World Meteorological Organization
Regional Association II (Asia)

Pilot Project to Enhance the Availability and Quality Management Support for NMHSs in Surface, Climate and Upper-air Observations

JMA/WMO
WORKSHOP ON QUALITY MANAGEMENT IN SURFACE, CLIMATE AND UPPER-AIR OBSERVATIONS IN RA II (ASIA)

TOKYO, JAPAN, 27 TO 30 JULY 2010

FINAL REPORT

Japan Meteorological Agency
World Meteorological Organization

Participants in the JMA/WMO Workshop on Quality Management in Surface, Climate and Upper-air Observations, Tokyo, Japan, 27- 30 July 2010

1. Introduction

1.1 The Pilot Project to Enhance the Availability and Quality Management Support for NMHSs in Surface, Climate and Upper-air Observations was established at the fourteenth session of Regional Association II (Asia), held in Tashkent, Uzbekistan in December 2008, to provide technical support to NMHSs of developing countries or least developed countries to ensure that quality assured observational data from weather, climate and upper-air stations are made available for the World Weather Watch, and the WMO Integrated Global Observing System and other relevant WMO programmes, including the provision of relevant tools on a centralized website to meet the stated purpose, and training activities. Japan was appointed as the Coordinator of the Coordinating Group of the Pilot Project at the session.

1.2 Within the framework of the Pilot Project, the Japan Meteorological Agency (JMA)/World Meteorological Organization (WMO) Workshop on Quality Management in Surface, Climate and Upper-air Observations was held at the JMA headquarters in Tokyo, Japan, from 27 to 30 July 2010.

1.3 Twenty experts from 18 National Meteorological and Hydrological Services (NMHSs) in RA II, two lecturers from the WMO Secretariat and Météo France, three lecturers from JMA, 22 experts from JMA participated in the Workshop. The list of participants and the programme of the Workshop are given in Appendices 1 and 2, respectively.

1.4 In his welcome address of the Workshop, Mr Yuji Kano, Director-General of the Observations Department, JMA, welcomed the participants and hoped that the Workshop will assist Asian NMHSs in enhancing their capability to manage the quality of observational data (Figure 1). The welcome address of Mr Kano is given in Appendix 3.

1.5 Dr Miroslav Ondras, Chief, Observing Systems Division of WMO, delivered the opening address. He thanked JMA for holding the Workshop on behalf of WMO and stated that the Pilot Project will have a direct impact on the implementation of the WMO Integrated Global Observing System (WIGOS) and will contribute to the Global Framework for Climate Services (GFCS) as well as other WMO's high priorities: Disaster Risk Reduction (DRR); Capacity Building; and Aviation Meteorology (Figure 2). The opening address of Dr Ondras is given in Appendix 4.

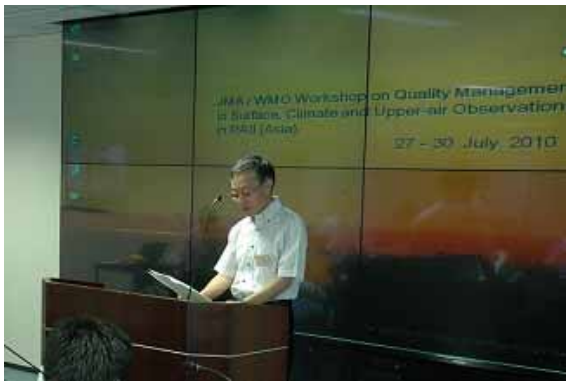

Figure 1. Welcome address by Mr Kano

Figure 2. Opening address by Dr Ondras

1.6 NMHSs have very important missions in weather forecasts, climate information and advice, and hydrological services to meet their national needs. In order for NMHSs to fulfil their missions, it is essential that national observing networks provide required observational data of required quality for international exchange through WMO GTS and WIS. However, a number of NMHSs, especially those of the Least Developed Countries, have yet to acquire such capabilities, especially to manage data quality.

1.7 In accordance with the Terms of References and the initial Action Plan of the Pilot Project, JMA, as the Coordinator of the Project, has been conducting a questionnaire survey and

organizing this Workshop, in cooperation with the Pilot Project Coordinating Group members and the WMO Secretariat.

1.8 The goals of the Workshop were:

- To identify the requirements of NMHSs, particularly those of developing countries in RA II for the implementation of weather, climate and upper-air observations, their provision and their quality management;
- To assess the current status of the above-mentioned issues;
- To facilitate communication between advanced centres and Members in RA II;
- To make recommendations for Members of RA II to acquire/enhance the capability to manage the quality of observational data and to make full use of the data.

1.9 All documents and presentations presented at the Workshop are available at the JMA website at http://www.jma.go.jp/jma/en/Activities/qmws_2010/qmws_2010.html.

2. Initial Action Plan and Workshop Structure

2.1 The Coordinator of the Project briefed the Workshop of the Initial Action Plan of the Pilot Project and the Workshop structure.

2.2 The Workshop recalled that the fourteenth session of RA II adopted the Resolution 5 (XIV-RA II) establishing the Pilot Project and decided:

- To set up a Pilot Project Coordinating Group;
- To appoint Japan as the Coordinator of the Coordinating Group;
- To invite Members desiring to participate in the Pilot Project to designate experts to serve as members of the Coordinating Group;
- To request the Coordinator of the Group to submit annual progress reports and a final report;
- That the Group to conduct its work by correspondence, including e-mail.

2.3 The terms of references of the Coordinating Group are:

- To identify the requirements of NMHSs of developing countries, in particular least developed countries in the Region;
- To assess the current status of the issues, and to facilitate communication between advanced centres and the recipient Members;
- To assist recipient Members in quality assurance of observational data from weather, climate and upper-air stations, including training;
- To monitor the progress of the project.

2.4 The Initial Action Plan of the Pilot Project has been developed through consultation with the Coordinating Group members as follows:

- Prepare a mailing list for RA II Members and Coordinating Group members (by the end of May 2010);
- Issue the Pilot Project Newsletter regularly (a few times a year) (from June 2010);
- Conduct the survey of members' requirements on meteorological observations methods and quality control of observation data (from May 2010);
- Hold a workshop concerning meteorological observation data quality control (July 2010);
- Develop a working plan after the Workshop (until September 2010).

2.5 The Workshop was organized:

- To invite Members desiring to participate in the Pilot Project;
- To invite advanced centres outside the region;
- Under the auspices of WMO,

- With the Resolution 5 (XIV-RA II), the terms of reference of the Coordinating Group, and the Initial Action Plan of Pilot Project.

The Workshop was designed to ensure that all issues and concerns from the Members' experiences were addressed.

2.6 The Workshop consisted of the following sessions:

Session 1: User Requirements;
Session 2: Standardization;
Session 3: Siting and metadata;
Session 4: Sensors/Instruments;
Session 5: QA/QC;
Session 6: Training;
Session 7: RIC-Tsukuba and Upper-air observations;
Session 8: Summary and recommendations.

