi, Seoul, Tokyo

[2] GISC Moscow is geographically located in RA VI, but GISC Moscow provides services to DCPCs/NCs in RA II. In this document, GISC Moscow is counted as an RA II GISC.

have completed their RMDCN-NG migration or connection to RMDCN-NG, but GISC Tehran has not been connected yet due to the license issue from supplier.

An annual survey for the status and plans of RMTN in RA II has completed. As of October 2015, the RMTN in RA II includes 90 operational circuits (i.e. 9 MTN, 48 regional, 13 inter-regional and 20 additional circuits). In 2015, Thimpu (Bhutan) connected to the GTS and started receiving observation data and products through RTH New Delhi. On the other hand, ten circuits in the Regional configuration plan are not in operation. Especially NMCs Baghdad (ought to have 2 regional circuits), Kabul (3) is isolated from the GTS. Satellite broadcasting systems, including CMACast, Meteoinform, INSAT-DMDD, EUMETCast and etc., are being used for complements to the GTS, backup sources and cost-effective alternatives to HF radio broadcasts.

The operational links (90) in RMTN are operated on three types of communication infrastructure, dedicated leased line (30), MPLS/VPLS (28) and the internet (31). Before 1999, all the GTS circuits in RA-II were operated on dedicated leased line, but these days, communication links tend to migrate to the internet. Internet is a cost-effective, but centres need to consider and understand the characteristics of internet, in particular the internet security and best-effort serves.

The IGDDS is for the efficient circulation of space-based observation data and products meeting the needs of WMO programmes and regional requirements. It is noted that CMACast began operation in June 2012 and has established data exchange and re-dissemination service with EUMETCast, JMA started to distribute Himawari-8/9 data via Internet cloud and DVB-S2 based HimawariCast in July 2015. KMA is planning for the follow-on geostationary meteorological satellite GEOKOMPSAT-2A which will be launched in May, 2018. In addition, as of March 2014, RARS network now involves 42 direct readout stations which altogether enable acquisition of satellite sounding data from around 80 % of the globe with 30-minute data latency. Another 5 stations is under preparation to fill the gap of the RARS network in South Pacific and strengthen the coverage of Indian Ocean. WMO convened a coordination meeting to investigate the steps to be taken to integrate the RARS, EARS and DBRTN initiatives into DBNet. In the future, it is necessary to collaborate with other WMO expert team and initiatives improve the data availability, user awareness, data access and technological training in RA II.

8.2.3 Data management

The main activities related to the theme of Data Representation and Metadata include technical consultation and support for Members working on code form migration, monitoring, analysis and questionnaires on the status of migration to Table Driven Code Forms (TDCF) and implementation of WIS discovery metadata. To determine the level of Members' understanding on the migration to TDCFs and WIS metadata management and status of implementation, and to assess training requirements on these areas, a questionnaire was sent to RA II Members in November 2015 and received responded by 18 Members.

According to the statistics collected every three months from January 2013 to October 2015, (1) notable progress has been seen with the migration of SYNOP data since October 2014, (2) number of BUFR TEMP report increased by about 50 in the first half of 2014, which is attributed to India's BUFR TEMP reports, (3) As of November 2015, ten Members were reporting CLIMAT data in BUFR format. The number of Members has increased by two

since 2013. Percentage of Members who report CLIMAT in BUFR format has been remaining around 25% for several years.

Creation and registration of WIS metadata for GTS bulletins in RA-II is showing a good progress in general. GISCs Moscow, Seoul, Teheran and Jeddah started operation during 2013-2015 and 31 RA-II Members (89%) out of 35 have registered at least one WIS metadata record to the catalogue. The community is waiting for GISC New Delhi to become operational and starting catalogue management for its area of responsibility. As of November 2015, Uzbekistan (its principal GISC is Seoul) has not registered its records to the catalogue yet.

The questionnaire survey results indicated the requirements for improving communication between Global Information system Centres (GISCs) and National Cemtres (NCs) and for training on WIS metadata management.

8.2.4 Discontinuing Volume II of the Manual on GTS

In accordance with the decision of Cg-17, Volume II of WMO No. 386 (Manual on GTS) will be discontinued and replaced by web-based documentation. EG-WIS agreed to organize a Task Team (TT) in this month to proceed and create the web-based document. Theme Leader in Data Communication Technics and Structure will lead the TT with Volunteer Experts of the Theme, and some experts would be invited. The EG-WIS will establish the TT with ToR and plans to submit the draft of web-based document to RAII Management Group.

8.2.5 WIS related projects

WIS monitoring is aimed at monitor availability of WIS centre functions and services in order to ensure stable operation, and the pilot project has been conducted by CBS/ET-WISC and leaded by two project managers. Currently four GISCs in RA II (Beijing, Moscow, Seoul and Tokyo) are providing actual operation status and GISC Beijing and Tokyo are providing prototype service to be available by web browser;

- GISC Beijing: http://wisportal.cma.gov.cn/monitor/test/dashboard/tiles
- GISC Tokyo: http://www.wis-jma.go.jp/wcd/top.html

GISCs Jeddah, New Delhi and Teheran have a plan to join the project.

ANNEX

RA II WIGOS IMPLEMENTATION PROJECTS

Project No. I

Project Title	**RA II WIGOS Project to Monitor and Review the Implementation of EGOS-IP in RA II**
Type	Regional Implementation Project (RA II)
Status	Draft Design
Overview	A vision for the Global Observing Systems in 2025 which provides high-level goals to guide the evolution of the global observing systems during the coming decades has been approved by EC-LXI in 2009. Accordingly, CBS-15 adopted a recommendation for the Implementation Plan for the Evolution of Global Observing Systems (EGOS-IP) to complement and respond to this Vision. The Implementation Plan outlined the key activities to be implemented during the period 2012 to 2025 aiming at maintaining and developing all WMO component observing systems. Thus, a project can be established to monitor the progress of RA II Members on the implementation of EGOS-IP, analyze gaps in the regional observing network, and therefore, prioritize actions listed in EGOS-IP. The concerned information should be shared by RA II Members and all users by establishing a portal. This project will: ● Encourage RA II Members to appoint National Focal Points and submit EGOS National Reports annually, ● Identify gaps and prioritize actions listed in EGOS-IP through reviewing the progress of EGOS-IP in RA II, ● Develop a Portal to share the progress of EGOS-IP Implementation of RA II Members.
Aim(s)	● To identify gaps and prioritize actions listed in the EGOS-IP through reviewing the progress of the Evolution of Global Observing Systems (EGOS), ● The progress and experiences are shared by RA II members when implementing the EGOS-IP.
Benefits	The Portal will provide Members and users with a platform for sharing updated progress of EGOS-IP implementation in RA II
Key Regional Players	China and Hong Kong, China
Capacity development	● Technical assistance by CBS, ● Workshop(s) on gaps analysis and actions prioritizing listed in

requirements	EGOS-IP.
Partners/Participants	All RA II Members
Funding Source(s)	This project will rely on existing budget allocations at the national level. Additional funding will be needed to facilitate some elements such as the cost for developing the portal software.
Overall Costs	(TBD)
Timescale	2013–2016
Expected Key Deliverables/Key responsible body	● A list of RA II EGOS National Focal Points, ● Prioritized actions listed in the EGOS-IP, ● Portal to share progress EGOS IP implementation in RA II.
Main risk(s)	Lack of resources (funds/expertise), lack of cooperation and missing or mistaken information from Members
Website	Not available
Summary	This project will develop a Portal that will provide updated progress on EGOS-IP in RA II, identify gaps and prioritize actions listed in EGOS-IP identify regional prioritized actions to be taken.
Date of the update	21 November 2012
Contact Person 1	Ms GUO Jianxia Meteorological Observation Center, China Meteorological Administration (CMA) China Tel: +86 10 68407934 Fax: +86 10 68400936 E-mail: gjxaoc@cma.gov.cn
Contact Person 2	Mr LEE Lap Shun Hong Kong Observatory Hong Kong, China Tel.: +852-2926-8416 Fax: +852-2311-9448 E-mail: lslee@hko.gov.hk

Project No. II

Title	**RA II WIGOS Project for Standard and Best Practice Portal, including Technical Documents with Necessary Details in English from all RA II Members**
Type	Regional Implementation Project (RA II)
Status	Draft Design
Overview	This project will develop a Standard and Best Practise Portal including mechanism and procedures needed for a regular updating process.
Aim(s)	● To develop a Standard and Best Practise Portal, ● To establish regional standard and best practices documentation (regional practices database) for enhanced observational data/products utilization, including data/metadata management, ● To specify mechanisms, procedures for regular monitoring and updating of the portal.
Benefits	The standard and best practices portal will enhance and improve quality and utilization of data/products.
Key Regional Player	Republic of Korea
Capacity development requirements	Technical assistance by CBS and CIMO
Partners/Participants	RA II Members
Relationship with existing project(s)	KMA WIGOS demonstration project
Funding Source(s)	This project will rely on existing budget allocations at the national level
Overall Costs	(TBD)
Timescale	2013–2016
Expected Key Deliverables / Key responsible body	Portal on standards and best practices with mechanisms and procedures for regular monitoring and keeping the portal up-to-dated.
Main risk(s)	Lack of resources (funds/expertise), lack of cooperation and missing or mistaken information from Members.
Website	Not available
Summary	This subproject will establish a RA II Portal of standards and best practices for enhanced observational data/products utilization.

