



# SCOPE-Nowcasting

World Meteorological Organization

Weather • Climate • Water

## Sustained, Co-Ordinated Processing of Environmental Satellite Data for Nowcasting

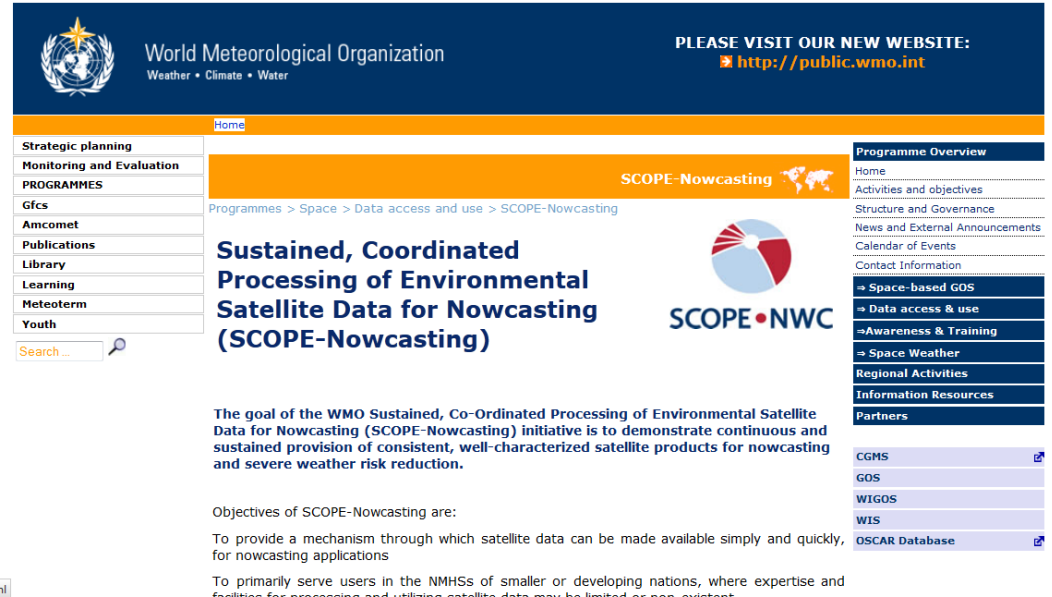
Presented to the WMO Nowcasting Symposium, Hong Kong, China  
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Chair WMO Inter-Program Expert Team on Satellite Utilisation and Products

# Summary

- Description
- Background
- Benefits
- Framework
- Pilots and next steps
- Overall next steps
- Recommendations