2.7 Sessions 3 through 6 were devoted to the issues affecting data quality: siting and metadata, sensors/instruments, QA/QC and training. Each session except for Session 4 included presentations on survey results, lectures on the specific subject and country report presentations. Session 7 included a site visit with technical tour of the Meteorological Instruments Center (MIC), the Aerological Observatory and the Meteorological Research Institute (MRI) in Tsukuba city.

2.8 The ad hoc working group was established to draft a workshop summary. The group was composed of chairpersons of Sessions 1 through 6 as well as participants from Bangladesh and China.

3. User Requirements (Session 1)

3.1 The purpose of quality management is to ensure that observational data meet user requirements in aspects, such as uncertainty, resolution and timeliness.

3.2 At Session 1: User requirements, three lecturers representing different points of views from climate, weather forecast and numerical weather prediction (NWP) perspectives stressed the importance of observations and appropriate quality controls for observational data.

3.3 Mr Takafumi Umeda, Climate Prediction Division of JMA, introduced some JMA products that monitor global surface climate in order to detect climate variability and change. It was stressed that CLIMAT reports from around 3,000 Regional Basic Climatological Network (RBCN) stations were essential to monitor the global climate and that they, therefore, should be provided with certainty and in a timely manner. He also pointed out that more historical daily datasets were needed to construct re-analysis data sets. It was noted that urban effects such as urban heat island affect the global climate monitoring, although the stations for climate monitoring in Japan are not influenced seriously by urbanization.

3.4 Mr Kazuhiko Nagata, Forecast Division of JMA described the importance of the data quality control, showing the examples of erroneous rainfall data that affected the "Radar/Raingauge-Analyzed Prediction" used in the forecast operation of JMA. He stressed that the provision of precise metadata was also critical as well as data quality control. The Workshop recognized that inspections of raingauge are important to measure accurate rainfall amount. It was also noted that continuous improvement of QC procedures is necessary and that the QC procedures used in JMA could be made available for use by Members of RA II.

3.5 Mr Hirokatsu Onoda, Numerical Prediction Division of JMA, delivered a presentation on the impact of observational data on numerical weather prediction. Observational data such as SYNOP or Radiosonde are still important although more and more remote sensing data are being assimilated in operational NWP systems. JMA's NWP systems perform both real-time and non-

real-time QC for all observational data. He stressed that the QC procedures were critical to improve the observations themselves, the initial values of NWP, thereby forecasts. As the Lead Centre, the Regional Specialized Meteorological Centre (RSMC)-Tokyo operated by JMA has monitored the quality of land surface observations for Region II every six months since 1991. He showed the examples of false reports that had been found in the processes of QC and emphasized the importance of maintenance of the observation networks and that further improvement of QC procedures is needed.

3.6 Recognizing that user requirements for NMHSs including climate information services, disaster prevention products and NWP are not fulfilled, the Workshop, concluded that continuous improvement of data availability and data quality control for certainty, timeliness, historical dataset, precise metadata and maintenance of the observation networks are needed.

Mr Takafumi Umeda Mr Kazuhiko Nagata Mr Hirokatsu Onoda

Figure 3. Presenters at Session 2: User Requirements

4. Standardization (Session 2)

4.1 At Session 2: Standardization, three invited lectures delivered presentations on standardization within WMO frameworks.

4.2 Dr Miroslav Ondras, Observing Systems Division of WMO, provided necessary background and the rationale for standardization in WMO and the meteorological community, referring to the WMO Basic Documents and decisions by WMO constituent bodies, in particular WMO Congress and Executive Council. Several decisions by the Fifteenth WMO Congress (2007) were also brought to the attention of participants of the Workshop, in particular a request to NMHSs to quality control on-site observations and to ensure the traceability of measurements to recognized world standards approved for the use of WMO Members. The Workshop recognized that accessibility to related WMO materials should be improved by using websites, publication or translation to languages other than English.

4.3 Mr Michel Leroy, Surface Observation Department, Météo France, delivered a presentation on the siting classification for surface observation of wind, air temperature, precipitation and solar radiation that was initiated by Météo France to rate and document the conditions of siting and exposure of instruments, ranging from 1 (WMO recommendations) to 5 (bad environment to be representative). The classification has been applied and proved to be efficient both to document the siting and improve it. It has been discussed and modified through expert meetings organized by WMO to be a standardized siting classification for all surface observation stations on land. It will be proposed for validation by the coming fifteenth session of the Commission for Instruments and Methods of Observation (CIMO-XV) in September 2010. He also introduced another classification called “maintained performance classification” that was rated by the uncertainty of the instrument and the organization of preventive maintenance and calibration. It was noted that there is urgent need to establish standardization for siting classification to set reliable observational networks, although the classification is not 100% enough.

4.4 Mr Kejun Wu, China Meteorological Administration (CMA) (China), introduced the structure of CMA and its integrated observing system which consists of surface, upper-air, radar, wind

profiler and other ground-based observing systems. He then described Meteorological Metrology Station, RIC-Beijing. RIC-Beijing together with RIC-Tsukuba has been designated as RICs by RA II at its eleventh session in 1996. The Workshop noted that services of RICs are not fully utilized by RA II Members and stressed that it is one of RICs' responsibilities to assist Members to establish traceability.

4.5 The Workshop concluded as follows:

(a) WMO regulatory materials comprise a complex system of Technical Regulation, Manuals, Guides and other technical documentation that are difficult to understand, and individual standard practices and procedures are not readily accessible and difficult to trace for some members. It was, therefore, recommended that WMO consider development of a unique standardization system that will navigate interested user to retrieve requested practices and procedures through a user-friendly search tool such as those provided by relational databases.

(b) English versions of WMO regulatory materials are often difficult to comprehend for non-English speaking Members. Therefore, it was recommended that WMO identify extra-budgetary resources to allow for translation to other required languages and make those available alongside with English version.

(c) It was recommended that Members of RA II identify gaps in WMO regulatory materials, from the point of view of the Region, and inform the Pilot Project Coordinating Group that will compile a response to the president of RA II and the WMO Secretariat.

(d) It may not be always possible for RA II Members to implement WMO standards fully due to reasons such as the cost involved and environmental limitations. This may become an issue also in the context of WIGOS in building interfaces with WMO co-sponsored or non-WMO observing systems where WMO/WIGOS standards may not be implemented by partners. It was agreed that differences should be documented and proposed that RA II Members consider the implementation of the siting classification for surface observing stations on land following its approval by CIMO-XV and the development of a simple implementation tool. A task team should be established within the RA II Pilot Project to oversee the possible implementation of this classification in RA II.

