SUMMARY REPORT

RA II WIGOS Workshop
- Regional WIGOS Centres (RWCs) and its services for Members

Japan Meteorological Agency, Tokyo, Japan
6 – 9 March 2019

1 Introduction

1.1 The *RA II WIGOS Workshop - Regional WIGOS Centres (RWCs) and its services for Members* was held at the Japan Meteorological Agency (JMA) headquarters in Tokyo, Japan, from 6 to 9 March 2019. The workshop was hosted by JMA and co-organized by the World Meteorological Organization (WMO) Secretariat.

1.2 According to the decision of the 17th World Meteorological Congress (Cg-17, 2015), establishment of RWCs is one of five priority areas for the WMO Integrated Global Observing System (WIGOS) in its pre-operational phase (2016 – 2019). With the prospect for WIGOS to become operational in 2020, China, India, Japan, the Russian Federation and Saudi Arabia are preparing to provide RWC support for Members in Regional Association (RA) II. This will require the future RWCs and the RA-II Members to discuss and coordinate support and functionalities of RWCs harmoniously to maximize potential benefits of the region.

1.3 The objectives of the workshop were:

(i) to foster mutual understanding of WIGOS key issues and systems, including OSCAR/Surface and the WIGOS Data Quality Monitoring System (WDQMS);
(ii) to facilitate practical discussions on collaboration between RWCs and Members to improve the availability and quality of observations; and
(iii) to share information on RWC services with Members in line with appropriate users' requirements.

1.4 Mr. Krunoslav Premec (WMO Secretariat) and Mr. Toshihiro Hayashi (JMA) served as co-moderators on the first day (6 March 2019). Mr. Kohei Matsuda (JMA) served as moderator on the other three days (7-9 March 2019).

1.4 The workshop agenda is provided in **Annex I** of this report.

1.5 Documents and information on the workshop are available at https://www.jma.go.jp/jma/jma-eng/jma-center/rwc/event/RWCws_2019/

2. Attendance

2.1 The workshop was attended by 21 experts from 17 National Meteorological and Hydrological Services (NMHSs) in RA II (Bangladesh, Bhutan, China, India, Lao People's Democratic Republic, Maldives, Mongolia, Myanmar, Nepal, Pakistan, the Russian Federation, Saudi Arabia, Sri Lanka, Thailand, United Arab Emirates and Viet Nam) and RA V (the Philippines) as well as from WMO Secretariat and JMA.

2.2 A list of participants is provided in **Annex II** of this report.

3. Workshop opening

3.1 The workshop was opened by Mr. Naoyuki Hasegawa (Director-General of JMA's Observation Department), who welcomed the participants to Tokyo and highlighted the importance of meteorological observations as an infrastructure for the daily lives of people. He pointed out that WIGOS is a timely and highly appropriate initiative to cope with extreme weathers on increase, and the RWCs should play a central role by providing supports to Members for the managements of quality and the basic information on the observation systems. He also encouraged the all at the premise to deepen the cooperation and friendships not only regarding the observation instruments and WIGOS but also the entire meteorological services in broader perspectives.

3.2 Mr. Abdullah Ahmed Al Mandoos (President of RA II and Executive Director of National Centre for Meteorology, United Arab Emirates) gave a video address to wish the participants a successful meeting. He reminded the participants

of the RWCs' critical role by providing regional coordination and technical supports to Members. He expected that China, India, Japan, the Russian Federation and Saudi Arabia, as RWCs, designing their functions to commence operating in 2020, hence this workshop is a good opportunity for both Members and RWCs to recognize the current issues and to consider solutions toward building appropriate services which RWCs should provide.

4. Session 1: Introduction

4.1 Dr. Lars Peter Riishojgaard (WMO Secretariat) gave a keynote presentation titled "The WMO Integrated Global Observing System; Introduction and Overview". His presentation included an overall introduction to WIGOS and its activities of the Pre-operational Phase (2016-2019). Dr. Riishojgaard described the status of the key components of WIGOS; the WMO Rolling Review of Requirements, the three OSCAR databases (OSCAR/Requirements, OSCAR/Space and OSCAR/Surface) and WDQMS. He stressed importance of global numerical weather prediction (NWP) for all WMO Members and the benefits of the Global Basic Observing Network (GBON), which will lead to better global NWP output for the benefit of all WMO Members.

