

WORLD METEOROLOGICAL ORGANIZATION

REGIONAL ASSOCIATION II (ASIA)

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

TOKYO, JAPAN, 21-23 FEBRUARY 2011



FINAL REPORT



Participants in the meeting of the Coordination Group

*(Back row) Chi Kuen So, Do Thanh Tuan, Humaid Al Badi, Muhammad Aslam, Sergey Klimov, Ali Shareef, Volker Gaertner, Oleg Pokrovsky, Ashok Kumar Sharma, Fang Xiang, Tomoo Ohno, Hakaru Mizuno
(Front row) Satoshi Harada, Tsutomu Jomura, Dohyeong Kim, Kuniyuki Shida, Yuji Kano, Jerome Lafeuille, Bin Chann Mony, Makhbuba Kasymova, Toshiyuki Kurino*

GENERAL SUMMARY

1. OPENING

1.1 The first 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 from 21 to 23 February 2011 at the headquarters of the Japan Meteorological Agency (JMA) in Tokyo, Japan. The list of participants is given in Annex I.

1.2 Mr Yuji Kano, Director-General of the Observations Department, JMA welcomed the all the participants to Tokyo. He recalled that the Pilot Project had been established at the fourteenth session of RA II held in Tashkent, Uzbekistan, in December 2008 for NMHSs in RA II to improve the flow of satellite-derived information including satellite imagery, data and application products. Mr Kano thanked all the organizations involved in the Project and noted that demands from NMHS users for more reliable and user-friendly satellite-derived information to be used in disaster risk reduction had grown significantly, making the major focus of the initiative to facilitate the timely provision of such information by satellite operators to users. In this context, Mr Kano highlighted that the meeting would contribute to the improved flow of satellite-derived information in RA II, and would therefore bring benefits in terms of satellite data, products and training for NMHSs. He concluded his address wishing a very productive meeting.

1.3 On behalf of Mr Michel Jarraud, Secretary-General of the World Meteorological Organization (WMO), Mr Jerome Lafeuille welcomed the participants in the meeting and expressed his appreciation to Mr Yuji Kano for hosting the meeting in Tokyo. Mr Lafeuille also expressed its appreciation to the staff of JMA for their work in making local arrangements, and to Mr Toshiyuki Kurino and Dr Dohyeong Kim (Co-coordinators of the Pilot Project) for guiding the work of the meeting. Mr Lafeuille highlighted that the Pilot Project was a very timely initiative. He recalled how space-based capabilities have expanded in recent years, especially in RA II, with nine geostationary satellites simultaneously functioning over the Indian Ocean and the West Pacific area (including COMS-1 and Elektro-L N1, which are still in the commissioning phase), four polar-orbiting meteorological satellites operated by RA II Members and strong contributions to ocean, climate and environmental observation by the space development agencies of RA II Members. Mr Lafeuille underlined that there was an increasing demand on NMHSs as the population growth made the society more vulnerable to weather, as severe or extreme weather events tended to be more frequent, and as climate needed to be monitored more rigorously to support climate prediction and services. In spite of this growing demand, the utilization of space-based capabilities remains generally below its potential, either due to a lack of awareness or insufficient technical expertise to master satellite applications, or because available satellite products do not fully correspond to users' requirements. Mr Lafeuille saw the RA II Pilot Project as an excellent way to tackle these issues and at the same time to strengthen networking and the sharing of experience and tools among satellite users and providers in the region. He again thanked JMA and KMA for their co-leadership and all satellite operators for their support, and encouraged participants to pursue constructive dialogues during the three-day meeting.

2. ORGANIZATION OF THE MEETING

2.1 Adoption of the agenda

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

2.2 Working arrangements

2.2.1 The meeting agreed on its working hours and other practical arrangements for the meeting. It also agreed that all documents submitted for the meeting be posted on the WMO website at <http://www.wmo.int/pages/prog/dra/rap/RAIIPilotProjectWMO.php>.

3. INTRODUCTION TO THE RA II PILOT PROJECT TO DEVELOP SUPPORT FOR NMHSs IN SATELLITE DATA, PRODUCTS AND TRAINING

3.1 Overall framework

3.1.1 Mr Kurino (Co-coordinator) provided an overview of RA2PPSat, including its background, status information and relevant decisions by the fourteenth session of RA II (XIV-RA II) held in Tashkent, Uzbekistan, in December 2008.

3.1.2 The meeting noted that RA2PPSat aimed at contributing to capacity-building as a kind of self-help effort for NMHSs in RA II, and also to help developing countries in particular to gain access to and to fully utilize existing satellite products for the disaster risk reduction. This is a cascading concept involving improvement for the application of satellite-based products that support forecasting and severe weather warning services.

3.2 Mission of the Coordinating Group

3.2.1 The meeting recalled the following terms of reference of the Pilot Project Coordinating Group:

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

3.2.2 The meeting recalled that the WMO Secretariat invited RA II Members after XIV-RA II to join the Coordinating Group of the Pilot Project, and noted that the members at the time of the meeting were Japan (Co-coordinator); Republic of Korea (Co-coordinator); Bahrain; China; Hong Kong, China; India; Kyrgyzstan; Oman; Pakistan; Russian Federation; Uzbekistan; Viet Nam and, as an observer, European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT). It was noted that any Member of RA II could designate its expert as a member of the Coordinating Group at the recommendation of its Permanent Representative with WMO.

3.3 WMO Space Programme

3.3.1 Mr Jerome Lafeuille, Chief of the Space-based Observing System Division, WMO Space Programme Office, 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. He informed the meeting that the Space Programme pursued three main goals: enhancement of the space-based observing system to better respond to needs; improvement of accessibility of satellite data and products; and development of users' capacity to utilize and benefit from satellite data and products. He stressed that, bearing in mind WMO's Strategic Plan, particular attention should be paid to advancing the integration of observing systems (e.g., through satellite intercalibration), integrating information systems (e.g., through data management in line with WIS standards for data and metadata), building capacity in developing and least developed countries, and supporting climate monitoring and services.