(e) The compatibility of data within the Region may be limited due to the lack of calibration facilities in some NMHSs and lack of traceability of measurements to international standards. This is especially true for the climate variability and climate change studies and applications. It was recommended that RA II Pilot Project establish a Task Team to develop proposals on how to assist Members to establish traceability. This may include possible establishment of respective regional structures, dedicated training, capacity building events, resource mobilization and other modalities.

(f) The capabilities and functions of the RICs are fully in agreement with the respective CIMO Recommendation. However, services of RICs are not fully utilized by RA II Members. It was recommended that the Pilot Project, in collaboration with CIMO, identify deficiencies and ways to improve provision of RICs' services to Members.


Dr Miroslav Ondras


Mr Michel Leroy


Mr Kejun Wu

Figure 4. Presenters at Session 3: Standardization

5. Siting and metadata (Session 3)

5.1 At Session 3: Siting and metadata, the results of the Questionnaire Survey on the Surface, Climate and Upper-air Observations and Quality Management in RA II and four country reports were presented focusing on the siting and metadata.

5.2 Mr Kotaro Bessho, Observations Division of Observations Department, JMA, reported to the Workshop the survey results based on the Questionnaires received form 22 Members in RA II out of 35. He pointed out that problems with surface observations are due to the lack of appropriately calibrated instruments and maintenance support, and that issues in observational reports are due to the insufficient data quality, and missing and irregular reports.

5.3 Dr Oleg Pokrovsky (Russian Federation) presented the current state and development potential of Roshydromet surface meteorological, upper-air and climate monitoring networks showing a network maps. Surface meteorological network includes 1610 sites in both European and Asian parts of Russian Federation. However, only 515 of them are operational. New scenarios on optimal design and redesign of networks configuration are considered as a potential to extend existing networks in data sparse areas.

5.4 Dr Songkran Agsorn (Thailand) introduced the plan to update and revise the station information for more useful usages of meteorological data. The station information and additional metadata were collected and surveyed.

5.5 Ms Peou Phalla (Cambodia) presented the status of weather observations and the situation of instruments and data management in Cambodia including:

- Problems: - Lack of human resources
  - Lack of instruments
  - Lack of trained personnel
- Future action: - Provide capacity building to the staff
  - Reinstall automatic weather stations
  - Install upper-air observation system
  - Improve telecommunication service system

5.6 Mr Rajendra Prasad Shrestha (Nepal) presented the perspective of the Department of Hydrology and Meteorology as follows:

Present status:

There are 15 synoptic stations, 337 precipitation stations, 72 climate stations and 22 agromet stations. All synoptic stations are connected with CDMA telemetry link or HF wireless in real time.

Future plan:

(1) 15 AWSs are going to be installed next year in low land for the purpose of storm study provided by SAARC-STORM program.
(2) 1 GPS sonde is also going to be installed under the same programme.

Constraints:

(1) Still poor telecommunication system in remote stations, in particular hilly region.
(2) No computerized system at stations.
(3) No AWS in very remote high mountains.
(4) Limited skilled manpower in instrument section.

5.7 The Workshop recommended as follows:

- Development of general scientific methodology for data quality control should be closely related to assimilation/interpolation technology in order to improve accuracy and reliability of final products.

- Design and redesign of surface and upper-air networks should be aimed at increasing reliability of spatial control technique.

- Existing data quality control system "Persona MIS", developed by RosHydroMet (RIHMI-WDC) and operationally used by NHMSs in Kazakhstan, Kyrgyzstan, Uzbekistan, Mongolia and Vietnam for many years, might be distributed to other developing countries (Cambodia, Nepal, Bangladesh, and others) as a very simple tool with a simplest computer requirements for implementation and guidance.


Mr Kotaro Bessho


Dr Oleg Pokrovsky


Dr Songkran Agsorn


Ms Peou Phalla


Mr Rajendra Prasad Shrestha

Figure 5. Presenters at Session 4: Siting and metadata

6. Sensors/Instruments (Session 4)

6.1 Mr Hyuk Je Lee (Republic of Korea) delivered a presentation on the two types of automatic surface observation networks in Republic of Korea: the ASOS for synoptic observations and the AWS network; the upper-air observation and the wind profiler network; and their applied products to users. He stressed that important issues for the Korea Meteorological Administration (KMA) were the continuity of observational data regarding the environmental change of observational stations due to the urbanization and the replacement of observational instruments with different types as the improvement of observational technique. To handle and resolve the issues, KMA is trying to establish standard meteorological observation sites for the weather sensor performance testing and field experiments performing parallel observations using various atmospheric profilers and rainfall micro-radar for the upper-air and in situ observational equipment for the synoptic weather. These efforts were expected to contribute to the standardization of observing conditions, quality management of observational data and WIGOS project. The Workshop noted that it is very useful to exchange practices of wind profiler observations and their quality management in different NMHSs.

6.2 Mr Singthong Pathoummady (Lao People's Democratic Republic) presented the status of meteorological networks and relating operational weather observation tasks as well as data archiving and data quality. All instruments are analogue and manual types and have no means to get calibrated due to the lack of standard calibration tools. This situation leads to poor data quality even though the data are preliminary checked manually prior to the archive in forms of hard copies and digital recorded devices.

6.3 Mr Norov Battur (Mongolia) introduced the observation network, data quality check processes and training in Mongolia. There are 130 meteorological stations, 186 meteorological posts and three (3) upper-air stations. Although the National Agency for Meteorology and Environment Monitoring (NAMEM) has operated about 60 AWSs since 2000, set up 30 in 2008 and is installing AWSs at all observation stations, installation of AWSs depends on economies. Local staff members check observational data at province meteorological center, and the Climate Section of the Institute of the Hydrology and Meteorology makes final control of observational data along specific instructions and transfers checked data to center of data base. All observational data are stored in database center of NAMEM. The following main goals of the NAMEM were stressed:

- To improve meteorological observation networks;
- To improve skills of meteorologists and technicians;
- To improve quality of observational data;
- To improve quality technologies and techniques.

6.4 Mr Dayananda Malavige Don (Sri Lanka) delivered a presentation on the meteorological observations and instrumental systems for meteorological services in Sri Lanka. He stressed that the quality management system in Sri Lanka does not meet WMO standards although several quality control procedures were applied to the data. The Department of Meteorology is seeking the ways to improve it. The Workshop recognized that assistance from external expertise for maintenance of the AWS system is needed. It was recommended that Members apply for the assistance for the maintenance from WMO, when necessary and appropriate.

6.5 Mr Aleksandr Merkushkin (Uzbekistan) presented AWS and manual data comparison for 3-hour and daily measurements based on T and F tests. He showed the following conclusions:

1) Only daily averaged measurements by sensors look like as confident in terms of statistically proven homogeneity in respect to manual data series;
2) Data come from sensors with 3-hour resolution cannot be merged to the manual data series as being a replenishment of that data series without adequate data processing because the risk of heterogeneity;
3) Variance of sensor data-manual data can be minimized via mitigation the ambient influences.