Date of the update	21 November 2012
Contact Person 1	Dr WON Jaegwang Korea Meteorological Administration (KMA) Republic of Korea Tel.: +82-2-2181-0694 Fax: +82-2-2181-0709 E-mail: wonjg@kma.go.kr, ecotus37@korea.kr
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Project No. III.1

Project Title	**RA II WIGOS Project for Observing Systems Integration for Supporting Disaster Risk Reduction**
Subproject Title	**Integration of Surface-based Remote Sensing Data in the East Asia**
Type	Regional Implementation Project (RA II)
Status	Draft Design
Overview	In order to enhance observing capabilities in severe weather monitoring and forecasting, specifically in East Asia, surface-based remote sensing datasets/ products, such as radar and GPS data, should be integrated for their better utilization. This project, as a first step, aims at developing a feasible and optimal draft design of integrated surface-based remote sensing observations toward future operational assimilation in meso-scale NWP system at the sub-regional level, as well as real-time quality-assured radar composite maps. The project will be Observing System Experiments (OSE) driven and proceed as follows: 1. Offline Exchange of surface-based remote sensing datasets/products including radar echo intensity, Doppler velocity, AWS data, and, if available, GPS precipitable water vapour, together with supplementary information (e.g. data format, details on observations, and data quality) among participating organs. 2. Examination of impacts of assimilation of exchanged remote sensing observation on its NWP performance. Also, sub-regional radar composite maps meeting their own operational requirements will be developed. Results and identified technical issues (e.g. data format, data policies, telecommunication for real-time data exchange, and quality of data) will be shared with and worked out cooperatively by the participating organs. Thus, requirements of data exchange for operational phase will be specified. 3. A feasible and optimal draft design of integration of surface-based remote sensing observations will be developed based on the results of the project. To proceed with this project, existing frameworks such as CMA-JMA-KMA NWP meeting will be expanded to include this project into its agenda.
Aim(s)	The aim of this project is to develop a feasible and optimal draft design of integrated surface-based remote sensing observations toward operational assimilation of those data in meso-scale NWP model of the participating organs at the sub-regional level, as well as real-time quality-assured radar composite maps.
Benefits	Members in East Asia will benefit from this project through enhancement of their capabilities in observations for better early

	monitoring/warning/nowcasting/very short-range forecasting. All the other RA II Members, particularly ones in Southeast Asia which might plan a similar project in the future, will benefit from shared outcomes of this project, namely: (1) solutions to identified issues for integration of surface-based remote sensing observations at sub-regional level; as well as (2) results of impact analysis on capacities in severe weather monitoring and forecasting.
Key Regional Player	China, Japan and Republic of Korea
Capacity development requirements	Workshop(s) on better utilization (decision making & assimilation)
Partners/Participants	CMA, JMA, KMA
Relationship with existing project(s)	1. WMO Workshop on the Impact of Various Observing Systems on Numerical Weather Prediction. 2. CMA-JMA-KMA joint workshop on NWP (The 1st CMA-JMA-KMA joint workshop on NWP was held in September 2011). 3. WMO/CIMO Radar Quality Control and Quantitative Precipitation Estimation Intercomparison (RQQI).
Funding Source(s)	This project will rely on existing budget allocations at the national level. The project will build on existing national observational networks and information management infrastructures. Additional funding might be needed to regularly hold technical meetings among CMA, JMA, and KMA to proceed with this project.
Overall Costs	(TBD)
Timescale	2013 – 2016
Expected Key Deliverables / Key responsible body	1. Establishment of collaborative working mechanism toward integrated surface-based remote sensing observations in the East Asia for operational monitoring and forecasting severe weather. 2. Solutions to identify issues to be solved for integration of surface-based remote sensing observations at sub-regional level and their solutions. 3. Impacts on capacities of NMHSs in severe weather monitoring and forecasting through utilization of surface-based remote sensing observations.
Main risk(s)	1. Limited exchange of observational data, for instance, due to data policies of providers. 2. Lack of sharing relevant technical documentation on exchanged data.
Website	Not to be established
Summary	This project will develop a feasible and optimal draft design of integrated

	surface-based remote sensing observations toward the sub-regional utilization in East Asia.
Date of the update	21 November 2012
Contact Person 1	Mr Yuki HONDA Office of International Affairs Japan Meteorological Agency (JMA) Japan Tel.: +81-3-3211-4966 Fax: +81-3-3211-2032 E-mail: iao-jma@met.kishou.go.jp,
Contact Person 2	Dr Jaegwang WON Korea Meteorological Administration (KMA) Republic of Korea Tel.: +82-2-2181-0694 Fax: +82-2-2181-0709 E-mail: wonjg@kma.go.kr, ecotus37@korea.kr
Contact Person 3	Mr LI Feng Meteorological Observation Center China Meteorological Administration (CMA) China Tel.: +86 10 68409293 Fax: +86 10 68400936 E-mail: liflif04@cma.gov.cn

Project No. III.2

Project Title	**RA II WIGOS Project for Observing Systems Integration for Supporting Disaster Risk Reduction**
Subproject Title	**Capacity Building in Radar Techniques in the Southeast Asia**
Type	Cross-regional Implementation Project (RAs II and V)
Status	Draft Design
Overview	Developing countries in Southeast Asia share common challenges for severe weather monitoring and forecasting. In spite of many radars having been installed in the region, they are not fully utilized due to lack of their expertises in weather radar techniques. Thus, capacity building in weather radar techniques is crucial concern for the countries. Although their levels of operational usage of radar vary, they are often facing common technical challenges. In this regard, sharing their technical issues and lessons learnt among countries in the Region and developing the regional strategy on development of the radar network in the Region will enable them to tackle those challenges collaboratively with help from the WMO community in an effective and efficient manner. This project, initiated by Thailand and Malaysia, within the framework of the ASEAN Sub-Committee on Meteorology and Geophysics (SCMG), aims at establishing a collaborative mechanism within SCMG through the following steps: 1) Thailand and Malaysia, as leaders of this project, will develop their national reports toward operational rainfall estimation/forecasting based on radar data. In order to share their experiences and lessons learnt among the participating organs, and to identify technical problems to be solved and necessary technical supports for, the reports should include the following items in a well-structured format: (a) overview of the current radar systems, (b) organization (department, division, staff, and budget), (c) specification of radar systems, (d) maintenance of equipment, (e) data processing (QC, calibration, and composite technique), (f) radar products, (g) details of current technical problems associated with (a) to (f), (h) lessons learnt from the past experiences, (i) recent progress, (j) future development plans. The reports will be submitted to the 35th SCMG meeting (2013).