4.2 A poster session was held during the morning break on the first day (6 March 2019). JAXA, JMA and NICT gave poster presentations on satellite-based precipitation dataset (GSMaP), satellite-based air quality monitoring, new remote sensing technology, low-cost instruments and advanced weather analysis map.

4.3 Mr. Krunoslav Premec (WMO Secretariat) gave a keynote presentation titled "CIMO-17 outcomes and CIMO activities - Quality management". He reminded the workshop participants of a general role and key activities of the Commission for Instruments and Methods of Observation (CIMO) and of the major WMO/CIMO regulatory and guidance documents, with a particular emphasis on the Guide to Instruments and Methods of Observations (WMO-No. 8). Mr. Premec highlighted the availability of different regional centres in RA II, such as Regional Instrument Centres (RICs), Regional Marine Instruments Centres (RMICs), Regional Radiation Centres (RRCs), Regional Training Centres (RTCs) and CIMO Testbeds and Lead Centres. He invited the participants to utilize the existing services to their full potential. Mr. Premec presented some of the key resolutions, decisions and

recommendations adopted at the 17th session of CIMO and invited participants to follow those as appropriate. On the final slide, Mr. Premec described very briefly the WMO constituent body reform, indicating a possible scenario for CIMO roles and activities within the future WMO structure.

4.4 Mr. Seiichiro Kigawa (JMA) gave a presentation titled "Development Framework" focusing on the regional developmental framework. He pointed out that about 60 % of the world population currently reside in Asia, and that disaster risk reduction is a major concern in the area. He introduced the JMA's activity on the Regional Specialized Meteorological Centre (RSMC) for Nowcasting to face the Asia's challenge. He explained that the centre provides satellite-derived nowcasting products to the region in their developmental framework, whilst pointing out that satellite-derived products are insufficient on their own. He explained that the key components of the JMA's 10-year plan combining product development and technical support/training are Himawari products, GSMaP, Southeast Asian radar network and Tokyo Action Plan 2018, describing in detail various actions to be taken for the key components. He introduced the discussion on the concept of integrated QPE/QPF with a few countries prior to the workshop. Mr. Vanhdy Douangmala (DMH of Lao PDR) and Mr. Hla Tun (DMH of Myanmar) commented on the effective use of satellite links and data exchanges among national and regional centres.

5. Session 2: Open seminar - Integration, quality management and application

5.1 Meteorological instrument manufacturers, radar manufacturers, and Japan International Cooperation Agency (JICA) were invited to participate in this session.

5.2 Mr. Krunoslav Premec (WMO Secretariat) gave a presentation titled "CIMO TECO-2018 highlights - Towards fit-for-purpose environmental measurements". He stressed that the WMO Technical Conference on Meteorological and Environmental Instruments and Methods of Observation (CIMO TECO-2018) was a real success in terms of the quality of the presented papers, as well as in attendance of experts from various disciplines. More than 400 experts had chances to explore altogether 173 oral and poster presentations and also to visit Meteorological Technology World Exhibition, whilst participating in the joint CIMO TECO-2018 and

the Global Weather Enterprise Conference (GWEC) session. Further in the presentation, Mr. Premec explained a short summary of the discussion sessions on new data sources and on automatic weather station (AWS) tender specifications. He also summarized the outcomes of the CIMO TECO-2018 feedback survey and commented on JMA Questionnaire Survey on the Workshop Content (2.1). Mr. Premec concluded his presentation by encouraging the workshop participants to test the AWS tender specifications and invited them to participate in the next CIMO TECO conference tentatively scheduled in Paris in the late September 2020.

5.3 Dr. Takuji Kubota (Japan Aerospace Exploration Agency (JAXA)) gave a presentation titled "GSMaP —Integrated application with developer and user collaboration—". He explained that JAXA's Global Satellite Mapping of Precipitation (GSMaP) is a multi-satellite precipitation product utilized globally, especially in Asia. He also explained validation results using ground instruments, integration of GSMaP and radar data demonstrated in the Philippines and the Fiji. He expected to promote the collaboration between JAXA and JMA with Asian users for integrated applications.

