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# RA II Pilot Project Newsletter

DEVELOPING SUPPORT FOR NATIONAL METEOROLOGICAL AND  
HYDROLOGICAL SERVICES IN SATELLITE DATA, PRODUCTS AND TRAINING

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### **The Second Asia/Oceania Meteorological Satellite Users' Conference**

The Japan Meteorological Agency (JMA) is pleased to announce the Second Asia/Oceania Meteorological Satellite Users' Conference to take place from 6 to 9 December, 2011, in Tokyo, Japan.

#### **Objectives**

The Asia and Oceania regions are frequently affected by severe natural phenomena such as tropical cyclones, torrential monsoons, volcanic eruptions, yellow sand storms, floods, sea ice and wildfires. In addition, the

importance of monitoring the climate and the environment is increasing, prompting enhanced global interest in the field. In this regard, meteorological and earth observation satellites provide frequent and extensive observational information for use in disaster prevention and climate monitoring/diagnostics, and are indispensable in today's world. The history of meteorological satellites over Asia and Oceania began with the launch of the Geostationary Meteorological Satellite (GMS) in 1977. Now, China, Europe, India, Japan, the Republic of Korea, the Russian Federation and the United States all operate meteorological and climate monitoring satellites over Asia and Oceania, as part of the

Global Observing System (GOS) promoted by the World Meteorological Organization (WMO), which contributes to the Global Earth Observation System of Systems (GEOSS) coordinated by the Group on Earth Observations (GEO).

To further enhance exchanges on application techniques among satellite data users as well as to advance satellite observation technologies and promote synergetic development related to meteorological satellites, the second Asia/Oceania Meteorological Satellite Users' Conference will be held in Japan in the footsteps of the successful first conference hosted by the China Meteorological Administration (CMA) last year.

### **Conference Topics**

- Current and future meteorological satellite programs
- Facilitation of data access and utilization
- Atmospheric parameters derived from satellite observations
- Application of satellite data to weather analysis and disaster monitoring
- Application of satellite data to numerical weather prediction
- Application of satellite data to climate and environmental monitoring
- Land surface and ocean parameters derived from satellite observations
- Capacity building and training activities

### **Call for Papers**

Those whose professional fields relate to the above themes and who wish to present at the conference are invited to register. The registration form can be downloaded from the webpage at

<http://mscweb.kishou.go.jp/second/1stannouncement.htm>.

The form should include author information, title, abstract and presentation type (verbal or poster), and should be e-mailed to the Local Organizing Committee at [asuc2-cp@dpc.kishou.go.jp](mailto:asuc2-cp@dpc.kishou.go.jp).

The language of the conference is English. The abstracts should be no longer than one page (A4). In cases where there are multiple authors, we kindly ask for a single coordinated response. To register more than one author, please fill out and submit a form for each. The deadline for submission is 1 August, 2011. Abstracts will be reviewed for inclusion in the conference programme. Authors may be asked to switch verbal presentations to poster presentations, or vice versa, if considered more appropriate. Selected authors will be notified via e-mail around September 2011, and their abstracts will be posted on the conference website.

### **Japan Travel Information**

Most of Japan's regions including Tokyo were unaffected by the 2011 off the Pacific coast of Tohoku Earthquake occurred on 11 March. Japan travel information is available on the Webpage of the Japan National Tourism Organization (JNTO)

<http://www.jnto.go.jp/eq/eng/>

### **Second Announcement**

The second announcement will be posted around September 2011 on the conference website at:

<http://mscweb.kishou.go.jp/second/index.htm>.

The preliminary program, details of visa support/accommodation and general information will be provided with the second announcement.

### **Local Organization Committee**

Japan Meteorological Agency  
1-3-4 Otemachi, Chiyoda-ku  
Tokyo 100-8122, Japan

<http://www.jma.go.jp/jma/indexe.html>

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3-235 Nakakiyoto, Kiyose

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E-mail: [asuc2-cp@dpc.kishou.go.jp](mailto:asuc2-cp@dpc.kishou.go.jp)

### **Conference History**

1st conference  
1 to 2 November, 2010  
Beijing, China  
Hosted by the China Meteorological  
Administration (CMA)  
<http://satellite.cma.gov.cn/conference/index.html>

(Keiko YAMAMOTO, JMA)

## **Utilization of Satellite Data and Products at the Hong Kong Observatory 2010**

### **Introduction**

Satellite data and products are indispensable for monitoring hazardous phenomena such as tropical cyclone, rainstorm, fog, haze, sandstorm, hill fire, volcanic eruption, etc. The Hong Kong Observatory (HKO), as the meteorological authority in Hong Kong, China, makes extensive use of meteorological satellite data and products in the provision of weather forecasting and warning services for the general public, the aviation community, the marine community, Government Departments and other users. This article summarises the availability and use of meteorological satellite data and products in Hong Kong, China in 2010.