	2) The other ASEAN member countries will also develop their national reports in the same format as that of Thailand and Malaysia, and submit their reports to 36th SCMG meeting. Based on the submitted report, the meeting will develop a regional strategic plan on radar which identifies common technical issues and necessary actions to be taken. 3) During the period of the project, all the above Members will be requested to update their national reports and submit the latest version to a SCMG meeting every year. Thailand and Malaysia are requested to encourage the other Members to develop and keep their national reports up-to-date. The regional strategic plan is also to be updated at every SCMG meeting. *Each Member will consult with the WMO or advanced RA II Members about appropriate technical missions focused on identified technical issues in the reports such as dispatch of radar experts to recipient countries, with the VCP or other funds. On completion of such a mission, the recipient Member is requested to update its national report by including details of the outcomes of the mission. *SCMG set up a new agenda item for discussion on the progress of this project.
Aim(s)	This project aims to develop effective early warning systems building on radar data in Southeast Asia.
Benefits	Capacity in monitoring and forecasting of the severe weather using radar data will be enhanced by shared experiences and lessons among the participating organs and technical missions focused on technical issues identified in national reports and the regional strategic plan.
Key Regional Player	ASEAN-SCMG: Thailand, Malaysia
Partners/ Participants	All the ASEAN Member countries (Cambodia, Brunei Darussalam, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam)
Relationship with existing project(s)	- Radar composite map in Southeast Asia, one of the on-going projects under the Meteorological Working Group of the WMO/ESCAP Typhoon Committee, - Severe Weather Forecasting Demonstration Project (SWFDP) for Southeast Asia, - ASEAN Sub-Committee on Meteorology and Geophysics(SCMG).
Funding Source(s)	This project will rely on existing budget allocations at the national level. The project will build on existing national observational networks and information management infrastructures. Additional funding will be needed for technical cooperation for those countries by dispatching appropriate experts and/or providing training workshops.
Overall Costs	(TBD)
Timescale	2013–2016

Expected Key Deliverables / Key responsible body	- National reports in the Southeast Asia toward operational rainfall estimation/forecasting based on radar data, - Regional strategic plan on development of the radar network.
Main risk(s)	1) Failure of development of national reports by participating organs. 2) Lack of available experts. 3) Lack of funds available.
Website	Not to be established
Date of the update	21 November 2012
Contact Person 1	Dr.Somchai Baimoung Deputy Director-General/Acting Director-General Thai Meteorological Department Thailand Tel.: +66 81 989 9025 Email: somchaib@tmd.go.th
Contact Person 2	Mr A. Kamiluddin Hj Ibrahim Director, Radar Meteorology Division Malaysian Meteorological Department Malaysia Tel.: +603 7967 8154 Fax: +603 7955 0964 E-mail: kamiluddin@met.gov.my

Project No. IV

Project Title	**RA II WIGOS Project to Enhance the Availability and Quality Management Support for NMHSs in Surface, Climate and Upper-air Observations**
Type	Regional Implementation Project (RA II)
Status	Draft Design
Overview	The Japan Meteorological Agency (JMA)/World Meteorological Organization (WMO) Workshop on Quality Management in Surface, Climate and Upper-air Observations, held at Tokyo in July 2010 as part of activities of the Pilot Project to Enhance the Availability and Quality Management Support for NMHSs in Surface, Climate and Upper-air Observations (hereafter, Pilot Project), found out that primary factors adversely affecting data quality in RA II are calibration and maintenance of instruments mainly due to lack of traceability of measurements to international standards and calibration facilities. This project will build on outcomes of the workshop. It consists of the following two activities: (i) improvements of data quality of RBCN/RBSN stations; and (ii) enhancement of capabilities of RIC-Tsukuba and RIC-Beijing. All the outcomes of this project will be shared at a Portal to be established by the Coordinator. 1. Improvements of data quality at RBCN/RBSN stations (a) Monitoring Data Quality The Coordinator checks data quality of RA II stations and identifies and requests RA II Members to identify technical issues, based on the following results: • Questionnaire on the Surface, Climate, and Upper-air Observations and Quality Management in Regional Association II (Asia) (conducted in July 2010), • Questionnaire on meteorological instruments, calibration and training in Regional Association II (Asia) (conducted in January 2012), • 6-monthly monitoring reports by the Lead Centre for monitoring the quality of land surface observations in Region II. (b) Survey on status on QA/QC procedures and site managements for the network of RBCN/RBSN stations, and report the results. Based on requests from the Coordinator, the following Members

	will consider the possibility of technical support if funds are available, and share the summary of the technical missions with RA II Members: - CMA, HKO, JMA, and KMA for Southeast Asia, - IMD for South Asia, - Roshydromet for Central Asia, - Kuwait for Middle East. 2. Enhancement of RIC's Services RICs plan to implement the following action items for further enhancement of their services in capacity building and calibration during the project: (a) Organization of a training workshop to improve understanding of calibration and maintenance of meteorological instruments according to needs of RA II Members to be identified by the "Questionnaire on Meteorological Instruments, Calibration and Training in Regional Association II (Asia)", (b) Development of training materials on calibration and maintenance of instruments (to be prepared for publication as an Instruments and Methods of Observation Programme (IMOP) technical document), (c) Obtaining the International Standard ISO/IEC 17025 – General requirements for the competence of testing and calibration laboratories – certification for air pressure, temperature, and humidity, (d) Development of RIC's Websites, (e) Intercomparison between RIC-Tsukuba and RIC-Beijing, (f) Reports on status on calibration instruments for surface-based observations in RA II (to be prepared for publication as an Instruments and Methods of Observation Programme (IMOP) technical document).
Aim(s)	This project aims at improvement of data quality at RBCN/RBSN stations and enhancement of services of RA II RICs.
Benefits	RA II Members, especially those with technical issues on data quality of observations, will potentially benefit from this project.
Role/Involvement of WMO Regional Centres in RA II	Regional Instrument Centres (RICs) Lead Centre for monitoring the quality of land surface observations
Key Regional Player	JMA (Coordinator), and Members of Coordination Group Technical Mission:

	- CMA, HKO, JMA, and KMA for Southeast Asia, - IMD for South Asia, - Roshydromet for Central Asia, - Kuwait for Middle East.
Capacity development requirements	1. Workshop on maintenance, field inspection, etc. (basic level), 2. Workshop on traceability, measurement uncertainty, etc. (advanced level).
Partners/Participants	RA II Members
Funding Source(s)	This project will rely on existing budget allocations at the national level. Additional funding will be needed to dispatch experts to NMHSs in developing countries and/or invite their observational staff to RICs for trainings and calibrations of national standards.
Overall Costs	(TBD)
Timescale	2013–2016
Expected Key Deliverables / Key responsible body	1. Provision of technical support for instrument maintenance and calibration by experts from RICs. 2. Holding a RIC's training workshop for RA II Members. 3. Development of training materials (to be prepared for publication as an IMOP technical document). 4. Obtaining ISO/IEC 17025 certification. 5. Portal Website to share outcomes of this project. 6. Report on status on QC/QA procedures and site management in RA II. 7. Reports on status on meteorological instruments, calibration and training in Regional Association II.
Main risk(s)	• Lack of funding for technical missions by RICs, • Insufficient communication between the Coordinator, RICs, and RA II Members on their status on maintenance and calibration of instruments to specify needs of technical supports, • Lack of responses from RA II Members.
Website	RIC's Website/Portal on QC/QA
Summary	Improvement of data quality of RA II Members through enhancement of RIC's services and capacity
Date of the update	21 November 2012
Contact Person 1	Mr Yoshihisa NAKAMOTO Senior Coordinator for Observation Planning

	Administration Division, Observations Department Japan Meteorological Agency (JMA) Japan Tel.: +81 3 3211 6018 Fax: +81 3 3211 7084 Email: nakamoto@met.kishou.go.jp
Contact Person 2	Mr He Xiaolei Meteorological Observation Center China Meteorological Administration (CMA) China Tel: +86 10 68409767 Fax: +86 10 68400936 E-mail: hxlaoc@cma.gov.cn