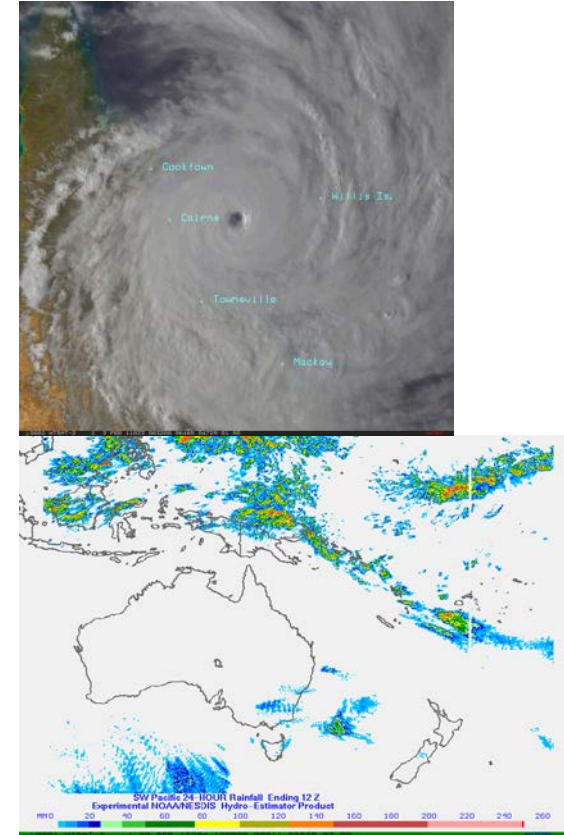


The screenshot shows the WMO website page for SCOPE-Nowcasting. The header includes the WMO logo and the text "World Meteorological Organization Weather • Climate • Water". A banner at the top right says "PLEASE VISIT OUR NEW WEBSITE: http://public.wmo.int". The main content area features the title "Sustained, Coordinated Processing of Environmental Satellite Data for Nowcasting (SCOPE-Nowcasting)" and a logo for SCOPE-NWC. Below the title, the text states: "The goal of the WMO Sustained, Co-Ordinated Processing of Environmental Satellite Data for Nowcasting (SCOPE-Nowcasting) initiative is to demonstrate continuous and sustained provision of consistent, well-characterized satellite products for nowcasting and severe weather risk reduction." It also lists objectives: "To provide a mechanism through which satellite data can be made available simply and quickly, for nowcasting applications" and "To primarily serve users in the NMHSs of smaller or developing nations, where expertise and facilities for processing and utilizing satellite data may be limited or non-existent". The page includes a navigation menu on the left with items like "Strategic planning", "Monitoring and Evaluation", and "PROGRAMMES". A search bar is also present.



# SCOPE-Nowcasting

- Sustained,
- Co-Ordinated
- Processing of
- Environmental Satellite Data for
- Nowcasting



# Background

- Concept arose from discussions in 2010 (in the 5<sup>th</sup> meeting of the WMO Expert Team on Satellite Utilization and Products – ET-SUP-5)
- Recognised the benefits of the SCOPE for Climate Monitoring (SCOPE-CM) initiative, where the value of different models of cooperation among satellite operators in generating satellite datasets for climate has been demonstrated through theme-driven pilot projects.
- SCOPE-CM information:
  - [http://www.wmo.int/pages/prog/sat/scope-cm\\_en.php](http://www.wmo.int/pages/prog/sat/scope-cm_en.php)



# Description

- (from website) ***The goal of the WMO Sustained, Co-Ordinated Processing of Environmental Satellite Data for Nowcasting (SCOPE-Nowcasting) initiative is to demonstrate continuous and sustained provision of consistent, well-characterized satellite products for nowcasting and severe weather risk reduction.***
- [http://www.wmo.int/pages/prog/sat/scope-nowcasting\\_en.php](http://www.wmo.int/pages/prog/sat/scope-nowcasting_en.php)



# Aims

## Operational

- Provide consistent and reliable satellite products to users to support nowcasting
- Demonstrate the concept through a number of pilot projects

## Strategic

- Build strong relationships between product developers across different agencies
- Foster scientific collaboration across satellite operators
- To sustain product dissemination and facilitate user uptake.



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# SCOPE-Nowcasting Criteria

ET-SUP-7 (May 2013) outlined a number of criteria for SCOPE-Nowcasting projects. These are:

- a) use of multi-satellite data;
- b) dataset formats can be read by standard tools;
- c) concise product documentation;
- d) open and easy access;
- e) available in near-real time (<6h);
- f) availability of training information; and
- g) an official commitment from all agencies involved in the project.



# Progress to Date

- Presentation to CGMS-41 in Tsukuba in July 2013
  - Actions arising:
    - CGMS members to nominate focal points for the SCOPE-Nowcasting (NWC) initiative as appropriate (by 15 August 2013)
    - Feedback from CGMS members sought on the final makeup of the SCOPE-NWC pilot projects (by 1 September 2013)
- First meeting of SCOPE-Nowcasting Team – 19-22 November 2013, WMO Geneva
  - Participation from CMA, JMA, KMA, EUMETSAT, NOAA and Bureau of Meteorology
- Follow-up discussion at CGMS-44 in Biot in June 2016



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# SCOPE-Nowcasting - Pilot project outlines

