

WORLD METEOROLOGICAL ORGANIZATION

REGIONAL ASSOCIATION II (ASIA)

**SECOND MEETING OF THE COORDINATING GROUP OF THE PILOT
PROJECT TO DEVELOP SUPPORT FOR NATIONAL
METEOROLOGICAL AND HYDROLOGICAL SERVICES
(NMHSs) IN SATELLITE DATA, PRODUCTS AND TRAINING**

JEJU, REPUBLIC OF KOREA, 8 OCTOBER 2012



FINAL REPORT



Participants in the second meeting of the Coordinating Group

(Back row) Ashok Kumar SHARMA, Thu Vinh NGYEN, Muhammad ASLAM, Adel Tarrar DAHAM, Makhbuba KASYMOVA, Ali SHAREEF , Chi Kuen SO, Sherzod MUKHTAROV

(Front row) Suman GOYAL, Oleg POKROVSKY, Jerome LAFEUILLE, Dohyeong KIM, Yoshihiko TAHARA, Kuniyuki SHIDA

GENERAL SUMMARY

1. OPENING

The Second Meeting of the Coordinating Group of the Regional Association II (Asia) Pilot Project to Develop Support for National Meteorological and Hydrological Services (NMHSs) in Satellite Data, Products and Training (RA2PPSat) was held on 8 October 2012 in Jeju Island, Republic of Korea. The list of participants is given in Annex I.

1.1 Welcome address

1.1.1 On behalf of Dr Hee-Sang Lee, Director-General of the National Meteorological Satellite Center (NMSC), Korea Meteorological Administration (KMA), Dr Dohyeong Kim welcomed all the participants to Jeju Island, Republic of Korea. He recalled that the first meeting of the Coordinating Group held in February 2011 in Tokyo, Japan had reviewed the issuance of the newsletters about the various activities of RA II Members, identification of RA II Members' requirements, and enhancement of RA II Pilot Project portal site showing the usage of products for sharing with the users. He stressed that this meeting would be very crucial to provide the proper satellite information and data service corresponding to the demands of users. He concluded his address wishing a successful and fruitful meeting.

1.2 Opening address

1.2.1 On behalf of Mr Michel Jarraud, Secretary-General of the World Meteorological Organization (WMO), Mr Jerome Lafeuille, Chief of the Space-based Observing System Division, WMO Space Programme Office also welcomed all participants in the second meeting and expressed his appreciation, to KMA for hosting the meeting in Jeju and to both of KMA and the Japan Meteorological Agency (JMA), Co-coordinators of the project, for organizing this meeting. He expressed the special thanks to KMA for hosting the training events that had just taken place from 4 to 6 October in Jincheon and the third Asia-Oceania Meteorological Satellite Users' Conference from 9 to 12 October in Jeju. He appreciated that collocating these events would benefit the conference participants and would consolidate the links among the training centres and increase the visibility of the project. He thanked KMA for inviting the WMO Secretariat staff, Mr Shida and himself to attend the meeting. He mentioned that this meeting would review the status of initially defined actions, evaluating the progress made and the lessons learnt, and define the next phase. He emphasized that the Group should take into account the developments that have occurred in WMO and in the satellite community: WMO Congress called for regional actions to advance the use of satellite systems; the CBS recommended a procedure for systematic definition of satellite data access requirements in every region; CBS also adopted a guideline for the preparation of the use of the upcoming new generation of satellites. He noted that a number of satellites were launched over the past year, i.e., Suomi-NPP by NOAA, Megha-Tropiques by CNES and ISRO, GCOM-W1 by JAXA and Metop-B by EUMETSAT, half of them being operated by RA II Members. At the fifth WMO workshop on the assessment of various global observing systems, which was held in Sedona, USA in May 2012, the dominant impact of satellite data for numerical weather prediction (NWP) was confirmed; this progress is due to both the improved performance of these systems, and the improved skill to use them. As concerns the direct use satellite data for forecasting or other applications, a number of limitations need to be addressed. The Pilot Project is therefore expected to be very useful. This particular meeting should enable the project Co-coordinators to report to the next session of RA II (Doha, Qatar, 13-19 December 2012) on the achievements of the project and the proposed plans for the next period.

1.3 Adoption of the agenda

1.3.1 The meeting adopted the agenda and the work programme as given in Annex II.

1.4 Working arrangements

1.4.1 The meeting agreed on its working hours and other practical arrangements for the meeting. All documents and presentations submitted for the meeting have been posted on the WMO website at: <http://www.wmo.int/pages/prog/dra/rap/RAIIPilotProjectonSatelliteWMO.php>.

2. OVERALL STATUS OF RA II PILOT PROJECT TO DEVELOP SUPPORT FOR NMHSs IN SATELLITE DATA, PRODUCT AND TRAINING (RA2PPSAT)

2.1 Introduction to RA II Pilot on Satellite

2.1.1 Mr Yoshihiko Tahara, Head of System Engineering Division, Data Processing Department of the Meteorological Satellite Center, JMA, introduced the outline of the Pilot Project which was adopted at the fourteenth session of WMO Regional Association II (XIV-RA II). After XIV-RA II, the Pilot Project Coordinating Group was composed as follows:

- Co-coordinators: Japan and Republic of Korea
- Members: Bahrain; China; Hong Kong, China; India; Kyrgyzstan; Oman; Pakistan; Russian Federation; Uzbekistan; and Viet Nam
- Observer: EUMETSAT.