3.3.2 Mr Lafeuille recalled the outcomes of the extraordinary session of the Commission for Basic System (CBS) held in November 2010 (CBS-Ext. (10)) which called for increased attention to

satellite data and product delivery and to the formulation of data requirements, the implementation of Digital Video Broadcast dissemination systems fed by multiple data sources, and the harmonization of Direct Broadcast and Internet distribution services. He noted that CBS-Ext. (10)) had also welcomed holding the first Asia Oceania Meteorological Satellite User's Conference and the proposals of JMA, KMA and CMA to hold similar events in the future. Finally, in response to the exponential increase in the number of satellite data sources and volume, and the sophistication of space-based instruments, Mr Lafeuille encouraged the regional collaboration toward the sharing of products. To this effect, he stressed the need for products to be based on agreed requirements, validated, quality-controlled, sustained and documented with proper metadata. He encouraged the Pilot Project to take steps in this direction.

3.4 Support for WMO Regional Association II (Asia)

3.4.1 Mr Kuniyuki Shida, Programme Manager, Regional Office for Asia and the South-West Pacific, Development and Regional Activities Department of WMO, delivered a presentation on the new working mechanism of Regional Association II (Asia) adopted at its fourteenth session (XIV-RA II) held in Tashkent, Uzbekistan, in December 2008, in view of the need to align with the WMO Strategic Plan as well as the Expected Results of the RA II Strategic Plan (2009–2011). He introduced the establishment of three pilot projects established at XIV-RA II, and stressed that they were established in order to enhance the capabilities of NMHSs in developing countries, particularly LDCs, to fulfill their mandates.

3.4.2 Mr Shida briefed the meeting on WMO support provided for RA II through the Regional Programme, the Technical Cooperation Programme (including the Voluntary Cooperation Programme (VCP)), the WMO Programme for LDCs and resource mobilization by the Development and Regional Activities Department, specifically by the Regional Office for Asia and the South-West Pacific.

3.4.3 He also expressed his appreciation for the work performed under this Pilot Project to date, and expressed expectations for various activities to be carried out within the project and reported to the next session of RA II.

4. EVALUATION OF THE FIRST-PHASE OF THE PILOT PROJECT

4.1 Mr Kurino reviewed the first-phase action plan of the Pilot Project, which covered from September 2009 through August 2010, including:

- 1) issuance of bi-monthly newsletters for RA II Members;
- 2) establishment of Pilot Project web pages on the WMO Space Programme website;
- 3) creation of two mailing lists (one for RA II Members and one for Coordinating Group Members);
- 4) identification of requirements through the above activities and through preparation for a survey of RA II Members to enable the organization of assistance to recipient members;
- 5) alignment of the Pilot Project activities with VLab activities to optimize assistance to NMHSs in RA II; and
- 6) development of a second-phase action plan by summer 2010.

4.1 RA II Pilot Project Newsletter

4.1.1 The meeting recalled that the five newsletters were issued in the first phase for RA II Members, providing information on how to access satellite imagery, data and products (including application products) as well as on training activities currently available or to be introduced in the future. It noted that the newsletter is a very effective way of providing information to RA II Members.

Accordingly, the meeting agreed on the need to increase the number of addresses to which the publication is distributed in RA II.

4.2 RA II Pilot Project web pages

4.2.1 The meeting recalled that the Pilot Project web pages have been set up on the WMO Space Programme website, including pages on the background and mission of the Pilot Project, RA II Pilot Project Coordinating Group members, and the RA II Pilot Project Newsletter at <http://www.wmo.int/pages/prog/sat/RAII-PilotProject.html>.

4.3 RA II Pilot Project mailing lists

4.3.1 The meeting recalled that an RA II Pilot Project mailing list function has been implemented on Google Groups for access through the web or by e-mail, and Pilot Project Coordinating Group members have already registered to facilitate the exchange of information on satellite data, products and training.

5. CASCADING SATELLITE-DERIVED INFORMATION TO RECIPIENT MEMBERS

5.1 Satellite operators

China Meteorological Administration (CMA), China

5.1.1 Mr Fang Xiang, Director of Remote Sensing Data Application, National Satellite Meteorological Center of CMA, delivered a presentation on the status of China's geostationary and polar-orbiting meteorological satellite programme. To promote data sharing in the field of meteorological sciences, CMA runs a meteorological satellite data sharing platform based on the Fengyun meteorological satellite ground application system. Since 2005, the system has provided speedy and convenient services supplying multi-level meteorological satellite data and products to domestic departments and users in a wide variety of fields. At present, CMA manages an archive containing more than 600 TB of meteorological satellite data, and operates a meteorological satellite data service and a sharing platform based on FENGYUNCast/CMACast and related websites.

India Meteorological Department (IMD), India

5.1.2 Mr A. K. Sharma, Deputy Director-General of Meteorology of IMD gave a presentation on the current status of India's operational meteorological satellites (namely, Kalpana-1 (74 E) and INSAT-3A (93.5E)) and the satellite products derived from their data for use in operational forecasting. Kalpana-1 has a three-channel Very High Resolution Radiometer (VHRR), while INSAT-3A has a three-channel VHRR and a three-channel CCD payload. The images and products derived from these satellites are available on the IMD website at www.imd.gov.in. The dissemination of satellite imagery to the regional forecasting offices of IMD and three neighboring countries (Nepal, Maldives and Sri Lanka) is performed via satellite broadcast using the Digital Meteorological Data Dissemination (DMDD) system. IMD also has three receiving platforms for the NOAA/MODIS/Metop polar satellite systems. The images and products generated using data from these polar-orbiting satellites are adopted in weather forecasting, and are also displayed on the IMD website. In September 2009, the OCEANSAT-II polar-orbiting satellite was launched by the Indian Space Research Organisation (ISRO). It carries a Ku-band pencil-beam scatterometer to provide data on ocean surface winds at a height of 10 m to facilitate early detection of cyclones. These wind products are available on the National Remote Sensing Centre website at www.nrsc.gov.in.