Category	Product	Region	Provider	User	Gaps
Basic nowcasting	RGB composites	WMO Region II (Asia) and Region V (SW Pacific)	JMA, CMA, KMA	NMSs in Region II and V	No standard products available; products limited
Advanced nowcasting	Volcanic Ash Products	Global	CMA, JMA, KMA, EUMETSAT, NOAA	NMHSs, VAACs	No standard products available; products limited
Advanced nowcasting	Blended satellite global precipitation product (GEO+LEO)	Global coverage	Hydro Estimator, NASA TRMM (3B42), NOAA (real-time MW)	Civil authorities, NMHSs, Flash flood guidance systems, general users	Rapid, facilitated access to quantitative precipitation estimates
RT Atmospheric Composition products	Dust Monitoring and Prediction Products	WMO Region II (Asia) and V (South-West Pacific)	CMA, JMA, KMA	SDS-WDCs, NMSs (to issue results and warnings) in RA II and RA V	Regional diversity of aerosol-related products not harmonized



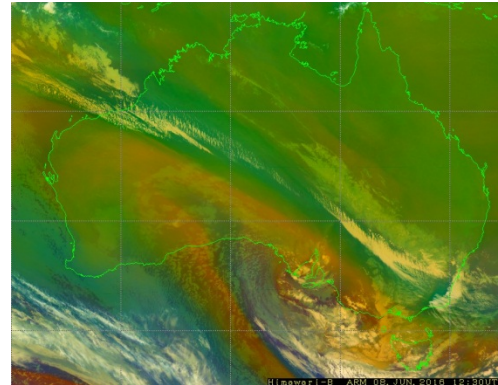
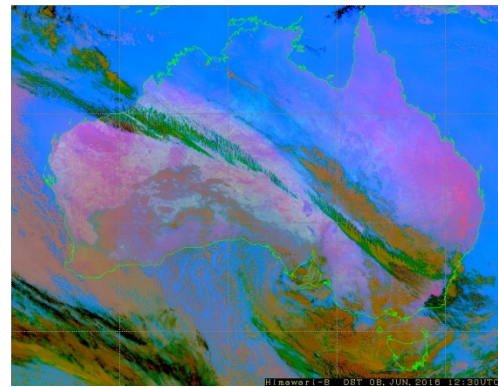
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# Pilot Project 1: Basic Nowcasting

Regionally-consistent RGB composites :

- i. There is a de facto standard for RGBs in existence which has been generated by EUMETSAT and endorsed by WMO
- ii. RGBs provide a mechanism for conveying multi-spectral data in a relatively low volume product
- iii. The next generation of geostationary satellites in the region - Himawari-8, FY-4A and Geo-KOMPSAT-2A – will provide an appropriate platform for delivery of these products.



# Achievements

- JMA are disseminating RGB products as part of the Himawari-8 product suite
- JMA have also provided RGB products to support SWFDP in the South Pacific
- [http://ds.data.jma.go.jp/mscweb/data/sat\\_dat/img/rw/rgb\\_img.html](http://ds.data.jma.go.jp/mscweb/data/sat_dat/img/rw/rgb_img.html)
- Documentation is also provided
- CMA and KMA are also considering RGBs for their next-generation GEOs
- Fact sheet has been prepared and a user survey will be issued for RA-II and RA-V to gauge interest and understanding