Project No. V

Project Title	**RA II WIGOS Project to Develop a Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS) in Asia Node**
Type	Regional Implementation Project (RA II)
Status	Draft Design
Overview	SDS-WAS was established in 2007 to achieve comprehensive, coordinated and sustained observations and modelling capabilities of sand and dust storms in order to improve the monitoring of sand and dust storms to increase the understanding of the dust processes and to enhance dust prediction capabilities for mitigation of risks in many affected area (aviation, health impacts, etc.). The WMO SDS-WAS Region for Asia third meeting of Regional Steering Group (RSG) was held at Tsukuba, Japan in March 2012. At the meeting, it was confirmed that observation data exchange schemes should be implemented promptly in order to enhance systematic near-real-time (NRT) monitoring of sand and dust events in each country, and the following near-term implementation plan was agreed within the SDS-WAS Asia Node activity: • Each country will confirm their data policy on observation data delivery, to reach an agreement on the provision of observation data to be shared within the Node in NRT, • Regional Centre (RC: China) will provide a portal website with a function for sharing the observation data and announce it to the Node members, • At the beginning, experimental observation data sharing will be conducted in off-line basis (not NRT) for the sand/dust storms (SDS) seasons, • For the data exchange, the ad-hoc working group will propose appropriate data format and parameters, • In SDS season in the spring (from February to June) 2013, the NRT (with a goal of approximately 1-day delay) data exchange will be conducted regularly, • NRT data will be used for intercomparison of sand and dust storm forecast model to improve forecast accuracy as well as for monitoring of sand and dust storms.
Aim(s)	This project aims at mitigation of risks in many affected areas in the Asia Node countries through enhancement of systematic NRT

	monitoring of sand and dust storm.
Benefits	The systematic NRT monitoring of sand and dust storm will provide the Asia Node countries with useful information for sand and dust storm risk mitigation.
Role/Involvement of WMO Regional Centres in RA II	Regional Specialized Meteorological Centre with activity specialization on Atmospheric Sand and Dust Forecast (RSMC-ASDF) (TBD)
Key Regional Player	China, Japan, Republic of Korea
Partners/Participants	Countries in SDS-WAS Asia Node (China, Japan, Kazakhstan, Republic of Korea and Mongolia)
Funding Source(s)	This project will rely on existing budget allocations at the national level.
Overall Costs	(TBD)
Timescale	2013–2015
Expected Key Deliverables / Key responsible body	The systematic NRT monitoring of sand and dust storm in SDS-WAS Asia Node
Main risk(s)	Lack of resources (funds/expertise)
Website	SDS-WAS Asia Node portal
Summary	Improvement of sand and dust storms monitoring in the SDS-WAS Asia Node
Date of the update	31 August 2016
Contact Person 1	Prof. ZHANG Xiaoye Chinese Academy of Meteorological Sciences China Meteorological Administration (CMA) China Tel.: +86 10 68406601 Fax: +86 10 62175931 E-mail: xiaoye@cams.cma.gov.cn
Contact Person 1	Mr Hiroshi Koide Senior Coordinator for Global Atmosphere Watch Atmospheric Environment Division Global Environment and Marine Department Japan Meteorological Agency (JMA) Japan Tel.: +81-3-3287-3439

	Fax: +81-3-3211-4640 E-mail: hkoide@met.kishou.go.jp
Contact Person 1	Dr Youngsin Chin Korea Meteorological Administration (KMA) Republic of Korea Tel.: +82 70 7850 6752 Fax: +82 2 831 4930 E-mail: hwangsa@korea.kr
Progress	In 2013, the 65th session of the WMO Executive Council approved the mandatory functions of Regional Specialized Meteorological Centres with Activity Specialization in Atmospheric Sand and Dust Storm Forecasts (RSMC-ASDF) and designated the SDS-WAS regional centre in Barcelona, Spain, as the RSMC- ASDF for Northern Africa, the Middle East, and Europe, as suggested by the 15th session of CBS in 2012. China expressed its offer of a RSMC-ASDF to serve the Members in RAII at various occasions, including the 15th session of RA II in 2012, 16th session of CAS in 2013, the 2014 Extraordinary Session of CBS, and 17th World Meteorological Congress in 2015. The fourth SDS-WAS Asian Regional Steering Group (RSG) Meeting in Beijing in 2015 adopted the SDS-WAS Technical Report on Asian Regional Centre, which demonstrated CMA's operational capabilities as well as the quality of dust forecasts for operational use in the Region. More information about this candidate RSMC-ASDFcan be found on the website (http://eng.nmc.cn/sds_was.asian_rc/). CMA has summited a formal letter to President of RAII, expressing the intent of CMA to be designated as RSMC-ASDF in July 2016. This RSMC-ASDF will be hosted by National Meteorological Centre of CMA, supported by Chinese Academy of Meteorological Sciences and National Satellite Meteorological Centre, in partnership with other NMHSs of Japan, Republic of Korea, Mongolia, Kazakhstan, etc.

Project No. VI

Project Title	**RA II WIGOS Project to Develop Support for NMHSs in Satellite Data, Products and Training**
Type	Regional Implementation Project (RA II)
Status	Draft Design
Overview	At its fourteenth session (December 2008), Regional Association II adopted a resolution to establish a pilot project for the development of support for National Meteorological and Hydrological Services (NMHSs) in the areas of satellite data, products and training. The Coordinating Group of the Pilot Project is composed of Japan (Co-coordinator); Republic of Korea (Co-coordinator); Bahrain; China; Hong Kong, China; India; Kyrgyzstan; Maldives; Oman; Pakistan; Russian Federation; Uzbekistan; Viet Nam and EUMETSAT (observer). The object of this project is to encourage NMHSs in RA II to make a kind of self-help effort to improve the flow of satellite-derived information by: ● Identifying the requirements of NMHSs of developing countries, regarding satellite imagery, data and products, use the results to update the RRR user requirements database and to fine tune the EGOS-IP, ● Facilitating the timely provision of satellite-related information by satellite operators themselves to users via the project web page, newsletters, etc., and ● Aligning with VLab activities to optimize assistance to NMHSs in RA II and coordinating training activities on use of satellite data/products).
Aim(s)	● To encourage NMHSs in RA II to make a kind of self-help effort to improve the flow of satellite-derived information, ● To improve the knowledge and techniques to use satellite data and products.
Benefits	NMHSs in RA II have benefited from this project to find means to access satellite data, products and training they want, and to improve the usage of satellite-derived information. This is expected to improve NMHSs' activities from nowcasting to climate and environment monitoring.
Key Regional Player	Japan, Republic of Korea and other satellite operators in RA II
Capacity development requirements	● Assistance (or support) of WMO VLab activities and other regional training activities, ● Assistance of satellite operators, ● Liaison with EGOS-IP.
Partners/Participants	Members of the Coordination Group members: Japan (Co-coordinator); Republic of Korea (Co-coordinator); Bahrain; China; Hong Kong, China; India; Kyrgyzstan; Maldives; Oman; Pakistan; Russian Federation; Uzbekistan; Viet Nam, RA V (observer) and EUMETSAT (observer) All other RA II Members can be nominated as the Group members.

Relationship with existing project(s)	(TBD)
Funding Source(s)	Regular activities of this project rely on existing budget allocations at the national level. Additional funding will be needed to hold the Coordination Group meetings and training events regularly.
Overall Costs	(TBD)
Timescale	2012–2016
Expected Key Deliverables / Key responsible body	● Reports on requirements of NMHSs regarding satellite imagery, data and products, ● Improvement on access to information on satellite data/products, ● Improvement on capacity in use of satellite data/products and facilitation of training datasets and toolboxes.
Main risk(s)	Lack of resources (funds/expertise) and lack of cooperation from Members
Website	The portal site of the project is operated on JMA's web server. http://www.jma.go.jp/jma/jma-eng/satellite/ra2wigosproject/ra2wigosproject-intro_en_jma.html
Summary	The project will encourage NMHSs in RA II to make a kind of self-help effort to improve the flow of satellite-érelated information.
Date of the update	30 November 2015
Contact Person 1	Mr Takeshi Otomo Senior Coordinator for Satellite Systems Satellite Program Division, Observation Department Japan Meteorological Agency (JMA) Japan Tel: +81-3201-8677 Fax: +81-3217-1036 E-mail: ootomo@met.kishou.go.jp
Contact Person 2	Dr Dohyeong KIM Senior Scientist National Meteorological Satellite Center Korea Meteorological Administration Republic of Korea Tel: +82-70-7850-5705 Fax: +82-43-717-0210 E-mail: dkim@kma.go.kr

ANNEX III

Summary of the highlights of the WG/ICT achievements

<WGWS>

EG-AeM

- Arrangements were being made to share information and best practices for the transition into ISO 9001:2015 which was published in Sep. 2015. WMO Secretariat conducted fact finding visiting to those Members to identify the support, including possibility of twinning and/or mentoring, required.
- ICAO APAC Regional Office conducted a survey in October 2015 on the implementation status of MET services for ATM. Related seminars were conducted and a capacity building RA II workshop for SIGMET improvement is being planned for 2016.

EG-OF

- Regional Subproject Management Team of SWFDP in Southeast Asia decided to start its demonstration phase from January 2016. A new SWFDP – Central Asia is being developed. These activities are supported by Global Centres.
- A questionnaire survey for non-registered members has conducted to find out their potential interest in ERA in 2014. A concise guidance for EER was provided to RA II Members in 2014.