5.1.3 The specially designed Cyclone Warning Dissemination System (CWDS), which depends on INSAT satellite data, provides area-specific cyclone warnings in local languages. In the system, a total of 252 analog and 101 digital CWDS receivers are deployed in vulnerable coastal areas

along the eastern and western coasts of India. This network will be replaced shortly by 500 new CWDS units that are modern and easy to maintain.

5.1.4 Satellite meteorology is taught as a subject on various training programmes run by IMD, which are also attended by trainees from neighboring countries. ISRO runs the UN-affiliated Centre for Space Science and Technology Education in Asia and the Pacific.

5.1.5 India plans to launch two new satellites called Megha-Tropiques (LEO) and INSAT-3D (GEO). The payloads of these satellites are detailed below.

Megha-Tropiques payloads:

- MADRAS (Microwave Analysis and Detection of Rain and Atmospheric Structures) – a facility for obtaining measurements for precipitation, cloud micro-physics, ocean surface winds, total water vapor and liquid water content of the atmosphere.
- SAPHIR – a six-channel millimeter-wave humidity sounder that enables the retrieval of information in six atmospheric layers from the Earth's surface up to an altitude of 12 km. The horizontal resolution is 10 km.
- ScaRaB (Scanner for Radiation Budget) – an Earth radiation budget instrument with four channels at 0.5 – 0.7 μm , 0.2 – 4 μm , 0.2 – 50 μm and 10.5 – 12.5 μm . With a spatial resolution of 40 km, it measures outgoing long-wave and short-wave radiation from the top of the atmosphere.
- GPS-ROS (Radio Occultation Sounder) – a GPS receiver used to measure vertical profiles of temperature and humidity at the point of radio occultation

INSAT-3D payloads:

- 6-channel imager
- 19-channel sounder

The INSAT-3D satellite will provide vertical profiles of temperature and humidity in addition to the products generated using data from the existing Kalpana-1 and INSAT-3A satellites.

Japan Meteorological Agency (JMA), Japan

5.1.6 Mr Tomoo Ohno, Head, System Engineering Division, Meteorological Satellite Center (MSC), JMA delivered a presentation on the websites of JMA (<http://www.jma.go.jp/en/gms/>) and MSC (<http://mscweb.kishou.go.jp/>), which provide information on MTSAT operation, real-time image data acquisition, products and training activities. He also highlighted the MSC site's real-time hourly JPEG files, which provide cropped images showing 15 areas, each with a file size small enough to allow problem-free viewing. MSC plans to add images for other areas in response to user demand. Mr Ohno invited all participants to visit the websites of JMA and MSC to promote the use of these satellite data.

Korea Meteorological Administration (KMA), Republic of Korea

5.1.7 Dr Dohyeong Kim, Senior Scientist, National Meteorological Satellite Center, KMA delivered a presentation on Korea's first multi-purpose geostationary satellite, COMS (Communication, Ocean and Meteorological Satellite), launched in Kourou, French Guiana, at 21:41 UTC on 26 June 2010. The first MI visible images were acquired on 12 July 2010, and the first IR images were obtained on 11 August 2010 after a successful outgassing period. The COMS MI data service is expected to start in April 2011. COMS raw data will be transmitted to the National Meteorological Satellite Center (NMSC) and the Satellite Operation Center (SOC) for ground processing at NMSC and re-transmission to users via HRIT and LRIT within 15 minutes.

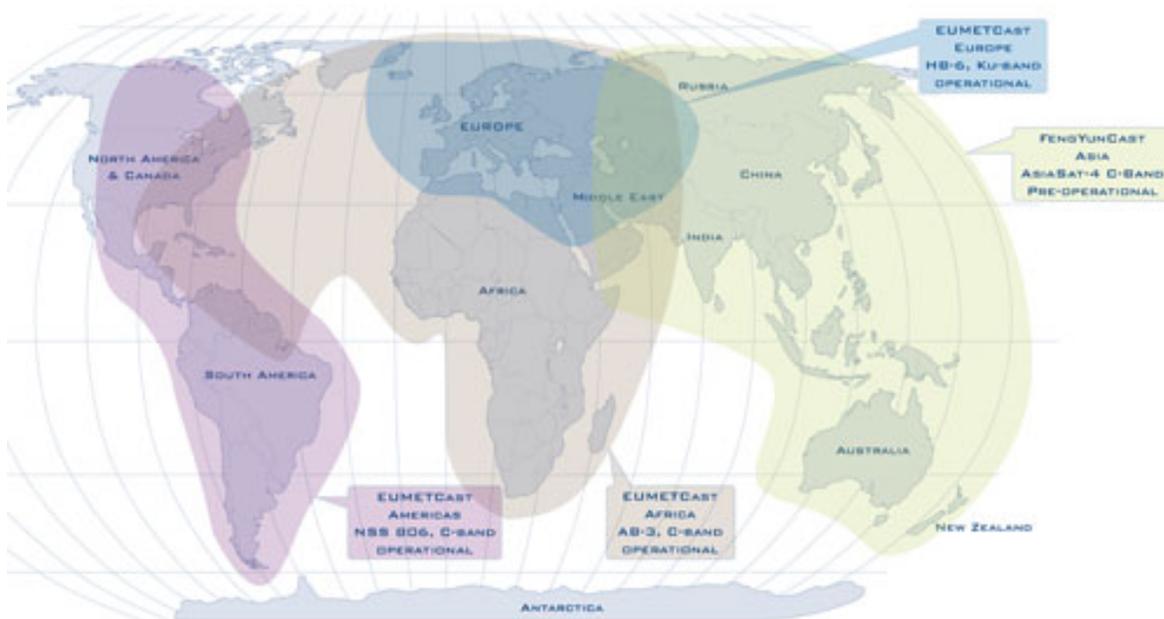
Federal Service for Hydrometeorology and Environmental Monitoring (ROSHYDROMET), Russian Federation