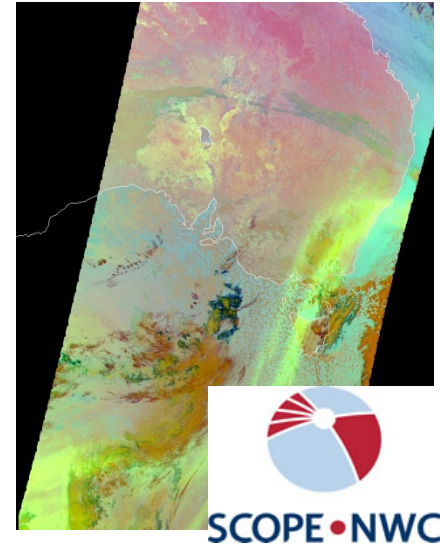
The screenshot displays the JMA (Japan Meteorological Agency) webpage for SWFDP (South West Pacific Disaster Preparedness). The page features a navigation bar with tabs for 'RA II: Southeast Asia', 'RA V: South Pacific Islands', and 'Information & Links'. Below this, there are buttons for 'GSM Products', 'EPS Products', and 'MTSAT Products'. The main content area is titled 'MTSAT PRODUCTS' and includes a prompt: 'LATEST IMAGE: Click the images to open the original MSC webpages!'. Two smaller satellite images are shown side-by-side, labeled 'IMAGERY WITH HEAVY RAINFALL POTENTIAL AREAS' and 'MTSAT RGB COMPOSITE IMAGERY (THIS SAMPLE IS "SANDWICH")'. A larger, more detailed satellite image is displayed below these, showing a wide area of the South Pacific with various weather patterns. The SCOPE-NWC logo is visible in the bottom right corner of the webpage screenshot.



# *Pilot Project 2: Advanced Nowcasting*

A globally-consistent volcanic ash product (from GEO and LEO):

- i. There is a clear need expressed by ICAO for a consistent product to be made available globally
- ii. A number of centres have made recent advances in developing satellite-based volcanic ash products; these could form the basis of a standard
- iii. More global coordination is required;
- iv. The need for this activity has been recognized by CGMS





## WMO Intercomparison of Satellite-based Volcanic Ash Retrieval Algorithms Workshop

29 June - 2 July 2015  
The Pyle Center  
University of Wisconsin-Madison

Volcanic ash from Pavlof Volcano as photographed by astronauts aboard the International Space Station on May 18, 2013 (credit: NASA)

**Venue**

**Program**

**Hotel**

**Register**

**Madison**

### Description of Meeting

In support of aeronautical meteorological services, WMO is sponsoring the Intercomparison of Satellite-based Volcanic Ash Retrieval Algorithms Workshop, which presents an excellent opportunity to improve the consistency of quantitative volcanic ash products from satellites. This meeting will be hosted by NOAA and Space Science and Engineering Center (SSEC) at the University of Wisconsin in Madison WI, USA, on 29 June through 2 July 2015. The volcanic ash intercomparison activity is embedded in the WMO-sponsored SCOPE-Nowcasting initiative (Sustained Coordinated Processing of Environmental Satellite Data for Nowcasting), which aims at improved rapid access to satellite data by member states, and at improved confidence in satellite products for nowcasting. The meeting in Madison is supported by the WMO Space Programme, the Aeronautical Meteorological Programme, and the Atmospheric Research and Environment Programme.

The meeting will begin at 1:00 p.m. on Monday, 29 June, and conclude at 3:00 p.m. on Thursday, 2 July 2015.