5.4 Mr. Soshi Iwata (Japan Weather Association (JWA)) gave a presentation titled "Proposed framework for integrated regional radar network". He introduced the background and the outline of the survey commissioned by JMA to understand the current status of weather radar operation, maintenance and data utilization in Asia in order to develop a framework of the integrated regional radar network. He summarized the results of the questionnaire survey distributed to 14 countries in Asia regarding the weather radar operations in each country, and the field survey undertaken in four selected countries with interviews for further understandings. He indicated several steps toward the integrated regional radar network, for a better radar operation with improved quality control (QC), quantitative precipitation estimation (QPE), and domestic radar composite. He pointed to the necessity of building a capacity at each step for high-performance radars, such as solid-state radar and dual-polarization radar, which could improve the situation.

5.5 Dr. Shoichiro Kojima (National Institute of Information and Communications Technology (NICT)) gave a presentation titled "Innovative remote sensing measurements as new data sources". He introduced remote sensing technologies such as a new radar utilizing phased array technology to observe rain clouds at high speed in three dimensions, a water vapor observation technique using

broadcasting waves with Pi-SAR X2, and the NICT's synthetic aperture radar (SAR) to observe floods and landslides.

5.6 Mr. Seiichiro Kigawa (JMA) gave a presentation titled "Observation for 2030 Vision". He explained that JMA has currently been working on the JMA Vision 2030, on purposes to respond appropriately to extreme weathers and to sustain vitality in everyday livings, innovative drives in economic activities and other endeavors. He highlighted the necessary operation and improvements which are to be made on the JMA's basic observation network to achieve these goals. He pointed out that an integrative operation of land-based instruments, radars and satellites, is expected to support a favorable balance between the introduction of high-resolution state-of-the-art observation instruments and the implementation of compact observation systems. He also highlighted the integrated usage of observation data collected by various bodies. He stated that JMA's weather analysis map integrated surface, radars and satellite observations will be conjoined with Internet of Things (IoT) supported by low-cost instruments. He called attention to a necessity of providing traceability and information on the observation environment of such low-cost instruments.

5.7 During the afternoon break on the first day (6 March 2019), poster presentations and an exhibition on instruments took place. JAXA, JMA and NICT kept the same posters from the morning break. The exhibition showcased the products and capabilities of various meteorological instrument manufacturers and radar manufacturers.

5.8 Mr. Krunoslav Premec (WMO Secretariat) gave a presentation titled "Measurement Quality Classifications for Surface Observing Stations on Land". At the beginning, participants were reminded of the existing Siting Classification for Surface Observing Stations on Land. A conclusion was reached through interactions with the audiences that participants presented at the workshop had not implemented this classification scheme yet. Mr. Premec then described in detail the contents of Measurement Quality Classification for Surface Observing Stations on Land. He informed participants of new CIMO Task Team on Classifications scheme (TT-Class), mentioning the representatives of RA II in the team. At the end of his presentation, Mr. Premec invited the participants to actively participate to further develop and finalize the scheme, by submitting their proposals either directly to TT-Class or via

the representatives of RA II.

5.9 Mr. Toshihiro Hayashi (JMA) and Mr. Krunoslav Premec (WMO Secretariat) reported the summary of a pre-workshop survey by revising the previous presentations in Session 2 and supporting the following discussion on measurement quality classifications.

5.10 Participants discussed measurement quality classifications based on the presentation from WMO Secretariat and pre-workshop survey results. Mr. Krunoslav Premec (WMO Secretariat) with Mr. Toshihiro Hayashi (JMA) led the discussion. Participants' recommendations were summarized in Session 4.