### **Reception of Meteorological Satellite Data and Products**

HKO operates a suite of ground reception stations for direct reception of satellite data and products from various meteorological satellites. These include satellite products from:

- (a) Chinese FY-1 series of polar-orbiting satellites
- (b) Chinese FY-2 series of geostationary satellites
- (c) Japanese MTSAT series of geostationary satellites

- (d) NOAA-series of polar-orbiting satellites
- (e) NASA EOS/MODIS series of polar-orbiting satellites

In addition to direct reception, HKO operates a ground reception system for receiving satellite images of FY-1 series, FY-2 series, NOAA-series and EOS/MODIS series of satellites via the Chinese FengyunCast system. Meteorological satellite data and images are also received via the Global Telecommunications System (GTS) and via the Internet. These include, among others, Advanced TIROS Operational Vertical Sounder (ATOVS) data and Advanced Scatterometer (ASCAT) images.

### **Applications of Meteorological Satellite Data and Products**

- (a) Geostationary satellites

HKO weather forecasters use satellite cloud images from geostationary satellites (FY-2 and MTSAT) to locate and track the evolution and movement of tropical cyclones. In addition, they use the automatic algorithm for D'vorak analysis to generate time-series of estimated maximum winds near tropical cyclone centres. Polar orbiting ASCAT images are also used in supplement for assessing the location and strength of tropical cyclones.

To facilitate the monitoring of rainstorm, infrared satellite images based on IR1 and IR3 channel data are processed for identifying potential areas of deep convection (Figure 1). By applying image processing techniques, the deep convection is further categorized into isolated, occasional and frequent (Figure 2) based on classification of the International Civil Aviation Organization (ICAO) to assist aviation forecasters in issuing SIGNificant METeorological (SIGMET) information to the aviation community for enhancement of flight safety. To aid the prediction of rainstorm development, forecast satellite deep

convection product using variation optical flow tracking algorithm for the coming 0-6 hours are generated and made available to forecasters on an experimental basis.

Apart from tropical cyclone and rainstorm, other weather and environmental phenomena are getting more attention in 2010. Volcanic eruption and sandstorm are notable examples due to their great impact to air traffic and the well being of the public. HKO generated tailor-made satellite products (Figure 3) to aid monitoring volcanic ash and sandstorm.

#### (b) Polar-orbiting satellites

With high spatial resolution and plentiful observational channels, polar-orbiting satellite images usefully augment those of the geostationary satellites. For instance, EOS/MODIS, which comes with 36 observational channels, provides numerous satellite products for observation of such phenomena as sea fog, hill fire, haze (aerosol optical depth; Figure 4), icing, sea surface temperature, chlorophyll concentration, vegetation index, etc. These images are made available to weather forecasters for weather watch as well as other Government Departments for monitoring of air quality, red tide etc.

Derived products from polar-orbiting satellites are also generated. These include upper-air temperature and moisture profile (ATOVS data), atmospheric stability index, total precipitable water, etc. These products, as well as other satellite products available from GTS like atmospheric motion vectors, visible albedo data, precipitable water vapour from SSM/I and AMSR-E, etc., are utilized in HKO's data assimilation systems and numerical weather prediction models. These data are found to be useful in analysing the state of the atmosphere and in forecasting the development of weather systems.

Satellite derived data are also being used in other related applications, such as ozone

column data from TOMS satellite being retrieved from internet to aid forecasting of UV index.

#### **Enhancement in public information and education**

To arouse public awareness of natural disasters, HKO makes available at its website (<http://www.hko.gov.hk/wxinfo/intersat/satpics.shtml>) real-time satellite images from a variety of satellites, including FY-1/FY-2 series, MTSAT series, EOS/MODIS series, NOAA series and Meteosat-7 satellites. The webpage also presents past interesting cases of weather and environmental phenomena for public education. Training courses for government department, teachers and the public are also organised to promote the application of satellite data in the community. There have been over 400 participants since 2003.