# Intercomparison Meeting

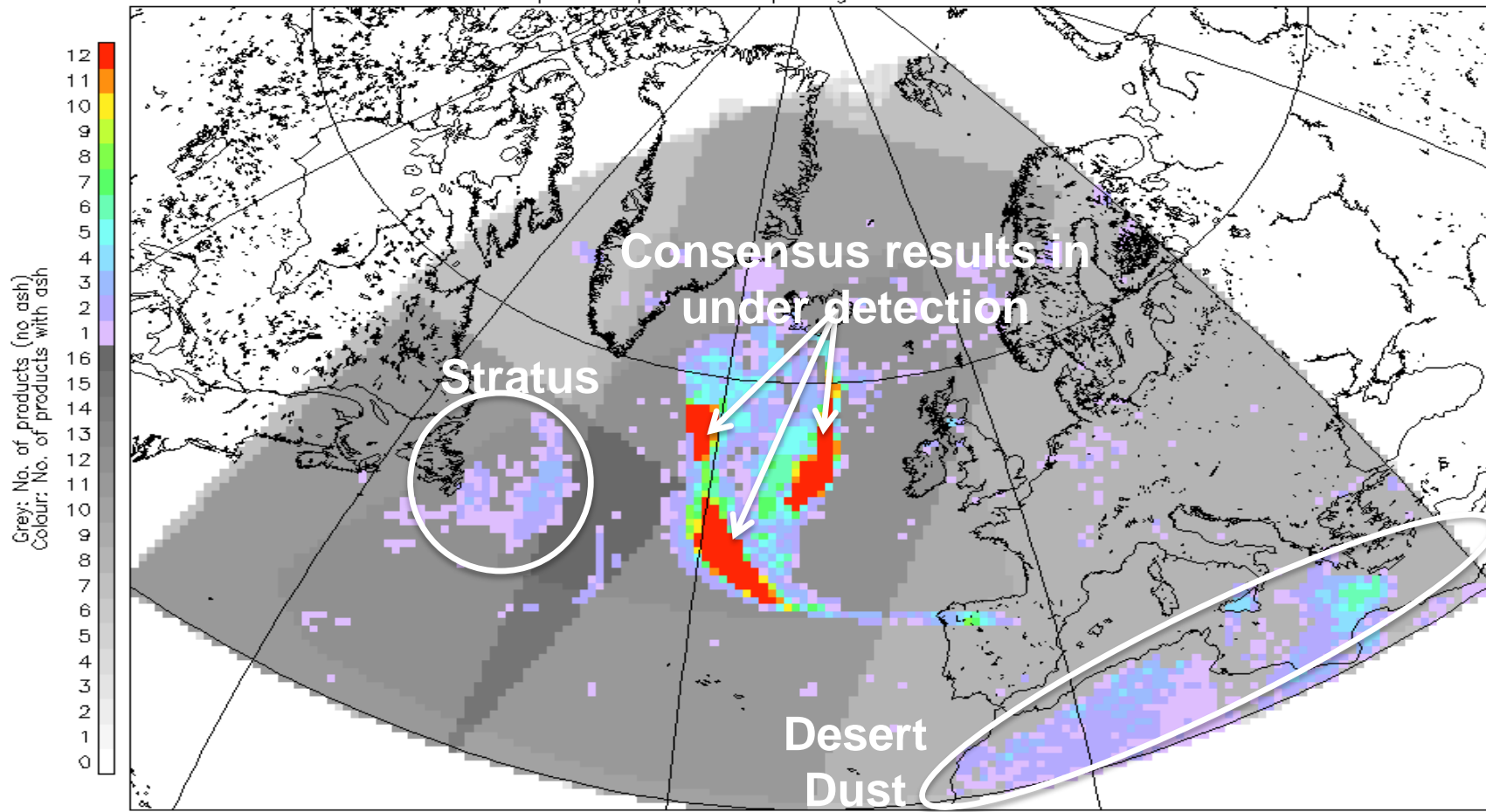
29 June – 02 July, 2015

Madison, WI, USA

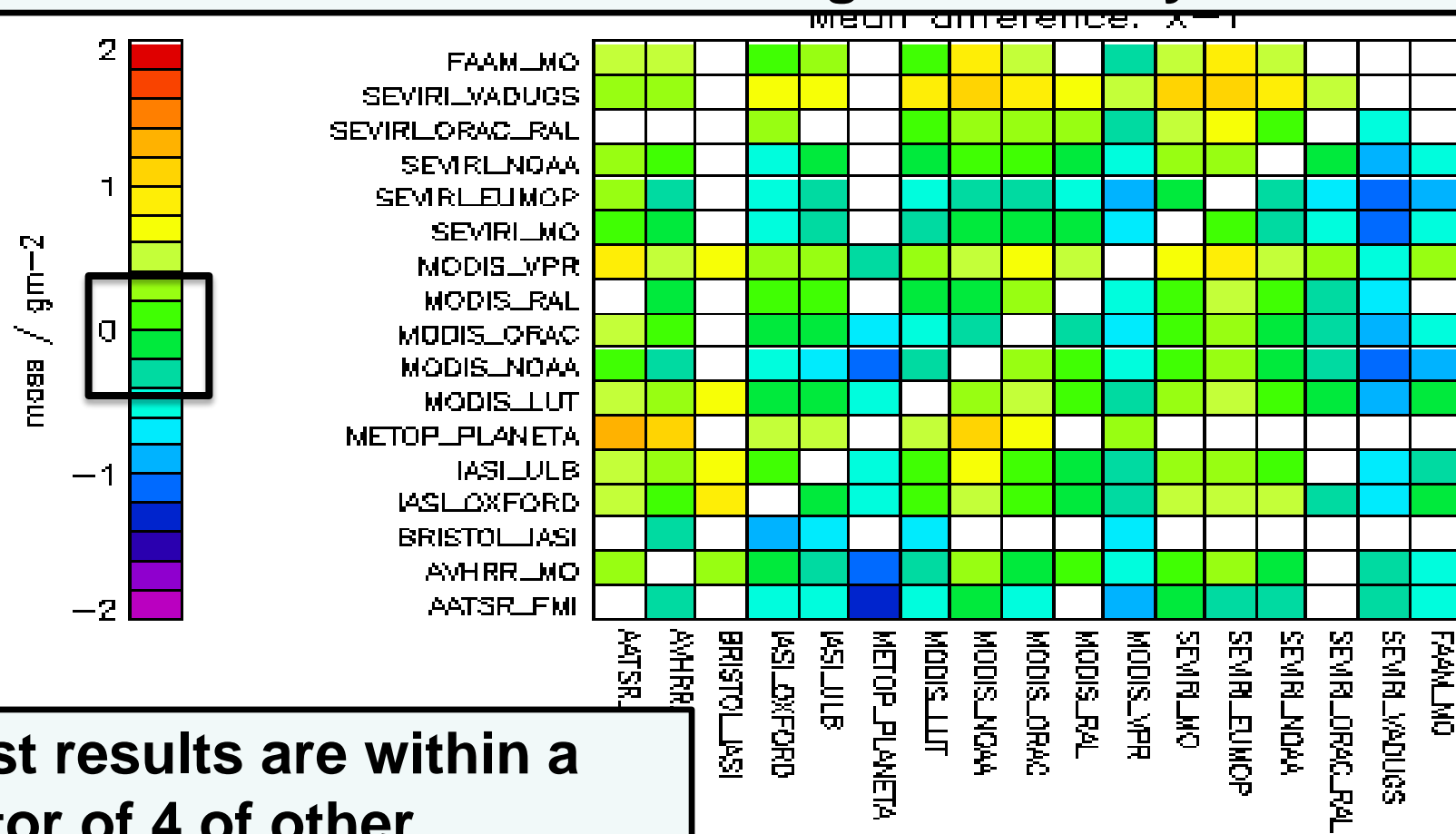


# Major Conclusion 2: Variable Ash Detection Capabilities

ensemble\_mask-cv0p1-no\_parallax\_0p5deg-EYJAFJALLAJOKULL-20100508-0426