6.6 The Workshop concluded as follows:

(a) Most of NMHSs recognize the importance of maintenance and calibration of the observational sensors for the improvement of data quality and make efforts to manage sensors properly under their circumstances. However, some of NMHSs, especially those of least developed countries, have yet to acquire the technical knowledge and skill of the operational management of sensors including calibration. They are also in need of the capacity in the security of spare parts of sensors.

(b) The knowledge and experience of the maintenance and calibration of the observational sensors and instruments need to be shared among NMHSs. In this connection, the publication and training of the detailed procedures of sensors and instruments management are considered including the establishment of a centralized website for QM support.

(c) Due to the urbanization, some of NMHSs are having trouble finding the solution for the relocation of weather stations, which are located at urban areas and have the observational environment become worse. WMO/CIMO needs to standardize the relocation of weather stations for the synoptic weather observation and the continuity of observation data.


Mr Hyuk Je Lee


Mr Singthong Pathoummady


Mr Norov Battur


Mr Dayananda Malavige Don


Mr Aleksandr Merkushkin

Figure 6. Presenters at Session 5: Sensors/Instruments

7. QA/QC (Session 5)

7.1 Mr Kotaro Bessho, Observations Division of Observations Department, JMA, reported to the Workshop the survey results based on the Questionnaires on QA/QC. He pointed out that improvement of QC methods are needed at different levels as follows:

Maintenance and calibration

- Traceability of measurements to international standards.
- Insufficient supply of spare instruments.

Challenges to improve the quality of observational data

- Observer's skills.
- Maintenance and calibration.
- Instrument performance.

Data availability

- Observations not taken.
- Observational data not collected.
- International telecommunication not working.

7.2 Mr Hing-yim Mok (Hong Kong, China) introduced the new AWS system developed and operated by the Hong Kong Observatory, focusing on its overall design concepts and quality assurance algorithms. The AWS data are passed to the Integrated Data Quality Assurance System for the real-time data quality control. Through various QC procedures, the system carries out quality assurance for each data by assigning a quality assurance flag to the data, filtering out erroneous data, and alerting maintenance staff to action via automatic e-mail. The status of the AWS network is monitored in real time via a webpage. Various kinds of tests and the assurance flags assigned based on the results of the tests were explained. The automatic alerting feature enables early detection and diagnosis of faults as well as enhancing data availability. He pointed out that the quality assurance flags facilitated future reference by users. The Workshop recognized that continuous improvement of QC procedures is necessary and felt that the WMO/CIMO Guides should be updated in the future in this regard.

7.3 Mr Hakaru Mizuno, Observations Department of JMA, provided a lecture on QA/QC of surface observations in JMA. He introduced the AMeDAS (Automated Meteorological Data Acquisition System), the AWS network in Japan consisting of about 1,300 surface observation stations. The AMeDAS data quality-controlled using instrumental housekeeping parameter are transmitted to the data-processing centre (AMeDAS Integrated Processing System: AIPS) in JMA headquarters, quality controlled in real time, and encoded to SYNOP or other BUFR reports. On the other hand, non-real-time QC such as spatial check, sequential check and extreme value check are performed. According to the AQC results returned from the AIPS and other systems, observers correct observational values. The procedures for siting, instrument maintenance, inspections, and training were also explained.

7.4 Ms Zainuldinova Dinara (Kazakhstan) introduced that the main task of Kazhydromet is to provide meteorological, agrometeorological, hydrological and ecological monitoring of Kazakhstan. Meteorological network consists of 259 stations and 8 upper-air network stations. Quality control of observations is made by using an automated processing system (Person ISI). Kazhydromet participates in international exchange of hydrometeorological data from the Global Telecommunication System through the Regional Telecommunication Hub in Tashkent and the World Meteorological Centre (WMC) in Moscow.

7.5 Mr Nguyen Dinh Luong (Viet Nam) presented the meteorological network of stations, equipment calibration, siting and metadata. There are 174 surface meteorological stations in operation in the whole territory of Viet Nam. All stations are manned stations. In the past, some stations were equipped with automatic instruments, but all of them are out of work at present. Since most of stations are located in populated areas, the following problems were stressed:

- Violation of technical corridor,
- Relocation of stations,
- Land for new stations.

He described the “station book” that included the metadata such as location, changes of instrumentation, and date of inspections. The Workshop recognized that the parallel observation and metadata database are important because of continuity of climatological data.

7.6 The Workshop concluded and recommended as follows:

(a) Lack of appropriate calibration instruments traceable to international standards.

Recommendations:

- Members to acquire at least one working standard which is traceable to international standard for each observation type with technical assistance and/or financial assistance from RICs and WMO, respectively, if necessary.
- RICs to provide regular calibration services to the working standards and maintain a comprehensive list and records of the working standards of Members that they are taking care of. RICs to send reminders to those Members to send the working standards for calibration before the due dates.

(b) Lack of maintenance support

Recommendations:

- Regional Training Centers to organize training courses on observation equipment maintenance for members.

(c) Move of stations due to environmental changes/deterioration of station environment/relocation of station/difficult to find land for new station/discontinuity of station climate

Recommendations:

- The sustainability of the station site should be assured by obtaining commitment from appropriate authority before installation of a new station at the site.

- All changes in environmental conditions and relocation of station should be recorded in the metadata database in detail.

(d) Frequency of updating metadata record – six (6) out of 20 Members updating frequency of more than 1 year

Recommendations:

- The metadata database should be updated at least once a year or whenever there are any changes in the environment of the site.

(e) Five (5) out of 22 Members do not have operational system for QC

Recommendations:

- An operational system for QC making reference to WMO guidelines should be implemented and activated. Regular review of the system with a view to enhance the effectiveness of the system has to be conducted.


Mr Kotaro Bessho


Mr Hing-yim Mok


Mr Hakaru Mizuno


Ms Zainuldinova Dinara


Mr Nguyen Dinh Luong

Figure 7. Presenters at Session 6: QA/QC

8. Training (Session 6)

8.1 Mr Kotaro Bessho, Observations Division of Observations Department, JMA, reported the survey results on training based on the Questionnaires answered form 22 Members out of 35 in RA II (35 NMHSs). Sixteen (16) out of 22 Members have own text books but 11 out of 22 facing shortage of trainers. 16 out of 22 countries did not participat in training courses on the meteorological instruments sponsored by WMO during the last five years.

8.2 Mr Mahesh Kumar Gupta (India) presented the status of meteorological observation network in India including current shortcomings and future plan to improve quality control and instrumentation. He also presented calibration facilities, which is open to all Members. He extensively described the training facilities at the WMO Regional Training Centre (RTC) in India. The RTC conducts regular courses in the discipline of general meteorology, meteorological instrumentation, agricultural meteorology, meteorological telecommunications and syllabus thereof.

He presented the statistics on Indian and foreign trainees trained so far. He requested Members to fully utilize the facilities.