6. Session 3: Operation of RWC mandatory functions

6.1 Dr. Lars Peter Riishojgaard (WMO Secretariat) gave a presentation titled "WIGOS Technical Systems (OSCAR/Surface and WDQMS) and Regional WIGOS Centers (RWCs)". He described that OSCAR/Surface has replaced WMO Pub. 9, Volume A, and regional training events and monthly webinars has been delivered to support Members. He also mentioned the status of development of the OSCAR/Surface application programming interface (API). Dr. Riishojgaard introduced the three major functions of WDQMS and WDQMS Pilot project with Global NWP Centres with monitoring examples. He pointed out that RWCs are a key element in supporting Members in the implementation of WIGOS and in improving the overall performance of WIGOS; in particular, providing support to other Members regarding the operational uptake and use of OSCAR/Surface and WDQMS are essential elements in the pilot phase of the RWCs.

6.2 Mr. Kohei Matsuda (JMA) gave a presentation titled "Introduction of RWC mandatory functions" focusing on the practical aspects of OSCAR/Surface and WDQMS. He outlined the relationship between WIGOS Metadata Standard and OSCAR/Surface database and the simple usage of OSCAR/Surface. He showed that JMA has keenly been confirming and updating more than 150 surface stations in Japan registered in OSCAR/Surface and corresponding to the development of OSCAR/Surface API. He encouraged Members to make plans for registering their metadata in OSCAR/Surface and to keep the data up-to-date toward the final goal of managing all metadata in OSCAR/Surface. He also outlined that WDQMS is composed

of Monitoring, Evaluation and Incident Management functions. He pointed out that the key to success of WDQMS is clear communications between RWCs and Members (i.e. data suppliers) and therefore each Member should understand how WDQMS works.

6.3 Reports from 17 countries (Bangladesh, Bhutan, China, India, Lao People's Democratic Republic, Maldives, Mongolia, Myanmar, Nepal, Pakistan, the Philippines, the Russian Federation, Saudi Arabia, Sri Lanka, Thailand, United Arab Emirates and Viet Nam) were presented in a poster form with focuses on the status of overall observational resources and future plans including the RWC implementation. The poster session generated active discussions among presenters and participants.

6.4 Following the country reports, the 17 countries shared the contents of discussions of the poster session with all participants.

6.5 Workshop participants visited JMA facilities, viewing its observation operation room and its forecast operation room.

6.6 Mr. Kohei Matsuda (JMA) reported a pre-workshop survey summary on OSCAR/Surface for supporting the following discussion on RWC mandatory functions.

6.7 Regarding the discussion on RWC mandatory functions with a focus on a high prioritized area in OSCAR/Surface and WDQMS, Mr. Kohei Matsuda (JMA) introduced JMA’s status and its plans on OSCAR/Surface and WDQMS, and suggested near-term goals in RA II. His presentation was based on the presentations by WMO Secretariat and those by JMA, and also on pre-workshop survey results. He provided a JMA’s future plan to manage OSCAR/Surface step by step and a plan to introduce an issue-tracking system aiming to identify the silent stations as the initiating step of the process. Dr. Li Changxing (CMA) gave a presentation on the status and plans on RWC in China. He reported the overall status of the implementation plan of the RWC pilot project of CMA, including quality monitoring and evaluation of surface, upper-air and radar observations, metadata maintenance in OSCAR/Surface, and the Rolling Requirements Review (RRR) process of the AWS network optimization. He unveiled the CMA plans on human resource training, provision of technical supports and services to strengthen cooperation between Members. All participants recognized

the usefulness of WDQMS especially in dealing with the issue of silent stations, and also the necessity of maintaining the information in OSCAR/Surface up to date for the successful implementation of WDQMS. The Workshop recommended that OSCAR/Surface training should be provided to all RA-II Members.

7. Session 4: Technical support as RWC optional functions

7.1 Mr. Krunoslav Premec (WMO Secretariat) reported draft recommendations about Measurement Quality Classifications discussed on the first day (6 March 2019). Participants reviewed and approved the recommendations (see **Annex III**).

7.2 Mr. Seiichiro Kigawa (JMA) gave a presentation titled "Introduction of RIC-RWC collaboration" to explain why the following RIC presentations and discussion are organized.

7.3 Dr. Li Changxing (CMA) gave a presentation on RIC Beijing activities including traceability, inter-comparisons and field testing of meteorological instruments. He also reported on the international collaboration between RICs, technical trainings and calibration services for Members.