5.1.8 Dr Oleg Pokrovsky, Principal Scientist, Voeikov Main Geophysical Observatory, ROSHYDROMET gave an outline of the remote sensing programmes run by the organization. The presentation included a description of the Meteor-M N1 (polar-orbiting) and Electro-L N1 (geostationary) satellite systems and their equipment, which includes multichannel radiometers. The second part of the presentation described particular products provided through the assimilation of remote sensing data on precipitation, solar radiation fields, surface temperature and albedo spatial distributions. Finally, some meteorological applications were presented.

European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT)

5.1.9 Dr Volker Gaertner, Head, User Services Division, EUMETSAT, gave a presentation on the status of the current and future satellite missions of EUMETSAT. He highlighted that the continuity of Europe's Meteosat satellite series is guaranteed with the adoption of the Meteosat Third Generation (MTG) programme, which will provide observations from geostationary orbit well into the next 25 years. Two more Meteosat Second Generation satellites (MSG-3 and MSG-4) will be launched in 2012 and 2015, respectively. In addition to Metop-A (operational since 2007), two more satellites (Metop-B and Metop-C) will be launched for the polar satellite system in 2012 and 2016, respectively. To facilitate ocean altimetry missions, EUMETSAT is supporting the Jason-2 mission, and is also preparing to continue with Jason-3 and a future Jason follow-on mission.

5.1.10 The products and data generated by EUMETSAT are processed in the distributed EUMETSAT ground segment (which includes satellite application facilities). All data and products are archived in the EUMETSAT Data Centre. For real-time dissemination, EUMETSAT uses the EUMETCast digital video broadcast system, which provides a wide variety of products from EUMETSAT and third parties including other satellite operators such as CMA, JMA, NOAA and IMD. A full product list is available on the EUMETSAT product navigator at <http://www.eumetsat.int/Home/Main/DataProducts/ProductNavigator/index.htm>. The EUMETCast system covers a large part of the globe, and is an integral part of the GEO/GEOSS GEONETCast system. The coverage areas of EUMETCast are shown below:



5.2 NMHSs

Hong Kong, China

5.2.1 Mr Chi Kuen So, Scientific Officer, Hong Kong Observatory (HKO), gave a status update on the availability and usage of meteorological satellite data and products at HKO. His presentation covered: Brief introduction to HKO; Satellite ground reception systems; Application of satellite data; Studies and use of satellite data on numerical models; and Enhancement of public information and education.

5.2.2 He introduced HKO's operation of a number of ground stations to receive direct broadcast satellite images from a host of meteorological satellites. In addition, he highlighted how HKO also receives a variety of satellite data and derived products via re-direct satellite broadcast, GTS and the Internet for use in operational weather forecasting and research. Some examples of applications of satellite data and derived products as well studies and use of satellite data on non-hydrostatic models by HKO were given. To enhance public information and education, HKO has started to provide satellite images on its website (www.weather.gov.hk) and other different channels for the public and users. Training courses on interpretation of radar and satellite images were introduced for government officers and the public as a means for raising awareness of natural disasters. Satellite imagery is also used by HKO meteorologists for daily TV weather programmes and for special media briefings on severe weather events. In conclusion, it was highlighted that meteorological satellite data and products are indispensable for the provision of weather forecasting and warning services in Hong Kong, China. They are widely used to support weather and environmental monitoring, severe weather warnings and disaster mitigation as well as for public education.

Kyrgyzstan

5.2.3 Ms Makhbuba Kasymova, Head, Department of Weather Forecasting, Agency of Hydrometeorology under Ministry of Emergency Situations of Kyrgyzstan (Kyrgyzhydromet), introduced Kyrgyzstan and its meteorological services, including the activities of the Meteorological Forecasting Department of Kyrgyzhydromet. The presentation outlined how satellite data is used within the organization. Problems relating to the prediction of hazard phenomena, which represent major issues for the country, were explicitly discussed. It was expected that this meeting and the ongoing Pilot Project would result in useful developments toward the usage of satellite products in NHMS activities in Kyrgyzstan.

Oman

5.2.4 Mr Humaid Al Badi, Chief, Remote Sensing and Studies Section, Directorate General of Meteorology and Air Navigation of Oman delivered a presentation on the usage of satellite products in Oman. He highlighted that: (a) Meteosat-IODC provides the best coverage and the most easily accessible data for Middle East countries, which look for the continuity of IODC services from EUMETSAT; (b) The information about the procedures and technical requirements for receiving CMACast data is not sufficient; (c) Recommendation from a user point of view: satellite operators should provide easily accessible descriptive information on how to obtain data and to whom contact on a technical level for individual satellites, e.g., through a WMO website; and (d) The meeting was invited to discuss ways to help CoEs to create more local trainers (experts), e.g., on-the-job training/internship programmes in organizations that use satellite data at the highest capacity and/or periods of work with organizations that specialize in deriving products.

Pakistan

5.2.5 Mr Muhammad Aslam, Senior Meteorologist, Pakistan Meteorological Department, delivered a presentation on the usage of satellite products in Pakistan. China's FY-2 E/D satellite imagery is used for the detection of thunderstorms, dust storms, tropical cyclones, fog, simple cloud, etc. This satellite information is used to help the issuance of accurate forecasts for the aviation industry, farmers, radio, TV, newspapers, etc.