# Major Conclusion 4: Mass Loading Uncertainty



**Most results are within a factor of 4 of other approaches (on average)**



# *Pilot Project 3: Advanced Nowcasting*

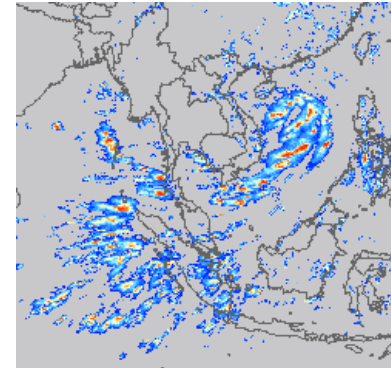
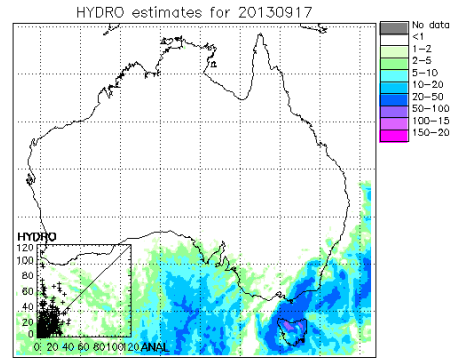
A globally-available consistent precipitation estimation and nowcasting product :