7.4 Mr. Rex L. Abdon Jr. (the Philippine Atmospheric, Geophysical and Astronomical Services (PAGASA)) gave a presentation on the PAGASA's organization with information on the RIC Manila functions. He also reported on their plans to establish three Local Instrument Centres with a calibration laboratory and field inspection personnel.

7.5 Mr. Kouichi Nakashima (RIC Tsukuba, JMA) gave a presentation on JMA's Meteorological Instrument Center and its functions as RIC Tsukuba. His presentation included activities such as calibration and training services for Members and interlaboratory comparison among RICs.

7.6 Regarding the question of "how do we encourage a skilled staff?", Mr. Seiichiro Kigawa (JMA) reported a pre-workshop survey summary on this topic and led the discussion.

7.7 Regarding the question of "how do we develop an expert community based on the inter-regional collaboration?", Mr. Seiichiro Kigawa (JMA) reported a pre-workshop survey summary on this topic and led the discussion. Malaysian Meteorological Department (MMD) provided a video clip introducing the collaborative activities on a satellite product development between MMD and JMA.

7.8 Regarding the question of "how do we improve observing systems?", Mr. Seiichiro Kigawa (JMA) reviewed the JMA/WMO Workshop on Quality Management of Surface Observations held in March 2018 and the Tokyo Action Plan 2018 as the outcome of the workshop. He reported the status of the Tokyo Action Plan 2018 and a pre-workshop survey summary on this topic prior to leading the discussion. Some participants of the workshop in 2018 gave video messages to enhance the discussion. The WMO/CIMO Lead Centre "B.Castelli" on Precipitation Intensity provided a video lecture demonstrating a portable rain-gauge calibrator operation.

7.9 Regarding the question of "how do we develop products and train the experts?", Mr. Seiichiro Kigawa (JMA) reported a pre-workshop survey summary on this topic and led the discussion. Mr. Nobuyuki Tanaka (Meteorological College, JMA) gave a presentation highlighting its education programs. All participants recognized that human resource development is a common issue in many countries and there was a lively discussion on the training system.

7.10 Regarding the question of "what can RWCs do for developing human resources in the region?", Mr. Seiichiro Kigawa (JMA) reported a pre-workshop survey summary on this topic and led the discussion.

7.11 Mr. Seiichiro Kigawa (JMA) reported a pre-workshop survey and an interview summary on improving services and summarized the discussions on developmental framework as optional functions of RWC.

8. Session 5: Wrapping up of the workshop

8.1 Based on the talks and inputs from Session 4, Mr. Seiichiro Kigawa (JMA) proposed a concept of "Regional Meteorological College" covering emerging issues such as new data sources and fit-for-purpose measurements in addition to meteorology and hydrology for an idea. Mr. Kohei Matsuda (JMA) reviewed the

presentations and the discussions on topics of future RWCs, providing a summary on future operations and activities of RWCs to comprise:

(i) Supporting Members to register in OSCAR/Surface database and make appropriate corrections through sharing expertise or experience;

(ii) Establishing Evaluation and Incident Management functions and providing incident information through WDQMS with close communications, especially on silent stations;

(iii) Sharing experiences and seeking collaborations through a mechanism of coordination among RWCs in the pilot mode;

(iv) Collaborating with other RWCs and relevant bodies such as RICs and RTCs in providing technical supports for Members;

(v) Holding workshops, training events, or participating in such events as lecturers, with utilization of webinars or video conferences as necessary; and

(vi) Promoting to develop human resources by the "teaching how to teach" approach.

8.2 Mr. Kohei Matsuda (JMA) reviewed the workshop on the whole. As outcomes of the workshop, Dr. Lars Peter Riishojgaard (WMO Secretariat) summarized the workshop recommendations. Participants reviewed and approved the recommendations (see **Annex IV**).