Uzbekistan

5.2.6 Mr Sergey Klimov, Acting Chief, Center of Hydrometeorological Service of Uzbekistan (Uzhydromet), , gave a brief introduction to Uzbekistan, hydrometeorological threats to the country and the status of application for remote sensing data by Uzhydromet. Issues related to the planning of data application in the future were also briefly discussed.

Viet Nam

5.2.7 Mr Do Thanh Tuan, Engineer of Meteorology, Central Hydro-Meteorological Forecasting Center, National Hydro-Meteorological Service (NHMS) of Viet Nam, delivered a presentation mainly focusing on the use of satellite data. His presentation covered: (a) Brief introduction to NHMS activities; (b) Equipment to receive and process data from MTSAT 1R, FY 2D/E and NOAA series and FY 1D satellites, and how satellite information is distributed between NHMS and regional forecasting centers; (c) Current applications for satellite data: weather analysis, tropical cyclone analysis and rainfall data retrieval; and (d) Plans to develop new satellite products and maintain cooperation with other NHMSs and international organizations.

Cambodia

5.2.8 Ms Bin Chann Mony, Vice Chief, Climate Office, Department of Meteorology (DOM) of Cambodia, delivered a presentation on the use of satellite service products by DOM with a focus on its capacity to use MTSAT products. As there is currently a lack of tools and software, DOM uses NWP products from SATAID and other NWP products provided through websites such as those of the RSMC Tokyo - Typhoon Center operated by JMA for monitoring/tracking typhoons and tropical cyclones, and those from the Hong Kong Observatory and the Thai Meteorological Department for making weather forecasts for the public. The presentation also highlighted the insufficient access for DOM staff to education and training opportunities and the future need to use satellite products and develop a strategy plan for DOM for 2012.

Maldives

5.2.9 Mr Ali Shareef, Deputy Director-General, of the Maldives Meteorological Service (MMS), delivered a presentation on the usage of satellite products in Maldives. The GEOSAT 500 ground station is a forecaster's workstation with integrated reception and processing functions. It has a full range of forecasting tools incorporating the Dvorak technique, topography, overlays, zooming and panning, integration and display of multiple data sources such as GRIB, SYNOPs, SST, and cloud classification. However, the system is currently not functioning, and local technicians have been unable to diagnose or rectify the problem or fault. As a result, Maldives currently has no facilities to receive images from polar-orbiting satellites. Pictures from the NOAA series and the FY orbiting series are important to the region; in 1991, a storm that hit southern Maldives was successfully predicted using data from the NOAA polar orbiters. It is therefore of the utmost importance for the organization to bring the system back to a functioning state. In the meantime, there is also concern over the probable discontinuation of METEOSAT-7 services over the Indian Ocean, which deliver images of the Maldives area in its entirety with extreme clarity. Capacity building in the area of satellite image interpretation and the development of simple application tools using satellite data will also be very useful for MMS staff. MMS looks forward to assistance from WMO, service providers or donors in resolving these issues.

6. ALIGNMENT OF PILOT PROJECT ACTIVITIES FOR TRAINING WITH WMO-CGMS VIRTUAL LABORATORY ACTIVITIES

6.1 Status of the WMO-CGMS Virtual Laboratory

6.1.1. Dr Volker Gaertner (EUMETSAT) delivered a presentation on the concept and status of the WMO Virtual Laboratory for Education and Training in Satellite Meteorology (VLab). The meeting noted that VLab is a cooperative effort among satellite operators to facilitate the use of satellite data in operational services, with particular focus on developing countries. VLab is a network of training entities providing training materials, organizing training courses and event weeks, and using more and more distance-learning techniques.

6.1.2. The aim of VLab is to create enough Centers of Excellence for each WMO regional association to be associated with one. These centers act as focal points for the organization of training events. Planned activities include Internet-based regional focus group exchanges in which interesting and critical weather situations can be discussed across national borders. More information is available on the WMO website at <http://www.wmo-sat.info/vlab/>.

6.2 Activities in the framework of the VL framework

6.2.1 The meeting noted that CMA had organized a number of training courses for domestic and international users, including use of satellite Images in weather analysis and forecasting, application of satellite data for nowcasting, application of satellite data for typhoon. Many of these courseware can be download from the website. CMA plans to improve technology and facilities for distance education and to upgrade training platform for virtual training room.

6.2.2 The meeting noted JMA's provision of the Virtual Resource Library (VRL) via the MSC website (<http://mscweb.kishou.go.jp/VRL/index.htm>), which includes: (a) an outline of meteorological satellite observation; (b) an introduction to remote sensing; (c) objective cloud analysis data; and (d) microwave remote sensing data. The VRL website also provides SATAID (Satellite Animation and Interactive Diagnosis) software to enable the use of satellite imagery with geophysical data, such as radar imagery or gridded NWP statistics, in order to produce integrated imagery for advanced analysis and interpretation (<http://www.jma.go.jp/jma/jma-eng/satellite/ds.html>).

6.2.3 The meeting noted that KMA has its own plan (as CGMS formally endorsed KMA's application at the 38th CGMS meeting) to develop various online training programmes regarding satellite data utilization (including that of COMS) for domestic and international users stage by stage. These activities can be harmonized with the Virtual Laboratory and regional Center of Excellence activities. In the near future, KMA plans to create a dedicated web page, establish an online learning system and develop continuous cooperation with other activities.