EG-PWS

- The work plan of EG-PWS for 2013-16 was formulated in 2013.
- Two training workshops on public weather services were organized under the WMO/CBS Severe Weather Forecast Demonstration Projects (SWFDP). The first one was held in Macao, China from 15 to 19 April 2013 with participants from Cambodia, Lao, Thailand, Viet Nam, India, Maldives, Myanmar, Sri Lanka, Pakistan, Nepal, Bhutan, and others. The second one was held in Manila, Philippines from 9 to 13 June 2014 with participants from Cambodia, Laos, Thailand, Vietnam, and others.
- In addition, a Voluntary Cooperation Programme (VCP) training workshop on "Effective Media Communication" was organized in Hong Kong, China in December 2013 for Bhutan, Cambodia, China, Islamic Republic of Iran, Republic of Kazakhstan, Republic of Korea, Thailand and The United Arab Emirates. The workshop covered media communication in different phases of significant weather events, through various channels including the traditional media like TV and radio as well as new media like the social media. There were practical sessions of weather presentation on TV and radio, which offered each participant hands-on experience together with expert feedback.
- A meeting of the EG-PWS was held in Doha on 3 December 2014 and teleconferences were held among the Co-coordinators and Theme Leaders of the EG-PWS on 25 March 2015 and 25 June 2015 to discuss the organization of a training workshop for RA II Members in 2015 on the enhancement of public weather service delivery. With the joint effort of the China Meteorological Administration (CMA) Training Centre, the CMA Public Meteorological Service Centre and the EG-PWS, an International Training Workshop on Public Weather Service was held in Beijing, China from 16 to 20 November 2015. Experts from CMA, Hong Kong Observatory and Korea Meteorological Administration were invited to deliver lectures, which covered such topics as delivery of weather forecast and warning messages, disaster prevention and mitigation strategy, and experience in promoting stakeholder engagement. Nearly 40 participants from 11 countries, including China, Kazakhstan, Maldives and Thailand attended the workshop.
- A meeting of the EG-PWS was held in Hong Kong, China on 10 and 11 December 2015. The meeting reviewed the 2013-2016 work plan of the EG-PWS and

identified new tasks to be performed in 2016 including public education and outreach; socio-economic studies and evaluations; communication between RA II members and stakeholders; and quality management of service delivery. Planning ahead, the meeting proposed organizing a workshop on socio-economic benefit study for Members in RA II or subregions in 2016-2019, with the assistance of WMO PWS Programme. Proposals of streamlining the Terms of Reference of EG-PWS and improvement of the structure of EG-PWS were also made for consideration in the next RA II session.

- The EG-PWS will collect and share Members' experience and best practices in service delivery and quality management in 2016. In 2016, the EG-PWS will request Members for the provision of PWS technical contact and update the list of PWS focal point.

<WGCS>

EG-CS

Currently, three WMO Regional Climate Centers (RCCs) have been operating in RA II such as BCC (China), TCC (Japan) and NEACC (Russian Federation). These RCCs have conducted a variety of RCC-related activities, including the dissemination of climate data/products and the organization of training workshops for capacity development in accordance with RCC mandatory functions. It is noted that India began a demonstration phase as a candidate RCC in May 2013.Regional Climate Outlook Forums (RCOFs), such as FOCRAII, SASCOF, NEACOF, EASCOF and ASEANCOF, are convened regularly. These RCOFs provide some consensus outlook for next season and some of these RCOFs also provide opportunities to exchange of good practices and the sharing of experiences in the application of climate information among NMHSs and to strengthen user-provider interaction. It is also noted that a pilot project on Information Sharing on Climate Services (Res.5 (RA II-15)) has been conducted by TCC and it has been operating the dedicated website since March 2014.

EG-AgM

The meeting of RA II Expert Group on Agro-meteorology "Strengthening of agro-meteorological activity in RA II countries" was held in India (Pune) on 9–10 November 2015. The directions of the discussion on the meeting were (1) Weather and Climate Services for Agro-meteorology, (2) Agrometeorological products for Agro-meteorological Services, and (3) Capacity Building & Impact Assessment. International and national delegates participated and gave presentation on the topics. Activities of EG-AgM are strongly linked with those of CAgM and co-coordinators of EG-AgM make their efforts to catch up with discussions and recommendations by CAgM Implementation Coordination Team (ICT). In RA II, a variety of issues are reported by the co-coordinators of EG-AgM, such as the progress in Agricultural Meteorology Programme, Nations Drought Management Policies for Asia-Pacific, Capacity development, Farmer Awareness Programme, dissemination of Agromet Advisories to the farmers, seasonal climate forecast and its application in agriculture for farmers at the national as well as district levels.

<WGHS>

- The first session was held in Seoul, Republic of Korea, from 30 September to 2 October 2014, and Individual work programme was developed consisted of actions, activities, outputs, resources, milestones and linkages.
- The second session was held in Gyeongju, Republic of Korea, from 14 to 16 April 2015. Progress of the work programme was reported, and the work programme was adjusted.
- WGHS members with Dr Pilon (WMO) and Dr Liu (CHy) participated as speakers or panelists in the 7th World Water Forum session titled "Hydrological Services in Asia under Rapidly Changing Conditions", Gyeongju, Republic of Korea, 15 April 2015 and organized by KICT, MLIT and WMO. Hydrological activities and issues

were presented and discussed.

- Water resources assessment tool was developed with support of MLIT of Republic of Korea in 2015. The developed tool is a public-domain SW with GUI and GIS interface, and can be used to analyze dynamics of water balance in consideration of climate and land use changes. Pilot test is scheduled in 2016 and the first version can be distributed to Members in 2017.
- Most of work programmes are being conducted as scheduled and the third session of WGHS is scheduled in first half of 2016.

<WG-WIGOS/WIS>

EG-WIGOS

- Regarding implementation of WIGOS, all seven projects have made progress. Two projects have been going well, which are Project No. IV - RA II WIGOS Project to Enhance the Availability and Quality Management Support for NMHSs in Surface, Climate and Upper-air Observations and Project No.VI - RA II WIGOS Project to Develop Support for NMHSs in Satellite Data, Products and Training. Unfortunately, project No.III.2 -Observing systems integration for supporting disaster risk reduction - Capacity Building in Radar Techniques in the Southeast Asia is very difficult to continue the transboundary radar composite network planned in the R-WIP due to Malaysia's withdrawal from the joint project of ASEAN Radar Composite between Thailand and Malaysia. Next actions are planned to be taken to implement these projects.
- The Joint RA-II/RA-V Workshop on WIGOS for Disaster Risk Reduction was held in Jakarta, Indonesia, 12-14, October 2015, and decided to propose two joint projects, which were "Joint RA-II/RA-V WIGOS Satellite Data Project" and "Joint RA-II/RA-V WIGOS Radar Data Project".

EG-WIS

- Regarding implementation of WIS, four GISCs became in operation since RA II-15. Now 6 out of 7 GISCs (including Moscow) in RA II are in operational status. Remaining GISC New Delhi is now pre-operational stage. As for the National Centre (NC), 35 out of 37 NCs in RA-II decided their principal GISC in RA-II-15 in 2012. After that remaining two NCs (Turkmenistan and DPRK) decided their principal GISC.
- Creation and registration of WIS metadata for GTS bulletins in RA-II is showing a good progress in general. 31 RA-II Members (89%) out of 35 have registered at least one WIS metadata record to the catalogue. The community is waiting for GISC New Delhi to become operational and starting catalogue management for its area of responsibility. As of November 2015, Uzbekistan has not registered its records to the catalogue yet.
- The thirteenth session of RA II (Resolution 5 (2004)) added the GTS link between Thimphu and New Delhi to Regional Meteorological Telecommunication Network (RMTN). After 10-years, the NMC Thimphu (Bhutan) connected to the GTS and started receiving meteorological data through RTH New Delhi in July 2015. On the other hand, ten circuits in the Regional configuration plan are not in operation. Especially NMCs Baghdad (2 circuits) and Kabul (3 circuits) are still isolated from the GTS.
- According to the statistics collected every three months from January 2013 to October 2015, notable progress has been seen with the migration of SYNOP data since October 2014, and the number of BUFR TEMP report increased by about 50 in the first half of 2014, which is attributed to India's BUFR TEMP reports. For CLIMAT data, as of November 2015, ten Members were reporting CLIMAT data in BUFR format. The number of Members has increased by two since 2013.
- In accordance with the decision of Cg-17, Volume II of the Manual on GTS (Regional Aspects) will be discontinued and replaced by web-based documentation. EG-WIS agreed to organize a Task Team (TT) in December 2015

to proceed and create the web-based document. This task will be completed in the second quarter of 2016.