With growing popularity of mobile platforms, "MyObservatory" - an app available on mobile PDA, iPhone and Android has also been made available to better serve people on the move. Apart from making use of positioning software to estimate the user's location for display of the latest weather information from nearby weather stations, it has been enhanced recently to include more weather information including satellite images. "MyObservatory" has become very popular with visit figure skyrocketing to 200 million in the second half of 2010.

HKO meteorologists also make use of satellite cloud images in daily TV weather programmes as well as special media briefings on severe weather events. The satellite images are particularly useful in alerting the public of hazardous weather that affects Hong Kong, China.

As a means to promoting research on the applications of satellite data in meteorological or other related fields, HKO provides

EOS/MODIS satellite data via secured FTP site to registered researchers in local tertiary institutes to facilitate their related studies.

### Conclusion

Meteorological satellite data and products are essential and indispensable for the provision of weather forecasting and warning services in Hong Kong, China. Satellite data are being received or retrieved via direct satellite reception, satellite re-broadcast, internet and GTS. They are widely used to support weather and environmental monitoring, severe weather warning, disaster mitigation, as well as public education. There will be a number of new meteorological satellites, e.g. Chinese FY-3 series and European MetOp series satellites, launched in the coming years. HKO will continue to explore the potential uses of these new meteorological satellites for improving its delivery of weather forecast and severe weather warning services.

(C.K. So, Hong Kong Observatory)

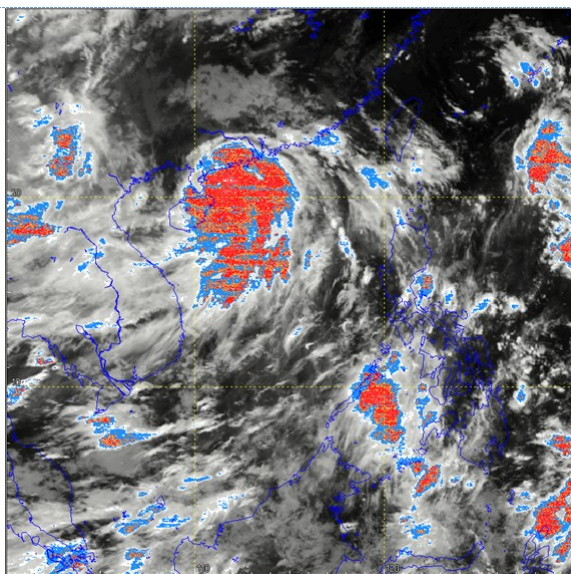


Figure 1 Infrared MTSAT satellite image with highlighted areas of deep convection.

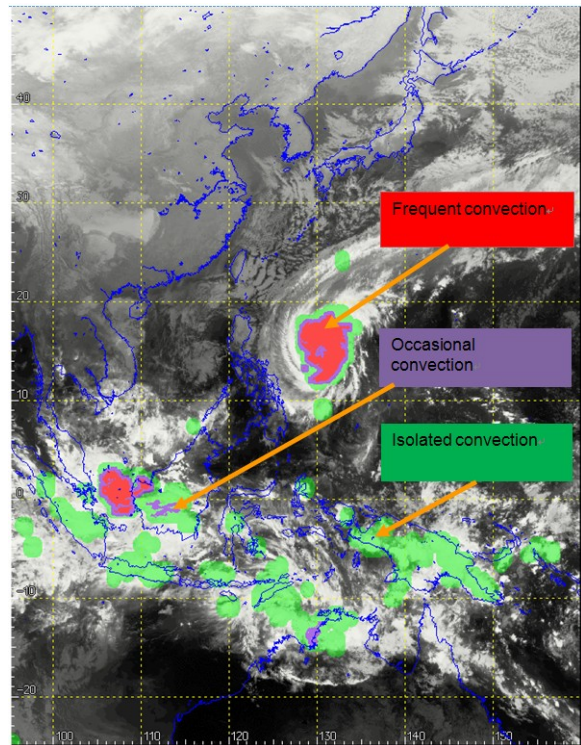


Figure 2 Deep convection classification product derived from MTSAT satellite data