6.2.4 The meeting noted that the Center of Excellence (CoE) in Muscat, Oman uses blended courses of face-to-face and distant lectures to invite the expertise in different fields of satellite applications and satellite meteorology from around the world to participate in the course. In turn, the Center supported the virtual courses organized by other organizations. VL site of CoE-Muscat uses the Moodle software to organize the VL courses. The Moodle tools show capabilities to archive the training materials and keep the trainers of each course in contact with each other virtually before and after the course.

6.3 Ways to share the training materials to enhance the capacity building for both international and internal usages

6.3.1 Dr Kim (Co-coordinator) delivered a presentation on the idea of sharing training materials to enhance capacity building both domestically and internationally. The three specific items suggested were investigation and selection of content; methods of sharing; and methods of activation. For the investigation and selection of content, domestic training materials need to be shared, regardless of language, along with pre-existing materials of VLab centers. The RA II Pilot Project website can be used as a portal to provide user groups with timely and appropriate information such as notice of training events. Information on local meteorological phenomena and language translation are also needed. To activate VLab within the RA II Pilot Project, ideas such as the appointment of a POC, feedback from a user forum and/or a questionnaire survey were suggested.

6.3.2 Mr Lafeuille (WMO) gave a short presentation illustrating the need for better harmonization of products and services among satellite operators in the region as a condition for wider use. He suggested actions at a number of different levels: establishment of a common portal to improve visibility; adoption of a common metadata approach to describe data and products in a consistent and comprehensive manner; definition of generic specifications and quality standards for products; and product distribution through common channels such as DVB-S services and the Internet in

order to progress toward a one-stop-shop approach. He also suggested a related pilot action involving a subset of products from all satellite operators.

7. LINKAGE WITH OTHER RELATED PROJECTS IN RA II

7.1 Asia/Oceania Meteorological Satellite Users' Conference

7.1.1 The meeting was informed that the 1st Asia/Oceania Meteorological Satellite Users' Conference was held on 1 and 2 November, 2010, in Beijing, China. Over 150 participants including scientists, users, and satellite operators attended the Conference. Topics of the Conference were: (a) current and planned satellite observational capabilities relevant to the Asia/Oceania region; (b) data sharing and utilization; (c) science activities and applications; and (d) education and training. The Conference concluded that the sharing of information on future systems and satellite plans was essential for realizing the vast potential of the satellite component of the Global Observing System, and that this would provide essential information to better satisfy various users in a variety of applications areas. The Conference further emphasized the importance of satellite operators to get feedback from the users of their services, regional coordination of satellite contributions to the GOS through data sharing, and exchange of ideas on improved data utilization. The Conference was successful by (a) promoting the importance of satellite observations and highlighting their usefulness; (b) advancing satellite remote sensing science by fostering information exchange among scientists; and (c) providing a forum for education and training by engaging the young people entering in the field.

7.1.2 Mr Yuki Kosaka, System Engineering Division, MSC/JMA delivered a presentation on plans for the 2nd Asia/Oceania Meteorological Satellite Users' Conference, which will be held in Tokyo, Japan, in 2011. The purpose of the Conference is to allow the exchange of the latest information on satellite status and future plans, data accessibility and application techniques. Mr Kosaka noted that JMA is now preparing for the next Conference in Japan, and outlined current plans for the event. In regard to the schedule, he explained that an initial announcement on the conference would be made soon, and that a website for it would be launched at the same time. To wrap up, Mr Kosaka expressed hopes that the Conference would attract high attendance and promote the widespread exchange of information on satellites.

7.2 Severe Weather Forecasting Demonstration Projects in RA II

7.2.1 The meeting recalled that plans for Severe Weather Forecasting Demonstration Projects (SWFDP) in RA II were discussed at XIV-RA II. It noted that SWFDP had achieved significant results and created benefits related to the GDPFS and PWS programmes in its first regional project in Africa, and the RA II Working Group on Disaster Risk Reduction and Service Delivery [*ref. XIV-RA II/Doc. 5.1*] was asked to consider developing an SWFDP project in RA II as a method for enhancing the GDPFS and PWS programmes and contributing to disaster risk reduction in developing countries such as those in Southeast Asia that have recently experienced disasters. The meeting was pleased to note that a workshop on SWFDP development for Southeast Asia was held in Hanoi, Viet Nam in February 2010.

7.2.2 The meeting acknowledged that the SWFDP had been implemented successfully in southern Africa and in the South Pacific Islands, and that plans had been initiated to consider SWFDP regional subprojects for eastern Africa and Southeast Asia. The meeting reviewed the progress of and benefits from the Severe Weather Forecasting and Disaster Risk Reduction Demonstration Project (SWFDDP) for the South Pacific Islands, including the use of satellite-based products.

7.2.3 The meeting noted that the following weather events are focused on under the SWFDP in RA II in order of decreasing priority, along with associated hazards such as flooding, landslides, high waves and swell:

- Tropical cyclone (both from the South China Sea and from the Bay of Bengal) track, intensity, structural changes and landfall processes (wind and gusts, rainfall, and storm surges).
- Heavy rain triggered by tropical cyclones, south-west and north-east monsoons, troughs and ITCZ migration, and orography.
- Thunderstorms and hail associated with severe convection.
- Cold conditions and frost.
- Extreme hot and dry conditions associated with the Föhn effect.

7.2.4 The meeting noted that support for the SWFDP was discussed at the 38th session of the Coordination Group for Meteorological Satellites (CGMS) held in New Delhi, India, in December 2010. The following recommendation was assigned by CGMS:

CGMS Recommendation 38.02: CGMS Members to examine opportunities to incorporate Severe Weather Forecasting Demonstration Project (SWFDP) required data and products in their broadcast schemes.