9. Workshop closure

9.1 Mr. Yoshiaki Hirano (JMA) and Dr. Lars Peter Riishojgaard (WMO Secretariat) provided closing remarks.

—END—

ANNEX I

RA II WIGOS Workshop

- **Regional WIGOS Centres (RWCs) and its services for Members**

AGENDA

Opening

Session 1: Introduction

1.1) Introduction of WIGOS —Integration—

1.2) CIMO-17 outcomes and CIMO activities —Quality management—

1.3) Development framework —Application—

Session 2: Open seminar - Integration, quality management and application

2.1) CIMO TECO-2018 highlights —Towards fit-for-purpose environmental measurement—

2.2) GSMaP —Integrated application with developer and user collaboration—

2.3) Proposed framework for Integrated regional radar network

2.4) Innovative remote sensing measurements as new data sources

2.5) Observation for 2030 Vision

2.6) Measurement quality classifications for surface observing stations on land

2.7) Survey results

2.8) Discussion on measurement quality classification

Session 3: Operation of RWC mandatory functions

3.1) Update on WIGOS and RWCs

3.2) Introduction of RWC mandatory functions

3.3) Country report

3.4) Country report summary

3.5) Technical tour

3.6) Survey results

3.7) Discussion on RWC mandatory functions

Session 4: Technical support as RWC optional functions

4.1) Review of Day 1 recommendations about Measurement Quality Classifications
4.2) Introduction of RIC-RWC collaboration
4.3) RIC Beijing report
4.4) RIC Manila report
4.5) RIC Tsukuba report
4.6) Discussion: How do we encourage skilled staff?
4.7) Discussion: How do we develop an expert community based on inter-regional collaboration?
4.8) Discussion: How do we improve observing system? —Review of Tokyo Action Plan 2018 status—
4.9) Discussion: How do we develop products and train experts? —JMA's 10-year plan and collaborative approaches—
4.10) Discussion: What can RWCs do for developing human resource in the region?
4.11) Discussion summary —Development framework as RWCs optional functions—

Session 5: Wrap up of the workshop
5.1) Future operation and activities of RWCs
5.2) Outcomes of the workshop

Closure

ANNEX II

LIST OF PARTICIPANTS

Bangladesh	
Mr. Abdul Awal	Assistant Meteorologist, Upper Air Data Prepare & Analysis Bangladesh Meteorological Department (BMD)
Bhutan	
Mr. Phuntsho Namgyal	Chief Engineer, Hydromet Operations & Infrastructure Division National Center for Hydrology and Meteorology (NCHM)
China	
Dr. Li Changxing	Deputy Director of Meteorological Observation Center (MOC) China Meteorological Administration (CMA)
India	
Mr. Kanchibhatla Nalini Mohan	Scientist-F & Head Surface Meteorological Instruments, Climate Research and Services India Meteorological Department (IMD)
Lao People's Democratic Republic	
Mr. Vanhdy Douangmala	Head of Aeronautical Meteorology Division Department of Meteorology and Hydrology (DMH)
Maldives	
Mr. Ibrahim Humaid	Seismologist Maldives Meteorological Service (MMS)
Mongolia	
Dr. Amgalan Ganbat	Senior Officer in charge of Meteorological Program and Technology National Agency for Meteorology and Environmental Monitoring (NAMEM)
Myanmar	
Mr. Hla Tun	Deputy Director, Meteorological Division Department of Meteorology and Hydrology (DMH)
Nepal	
Mr. Sunny Maharjan	Meteorologist Department of Hydrology and Meteorology (DHM)

Ms. Shanti Kandel	Senior Divisional Meteorologist Department of Hydrology and Meteorology (DHM)
Pakistan	
Mr. Muhsin Ali	Section Officer, Aviation Division, Islamabad Pakistan Meteorological Department (PMD)
The Philippines	
Mr. Rex L. Abdon Jr.	Weather Specialist I Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)
The Russian Federation	
Dr. Alexander Gusev	Deputy Director Russian Institute of Hydrometeorological Information - World Data Centre Federal Service for Hydrometeorology and Environmental Monitoring (Roshydromet)
Saudi Arabia	
Mr. Mohammed Alawi Babidhan	Director, Center for Crisis and Disaster Management General Authority for Meteorology and Environment Protection (GAMEP)
Mr. Fazi Hasan Alkhuzaie	Senior Observer, Center for Crisis and Disaster Management General Authority for Meteorology and Environment Protection (GAMEP)
Sri Lanka	
Ms. Dulari Gangani Fernando Asurappulige	Deputy Director of Meteorology Department of Meteorology (DOM)
Thailand	
Dr. Wanchalearm Petsuwan	Computer Technical Officer South East Asia Meteorological Telecommunication Center Thai Meteorological Department (TMD)
United Arab Emirates	
Mr. Mohamed Abdulla Alebri	Director of Meteorology Department National Centre of Meteorology (NCM)
Viet Nam	
Dr. Duong Van Khanh	Director of Hydrometeorological Observation Center (HYMOC) Viet Nam Meteorological and Hydrological Administration (VNMHA)