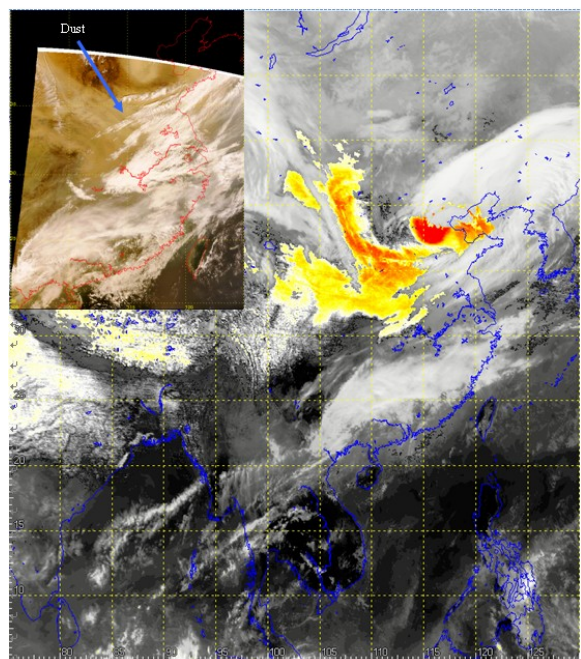


Figure 3 Infrared MTSAT satellite image with highlighted areas of sand, dust and ash.

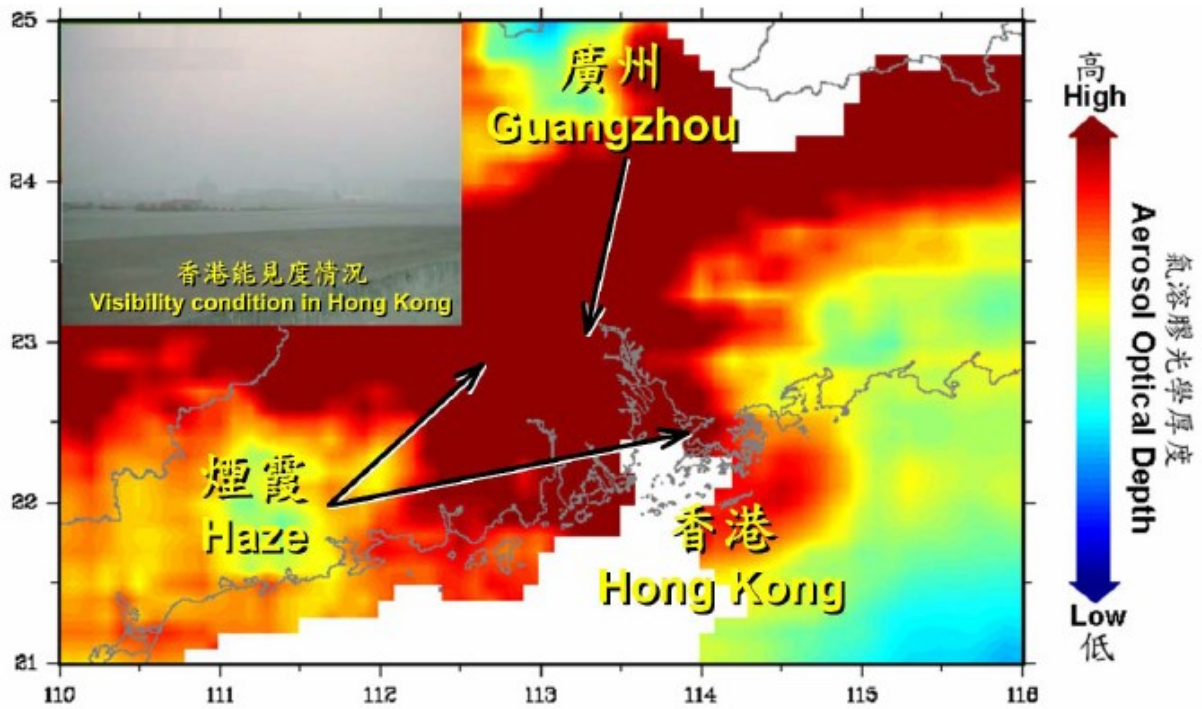


Figure 4 Aerosol optical depth image from EOS/MODIS is useful for monitoring of haze.