8.3 Mr Muhammad Touseef Alam (Pakistan) introduced the status of meteorological observation network in Pakistan including the recently established AWS network. He gave overview of the work on QA/QC. He also presented various training programs for their own and foreign personnel. The MSc Meteorology Program, commenced in 2005, has been conducted with the collaboration of the Pakistan Meteorological Department (PMD) and COMSATS Institute of Information Technology in Islamabad. The current issues and future plan are as follows:

- Expansion of more data observing network;
- Upgrade of existing observing stations;
- Installation of more AWSs;
- Increase in the more observational hours (24 observations per day).

8.4 Mr Shamsuddin Ahmed (Bangladesh) presented the surface and upper-air observational network. He presented extensive details of current issues and future plan on network expansion/management and human resource development (HRD) in order to get reliable data as follows:

- To improve capabilities of the existing observatories located in the targeted areas;
- Preparation of the observation manual;
- Inspection of field observation manual utilization;
- Training on data acquisition and quality control;
- Preparation of observatory maintenance and management record book;
- Implementation of trainings for observation field and instrument maintenance and management;
- Utilization of the existing climate data for climate change analysis.

8.5 Ms Svetlana Vandasheva (Kyrgyzstan) presented the activities of Kyrgyzhydromet. She informed the Workshop that reduction of the observational network has a negative effect for rational utilization of climate and water resources on national and regional levels. She mentioned the cooperation on the preparation of the synoptic material for weather forecasts and warnings hydrometeorological services of Uzbekistan, Russian Federation and Kazakhstan. The country requires international funding and technical expertise to rebuild its own hydrometeorological services. Actions for improvement of functional abilities of observational data quality management and more effective data usage were stressed as follows:

- Rendering of assistance on repair and reconstruction of hydrometeorological stations and posts;
- Rendering of assistance in acquisition of the software and hardware complex Oracle&Cliware for implementation of high technology in Kyrgyzhydromet;
- Rendering of assistance on the implementation Oracle&Cliware and personnel training;
- Resumption of the upper-air sounding and rendering of assistance in acquisition of expendable materials – radiosondes and balloons.

8.6 Mr Essa Ramadan Mohammad (Kuwait) introduced surface stations (1 manned station, 26 Automatic Weather Observing System (AWOS) stations), station equipments and sensors, upper-air station and instruments, and quality management system (QMS). With respect to meteorological staff training, training activities and workshop in Kuwait and abroad have been conducted as follows:

- Upper-air training for engineers and forecasters in Finland for the DigiCORA radiosonde and Ozone releases,
- Surface AWOS by Amlos in Australia,
- Manned station training for observers conducted in WMO Regional Training Centre (RTC) in Egypt.

He mentioned that more frequent training courses on yearly basis are needed.

Current issues:

- Staffs need to have more experience and to transfer new technologies and training to them.
- Lack in the Kuwaiti human resources in this field is one of the most challenging issues to the future of the Kuwait Meteorological Department (KMD).

Future plan:

- To improve the QC/QM and get the ISO for KMD,
- More training strategies for future challenges.

8.7 Mr Hongzheng Zhang (China) introduced the observation networks (surface observation network, upper-air observation network), instruments and sensors' upgrade and maintenance, quality control, training activities and data statistics and application. He also explained activities of the China Meteorological Administration (CMA) with more details on real-time and non-real-time QA/QC procedures. He stressed further improvement in QA/QC procedures, metadata and human resource development (HRD).

8.8 The Workshop recommended as follows:

(a) Members may give priority to training of personnel because skilled manpower is essential for reliable data and reliable hydrometeorological service to community. WMO-sponsored programs should be fully utilized.

(b) A suitable strategy is required to overcome shortage of trainers.

(c) All Members may share QA/QC procedures and results.

(d) A study on strength and weakness of all Member countries should be conducted so that strength can be shared with others and weakness can be removed through mutual cooperation/WMO funding.


Mr Mahesh Kumar Gupta


Mr Muhammad Touseef Alam


Mr Shamsuddin Ahmed


Ms Svetlana Vandasheva


Mr Essa Ramadan Mohammad


Mr Hongzheng Zhang

Figure 8. Presenters at Session 7: Training

9. RIC-Tsukuba and upper-air observations (Session 7)

9.1 Session 7 of the Workshop included a site visit with technical tour of the Meteorological Instruments Center, the Aerological Observatory and the Meteorological Research Institute in Tsukuba city. Participants found the site visit of the JMA facilities very valuable, allowing deeper understanding of the JMA practices to address data quality-related issues.

9.2 Mr Toshihiko Kobayashi, Meteorological Instruments Center (MIC), JMA, presented an overview of MIC: history, organizational structure and services. He demonstrated that the main services of MIC are quality assurance of meteorological instruments, research and development, activities of the Regional Instrument Centre (RIC)-Tsukuba. Quality assurance of meteorological instruments is devoted to inspection of meteorological equipment to maintain high-precision meteorological observations in Japan, and to maintain meteorological standard instruments and their traceability. Research and development are related to development of meteorological instruments, site environment and methods of observation. Activities of RIC-Tsukuba are to assist Members of the Region II through calibration and comparison with meteorological instruments, and to support to train instrument specialists in Asia. Mr Hiroshi Kawamura and Ms Mariko Kumamoto of MIC introduced recent activities on research and development at MIC:

- Test of Piezo-resistive barometers.
- Development of visibility presumption method using video images at airport.
- Test of capacitive hygrometer with warmed probe.
- Intercomparison of thermometer screens/shields.
- Investigation of environmental influence on the quality of meteorological measurement.

9.3 Mr Kenji Akaeda, Director, Observations Division of Observations Department, JMA, overviewed upper-air sounding network of JMA consisting of 16 radiosonde stations and 31 wind profilers. The Japanese upper-air sounding network started in 1938, and reach to completion/developed stage almost same as present one in 1973. All JMA sounding stations belong to the Regional Basic Synoptic Network (RBSN) of WMO, and six (6) stations (Sapporo, Tsukuba, Kagoshima, Ishigakijima, Chichijima and Minamitorishima) and Syowa station in Antarctica are incorporated into GCOS Upper-Air Network (GUAN). In March 2010, all 16 sounding stations of JMA were updated to GPS Radiosonde system. Eight (8) of them are operated as unmanned system with a combination of automatic balloon launcher and hydrogen generator system. JMA has an operational wind profiler network called WINDAS (Wind profiler Network and Data Acquisition System). The profiler is a ground-based multiple-beam Doppler radar unit with 1.3 GHz-band covering a range of up to 5 – 8 km from the surface and automatically performing wind measurement every 10 minutes. All observational data of GPS upper-air sounding system and WINDAS from Japanese islands are collected at the JMA headquarters, and quality check is executed.