8. IMPLEMENTATION OF THE SECOND-PHASE ACTION PLAN OF THE PILOT PROJECT

8.1 Review of the second-phase action plan

8.1 Mr Kurino (Co-coordinator) reviewed the second-phase action plan of the RA II Pilot Project, which runs from September 2010 through August 2011, including:

- 1) Issuance of quarterly newsletters for RA II Members;
- 2) Enhancement of Pilot Project pages on the WMO Space Programme (WMOSP) website;
- 3) Enhancement of the mailing list for RA II Members and that for Coordinating Group Members;
- 4) Identification of RA II Member requirements;
- 5) Alignment of Pilot Project activities with VLab activities to optimize assistance to NMHSs in RA II;
- 6) Development of a third-phase action plan by summer 2011.

8.2 Enhancement of Pilot Project web pages as a “Portal Site” function for accessing satellite imagery, data, products and training

8.2.1 The meeting noted that a wide variety of satellite imagery, satellite-derived products and training are provided by satellite operators in RA II. Accordingly, there are still opportunities for the improvement of existing web links to individual satellite operators’ web pages from an RA II user viewpoint.

8.2.2 The meeting noted that the Co-coordinators intend to produce a one-stop portal site for the Pilot Project web pages on the WMO Space Programme in order to facilitate access to satellite data and products. The pages will include information on access to satellite imagery, data, products and training information.

8.2.3 The meeting noted that plans for the portal site function were discussed at the 38th session of CGMS. The following action item was assigned by CGMS:

CGMS Action 38.07: CGMS Satellite Operators are encouraged to note the usefulness of RA II Pilot Project web pages on the WMO Space Programme

(WMOSP) website providing information related to meteorological satellites for NMHSs users, and to support the project for providing information on satellite data and products by answering the questionnaire to be sent out by the project co-coordinators.

8.3 RA II Pilot Project questionnaire survey on satellite data utilization for identification of requirements from RA II Members

8.3.1 The meeting was pleased to note that JMA is developing an RA II Pilot Project questionnaire on satellite data utilization by RA II Members. This is a web-based survey modeled on the WMO questionnaire on the status of the availability and use of satellite data and products by WMO Members, and will be implemented through the WMO Space Programme website's RA II Pilot Project web pages.

8.3.2 The meeting noted that the results of preliminary evaluation by Pilot Project Coordinating Group Members will be ready by June 2011. After the identification of requirements through the above activities, it will be possible to prepare a survey of RA II Members in the third phase of the RA II Pilot Project.

8.3.3 The meeting acknowledged the potential value of a web-based questionnaire placing more emphasis on monitoring the actual use of satellite data and products.

9. Conclusions and recommended actions

9.1 RA II Pilot Project Newsletter

9.1.1 The meeting pointed out that the RA II Pilot Project Newsletter is a very effective way of providing information on access to satellite imagery, data, products (including application products) and training information. Coordinating Group Members will therefore be encouraged to submit articles including:

- 1) Information on access to satellite imagery, data and products (including application products)
- 2) Outlines of currently available and planned training activities
- 3) News on meteorological satellites
- 4) News on new services
- 5) Brief progress reports on the Pilot Project
- 6) Introduction to the activities of other RAs and WMO VLab activities

9.1.2 The meeting agreed on the following action:

Action 1.01: RA II Pilot Project Coordinating Group Members to provide articles to be posted to the Special Issue of the Pilot Project Newsletter. Deadline: 30 March 2011.

9.2 RA II Questionnaire

9.2.1 The meeting concluded that demand from NMHS users for more reliable and user-friendly satellite-derived information for the mitigation and prevention of disasters has been increasing. Accordingly, the major focus of the initiative is to facilitate the timely provision of satellite-derived information by satellite operators to users.

9.2.2 The meeting agreed on the following actions:

Action 1.02: JMA to implement the questionnaire system on the RA II Pilot Project web pages. **Deadline: 30 June 2011.**

Action 1.03: RA II Pilot Project Coordinating Group members to review the contents of the questionnaire and its usability. **Deadline: 31 July 2011.**

9.3 RA II portal site

9.3.1 The meeting concluded that a portal site is necessary for users to access satellite imagery, data, products and training information, and that related activities should be enhanced and continuously developed.

9.3.2 The following action items were agreed:

Action 1.04: JMA to implement the portal site demonstration system on the RA II Pilot Project web pages. *(Deadline: 31 May 2011)*

Action 1.05: Satellite operators to provide RA II Pilot Project Coordinating Group Members with information on data, products and services, including training information, for the portal. *(Deadline: 31 July 2011)*

Action 1.06: Coordinating Group members to provide feedback on the function and usability of the portal site, in particular from a user's perspective. *(Deadline: 31 August 2011)*

Action 1.07: Co-coordinators to develop a template and catalogue for describing selected products such as those on precipitation, in accordance with WMO Information System (WIS) metadata standards and recommended practices. *(Deadline: 31 March 2011)*

10. ANY OTHER BUSINESS

10.1 The meeting agreed that the next meeting of RA2PPSat be held before the fifteenth session of RA II planned for late 2012, and requested the Co-coordinators of RA2PPSat to work with the WMO Secretariat to decide a suitable venue and appropriate date for the next meeting.

11. CLOSING

11.1 On behalf of participants and WMO, Mr Shida (WMO) thanked Dr Mitsuhiko Hatori, Director-General of JMA and Permanent Representative of Japan with WMO, Mr Yuji Kano, Director-General of the Observations Department of JMA and all JMA staff involved in making local arrangements to ensure the success of the meeting. He also thanked the two Co-coordinators of the Coordinating Group, Mr Toshiyuki Kurino and Dr Dohyeong Kim, for promoting the project and guiding the Coordinating Group, including their work in chairing the meeting. Mr Shida specifically commended Mr Tatsuya Kimura (a former Co-coordinator from JMA at the time of the establishment of this Pilot Project) for his initiative in developing work plans, including the issuance of newsletters. He pointed out that without his passion and thoughtful planning, the various activities implemented under the project, including this meeting, would not have been possible. Mr Shida highlighted that various presentations and useful discussions had been made during the three-day meeting, and noted that the work plan and activities of the Pilot Project until the next session of RA II (scheduled for 2012) had been discussed based on information provided by satellite operators and the requirements of recipient Members including LDCs. Finally, Mr Shida expressed his sincere thanks to Dr Gaertner of EUMETSAT for his active participation in the meeting and his support for the work of the Pilot Project.