<ICT-SD>

Several events have been organized to encourage and facilitate working experience exchange in RAII members on Meteorological Service Delivery. The 45th China Study Tour jointly organized by CMA and WMO (15-22 October 2015) was attended by officials from 12 NMHSs(including those from Iran, Thailand, Nepal, Pakistan, Myanmar, Sri Lanka, Bangladesh, Tajikistan, Maldives, Vietnam). Participants were high impressed by the meteorological service delivery by

Nigerian
Canada

ANNEX IV

World Meteorological Organization
Organisation météorologique mondiale

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Weather • Climate • Water
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Our ref.: SG/CER/RA II-16

GENEVA, 24 February 2016

Sir/Madam,

I have the honour to refer to the letter WMO-1425 dated 17 December 2015, informing you that at the kind invitation of the Government of the United Arab Emirates and by virtue of Regulation 171 of the WMO General Regulations, the sixteenth session of Regional Association II (Asia) would be held from 26 to 29 September 2016, in Abu Dhabi, United Arab Emirates. It has now been decided that the dates for the session will be from 12 to 16 February 2017. The venue for the session remains unchanged.

In accordance with the procedures relating to the acceptance of invitations for sessions of constituent bodies as laid down in Annex I to the General Regulations of the Organization, and in particular paragraph 7 thereof, I have the honour to request that, if it is the intention of your country to be represented at this session, notification be sent to the Secretariat of the World Meteorological Organization, so as to arrive no later than **24 July 2016**.

The provisional annotated agenda of the session will soon be accessible through the WMO website.

A copy of this letter is being sent to the Permanent Representatives of Members with WMO.

Accept, Sir/Madam, the assurances of my highest consideration.

(P. Taalas)
Secretary-General

To: Ministers of Foreign Affairs of Member States of the World Meteorological Organization (WMO-1428)

ANNEX V

PROVISIONAL AGENDA for RA II-16

1	**OPENING OF THE SESSION**
2	**ORGANIZATION OF THE SESSION**
2.1	Consideration of the report on credentials
2.2	Adoption of the agenda
2.3	Establishment of committees
2.4	Other organizational matters
3	**REPORT BY THE PRESIDENT OF THE ASSOCIATION**
4	**PROGRAMME ACTIVITIES – REGIONAL ASPECTS**
4.1	Disaster Risk Reduction, Resilience and Prevention
4.2	Climate Services, Support to Climate Action and Climate Resilience
4.3	Observations and Data Exchange
4.4	Service Quality and Service Delivery
4.5	Data Processing, Modelling and Forecasting
4.6	Research
4.7	Capacity Development
4.8	Partnerships
5	**IMPROVED EFFICIENCY AND EFFECTIVENESS**
5.1	WMO strategic and operating plan – regional aspects
5.2	Internal matters of the Association
6	**EMERGING ISSUES AND SPECIFIC CHALLENGES**
7	**WMO REGIONAL OFFICE FOR ASIA AND THE SOUTH-WEST PACIFIC INCLUDING WMO OFFICE FOR WEST ASIA**
8	**REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF THE ASSOCIATION AND OF RELEVANT EXECUTIVE COUNCIL RESOLUTIONS**
9	**ELECTION OF OFFICERS**
10	**DATE AND PLACE OF THE SEVENTEENTH SESSION**
11	**CLOSURE OF THE SESSION**

ANNEX VI

Tentative Work Plan

Sixteenth session of RA II, Abu Dhabi, United Arab Emirates (UAE), 12–16 February 2017

All items will be discussed in Plenary meetings	Sunday 12 February		Monday 13 February		Tuesday 14 February		Wednesday 15 February		Thursday 16 February	
	a.m.	p.m.	a.m.	p.m.	a.m.	p.m.	a.m.	p.m.	a.m.	p.m.
General Plenary **Chair: President** **Items: 1, 2, 3, 5-11**	**1** **2.1** **2.2** **2.3** **2.4** **3**	**6** **8***	**9**** **5.2****	**5.1**			**7** **D**	**D**	**8**	**D** **10** **11**
Plenary A **Co-Chair: Vice President** **Items: 4.1-4.4**				**4.1** **4.2**		**4.3** **4.4**			**D**	
Plenary B **Co-Chair: MG Member** **Items: 4.5-4.8**					**4.5** **4.6**		**4.7** **4.8**		**D**	

Explanatory notes:

D - consideration of outstanding in-session Draft Decisions: Draft 2, Draft 3, … Final Draft. (formerly called working papers and PINKs).

* To appoint a Rapporteur

** To appoint a sub-committee

Side meetings: dates and time will be provided at the session ***Calendar*** *to be updated on the WMO web page*

ANNEX VII

RA II Operating Plan 2016 – 2019

DEPT	ER	KEY OUTCOME	KEY PERFORMANCE INDICATOR	DELIVERABLE	PRORGAMME	TC	REGION	ACTIVITY	Y2016	Y2017	Y2018	Y2019
DRA	1	1.1	1.1.1	Monitoring of and improvement in the provision measures for the ERA products and services	WWW, ERA	CBS	RA II	Continue email / fax tests to improve reachability for the registered NMHSs	x	x	x	x
DRA	1	1.1.	1.1.1	Enhanced communication with ET-ERA though the provision of Members' requirements	WWW, ERA	CBS	RA II	(a) Carry out a user request survey (b) Convey appropriate requests from Members to CBS ET-ERA	x	x		
DRA	1	1.1	1.1.1	Enhanced Members' understanding on ERA	WWW, ERA	CBS	RA II	Provide Members with a concise guidance for the transition to the new GDPFS manual regarding EER			x	x
DRA	1	1.2	1.2.1	Improvement or delegation of responsibilities on issuance of SIGMET	WWW, AeMP	CBS, CAeM	RA II	(a) Provide support and/or conduct expert visit to Members in need, as necessary (b) Carry out a survey on the status of implementation and planning in each Member	x			x
DRA	1	1.2	1.2.1	Provision of improved aeronautical meteorological services to Air Traffic Management (ATM)	AeMP	CAeM	RA II	(a) Encourage Members' dialogue with ATM users and implementation of MET services in support of ATM operations (b) Provision of guidance material and advice to Members (c) Carry out an annual survey on current status of the implementation and planning of MET support to ATM in each Member (d) Conjoint work with relevant ICAO and WMO groups, such as ICAO APAC MET/R TF, WMO ET-ISA (e) Introduce examples of best practices and present regional status and practices of MET support to ATM	x	x	x	x
DRA	1	1.2	1.2.1	Implementation of WMO-No. 49 requirements for aeronautical meteorological personnel (Enhanced awareness of Members on Competency Assessment)	WWW, AeMP, ETRP	CBS, CAeM	RA II	(a) Facilitate assistance from regional resource persons through twinning, etc. (b) Include a topic on AeM in Regional Seminar or emerging issues of RA II-15 to discuss the issue in depth	x	x		
DRA	1	1.2	1.2.1	Implementation of QMS for AeM Service Providers (AEMSP)	WWW, AeMP	CBS, CAeM	RA II	(a) Share the experience and lessons learned with focal points for QMS (from IR of Iran, Oman and Qatar) (b) Promote and coordinate twinning assistance between Members in RA II in cooperation with CAeM TT-QMS	x	x	x	x
DRA	1	1.2	1.2.1	Increased accuracy, timeliness and usefulness of tropical cyclone forecasts and warnings	WWW, DPFS, TCP	CBS	RA II	(a) Training on operational tropical cyclone forecasts and warnings (b) Training on medium-range forecasts and warnings (c) Training on the use of Ensemble Prediction System (EPS) and consensus technique for tropical cyclone forecasting	x	x	x	x