World Meteorological Organization (WMO)

Dr. Lars Peter Riishojgaard	WIGOS Project Manager, WIGOS Project Office World Meteorological Organization
Mr. Krunoslav Premec	Scientific Officer, Instruments and Methods of Observation Observing and Information Systems Department World Meteorological Organization

Japan Aerospace Exploration Agency (JAXA)

Dr. Takuji Kubota	Associate Senior Researcher, Earth Observation Research Center (EORC)
Ms. Moeka Yamaji	Researcher, Earth Observation Research Center (EORC)
Dr. Maki Kikuchi	Researcher, Earth Observation Research Center (EORC)
Dr. Mayumi Yoshida	Associate Senior Engineer, Earth Observation Research Center (EORC)

National Institute of Information and Communications Technology (NICT)

Dr. Shoichiro Kojima	Research Manager, Remote Sensing Laboratory Applied Electromagnetic Research Institute
Dr. Katsuhiro Nakagawa	Director, Remote Sensing Laboratory Applied Electromagnetic Research Institute
Dr. Yuko Hanado	

Japan Weather Association (JWA)

Mr. Soshi Iwata	Senior Engineer, Disaster Mitigation Support Section
Mr. Hideshige Iida	Senior Engineer, Overseas Business Section
Ms. Chiho Kimpara	Innovative Weather Solutions Section

Experts from Japan Meteorological Agency (JMA)

Observation Department

Mr. Naoyuki Hasegawa	Director-General

Administration Division, Observation Department

Mr. Yoshiaki Hirano	Senior Coordinator for Observation Planning
Mr. Kohei Matsuda	International Strategy Officer for Meteorological Observation
Mr. Toshihiro Hayashi	Scientific Officer

Office of Meteorological Analysis and Application Development, Administration Division, Observation Department

Mr. Seiichiro Kigawa	Senior Coordinator for Development Collaboration
Ms. Hiromi Owada	Senior Scientific Officer
Mr. Masanori Oigawa	Assistant Scientific Officer

Meteorological Instrument Center, Observation Division, Observation Department

Mr. Kouichi Nakashima	Scientific Officer, Regional Instrument Centre (RIC) Tsukuba

Meteorological College

Mr. Nobuyuki Tanaka	Professor Director, Registrar Division

Local Coordinating Staff from JMA

Administration Division, Observation Department

Ms. Keiko Makiyama	Assistant Scientific Officer

Office of Meteorological Analysis and Application Development, Administration Division, Observation Department

Mr. Shiro Omori	Senior Scientific Officer
Mr. Toshiyuki Kitajima	Scientific Officer
Mr. Takumi Maruyama	Assistant Scientific Officer
Ms. Yukie Gotou	Assistant Scientific Officer

Office of Data and Information Services, Administration Division, Observation Department

Mr. Yasushi Izumikawa	Senior Scientific Officer
Mr. Hirokatsu Onoda	Scientific Officer
Mr. Hidehiro Omori	Scientific Officer
Mr. Yusuke Baba	Assistant Scientific Officer
Ms. Mai Miura	Assistant Scientific Officer

Observation Division, Observation Department

Mr. Satoshi Hagiya	Scientific Officer
Mr. Masahiro Umezaki	Scientific Officer
Mr. Yuki Saeki	Assistant Scientific Officer

Mr. Yuki Mitani	Assistant Scientific Officer

Meteorological Instrument Center, Observation Division, Observation Department

Mr. Takeyuki Ichihara	Senior Scientific Officer
Mr. Hiroumi Shigeoka	Scientific Officer
Mr. Masaki Kuroiwa	Assistant Scientific Officer