2.1.2 The Terms of Reference of the Coordinating Group are:

- (a) To identify the requirements of NMHSs of developing countries, and in particular least developed countries in the Region, regarding satellite imagery, data and products in support of their weather services, including forecasts and warnings;
- (b) To develop a brief and effective action plan, taking into account the relevant existing activities, for consortium members and recipient Members;
- (c) To facilitate communication between centres willing to develop the required products and recipient Members;
- (d) To organize assistance to recipient Members in accessing and utilizing available satellite imageries, data and products, as a first priority through training;
- (e) To monitor the progress of the project.

2.2 Accomplishments

2.2.1 Each phase of this project starts in September and ends in August of the following year. Mr Tahara and Dr Kim introduced the accomplishments in the first to third phases:

1. Quarterly newsletters for RA II Members
2. The first Meeting of the Coordinating Group of the RA II Pilot Project to Develop Support for NMHSs in Satellite Data, Products and Training, Tokyo, Japan, 21 – 23 February 2011
3. Establishment of the RA II Pilot Project Webpage on the WMO Space Programme (WMOSP) website (hosted by WMOSP)
4. Establishment of the Portal Site for accessing satellite imagery, data and products as well as training on the Webpage
5. RA II Pilot Project questionnaire survey conducted to understand the needs of satellite data users in RA II with the newly introduced web-based questionnaire system
6. Operating on-site “Training Program” of satellite data processing, utilization and application as part of VLab

2.3 The WMO Space Programme

2.3.1 Mr Lafeuille delivered a presentation outlining the activities conducted by WMO Members within the WMO Space Programme, the main current challenges, and the important roles of the RA II Pilot Project in this context. The WMO Space Programme activities are divided into four (4) parts: Observation capabilities; EO products and applications; Access to data and products; and Information and capacity building. A web-based resource (OSCAR) has been developed to record the characteristics of the space-based observation system in support of the rolling review of observation requirements (RRR); it contains technical descriptions of more than 500 satellites and 700 instruments and is accessible at: www.wmo.int/oscar. Through the SCOPE-CM (Climate Monitoring), SCOPE-NWC (Nowcasting), Severe Weather Forecasting Demonstration Project (SWFDP), and RGB workshop, product development and generation have been enhanced.

2.3.2 Mr Lafeuille briefly introduced the relevant outcomes of the fifteenth session of the Commission for Basic Systems (CBS-15) held in Jakarta in September 2012. At this session, the importance of the protection of both X and L frequency bands for satellite-ground telecommunication was recognized. The Commission endorsed the CBS Guideline for Ensuring User Readiness for New Generation Satellites consisting of 12 items.

2.3.3 Mr Lafeuille introduced other activities. WMO Members, within the WMO Space Programme, are coordinating their efforts for space weather warning services. The next annual meeting of the Coordination Group for Meteorological Satellites (CGMS) will be its 40-year anniversary. He highlighted the priorities for space-based observation that are directly relevant to the RA II Pilot Project: (i) integration of observing systems within the WMO Integrated Global Observing System (WIGOS) concept; (ii) actions needed to bridge the gap between potential capabilities and actual usage of satellites

2.4 Support for WMO Regional Association II (Asia)

2.4.1 Mr Kuniyuki Shida, Programme Manager of the Regional Office for Asia and the South-West Pacific, Development and Regional Activities Department of WMO, presented supporting activities for WMO RA II. At the WMO Congress in 2011, five (5) high priorities area were decided, namely, the Global Framework for Climate Services (GFCS), Capacity Development, WMO Integrated Global Observing System (WIGOS)/WMO Information System (WIS), Disaster Risk Reduction, and Aeronautical Meteorology, all of which are related to satellite programmes. He introduced the pillars of GFCS for discussing how GFCS will proceed highlighting the importance of the user interface.

2.4.2 Mr Shida introduced other regional activities related to weather and climate. He mentioned that this RA II Pilot Project, one of the five pilot projects, is the most successful and active project. He informed the meeting of the outline of the coming session of RA II. In this regard, he mentioned that it was a really crucial time for this project to review all activities and propose new plans to the RA II session.

2.4.3 Mr Tahara mentioned the importance of this meeting to discuss the future of this project recognizing that the next phase is the final of four-year cycle, and the next RA II session will be held in December.

3. RA II PRODUCT PORTAL AND WMOSP PRODUCT ACCESS GUIDE

3.1 RA II Product Portal

3.1.1 Mr Tahara informed that the Web page of the RA II Pilot Project (http://www.wmo.int/pages/prog/sat/ra2pilotproject-intro_en.php) provides the information and outcomes of this project such as missions, newsletters, Coordinating Group meetings, and questionnaire. Via a link to this page, viewers can reach to the RA II Product Portal site (http://www.wmo.int/pages/prog/sat/ra2pilotproject-links_en.php) displaying the ways to access to satellite related information such as satellite operation, imagery, products, education and training. He expressed his expectation to enhance these pages, for instance introducing the examples of successful utilization of satellite data/products by NMHSs.