DRA	1	1.2	1.2.1	Promotion of the implementation of the "Competency Framework for PWS Forecasters and Advisors" in the Region	ETRP, PWSP	CBS	RA II	(a) Implement the "Competency Framework for PWS Forecasters and Advisors" in the Region (b) Provide training and technical support to flash flood and urban flood forecasting for operational nowcasting (0-6 hours ahead) service on high-impact weather (c) Training on short-range forecasts and warnings (6-24 hours ahead)		x	x	x
DRA	1	1.2	1.2.1	Participation in PWS capacity development activities	ETRP, PWSP	CBS	RA II	(a) Conduct a training on PWS (b) Conduct a training in Communications (c) Conduct a training on interpretation of radar/satellite information for improved nowcasting		x	x	x
DRA	2	2.1	2.1.1	Implemented WMO Guidelines on Multi-hazard Impact-Based Forecast and Warning Services in the preparation in moving towards impact-based forecasts practices in the NMHSs	ETRP, PWSP	CBS	RA II	Conduct a workshop-on impact-based forecast and warning for NMHSs and users		x	x	x
DRA	2	2.1	2.1.1	Enhanced communication with Members	PWSP	CBS	RA II	Annually update the list of PWS focal point, PWS technical contact and alerting authorities of Members, as well as their progress on PWS activities such as CAP implementation status		x	x	x
DRA	2	2.1	2.1.1	Enhanced capability of socio-economic benefit study	ETRP, PWSP	CBS	RA II	Organize workshop on socio-economic benefit study for Members in RA II or subregions		x	x	x
DRA	2	2.1	2.1.1	Enhanced capability of severe weather forecasting and warning services through SWFDP	WWW, DPFS	CBS, CAS	RA II	(a) Implement regional and national components of Severe Weather Forecasting Demonstration Project, in particular SWFDP-Southeast Asia, SWFDP-Central Asia and SWFDP-Bay of Bengal (b) Increase awareness of SWFDP and utilization by NMHS	x	x	x	x
DRA	3	3.1	3.1.1	Enhanced capability of the use of NWP, including EPS, products provided by RSMCs and advanced NWP centres	WWW, DPFS	CBS	RA II	(a) Identify the focal point of GDPFS and update annually; (b) Encourage NMCs to submit WMO Technical Progress Report on GDPFS and NWP research and analyze GDPFS status in RA II from these reports. (c) Collect Members' needs on NWP, including EPS, products (d) collect and share information on available resources and services provided by Members	x	x	x	x
DRA	5	5.4	5.4.1	Enhanced capability on sand and dust monitoring and forecasting	WWRP, GAW, DPFS	CAS, CBS	RA II	(a) Enhance the ability of partner research experts to deliver timely and quality forecasts of sand and dust storms under the WMO Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS) (b) Organize training on interpretation of sand and dust storm output from the SDS-WAS Asian Node (hosted by China), including how to access data and information (c) Examine data policies and exchange observational sand and dust data (d) Enhance the quality check and conduct intercomparison	x	x	x	x

DEPT	BRANCH	ER	KEY OUTCOME	KEY PERFORMANCE INDICATOR	DELIVERABLE	PRORGAMME	TC	REGION	ACTIVITY	Y2016	Y2017	Y2018	Y2019
DRA	RAP	1	1.2	1.2.1	Enhanced capability in using climate services operationally for farmers	WCP, AgMP	CAgM	RA II	Conduct workshops and training courses for Members in developing countries or least developed countries	x	x	x	x
DRA	RAP	3	3.2	3.2.2	Enhanced capability in providing climate prediction services to meet users' requirements	WCP, DPFS	CCl, CBS	RA II	(a) Further establish sub-regional Regional Climate Outlook Forums (RCOFs) (b) Enhance exchange and training on monthly/seasonal climate prediction including ENSO, IOD, monsoon and MJO predictions	x	x	x	x
DRA	RAP	3	3.2	3.2.4	Enhanced services of the Regional Climate Centres (RCCs)	WCP, DPFS	CCl, CBS	RA II	(a) Improve RCC products to meet Members' requirements; (b) Facilitate candidate RCCs to demonstrate the capabilities and move on to designation process	x	x	x	x
DRA	RAP	4	4.4	4.4.1	Improved observations for climate services	WCP, GCOS, WWW	CCl, CBS	RA II	(a) Enhance training on the maintenance of metadata records based on Climate Data Management System (CDMS); (b) Render assistance to NMHSs for Data Rescue (DARE) projects	x	x	x	x
DRA	RAP	1	1.2	1.2.1	Enhanced capability of Socio-economic impacts of weather and climate extremes on Agriculture	WCP, AgMP	CAgM	RA II	Organize workshop on socio-economic impacts of Weather and Climate extremes for Members in RA II or subregions	x	x	x	x

DEPT	BRANCH	ER	KEY OUTCOME	KEY PERFORMANCE INDICATOR	DELIVERABLE	PRORGAMME	TC	REGION	ACTIVITY	Y2016	Y2017	Y2018	Y2019
DRA	RAP	2	2.2	2.2.1	Improvement in hydrological warnings capability through enhanced and effective cooperation with other NMHSs	WWW, HWRP, DRR	CBS, CHy	RA II	(a) Prepare recommendations on the use of NWP outputs in flood forecasts; (b) Document approaches to ascertain the deterministic error of each ensemble element of NWP products; (c) Use WMO Flood Forecasting Initiative as platform		x	x	x
DRA	RAP	3	3.3	3.3.1	Improvement in adaptation capacity of water resources systems in a changing climate	WWW, HWRP, WCP	CBS, CHy, CCl	RA II	(a) Assess changes in climate extremes - Data and method of climate extreme study: data inventory, climate index - Trend of some climate extremes: temperature, rainfall and others (b) Translate climate and climate change information into actions in water resources development and management	x	x	x	x
DRA	RAP	3	2.1	2.1.1	Improvement in capacity for water-related disaster management (Hydrological extremes)	WWW, HWRP, DRR	CBS, CHy	RA II	(a) Organize a workshop on the provision of input and support to disaster management (b) Attend seminars on sediment disasters in order to communicate and cooperate among member countries		x	x	x
DRA	RAP	3	3.3	3.3.1	Improvement in hydrometric measurements with quality and accuracy	WWW, HWRP	CBS, CHy, CIMO	RA II	Provide guidance on the use of appropriate instrumentation and methods of observation in diverse conditions		x	x	x
DRA	RAP	2	2.2	2.2.1	Issuance of flood, flash and urban flood warnings and constantly improving upon them	WWW, HWRP, DRR	CBS, CHy	RA II	(a) Document experiences in the use of the Central Asia Region Flash Flood Guidance System (FFGS) in participating countries by reviewing its use (b) Facilitate FFGS understanding by operational hydrologists in the Region (c) Develop recommendations on the use of hydrological forecasts in flood management	x	x	x	x
DRA	RAP	2	2.1	2.1.1	Issuance of landslide/debris flow warnings and constantly improving upon them	WWW, HWRP, DRR	CBS, CHy	RA II	Collect and disseminate guidance materials and manuals on the assessment of rainfall/flood induced mass movement hazards and potential forecast methodologies		x	x	x
DRA	RAP	3	3.3	3.3.1	Development of national and regional capacity building programmes and related training activities for hydrological services	HWRP	CHy	RA II	Synthesize report from individual reports from participating countries in RA II on national and regional capacity development activities in hydrology and make recommendations on their enhancement		x	x	x