### Support on Severe Weather using COMS

One of the most expected COMS application is severe weather monitoring especially heavy rain, lightening, and typhoon during summer time using high temporal resolution of 15-min over NH. Early detection and warning system of severe weather is getting considerably important on nowcasting and very short range forecast. Detecting and tracking of convective

system from west of Korea is very essential on early warning of rapidly developed convective and lightening system over Korea. KMA developed the image analysis and automatic satellite data processing system to detect and track the convective cloud system. Convective rainfall rate, 3-hr estimated rain rate, and estimated satellite image using COMS. Fig. 1 reveals example of convective cloud system detect and following.

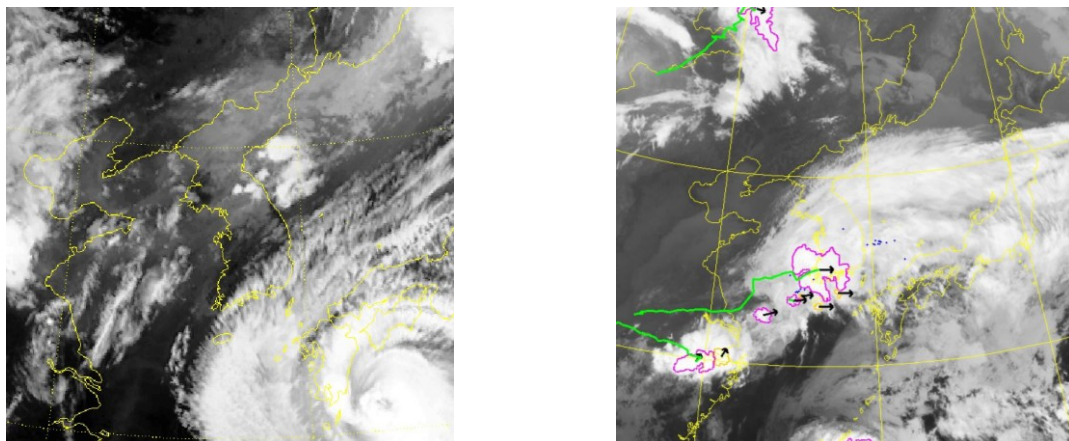


Figure 1. Local Area scan image around Korea when the Typhoon approaches. (left) and convective cloud system detect (pink) and tracking (green) with moving direction and speed (black arrow). (right)

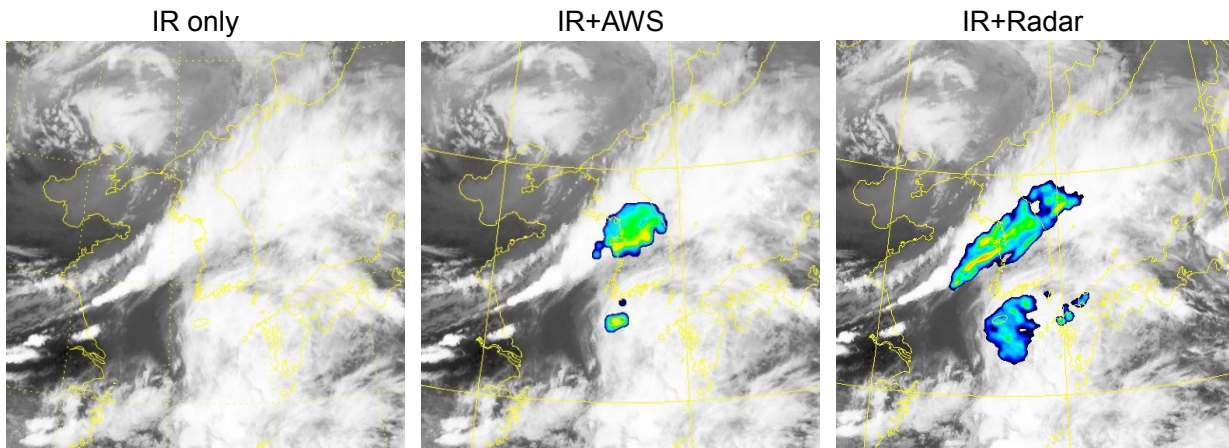


Figure 2. Sample images of COMS composite images with AWS (middle) and radar (right) rainrate.