11.2 The Meeting of the Coordinating Group of the RA II Pilot Project to Develop Support for National Meteorological and Hydrological Services (NMHSs) in Satellite Data, Products and Training closed at 12:30 on 23 February 2011.

**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)**

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**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)**

AGENDA

Day 1: Monday, 21 February

Morning

08:30-09:00 Registration

09:15-09:45 **1. OPENING**

(Chair: Mr Kurino, JMA & Dr Kim, KMA)

1.1 Welcome address (Mr Kano, JMA)

1.2 Opening address (Mr Lafeuille, WMO)

09:45-09:55 **2. ORGANIZATION OF THE MEETING**

(Chair: Mr Kurino, JMA & Dr Kim, KMA)

2.1 Adoption of the agenda

2.2 Working arrangements

09:55-10:00 *Group Photo*

10:00-10:20 *Coffee Break*

10:20-12:00 **3. INTRODUCTION TO RA II PILOT PROJECT TO DEVELOP SUPPORT FOR NMHSs IN SATELLITE DATA, PRODUCTS AND TRAINING (RA2PPSat)**

(Chair: Mr Kurino, JMA)

3.1 Overall framework (JMA, KMA)

3.2 Mission of the Coordinating Group (JMA, KMA)

3.3 The WMO Space Programme (WMO)

3.4 Support for WMO Regional Association II (Asia) (WMO)

12:00-12:30 **4. EVALUATION OF THE FIRST PHASE OF THE PILOT PROJECT**

(Chair: Mr Kurino, JMA)

4.1 RA II Pilot Project Newsletter (JMA, KMA)

4.2 RA II Pilot Project Web Pages (JMA, KMA)

4.3 RA II Pilot Project Mailing Lists (JMA, KMA)

12:30-13:45 *Lunch Break*

Afternoon

13:45-15:15 **5. CASCADING SATELLITE-DERIVED INFORMATION TO RECIPIENT MEMBERS**

(Chair: Mr. Kurino, JMA)

5.1 Satellite Operators

- CMA (China), IMD (India), JMA (Japan)

15:15-15:35 *Coffee Break*

15:35-17:30 **5. CASCADING SATELLITE-DERIVED INFORMATION TO RECIPIENT MEMBERS (continued)**

- KMA (Republic of Korea), ROSHYDROMET (Russian Federation), EUMETSAT

Day 2: Tuesday, 22 February

Morning

09:00-11:00 **5. CASCADING SATELLITE-DERIVED INFORMATION TO RECIPIENT MEMBERS (continued)**

(Chair: Dr Kim, KMA)

5.2 NMHSs

- Hong Kong, China; Kyrgyzstan; Oman

11:00-11:20 *Coffee Break*

11:20-12:20 - Pakistan, Uzbekistan

12:20-13:45 *Lunch break*

Afternoon

13:45-15:15 - Viet Nam, Cambodia, Maldives

15:15-15:35 *Coffee Break*

15:35-17:00 **6. ALIGNMENT OF PILOT PROJECT ACTIVITIES FOR TRAINING WITH WMO-CGMS VIRTUAL LABORATORY ACTIVITIES**

(Chair: Dr Kim, KMA)

6.1 Status of WMO-CGMS Virtual Laboratory (EUMETSAT)

6.2 Activities in the framework of VL (CMA, JMA, KMA, Oman)

6.3 Ways to share the training materials to enhance the capacity building for both international and internal usages (KMA)

17:00-17:30 **7. LINKAGE WITH OTHER RELATED PROJECTS IN RA II**

(Chair: Mr Kurino, JMA)

7.1 Asia/Oceania Meteorological Satellite Users' Conference

- Outcome of the 1st Asia/Oceania Meteorological Satellite Users' Conference in Beijing (CMA)
- Plans for the 2nd Asia/Oceania Meteorological Satellite Users' Conference in Tokyo (JMA)

7.2 Severe Weather Forecasting Demonstration Projects (SWFDP) in RA II

Day 3: Wednesday, 23 February

Morning

09:00-11:00 **8. IMPLEMENTATION OF THE SECOND-PHASE ACTION PLAN OF THE PILOT PROJECT**

(Chair: Mr Kurino, JMA & Dr Kim, KMA)

- 8.1 Review of the second-phase (JMA, KMA)
- 8.2 Enhancement of Pilot Project Web Pages as a "Portal Site" function for accessing satellite imagery, data and products as well as training (JMA, KMA)
- 8.3 RA II Pilot Project questionnaire survey on satellite data utilization for Identification of requirements from RA II Members (JMA, KMA)

11:00-11:20 *Coffee Break*

11:20-12:00 **9. CONCLUSIONS AND RECOMMENDED ACTIONS**

(Chair: Mr Kurino, JMA & Dr Kim, KMA)

- 9.1 RA II Pilot Project Newsletter (JMA, KMA)
- 9.2 RA II Questionnaire (JMA, KMA)
- 9.3 RA II Portal Site (JMA, KMA)

12:00-12:15 **10. ANY OTHER BUSINESS**

(Chair: Mr Kurino, JMA)

12:15-12:30 **11. CLOSING**

(Chair: Mr Kurino, JMA)

- 11.1 Closing address (Mr Shida, WMO)

Technical Tour in JMA headquarters

(12 :30-13 :30)

- Forecasting operation center
- Observational operation center