Satellite Program Division, Observation Department

Mr. Akiyoshi Andou	Senior Scientific Officer

Numerical Prediction Division, Forecast Department

Mr. Yukinari Ota	Senior Scientific Officer

Information and Communications Technology Division, Forecast Department

Mr. Kentaro Tsuboi	Scientific Officer
Mr. Shuichi Ikeda	Assistant Scientific Officer

Center for Information on Climate Extremes, Climate Prediction Division, Global Environment and Marine Department

Mr. Noriyuki Adachi	Scientific Officer

ANNEX III

Recommendations about Measurement Quality Classifications

As presented by participants at RA II WIGOS Workshop
- Regional WIGOS Centres (RWCs) and its services for Members
Japan Meteorological Agency, Tokyo, Japan, 6 – 9 March 2019

1. Members are urged to implement Siting Classification for Surface Observing Stations on Land and share their experiences with this implementation.

2. CIMO Task Team on Classification Schemes (TT-Class) is invited to examine Siting Classification in the sense of its applicability for different terrain (for example, mountain areas, steep slopes, urban areas) and provide updates and/or guidance, as necessary.

3. Measurement Quality Classification scheme is recognized as a helpful tool to increase the reliability of the measurement data and to improve the measurement quality.

4. Possible concerns expressed by survey respondents, including the existence of many low-class stations and a need for additional human resources in implementing the scheme, should be the parts of the challenges for the improvement of the overall measurement quality.

5. TT-Class is encouraged to clearly indicate benefits of implementation of the classification schemes in the introductory text of the schemes, and to consider developing a relevant guidance material.

6. TT-Class is invited to consider inclusions and interpretations of different averaging intervals in Measurement Quality Classifications for Surface Observing Stations on Land.

7. Finalization and approval of the Measurement Quality Classification Scheme

is supported firmly by the Workshop participants.

8. Future development of Measurement Quality Classification Scheme could include measurands from remote sensing instruments (weather radars, wind profilers, lidars, etc.), and upper-air stations, based on available resources.

9. TT-Class is invited to explore possibilities for developing quality classifications for manual measurements.

10. WIGOS Task Team on Metadata is invited to consider an inclusion of indicators of both classification schemes as optional metadata in the WIGOS Metadata Standard.

11. Members are encouraged to share their experiences on maintenances and field calibrations by submitting relevant guidance materials, which is to be posted on CIMO Knowledge-sharing portal: https://www.wmo.int/pages/prog/www/IMOP/Knowledge-sharing_Portal.html

ANNEX IV

Workshop Recommendations

As presented by participants at RA II WIGOS Workshop
- Regional WIGOS Centres (RWCs) and its services for Members
Japan Meteorological Agency, Tokyo, Japan, 6 – 9 March 2019

(to WMO Secretariat)

1. Training in OSCAR/Surface to be provided to every RA-II Member;

2. Guidance on the assignment of WIGOS Station IDs to be communicated to Members;

3. Communications regarding OSCAR National Focal Points to be shared with Workshop participants in addition to standard communication with PR's office;

4. Clear process and guidelines regarding usernames and passwords for OSCAR/Surface upon request;

(to RA-II Members/Workshop participants)

5. Participation to OSCAR Webinars when possible;

6. Participation to API testing (Machine to machine interface);

7. Provisions of assistances in spreading awareness of OSCAR/Surface and related training events in Members'/participants' own service;

8. Reviewing the availability of observations from Members'/participants' own country as presented by WDQMS and notifying RWCs of any inconsistency upon its discovery;

(regarding RWCs)

9. RWCs to align closely with GISCs and other WMO centers where possible;

10. RWCs to provide appropriate supports in capacity development to Members aligned with the Centre;

11. Seeking a direct one-to-one affiliation between a RWC and a Member is not recommended at this stage;

12. RWC coordination in RA II in continuation; the next opportunity for a coordination meeting will be during the RA II WIGOS Workshop held in Jeddah between 30 April and 2 May, 2019.