3.2 WMO SP Product Access Guide

3.2.1 Mr Lafeuille presented the WMO Secretariat inputs to the product portal discussion, including the status of the Product Access Guide and the Space Weather Product Portal. Following the outcomes of the first meeting of this Coordinating Group, for harmonization of products and services among satellite operators in the region, actions were suggested at different levels:

- Common portal to improve visibility
- Common product specifications and quality standards
- Common metadata approach describing data/products

- Explore distribution through common channels such as DVB-S services and Internet (one-stop-shop approach)
- Pilot action involving subset of products from all satellite operators

The product portals on www.wmo.int are as follows:

- RA II PP Portal: http://www.wmo.int/pages/prog/sat/ra2pilotproject-links_en.php
- Product Access Guide: http://www.wmo.int/pages/prog/sat/accessandtools_en.php
- Space Weather Product Portal: http://www.wmo.int/pages/prog/sat/spaceweather-productportal_en.php

The Space Weather PP is based on following key principles:

- Overall structure:
 - Limit the scope to a level of information that WMO can maintain
 - The portal aims to be a simple access guide, far from duplicating a WIS portal
 - Maximum one record per category and per organization in order to limit the number of links
 - The product descriptions and references are all on providers' web sites to ensure full ownership, responsibility, and operational maintenance
- Products are organized along a taxonomy to be agreed
- Criteria for product submission (e.g. operational, and well documented)
- Common template for product description

3.2.2 After the presentation, Mr Lafeuille pointed out the similarity of the RA II Product Portal and WMO SP Product Access Guide. Although they are not fully the same there is a large overlap and in essence they should lead to the same contents, i.e., satellite products available from different satellite operators and organized in a thematic and user friendly way. Mr Tahara added that it is necessary to avoid the duplication and seek better design on the webpages. The participants agreed to take the following action.

Action: The Co-coordinators and WMO SP to seek linkage between the WMO SP Product Access Guide and RA II Product Portal avoiding the duplication of the similar information and considering sustainability.

3.2.3 In response to the question by Mr Tahara on the Product Access Guide (PAG), Mr Lafeuille responded that the inputs to the PAG were gathered via the Expert Team on Satellite Utilization and Products (ET-SUP) and the Secretariat, and recommended to contact his colleague, Dr Stephan Bojinski for the latest status. The PAG is still a prototype and its concept should be reviewed in the context of WIGOS, taking into account the necessary linkage with the RA II portal.

4. RESULTS OF RA II USER SURVEY AND WMOSP USER SURVEY (RA II EXTRACT)

4.1 RA II User Survey

4.1.1 Mr Tahara introduced that the RA II Pilot Project Web-based Questionnaire Survey was conducted in the third phase and the question items in this web questionnaire were almost the same as those of the WMO Space Programme Questionnaire. The purpose of this questionnaire was to monitor the availability and use of existing satellite data and products and to identify any associated difficulties or limiting factors in RA II. The preliminary report was issued on RA II Newsletter Vol. 3 No. 2. Twenty (20) out of 35 Members of RA II responded. This questionnaire was divided into several parts including access to satellite data, use of satellite data and products, applications of satellite data and products, and training in satellite meteorology.

4.2 WMOSP User Survey

4.2.1 Mr Lafeuille informed that the questionnaire of the 2012 WMO survey on satellite use by WMO Members was simplified with respect to previous issues: 26 questions. The online survey was conducted from 30 May to 11 September 2012. There were 217 valid responses from public sector and nine responses from commercial users, treated separately, due to their small number.

About 15% of Global responses were taken from RA II. He introduced the number of responses in Research and Academia, and NMSC, other operations about the use of GEO and LEO satellites by operational/research users, major application area, satellite data access by operational users, and challenges in the use of satellite data. Mr Lafeuille also underlined the high usage of Internet to access satellite data.

4.2.2 It was clarified that the RA II survey and the global WMOSP survey should be complementary, since the global survey will only be performed every 4 years in the future.

5. RA II PP SAT ACTIONS RELATED TO THE PROCEDURE FOR REGIONAL SATELLITE DATA ACCESS REQUIREMENTS

5.1 CBS procedure for data/product access requirements

5.1.1 Mr Lafeuille informed the following outcomes of the fifteenth session of the Commission for Basic System (CBS-15), held in Jakarta, Indonesia from 10 to 15 September 2012:

- Cg-XVI recommended to “organize the formulation of data requirements and the dialogue between data users and providers”;
- CBS welcomed the progress by Members in defining Region-oriented requirements for satellite data access and exchange, particularly in RAs I, III, and IV, and encouraged Members in other RAs to initiate similar efforts in their respective Regions;
- CBS emphasized that a common approach to defining requirements would facilitate the dialogue;
- CBS adopted the Procedure for Documenting Regional Requirements for Satellite Data Access and Exchange and recommended that the Procedure be adopted as a guidance in all Regions.