COMS 15-min image is now providing more valuable information to the weather forecaster combining with 10-min automatic weather station (AWS) and conventional ground radar after collocated by time and space. It will help to analyze and promptly warn the rapidly developed convective cells. Fig. 2 is showing sample of composite images with AWS and radar with COMS.

rapidly. Satellite visible and infrared images have a key role on typhoon warning forecast. COMS 15-min images help a lot to give accurate operational typhoon forecast and warning, and additionally a better understanding ocean surface wind distribution around typhoon. Fig. 3 shows the typhoon track image and wind gust radius of 15 m/s over enhanced satellite IR image.

Each year 2 – 3 typhoons hit Korea and the number of issuing typhoon warning grows

(Jun PARK, KMA)

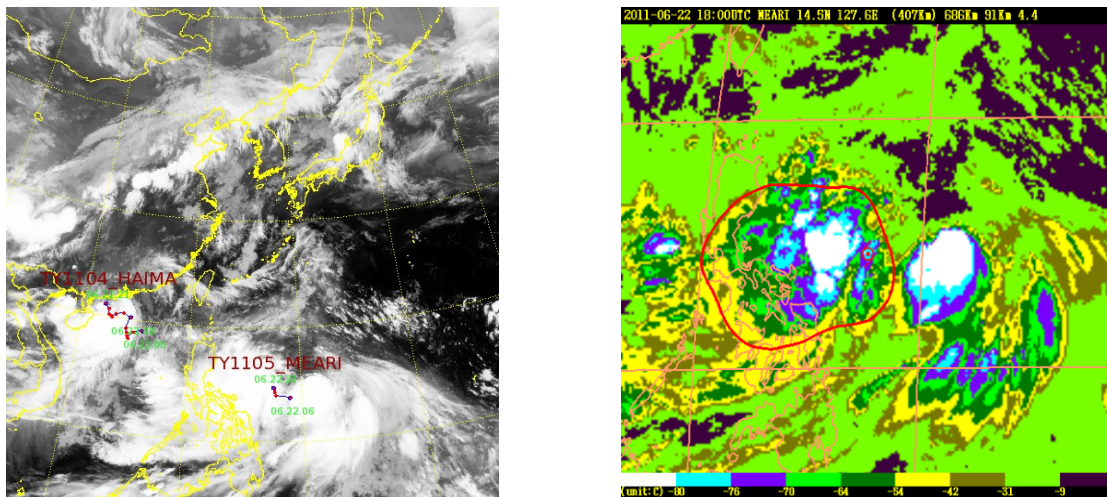


Figure 3. 2011-5<sup>th</sup> Typhoon MEARI track image. (left) and automatic calculated wind gust radius (red circle) over enhanced IR image. (right)

## **Members of the Coordinating Group**

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## From the Co-editors

The co-editors invite contributions to the newsletter. Although it is assumed that the major contributors for the time being will be satellite operators, we also welcome articles (short contributions of less than a page are fine) from all RA II Members, regardless of whether they are registered with the WMO Secretariat as members of the Pilot Project Coordinating Group. We look forward to receiving your contributions to the newsletter.

*(Toshiyuki KURINO, JMA, and Dohyeong KIM, KMA)*

## RA II Pilot Project Mailing Lists

Two mailing lists for discussion on the pilot project will soon be set up using the Google Groups service, and will be implemented either through the Google Groups web interface or by e-mail.

One list is for Pilot Project Coordinating Group members who are already registered with the WMO's Regional Office for Asia and the South-West Pacific.

**Group name:** ra2pp\_sat\_cg

**Group home page:**

[http://groups.google.com/group/ra2pp\\_sat\\_cg](http://groups.google.com/group/ra2pp_sat_cg)

**Group email address:**

[ra2pp\\_sat\\_cg@googlegroups.com](mailto:ra2pp_sat_cg@googlegroups.com)

The other list is for RA II Members in general.

**Group name:** ra2pp\_sat

**Group home page:**

[http://groups.google.com/group/ra2pp\\_sat](http://groups.google.com/group/ra2pp_sat)

**Group email address:**

[ra2pp\\_sat@googlegroups.com](mailto:ra2pp_sat@googlegroups.com)

## RA II Pilot Project Home Page

<http://www.wmo.int/pages/prog/sat/RAII-PilotProject.html>

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*(Editor-in-chief of this issue: Toshiyuki KURINO)*