9.4 Dr Hiroatsu Maki, Director of the Aerological Observatory, JMA, demonstrated upper-air observations at Tateno (Aerological Observatory). The Aerological Observatory in Japan was established in 1920 in Tateno, which is now a part of Tsukuba, a newly developed city for research and education. In 1924, strong wind of wind speed 72m/s at just below 10km level was observed, which is believed as the first observation of the jet stream. Since then, the Aerological Observatory has acted as the technical center for upper-air observations in Japan. The Aerological Observatory also contributes to the discovery of ozone depletion through technical support of upper-air observation at Japanese base (Syowa) in Antarctica. Currently, the Observatory has extended their activities as a GRUAN (GCOS Reference Upper Air Network) site, and as a BSRN (Baseline Surface observation Network) site.

9.5 Mr Hiroshi Takahashi, Planning Office of the Meteorological Research Institute (MRI), JMA, presented an overview of MRI: mission, history, organization, budget and research activities. Three major research activities are devoted to severe weather, climate change and earthquakes and volcanoes. He also demonstrated research facilities: a supercomputer system, a large meteorological wind tunnel, a Doppler weather radar, a lidar and a cold environmental simulator.

9.6 Dr Ahoro Adachi, Meteorological Satellite and Observation System Research Department of MRI, JMA, delivered a lecture on fundamentals of wind profiling radar and applications in measuring wind and temperature profiling. He provided the background information and basic theory in remote sensing especially in wind profiling radar to understand what is advantage and disadvantage of the remotely sensed data. The lecture was divided into two parts: 1) a brief overview of the profiling and an introduction to radar profiling techniques including Radio Acoustic Sounding System (RASS) used for temperature profiling, and 2) some operational characteristics of the MRI wind profilers including initial installation costs. Some observational results obtained from the profilers were also presented. Comparisons with in situ measurements were included in the results to show the accuracy and precision of the profiling radar.

9.7 Dr Shinji Nakagawa, Physical Meteorology Research Department of MRI, JMA, demonstrated the MRI large meteorological wind tunnel, which is one of the largest boundary-layer wind tunnels in Japan with a long test section and heating/cooling systems. Since the maximum wind speed is high, the wind tunnel is also available for other purposes, e.g., development of meteorological instruments. The measurement system includes a hot-wire anemometer, a laser Doppler anemometer, a sonic anemometer, and a cold-wire anemometer.

Figure 9. Participants in the Session 7: RIC-Tsukuba and upper-air observations, 29 July 2010.

Mr Toshihiko Kobayashi

Mr Hiroshi Kawamura

Ms Mariko Kumamoto

Figure 10. Lecturers at the Meteorological Instruments Center


Calibration of thermometers


Test of raingauges


Traceability of sunshine duration

Figure 11. Technical tour of the Meteorological Instruments Center


Mr Kenji Akaeda


Dr Hiroatsu Maki

Figure 12. Lecturers at the Aerological Observatory


Mr Hiroshi Takahashi


Dr Ahoro Adachi

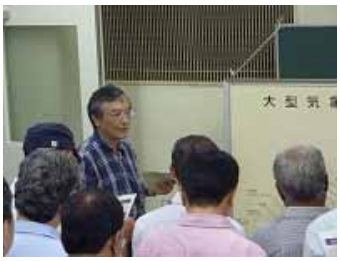
Dr Shinji Nakagawa

Figure 13. Lecturers at the Meteorological Research Institute

10. Summary and recommendations (Session 8)

10.1 With a view to improving the quality management support for NMHSs of RA II in surface, climate and upper-air observations and the availability of accurate and compatible data in a sustainable manner, the Workshop reviewed:

(a) User requirements from major application areas essential to NMHSs activities, such as climate services, disaster prevention information and numerical weather prediction;

(b) Presentations made by lecturers, country report presentations, survey results on the Questionnaire on the Surface, Climate and Upper-air Observations and Quality Management in RA II; and

(c) Presentations made by JMA experts during the visit to the Meteorological Instruments Center (MIC), the Regional Instrument Centre (RIC), the Aerological Observatory and the Meteorological Research Institute (MRI) in Tsukuba and other JMA facilities including observational operation center and wind tunnel for calibration of anemometers.

10.2 The Workshop identified a number of issues from the review regarding the implementation and operation of surface, climate and upper-air observations, and developed a set of recommendations for the Members, the Pilot Project Coordinating Group and the WMO Secretariat.

10.3 The main recommendations of the Workshop for enhancement of data quality and availability in RA II are summarized as follows:

1) Full utilization of RICs

- It was noted that, among various factors, the most important ones adversely affecting data quality in RA II are calibration and maintenance of the instruments. Services of Regional Instrument Centres (RICs) should be fully utilized by RA II Members to address this issue.
  (action: RA II Members/RICs)

- Members should establish, as far as possible, calibration laboratories within each NMHS to guarantee traceability of the measurements to international standards.
  (action: RA II Members)

2) Human capacity building

- Many participants reported that the human capacity building is a priority issue in the observations and their management, and therefore the Pilot Project Coordinating Group is recommended to explore the possibility of regional training opportunities for calibration, data quality management, monitoring of data and best practices in observations, including training seminars, training materials and e-learning sites.
  (action: Coordinating Group)

3) Relocation, siting and metadata

- Recognizing that the relocation of stations due to environmental changes/deterioration of station environment has negative consequences in station data homogeneity records not acceptable for climate applications, all changes in environmental conditions and relocation of station should be recorded in the metadata database in appropriate details. It is recommended that relocation and the environmental conditions of observing stations are standardized by CIMO, e.g., by siting classification.
  (action: RA II Members/CIMO)

4) Exchange practices

- The participants found it very useful to exchange practices of the observations and their quality management in different NMHSs, and encouraged the Pilot Project Coordinating Group to further promote the information sharing.
  (action: Coordinating Group)

- All Members are requested to share QA/QC procedures and results. The existing data quality control system "Persona MIS", developed in RosHydroMet (RIHMI-WDC) and operationally used by NHMSs in Russian Federation, Kazakhstan, Uzbekistan, Mongolia and Vietnam for many years, could be available for use by Members of RA II, if requested. This requires basic computer facilities. Similarly, systems developed by other NMHSs, such as CMA, JMA, KMA and HKO may also be available.
  (action: RA II Members)

5) Continuous improvement

- Recognizing that user requirements for NMHSs including climate information services, disaster prevention and mitigation products and numerical weather prediction are not fully met, continuous improvement of data availability and data quality control for certainty, timeliness, historical dataset, precise metadata and maintenance of the observation networks are needed.
  (action: RA II Members)

11. Closure of the Workshop

11.1 The participants and the representative of WMO expressed their appreciation to the Government of Japan for the successful hosting of the Workshop. They also expressed gratitude to Mr Kunio Sakurai, Director-General of the Japan Meteorological Agency and Permanent Representative of Japan with WMO and his staff for the warm hospitality and excellent arrangements made.