5.1.2 Mr Lafeuille also introduced some annexes to these recommendations such as the scope of the requirements, establishing the (Initial) regional task team, workflow, initial activities to be completed and routine mode: integration into RA and CBS work plans.

5.1.3 After the presentation, he recalled that this pilot project surveyed user needs and expectations regarding satellite data and products for RA II users; the project would thus be in a good position to take the task to document RA II requirements as recommended by CBS-15. The meeting agreed for this project to play this role, and adopted an action to organize small team to create an initial draft document of the requirements.

Action: JMA, KMA, IMD and ROSYDROMET to nominate experts for a small drafting team for RA II initial version of the requirements for satellite data and products access.

6. CASCADING SATELLITE-DERIVED INFORMATION TO RECIPIENT MEMBERS

6.1 Satellite operators

India

6.1.1 Mr A. K. Sharma, Deputy Director General of Meteorology (Satellite Meteorology) of the India Meteorological Department (IMD), presented the current status of operational meteorological satellites, namely Kalpana-1 (74 deg. E) and INSAT-3A (93.5 deg. E) and the satellite products derived from these satellites. From the images of these satellites, color composites image, outgoing long wave radiation, atmospheric motion vectors, cloud top temperatures, sea surface temperatures, quantitative precipitation estimates, upper tropospheric humidity and their daily/weekly/monthly/seasonal averages and hovmoller diagrams etc. are generated for use by forecasters and researchers. All images and products derived from these satellites are available on the website of IMD (www.imd.gov.in), and RA II web portal has a link to it. The Satellite Division of IMD issues a satellite bulletin every three hours giving the interpretation of current images and

products for use in weather forecast, and all satellite bulletins are disseminated through IMD website and GTS.

Satellite imageries are disseminated to the regional forecasting offices of IMD and three neighbouring countries, namely Maldives, Nepal and Sri Lanka by a Digital Meteorological Data Dissemination (DMDD) system using satellite broadcast. IMD also has three receiving systems of NOAA/MODIS/Metop polar orbiting satellite, and a large number of standard products are generated and displayed on IMD website.

In September 2009, a polar orbiting satellite OCEANSAT-II was launched by the Indian Space Research Organisation (ISRO), which carries three payloads, namely ocean color monitor, Ku-band pencil beam scatterometer and a Radio Occultation payload. The meteorological products from this satellite can be accessed from the ISRO website (www.nrsc.gov.in).

India launched a new satellite, Megha-tropiques (LEO) on 12 October 2011. The satellite is at the orbit of 20 degrees inclination covering the tropics. The payloads are a multi-frequency scanning microwave imager MADRAS to measure precipitation, cloud properties and surface wind speed over the ocean, a millimetre wave humidity sounder SAPHIR, a four-channel Earth radiation budget Instrument ScaRaB and a radio occultation sounder GPS-ROS. The products from this satellite are available on ISRO website (www.mosdac.gov.in).

India is planning to launch a new satellite INSAT-3D (GEO) in 2013 carrying the payloads of a six-channel imager and a 19-channel sounder. INSAT-3D is expected to provide vertical profiles of temperature and humidity and several new products in addition to those of Kalpana-1 and INSAT-3A.

Mr Sharma also provided the following comments on the activities of this pilot project.

- RA II web portal is a good beginning. All satellite agencies in RA II may display all images and products (every half hour or more frequently) of geosynchronous/Polar satellites on the RA II Portal in real time and of last 24 hours. It will be better if some products are identified for operational forecasting and hydrology (for flood warning etc.) and a common template is designed for all satellite operators to provide data/products in that form for easy and quick access.
- India needs capacity building in satellite image and products interpretation (especially multispectral) and the assimilation of satellite data and products in NWP models.
- Newsletters should be continued for keeping abreast with technology and news.

Russian Federation

6.1.2 Dr Oleg POKROVSKY, Principal Scientist of Voeikov Main Geophysical Observatory in Federal Service for Hydrometeorology and Environmental Monitoring (ROSHYDROMET), presented the Russian meteorological satellite program including Meteor-M and Electro-L N1.

"Meteor-M" polar-orbiting satellites are designed to be used to support Russian hydrometeorological and environment monitoring service and other organizations with operative satellite data, for the solution of following tasks:

- weather analysis and forecasting on regional and global scale
- sea water conditions analysis and forecasting (including ice cover monitoring)
- atmosphere conditions analysis and forecasting for aviation purposes
- analysis and forecasting of helio-geophysical conditions in near-Earth space environment, ionosphere and geomagnetic field conditions
- global climate monitoring
- emergency situations monitoring
- ecological monitoring of the environment etc.
- The satellite is also capable of acquiring information from ground data collection platforms using international frequency band (401,9 - 402,0 MHz) at 400 bit/s rate.

Electro-L N1 was launched on 20 January 2011:

- Satellite mass – 1500 kg
- Useful mass – 430 kg
- Geostationary satellite locates at stationary point 76 E (to capture Russian territory mostly)
- Provides the monitoring of the Earth surface pixels with a time resolution of 15 and 30 minutes
- Disseminates the observed information in formats HRIT, LRIT within Russia.