DEPT	BRANCH	ER	KEY OUTCOME	KEY PERFORMANCE INDICATOR	DELIVERABLE	PRORGAMME	TC	REGION	ACTIVITY	Y2016	Y2017	Y2018	Y2019
DRA	RAP	4	4.1	4.1.1	Update of Regional WIGOS Implementation Plan (RWIP)	WWW	CBS	RA II	Encourage the Task Team on Regional WIP for updating RWIP			X	X
DRA	RAP	4	4.1	4.1.1	Pre-operation of WIGOS in region II	WWW	CBS	RA II	(a) Establish a task team to analyze the main requirement of pre-operation of WIGOS and challenges for pre-operation of WIGOS in RA II; (b) Develop a guidance to pre-operation of WIGOS in Region II for Members; (c) Encourage Members to finalize the national WIGOS implementation plan.	X	X	X	X
DRA	RAP	4	4.1	4.1.2	Regular maintenance and calibration of observation instruments, and implementation of reliability measures on quality management routines and procedures of weather observations	IMOP, WWW	CIMO, CBS	RA II	Implement the RA II WIGOS Project to enhance the availability and quality management support for NMHSs in surface, climate and upper-air observations	X	X	X	X
DRA	RAP	4	4.1	4.1.2	Maintenance and enhancement of the measuring stations in the Region	WWW, WCP, MMOP	CBS, CCl, JCOMM	RA II	(a) Collect and share standard and best practices documents from RA II Members; (b) Encourage the collection of metadata on observing systems; (c) Support standard of Regional Instrument Centre (RIC)	X	X	X	X
DRA	RAP	4	4.1	4.1.2	Implementation of Implementation Plan for the Evolution of Global Observing Systems (EGOS-IP)	WWW	CBS	RA II	(a) Encourage Members to develop national reports on progress of Implementation Plan for the Evolution of Global Observing Systems (EGOS-IP); (b) Make gap analysis of observing network in RA II on the basis of users' requirements and existing observing network.	X	X	X	X
DRA	RAP	4	4.1	4.1.2	Development of Regional Basic Observing Network of RA II (RBON-II)	WWW	CBS	RA II	(a) Survey the comprehensive review of all existing observing systems in the Region; (b) Hold a workshop to develop a concept of RBON-II; (c) Develop the RBON-II by a task team and submit to the RA II session.	X	X	X	X

DRA	RAP	4	4.1	4.1.2	Development and implementation of the WIGOS data quality monitoring system	IMOP, WWW	CIMO, CBS	RA II	(a) Implement the WIGOS Project to enhance the availability and quality management support for NMHSs; (b) Organize RIC training workshops to ensure the accuracy of the instruments	X	X	X	X
DRA	RAP	4	4.1	4.1.2	Integration of Observing Systems for supporting Disaster Risk Reduction and aviation services	WWW	CBS	RA II	(a) Develop integrated weather radar product for severe weather monitoring at the sub-regional level; (b) Develop integrated surface-based and space-based operational products	X	X	X	X
DRA	RAP	4	4.1	4.1.2	Maintenance/enhancement of operational weather radar stations in the Region	WWW	CBS	RA II (joint with RA V)	(a) Improvement of data quality of existing radars; (b) Development and expansion of national radar networks; (c) Near real time international exchange of radar data; (d) Development of "sub-regional" radar data centre(s).	X	X	X	X
DRA	RAP	4	4.1	4.1.2	Maintenance/enhancement of ground station(s) in the Region to receive high-resolution images from geostationary meteorological satellites	WWW, SP	CBS	RA II	(a) Continue implementation of the RA II WIGOS Project to develop support for NMHSs in satellite data, products and training; (b) Encourage and facilitate exchange and training on relevant know-how.	X	X	X	X
DRA	RAP	4	4.1	4.1.2	Growth in spatial and temporal coverage of hydrological observation networks	HWR, WWW	CHY, CBS	RA II	Encourage Members to maintain stations with long hydrological records for climate services.	X	X	X	X
DRA	RAP	4	4.2	4.2.1	Update Regional WIS implementation plan	WWW	CBS	RA II	(a) Mobilize experts of “Local Secondment” for updating of Regional WIS Implementation Plan; (b) Continue identification of WIS requirements of Members; (c) Organize training, WIS experts' visit for WIS implementation.	X	X	X	X
DRA	RAP	4	4.2	4.2.1	Implementation of GISCs, DCPCs and NCs	WWW	CBS	RA II	(a) Demonstrate capabilities of GISCs and DCPCs; (b) Produce regional information documents on WIS; (c) Organize a regional and national workshop for potential DCPCs and NCs.	X	X	X	X
DRA	RAP	4	4.2	4.2.1	Assessment of the implementation of WIS	WWW	CBS	RA II	Carry out a survey to monitor the status of WIS Centres and Area Meteorological Data Communication Networks (AMDCN) development/implementation.	X	X	X	X

DRA	RAP	4	4.2	4.2.1	Development WIS application Pilot Project	WWW	CBS	RA II	(a) Develop and evaluate new WIS applications; (b) Provide evaluated techniques and applications to operational WIS centers.	X	X	X	X
DRA	RAP	4	4.2	4.2.1	Solution of isolated NMCs from the GTS	WWW	CBS	RA II	(a) Encourage and facilitate exchange on relevant know-how; (b) Render assistance to NMCs Baghdad and Kabul.	X	X	X	X
DRA	RAP	4	4.2	4.2.2	Connection to the Internet by broadband VPN	WWW	CBS	RA II	Provide assistance to NMCs.	X	X	X	X
DRA	RAP	4	4.2	4.2.2	Shift from the costly radiofacsimile broadcast of meteorological and oceanographic information in chart form to more economical modern communication means	WWW	CBS	RA II	(a) Encourage and facilitate exchange on relevant know-how; (b) Render assistance if needed to Members who wish to involve the operators and users in modernizing the service.	X	X	X	X
DRA	RAP	4	4.2	4.2.2	Improvement of the Regional Meteorological Telecommunication Network (RMTN) to meet the minimum required bandwidth of 128 kbps	WWW	CBS	RA II	(a) Encourage the migration from analogue to digital circuits in the Middle-East and Central Asia; (b) Continue annual survey in the RMTN status.	X	X	X	X
DRA	RAP	4	4.2	4.2.2	Data catalogue implementation by DCPCs and NCs	WWW	CBS	RA II	(a) Review and complement the initial catalogue for DCPCs and NCs; (b) Develop a system to update data catalogue with relevant centres.	X	X	X	X
DRA	RAP	4	4.2	4.2.2	Validation checking and Maintaining Data catalogue in the area of responsibility by the related GISC(s)	WWW	CBS	RA II	Review and check the updated data catalogue to maintain its reliability in the area of responsibility.	X	X	X	X

DEPT	BRANCH	ER	KEY OUTCOME	KEY PERFORMANCE INDICATOR	DELIVERABLE	PRORGAMME	TC	REGION	ACTIVITY	Y2016	Y2017	Y2018	Y2019
DRA	RAP	1	1.2	1.2.1	Enhancement of socio-economic benefits (SEB) of weather, climate and water services (Assessment of SEB of weather, climate and water services)	WWW, PWSP	CBS	RA II	(a) Implement the socio-economic studies and evaluations at regional level based on the recommendation of the book on methodologies for assessing SEB being prepared by WMO in collaboration with the World Bank	X	X	X	
									(b)Develop a web-based SEB guidance platform	X	X		
									(c) Examine and facilitate the exchange of data between the regional Members	X	X		
DRA	RAP	7	7.1	7.1.3	Enhancement of joint activities with partner organizations for utilization of meteorological information to be used as the guidance for decision making in national level	WCP, RP	CCl	RA II	Joint Workshop in the field of health, water, food, energy, etc., with partner organizations			X	
DRA	RAP	7	7.2	7.2.1	Enhancement of visibility of activities and priorities of NMHS and communication with stakeholders and with regional organizations	PWSP	CBS	RA II	(a) Implementation of recommendations at regional level given by the guideline on communication with stakeholders including academia and regional organizations being prepared by WMO CBS/OPAG-PWS ET/COPE		X	X	
									(b) Training on relevant know-how		X		X

ANNEX VIII

LIST OF THE RA II REGIONAL ACTIVITIES (2016–2019)

Years / Regional Events	2016	2017	2018	2019
Session of the Association		12-16 Feb. Abu Dhabi, UAE (RA II-16)		
Regional Conference on the Management of Meteorological and Hydrological Services (RECO)		10-11 Feb. Abu Dhabi, UAE (RECO-7)		
Regional Forum for Directors of NMHSs in RA II				Feb./Mar.
Meeting of Management Group (MG)	June Geneva (MG-10) Dec. Abu Dhabi, UAE (MG-11)	May/June Geneva (MG-12)	May/June Geneva (MG-13)	May/June Geneva (MG-14)
RA II WG-ICT-TT Chairs' Meeting	Dec. Abu Dhabi, UAE	Dec.		
Working Group on Weather Services (WGWS)			x	
Working Group on Climate Services (WGCS)				x
Working Group on Hydrological Services (WGHS)			x	
Working Group on WMO Integrated Global Observing System (WIGOS) and WMO Information System (WIS) (WG-WIGOS/WIS)	Second half EG-WIGOS			x
WMO/JMA SIGMET Workshop	27–30 June Tokyo, Japan			

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ANNEX IX

LIST OF PARTICIPANTS

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