11.2 The Workshop closed at 13:30 hours on 30 July 2010.

Appendix 1

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Appendix 2

PROGRAMME

Date/Time	Item	Presenter(s)
Day 1, Tuesday 27 July		
09:00	*Registration at the JMA Headquarters*	
09:30 – 10:00	**Opening**	
	Welcome address	Mr Yuji Kano (JMA)
	Opening address	Dr Miroslav Ondras (WMO)
	Self introduction of participants	
	Organization for the workshop	Mr Hakaru Mizuno (JMA)
10:00 – 12:05	**Session 1: User Requirements** ***Chair: Mr Mizuno (JMA)***	
10:00 – 10:45	Climate Services Perspective	Mr Takafumi Umeda (Climate Prediction Division, JMA)
10:45 – 11:00	*Coffee break*	
11:00 – 11:45	The Importance of Data Quality Control in Disaster Prevention and Mitigation	Mr Kazuhiko Nagata (Forecast Division, JMA)
11:45 – 12:30	The Impact of Observational Data on Numerical Weather Prediction	Mr Hirokatsu Onoda (NWP Division, JMA)
12:30 – 12:40	*Group photo*	
12:40 – 14:00	*Lunch break*	
14:00 – 16:45	**Session 2: Standardization** ***Chair: Dr Ondras (WMO)***	
14:00 – 15:00	WMO/CIMO Perspective	Mr Miroslav Ondras (WMO)
15:00 – 16:00	Siting Classification for Surface Observing Stations on Land	Mr Michel Leroy (Météo France)
16:00 – 16:15	*Coffee break*	
16:15 – 16:45	Regional Instrument Centres RIC-Beijing	Mr Kejun Wu (China)
16:45 – 18:25	**Session 3: Siting and metadata** ***Chair: Dr Pokrovsky (Russian Federation)***	
16:45 – 17:05	Survey results	Mr Kotaro Bessho (JMA)
17:05 – 17:25	Current state and development potential of Roshydromet surface meteorological, upper-air and climate monitoring networks	Dr Oleg M. Pokrovsky (Russian Federation)
17:25 – 17:45	Updated Station Documentation and Metadata Pilot Case: Phetchaburi Observation Station	Dr Songkran Agsorn (Thailand)
17:45 – 18:05	Report on the Status of Weather Observation in Cambodia	Ms Peou Phalla (Cambodia)
18:05 – 18:25	Perspective of Department of Hydrology and Meteorology (DHM) in Nepal	Mr Rajendra Prasad Shrestha (Nepal)

Day 2, Wednesday 28 July		
09:30 – 12:10	**Session 4: Sensors/Instruments** ***Chair: Mr Lee (Republic of Korea)***	
09:30 – 10:30	Planning and Situation of the Meteorological Observation in the Republic of Korea	Mr Hyuk Je Lee (Republic of Korea)
10:30 – 10:50	Status of Meteorological Network, Observations and Data Management	Mr Singthong Pathoummady (Lao People's Democratic Republic)
10:50 – 11:10	*Coffee break*	
11:10 – 11:30	Observation network of Mongolia	Mr Norov Battur (Mongolia)
11:30 – 11:50	Meteorological Observations and Instrumental Systems for Meteorological services in Sri Lanka	Mr Dayananda Malavige Don (Sri Lanka)
11:50 – 12:10	One of issues related to replacement the manual observational weather stations with automated ones	Dr Aleksandr Merkushkin (Uzbekistan)
12:10 – 13:40	*Lunch break*	
13:40 – 16:00	**Session 5: QA/QC** ***Chair: Mr Mok (Hong Kong, China)***	
13:40 – 14:00	Survey results	Mr Kotaro Bessho (JMA)
14:00 – 14:30	An Integrated Meteorological Data Quality Assurance System for operation of the Automatic Weather Station (AWS) Network in Hong Kong	Mr Hing-yim Mok (Hong Kong, China)
14:30 – 15:00	Quality Assurance and Quality Control of Surface Observations in JMA	Mr Hakaru Mizuno (Japan)
15:00 – 15:20	Kazhydromet - National Hydrometeorological Service of Republic of Kazakhstan	Ms Zainuldinova Dinara (Kazakhstan)
15:20 – 15:40	Current Status and Future Plan of Surface, Climate and Upper-air Observations of National Hydro-Meteorological Service of Viet Nam	Nguyen Dinh Luong (Viet Nam)
15:40 – 16:00	*Coffee break*	
16:00 – 18:00	**Session 6: Training** ***Chair: Mr Gupta (India)***	
16:00 – 16:10	Survey results	Mr Kotaro Bessho (JMA)
16:10 – 16:40	Training Facilities in India Meteorological Department	Mr Mahesh Kumar Gupta (India)
16:40 – 17:00	Surface, Climate and Upper-air Observations and Training System in Pakistan	Mr Muhammad Touseef Alam (Pakistan)
17:00 – 17:20	Country report for Bangladesh	Mr Shamsuddin Ahmed (Bangladesh)
17:20 – 17:40	Country report for Kyrgyzstan	Ms Svetlana Vandasheva (Kyrgyzstan)
17:40 – 18:00	Country report for Kuwait	Mr Essa Ramadan Mohammad (Kuwait)
18:00 – 18:20	Quality Management in Surface, Climate and Upper-air Observations in China	Mr Zhang Hongzheng (China)
18:25 –	Working group meeting for draft summary	Working group member

Day 3, Thursday 29 July (Visit to RIC-Tsukuba, the Aerological Observatory and the Meteorological Research Institute)		
	Session 7: RIC-Tsukuba and upper-air observations ***Chair: Mr Mizuno (JMA)***	
	Meteorological Instruments Center (MIC)	
10:00 – 10:20	Overview of MIC	Mr Toshihiko Kobayashi (MIC)
10:20 – 11:00	Research and development at MIC	Mr Hiroshi Kawamura/Ms Mariko Kumamoto (MIC)
11:00 – 12:00	Technical tour of the Calibration Rooms	
12:00 – 13:10	*Lunch break*	
	Aerological Observatory (AO)	
13:10 – 13:35	Upper-air observation network in Japan	Mr Kenji Akaeda (JMA)
13:35 – 13:55	Upper-air observation in Tateno, Tsukuba	Dr Hiroatu Maki (Director, AO)
13:55 – 14:10	Radiation observation	
14:10 – 14:20	Observation of the Lower Atmosphere	
14:20 – 14:40	Ozonsonde observation	
14:40 – 15:10	*Coffee break*	
	Meteorological Research Institute (MRI)	
15:10 – 15:20	Overview of MRI	Mr Hiroshi Takahashi (MRI)
15:20 – 15:55	Lecture and tour of wind profiler	Dr Ahoro Adachi (MRI)
16:00 – 16:30	Lecture and tour of wind tunnel	Dr Shinji Nakagawa (MRI)
Day 4, Friday 30 July		
09:30 – 12:15	**Session 8: Summary and recommendations** ***Chair: Mr Mizuno (JMA)***	
09:30 – 10:30	- Technical tour of JMA headquarters ➢ Observational operation center ➢ Forecasting operation center ➢ Wind tunnel facility	 Mr Yoshiaki Takeuchi (JMA) Mr Shun-ichi Yamaguchi (JMA) Mr Masato Fukuda (JMA)
10:30 – 10:45	*Coffee break*	
10:45 – 12:15	- Outcomes of the sessions - Adoption of the report	Mr Hakaru Mizuno (JMA)
12:15 – 12:30	**Closure of the Workshop**	

Appendix 3

Welcome Address

Mr Yuji Kano
Director-General of the Observations Department
Japan Meteorological Agency

Good morning,
Ladies and gentlemen,

It is my great pleasure and honour to deliver an opening address for the "JMA/WMO Workshop on Quality Management in Surface, Climate and Upper-air Observations in RA II (Asia)"'.