Republic of Korea

6.1.3 Dr Dohyeong Kim, Senior Scientist, National Meteorological Satellite Center, KMA delivered information of Korean meteorological satellite plan and KMA's activities as follows:

- Status of COMS and Geo-KOMPSAT-2A:

COMS (Communication, Ocean and Meteorological Satellite) has started operation and service to public in April 2011. COMS data dissemination schedule includes three measurement modes: FD (Full Disk) every three hours and ENH (Extended Northern Hemisphere) every 15 minutes. COMS data are re-transmitted to the users by HRIT and LRIT within 15 minute after the completion of the measurement. For the imagery, the KMA (<http://web.kma.go.kr/eng/index.jsp>) and NMSC (<http://nmsc.kma.go.kr/jsp/homepage/eng/contents/main/main.jsp>) website. FTP server is also available for near-real time access of COMS data with the designated ID and password after registration. Geo-KOMPSAT-2A program, COMS follow-on, was kicked-off in 2012 and scheduled to be launched in 2017 before the end of lifetime of COMS MI.

- KMA's training activities:

KMA accomplished various on-site training programs on satellite, including analysis and utilization of COMS data for domestic and foreign users in 2012. WMO-KMA VLab High Profile Training Event was conducted at NMSC/KMA in Jincheon from 4 to 6 October 2012. There were about 25 participants including lecturers from the United States of America (James Purdom and Paul Menzel) and the Russian Federation, and the remote lectures were also given by IPWG, EUMETSAT, CMA, and JMA. KMA's near future plans is to open the VLab webpage, including online learning system.

Japan

6.1.4 Mr Yoshihiko Tahara, Head of System Engineering Division, Data Processing Department of the Meteorological Satellite Center, JMA presented updates on the Web pages of MTSAT. The Webpages in the JMA portal site (www.jma.go.jp/jma/jma-eng/satellite) provides the introduction of MTSAT and information on how to access MTSAT data. The Webpages of the Meteorological Satellite Center (<http://mscweb.kishou.go.jp>) are designed for providing MTSAT users with the information on satellite operation and user guide including data format, sample data, calibration tables and spectral response functions. In addition, the MTSAT regional images are provided to support users with low Internet bandwidth. There are the MTSAT images of 15 areas, whose volumes are small and about 64 Kbytes to 128 Kbytes. The analysis images of heavily raining areas are also provided to support the Severe Weather Forecasting Demonstration Projects (SWFDP) of WMO RA II as well as RA V.

6.2 NMHSs

Hong Kong, China

6.2.1 Mr Chi Kuen So, Scientific Officer, Hong Kong Observatory (HKO), delivered a presentation on an update of the latest status in respect of the availability and use of meteorological satellite data and products in Hong Kong, China in 2012.

A number of ground reception stations are being used in HKO for direct reception of satellite data from a host of meteorological geostationary satellites. A variety of satellite data and derived products are also obtained via re-direct broadcast satellite, the Global Telecommunication System (GTS) and the Internet for use in operational weather forecasting and research. Examples of

different applications of satellite data, derived products as well as studies and use of satellite data on non-hydrostatic NWP models were demonstrated in the presentation.

As a mean to promote public awareness of natural disasters, HKO makes available on its website (www.weather.gov.hk) satellite images for the public. A mobile application was also developed for location-based weather services. Training courses on interpretation of radar and satellite images were delivered to government officers and the public. Satellite imagery is used by meteorologists of HKO for daily TV weather programmes, as well as for special media briefings on severe weather events.

Kyrgyzstan

6.2.2 Ms Makhbuba Kasymova, Head of Department of Weather Forecasting, Agency on Hydrometeorology of the Kyrgyz Republic (Kyrgyzhydromet), delivered a presentation on the use of satellite. Firstly, she expressed her appreciation to this project enabling to collect much information about the latest developments of technologies on using satellite products and possibilities to get access to satellite products, which could play an important role in improving accuracy on weather forecasting in Kyrgyz Republic. The satellite systems have capability to monitor severe weather and can help to improve the prediction of hazardous phenomena warnings for better protection of life and property from severe thunderstorms, flooding, hurricanes, avalanche and drought. Improvement of monitoring and prediction of severe weather phenomena is the priority task of Kyrgyzhydromet.

She introduced to the Project that Kyrgyzhydromet faces the acute shortage of being provided with equipment, technical support and training of staff, and expressed that the close cooperation with countries leading in satellite meteorology and their support are indispensable for activities of the Agency. In this situation, the Virtual Laboratory Training Event conducted by KMA and NMSC on 3-4 October 2012 gave a great chance to learn useful information, which will make one step further to the improvement on domain of satellite data and product utilization in Kyrgyzhydromet. She expressed an expectation that the project would consider organizing international trainings for users of satellite data and productions.

Lastly, she emphasized the usefulness of the Pilot Project Newsletters and the Project Portal, which play an important role to collect information on satellite meteorology, products and project activities.

Maldives

6.2.3 Mr Ali Shareef, Deputy Director General of the Maldives Meteorological Service (MMS), presented MMS's activities. The Department of Meteorology of Maldives was formed for providing vital information and data required for the socio-economic planning and development of the country. Since 1985, the Department has been providing weather forecasts, advisories and warnings for safeguarding the lives of people and minimizing damage to property. The name of the Department has been changed to the MMS in December 2008. The service is operational for 24/7 to monitor weather, climate, earthquakes and tsunamis. MMS provides information, advisories and warning for meteorological, seismological and marine hazards to protect the people, to reduce risks and the impact of the natural hazards on infrastructure and property. On the aftermath of the devastating Indian Ocean Tsunami in 2004, early warning has been enhanced for the safety and security of the people. MMS has invested and involved in several projects and programs through which it acquired number of new equipments, upgraded existing instruments and to some extent, developed its manpower.

Mr Shareef introduced satellite data and products of Maldives:

Maldives' Satellite Data receiving ground station is GEOSAT 500 made in Australia.

System components:

- Antenna (with L-band feed)
- Satellite receiver (input 50ohm, frequency 130-145MHz, Demodulation FY2C HiRID)

GEOSAT 500 is currently not functioning. Local technicians were unable to diagnose or rectify the problem or fault. IMD has graciously donated an MDD System to Maldives to receive processed

satellite images of KALPANA-1 via the Digital Meteorological Data Dissemination (DMDD) system. CMA also donated a CMACast receiver. However, these systems are now not functional. Therefore, the Internet is now an only resource to access to satellite data and products, and MMS gets satellite products from various websites. MMS does not obtain polar-orbiting satellite data now, and is seeking a way to get NOAA and FY-3 data since it is useful for MMS's services monitoring and forecast.

Mr Shareef added that the primary limiting factors in his organization for usage of satellite data and products are lack of trained personnel and budget limitation.

In response to the questions by Mr Tahara on MMS's Internet environment, Mr Shareef replied that MMS has enough bandwidth to access satellite data via the Internet, and was informed that NOAA data is available from the CLASS server operated by NOAA/NESDIS (<http://www.class.ngdc.noaa.gov>).

Pakistan

6.2.4 Mr Muhammad Aslam, Senior Meteorologist, Pakistan Meteorological Department (PMD), delivered a presentation on the use of satellite data in PMD. PMD has set up an antenna provided by China at the headquarters of PMD in Islamabad, and receives the imagery data of the Chinese geostationary satellites, FY-2D and 2E. The imagery data are used to provide services in the Department. On the basis of these satellite imageries, PMD generates many products and issues warning/forecasts on thunderstorm, fog, dust storm, tropical cyclones, etc.

Bahrain

6.2.5 Mr Adel Tarrar Daham, Supervisor, Meteorology Operation, Education and Training, Bahrain Meteorological Services (BMS), delivered a presentation on typical weather system in Kingdom of Bahrain and the use of satellite data in BMS. The Kingdom of Bahrain is located in the Middle East. In winter, weather system coming from Europe generates thunderstorms and downdraft yields rain thick dust haze. In summer, the southwesterly monsoon dominates providing thick dust haze frequently. BMS has been using satellite imagery since 1970s to watch the weather system. Currently, BMS receives EUMETSAT geostationary satellite imagery three-hourly via EUMETCast, and every half an hour via the Internet, whose connection is less reliable.

Uzbekistan

6.2.6 Mr Sherzod Mukhtarov, Center of Hydrometeorological Service of Uzbekistan (Uzhydromet), gave a brief introduction to Uzhydromet and its activities. Uzhydromet is the body of the state government, which is specially authorized for solution of tasks in the field of hydrometeorology in the Republic of Uzbekistan. The tasks of Uzhydromet services include the development and improvement of the state system of hydrometeorological observations, hydrometeorological provision of the sectors of economy, implementation of research works, improvement of the short- and long-term weather forecasting, river flow and climate change. Observations of the water regime of hydrological objects in Amudarya and Syrdarya basins and of their components are being conducted. Uzhydromet fulfills hydrometeorological and agrometeorological observations over the whole territory of Republic of Uzbekistan. The stations with the long observation series are in the zone of responsibility of Uzhydromet. The main objectives and tasks of hydrometeorological monitoring are the provision to users with hydrometeorological data and forecast and analytic information prepared on their base.

Primary activities of Uzhydromet are:

- Reception of satellite data from foreign satellites
- Carrying out the processing and interpretation of satellite data to analyze the synoptic processes and forecasting weather conditions in the region of Central Asia
- Provision of satellite images of clouds in real time to Uzhydromet units and other consumers
- Mapping, forecast movement and the development of cloud formations
- Monitoring of mountain snow cover in Central Asia and the creation of maps of snow cover

- Monitoring of the Aral Sea

The service is equipped with a special remote sensing hardware and software for receiving and processing satellite data in real time. Qualified staff provides services round the clock reception of satellite information and the issuance of the finished product. Technical support includes four stations for receiving satellite information Polar Tracker (NOAA), EUMETSAT, CMACast and Modis (Terra).