First of all, on behalf of the Japan Meteorological Agency (JMA), I would like to extend my warm and cordial welcome to all of the participants, and make a coordinal acknowledgment to cooperation and supports by WMO for holding this Workshop.

National Meteorological and Hydrological Services (NMHSs) have very important missions in weather forecasts, climate information and advice, and hydrological services to meet their national needs. In order for NMHSs to fulfill the missions, collecting observational data, managing the quality, and sharing them with other NMHSs are essential.

However, a number of NMHSs, especially those of least developed countries, have yet to acquire such capabilities, especially to manage data quality.

In order to tackle such situation, the fourteenth session of Regional Association II (Asia), held in Tashkent, Uzbekistan in December 2008, established the Pilot Project to Enhance the Availability and Quality Management Support for NMHSs in Surface, Climate and Upper-air Observations, and Japan was appointed as the Coordinator of the Pilot Project.

In accordance with the terms of reference and the work plan of the Pilot Project, JMA has been leading the project by conducting a questionnaire survey and organizing this Workshop, in cooperation with the Project Coordinating Group members and the WMO Secretariat.

I am convinced that this Workshop is a great opportunity to share the current status and a vision of the future observation networks among the RA II Members.

We have 20 participants from 18 Asian NMHSs and two invited leading experts from WMO/CIMO and Météo France that have been deeply involved in this issue for many years.

Lastly, I strongly hope that this Workshop will be very fruitful and will assist Asian NMHSs in enhancing their capability to manage the quality of observational data.

Thank you very much for your attention.

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Appendix 4

Opening Address

Dr Miroslav Ondráš
Chief, Observing Systems Division
Observing and Information Systems Department
World Meteorological Organization

Mr Yuji Kano, Director-General of the JMA Observations Department,
Ladies and Gentlemen,

It is indeed a privilege for me to address you on behalf of WMO on the occasion of the opening of the JMA/WMO Workshop on Quality Management in Surface, Climate and Upper-air Observations in Region II (Asia), held here in Tokyo, Japan, 27-30 July 2010.

I would like to express the WMO appreciation to Mr Kunio SAKURAI, Director-General of the Japan Meteorological Agency and Permanent Representative of Japan with WMO for hosting this Workshop, as well as for the warm welcome and generous hospitality accorded to all participants. It gives me great pleasure to extend greetings of the Secretary-General of WMO, Mr M. Jarraud, to JMA staff and to all participants and lecturers.

As you already know, fourteenth session of RA II (Asia) in Tashkent, 2008, acknowledged the importance of surface, climate and upper-air observations to the broader use for weather, climate and water applications and for decision-making by NMHSs, including those of developing and the Least Developed Countries. A number of advanced centres in the Region II are engaged in the quantity and quality monitoring of data, including quality assurance and identification of deficiencies in the observational data in the framework of various WMO programmes, thereby improving the quality of weather, climate, hydrological and water-related services including advisories, forecasts and warnings.

The Association's commitment to further improve the quality of observational data resulted in a proposal of a Pilot Project to Develop Quality Management Support for NMHSs of the Region in Surface, Climate and Upper-air Observations and adopted Resolution 5 (XIV-RA II) – "Pilot project to enhance the availability and quality management support for NMHSs in surface, climate and upper-air observations". It established a Pilot Project Coordinating Group to steer this activity with Japan as the Coordinator of this Group. The Association also requested the Secretary-General to assist Members in the implementation of this Resolution. As a follow-up, this Workshop has been organized with a view to assessing the situation in Member countries, identifying the requirements, modalities and actions of this Pilot Project. An ultimate objective of this project is a provision of assistance to recipient Members in quality assurance of observational data.

I wish to recall that following the strategic decision made by the Fifteenth WMO Congress (Geneva, May 2007) to embark on enhancing the integration between the WMO observing systems, the Executive Council Working Group on the WMO Integrated Global Observing Systems (WIGOS) and the WMO Information System (WIS) steered and monitored the development of WIGOS concept in a way to achieve the broadest possible collaboration and cooperation.

WIGOS will provide the integration and interoperability of the different observing systems that WMO sponsors and co-sponsors and will lead to the establishment of a comprehensive, coordinated and sustainable system of observing systems that addresses the requirements of all WMO Programmes. Four WIGOS basic documents, namely WIGOS Development and Implementation Plan (WDIP), Concept of Operation (CONOPS), WIGOS Development and Implementation Strategy (WDIS) and WIGOS Imperative have been produced and submitted to the WMO Executive Council in June 2010 for consideration. I also wish to inform you that WIGOS has become one of the five high priorities in WMO and it is so reflected in the WMO Strategic Plan.

This Pilot Project will have a direct impact on the WIGOS implementation as it addresses its standardization components. Through WIGOS, this Pilot project will be contributing to the future Global Framework for Climate Services (GFCS), also one of the five WMO high priorities for the next financial period. The Global Framework for Climate Services was established at the World Climate Conference-3 (WCC-3), 31 August - 4 September 2009, with one of the major outcomes being the Conference declaration to strengthen the production, availability, delivery and application of science based climate monitoring and prediction services. Availability of high quality climate data is crucial for the Global Framework for Climate Services and will be ensured by the implementation of the WMO Quality Management Framework. In doing this, reliable, timely and quality assured data streams with essential quality control and relevant metadata should be available for the purposes of GFCS.

There is no doubt that this Pilot Project will also contribute to the other three WMO's high priorities, namely Disaster Risk Reduction (DRR), Capacity Building and Aviation Meteorology.

I wish to assure you that WMO is committed to support this Pilot Project and all activities related to the improvements in quality of observations and products for the benefit of all WMO Members.

Finally, I wish to thank the Local Organizing Committee for excellent arrangements made so far and for having provided these excellent facilities and organizational support for this Workshop. I wish the participants every success in their work during the Workshop as well as an enjoyable stay in Tokyo.

Thank you for your attention.