Viet Nam

6.2.7 Mr Nguyen Vinh Thu, Chief of R&D Division, Head of Satellite Section, National Hydro-Meteorological Service (NHMS) of Viet Nam, reported status of satellite usage and systems of Viet Nam under the title "The use of satellite data for weather analyzing and forecasting in Viet Nam". The topics of presentation covered: (1) Main weather system in Viet Nam; (2) Satellite reception systems; (3) Usage of satellite and its products in the operational weather forecasting; (4) Future plans. Some priorities in the next couple of years in NHMS were to implement including: Acquiring new satellite data, improving satellite-based products and maintaining and strengthening international cooperation in the field of meteorological satellite.

7. IMPLEMENTATION AND DISCUSSION OF FOURTH-PHASE OF THE PILOT PROJECT

7.1 Mr Tahara introduced a draft fourth-phase action plan of the Pilot Project, which runs from September 2012 through August 2013. The Group adopted the revised action plan as given in Annex III.

7.2 Dr Kim emphasized the importance of VLab for the Pilot Project. He suggested that the VLab high profile training events be conducted prior to Pilot Project meetings.

7.3 Mr Lafeuille highlighted the feedback of the Coordinating Group members. Mr Tahara emphasized the importance to collect the successful cases from the Coordinating Group members.

7.4 Mr Tahara recalled the actions adopted in the previous meeting in Tokyo, and reviewed the status with participants. A new list of action items including actions raised in this meeting was adopted as given in Annex IV.

8. DISCUSSION OF THE CONTINUATION OF THE PP BY AGREEMENT OF THE 15TH SESSION OF WMO REGIONAL ASSOCIATION II (RA II-15)

8.1 Introduction to WIGOS activities

8.1.1 Mr Shida delivered the presentation on the development of an RA II Regional WIGOS Implementation Plan (R-WIP-II) including background, WIGOS initiative, benefits, development and implementation activities. He emphasized that WIGOS framework is about doing more with what we have to enable more efficient and effective service delivery.

8.1.2 Mr Shida informed that the draft of the 'RA II Regional WIGOS Implementation Plan' was being prepared by the RA II Task Team on R-WIP-II. He mentioned that this pilot project might be involved in the WIGOS framework. In this regard, Mr Tahara suggested two options for this project:

- 1) Keep on the track as a "pilot" project
- 2) Move to a WIGOS project

He added that the coming fourth-phase is final and this project has to foresee the future. He also mentioned that this project tries to strengthen linkage between satellite operators and users collecting latest information on satellite matters and provide it to users, and these activities are necessary to establish WIGOS. The participants agreed this point, and an action was adopted for this project to be involved in WIGOS through the fifteenth session of WMO Regional Association II (Asia) to be held in Doha, Qatar in December 2012.

Action: The Co-coordinators to create a proposal for the RA II Regional WIGOS Implementation Plan and circulate it to the Coordinating Group members. The members to respond sending comments and suggestions back to the Co-coordinators.

8.1.3 Mr Tahara emphasized that Co-coordinators (KMA-JMA) recognize the importance of the participation by partners and key players. In this regard, he suggested CMA to participate in the future activities of the Pilot Project.

Action: The Co-coordinators to make a contact to CMA to invite CMA to the WIGOS project as one of key players.

9. CLOSING

9.1 Mr Lafeuille and Mr Shida thanked Dr Kim and the staff of KMA for their hard work in organizing this meeting as well as the training event and the Asia-Oceania Meteorological Satellite Users' Conference. They expressed their appreciation for Dr Kim and Mr Tahara, who was acting on behalf of Mr Kurino, Co-coordinators of the Pilot Project for guiding the work of this meeting.

9.2 The Second Coordinating Group Meeting for Regional Association II (RA II) Pilot Project to Develop Support for National Meteorological and Hydrological Services (NMHSs) in Satellite Data, Products and Training (RA2PPSatCG) was closed at 18:00 on Monday, 8 October 2012.

**SECOND MEETING OF THE COORDINATING GROUP OF THE RA II PILOT PROJECT
TO DEVELOP SUPPORT FOR NMHSs IN SATELLITE DATA, PRODUCTS AND TRAINING
(8 October 2012, Jeju Island, Republic of Korea)**

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Second Meeting of the Coordinating Group of the RA II Pilot Project to Develop Support for NMHSs in Satellite Data, Products and Training

(Jeju Island, Republic of Korea, 8 October 2012)

AGENDA

- 09:00~09:30 **1. Opening**
(Chair: Dr Kim, KMA)
1.1 Welcome address (KMA)
1.2 Opening address (Mr Lafeuille, WMO)
1.3 Adoption of agenda
1.4 Working arrangements
- 09:30~10:10 **2. Overall status of RA II Pilot Project to develop support for NMHSs in satellite data, product and training (RA2PPSat)**
(Chair: Dr Kim, KMA)
2.1 Introduction to RA II Pilot Project on satellite (JMA)
2.2 Accomplishments (JMA, KMA)
2.3 The WMO Space Programme (WMO)
2.4 Support for WMO Regional Association II (Asia) (WMO)
- Break (Group Photo)*
- 10:30~11:00 **3. RA II Product Portal and WMOSP Product Access Guide**
(Chair: Mr Tahara)
3.1 RA II Product Portal (JMA)
3.2 WMO SP Product Access Guide (WMO)
- 11:00~11:30 **4. Results of RA II User Survey and WMOSP User Survey (RA II extract)**
(Chair: Mr Tahara)
4.1 RA II User Survey (JMA)
4.2 WMOSP User Survey (WMO)
- 11:30~12:00 **5. RA II PP SAT actions related to the procedure for regional satellite data access requirements**
(Chair: Mr Tahara)
5.1 CBS procedure for data/product access requirements (WMO)

Lunch

- 13:00~15:30 **6. Cascading satellite-derived information to recipient members**
(Chair: Dr Kim)
6.1 Satellite operators:
- IMD, ROSHYDROMET, KMA, JMA
6.2 NMHSs:
- Hong Kong, China; Kyrgyz Republic; Maldives; Pakistan; Bahrain;
Uzbekistan; Viet Nam
- Break*
- 16:00~17:00 **7. Implementation and discussion of fourth-phase of the pilot project**
(Chair: Mr Tahara)
- 17:00~18:00 **8. Discussion of the continuation of the PP by agreement of the 15th session of WMO Regional Association II (RA II-15)**
(Chair: Mr Tahara)
8.1 Introduction to WIGOS activities (WMO)
- 18:00~18:30 **9. Closing**
(Chair: Dr Kim)
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**Fourth-phase Action Plan of the Pilot Project to Develop Support for
NMHSs in Satellite Data, Products and Training
(Fourth-phase: September 2012 – August 2013)**

(1) Continuative Issuance of Quarterly newsletters for RA II Members

The contents will include:

- Access to satellite imagery, data and products including application products
- Training activities currently available or to be available in the future
- News on meteorological satellites
- News on new services
- Brief progress reports on the pilot project
- Introduction to the activities of other RAs and WMO VLab activities
- Feedback from NMHSs in the use of satellite data, products and training

(2) Enhancement of Pilot Project Web Pages on the WMO Space Programme (WMOSP) website hosted by WMOSP Web pages will include:

- Information on access to satellite imagery, data and products as well as training
- Newsletter archives
- RA II Pilot Project Questionnaire
- RA II Pilot Project portal site
- Meeting report

(3) Identification of requirements from RA II Members (by March 2013)

- Conducting of a survey on satellite data utilization by the web-based RA II Pilot Project questionnaire system among RA II Members on the RA II Pilot Project web pages with a computerized answer sheet
- Sharing of questionnaire results through the web pages
- Identification of requirements from RA II Members through the questionnaire system to response to the CBS-15 recommendation to formulate procedure for documenting regional requirements for satellite data access and exchange for each region.

(4) Alignment of pilot project activities with Virtual Lab to optimize assistance to NMHSs in RA II (by October 2012)

- Ongoing liaison with the WMO Secretariat and the VLab Secretariat (EUMETSAT) for information sharing in order to optimize assistance to NMHSs while avoiding duplication of effort
- Seek the way of implementation/promotion of High Profile Training Event (HPTE) in conjunction with RA II PP or Asia/Oceania Meteorological Satellite Users' Conference

(5) Enhancement of the RA II Pilot Project portal site with successful examples and experiences in the usage of products to be shared among users

(6) Planning of the 3rd Meeting of the Coordinating Group of the RA II Pilot Project to be held in 2013

(7) Continuation of this project by agreement of the 15th session of WMO Regional Association II (XV-RA II) by involvement into a WMO RA-II WIGOS project

**SECOND MEETING OF THE COORDINATING GROUP OF THE RA II PILOT PROJECT TO
DEVELOP SUPPORT FOR NMHSs IN SATELLITE DATA, PRODUCTS AND TRAINING**

(8 October 2012, Jeju Island, Republic of Korea)

ACTION ITEMS

	Category	Actions	Deadline
1	Newsletter	The RA II Pilot Project Coordinating Group members to provide articles to be posted to the Special Issue of Pilot Project Newsletter.	January 2013
2	Questionnaire	The RA II Pilot Project Coordinating Group members to review the contents of the Questionnaire and its usability.	January 2013
3	Questionnaire	The Co-coordinators to make the plan of the next questionnaire taking into account for the WMO SP questionnaire in order to avoid for them to be performed in the same time frame.	March 2013
4	Web page	The Coordinating Group members to provide feedback on the function and usability of the Portal site, in particular, from the users' perspective.	January 2013
5	Product Portal	The Co-coordinators and WMO SP to seek linkage between the WMO SP Product Access Guide and RA II Product Portal avoiding the duplication of the similar information and considering sustainability.	August 2013
6	RA II Requirements	JMA, KMA, IMD and ROSYDROMET to nominate persons to establish a small drafting team for RA II requirements on satellite products.	December 2012
7	WIGOS Project	The Co-coordinators to create a proposal for the RA II Regional WIGOS Implementation Plan and circulate it to the Management group members. The members to respond sending comments and suggestions back to the Co-coordinators.	November 2012
8	WIGOS Project	The Co-coordinators to make a contact to CMA to invite CMA to the WIGOS project as one of key players.	November 2012