- Users would include civil authorities, flash flood guidance systems
- A clear requirement exists for rapid, facilitated access to quantitative precipitation estimates
- Products will include:
  - Precipitation Intensity (2 to 4 hours latency)
  - Nowcasting of precipitation Intensity (3 hours in Advance)
  - Cumulated Precipitation in the last 24, 48 and 72 hours



# Achievements

- SIGMA-SCOPE website has been set up by INPE (Daniel Vila and Luiz Machado)
- <http://sigma.cptec.inpe.br/scope/>
- Brings together near real-time GEO and LEO rain products and a short-term (2-3 hours) projection product for use in real time
- SWFDP regions have been added to the interface



# SCOPE - Nowcasting

Co-Ordinated Processing of Environmental  
Satellite Data for Nowcasting



## Products

[Read More](#)

Current rain rates (mm/h)

Date/Hour: 2016-05-26 - 04:00:00

Opacity:

Animation:

Label:



## Nowcasting

[Read More](#)

60min lead time(mm/h)

120min lead time(mm/h)

180min lead time(mm/h)

## Accumulated Precipitation (mm)

[Read More](#)

Last 24 hours

Last 48 hours

Last 72 hours

## Additional Layers

[Read More](#)

Countries

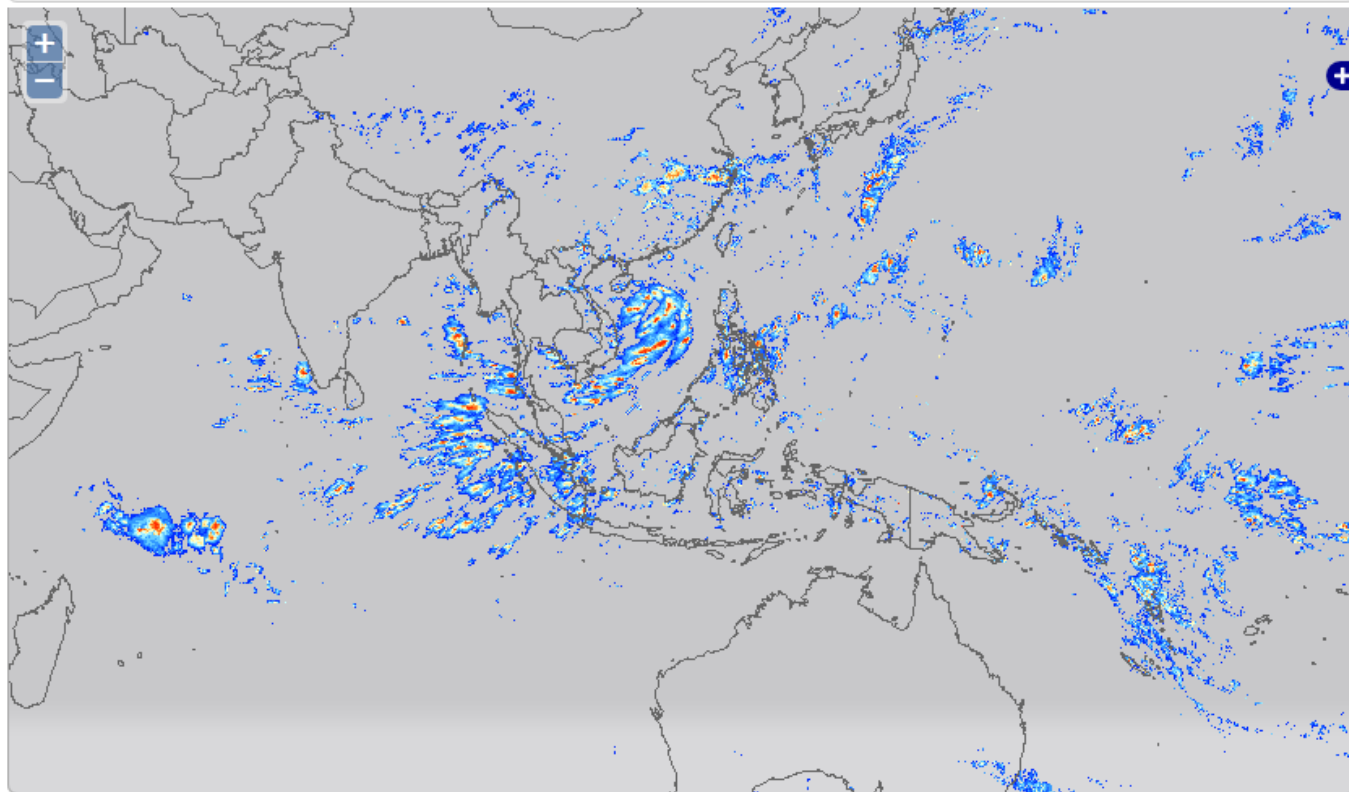
States

Distance calculator

## SWFPD Regions

[Read More](#)

67.606 25.568

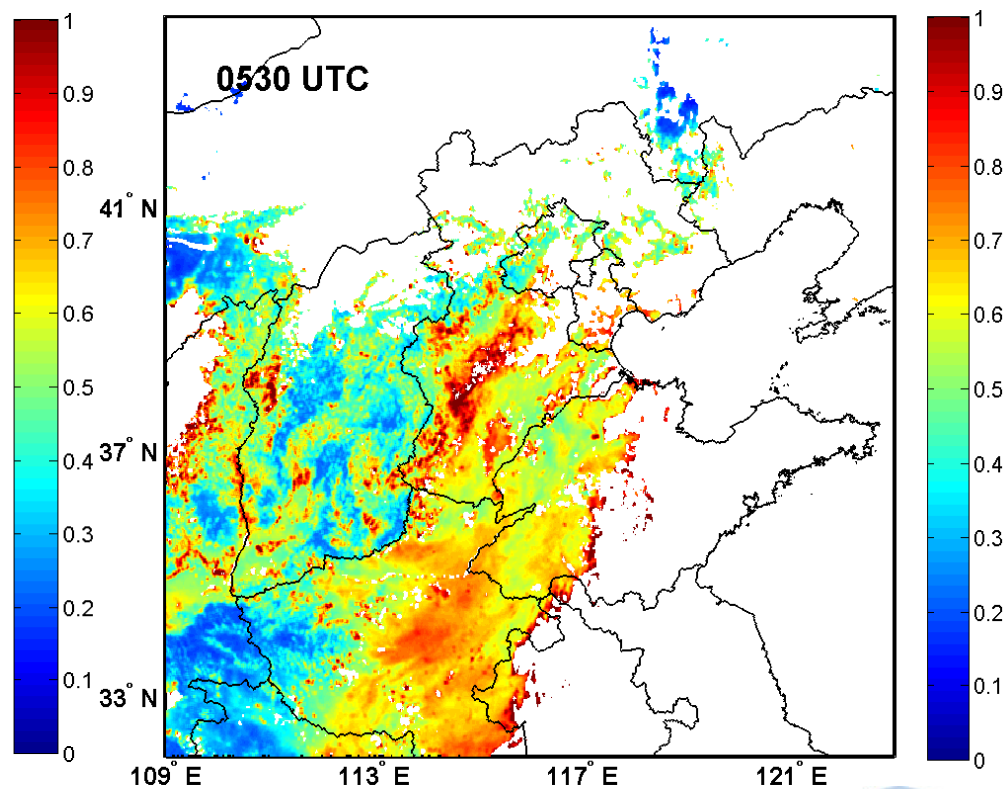
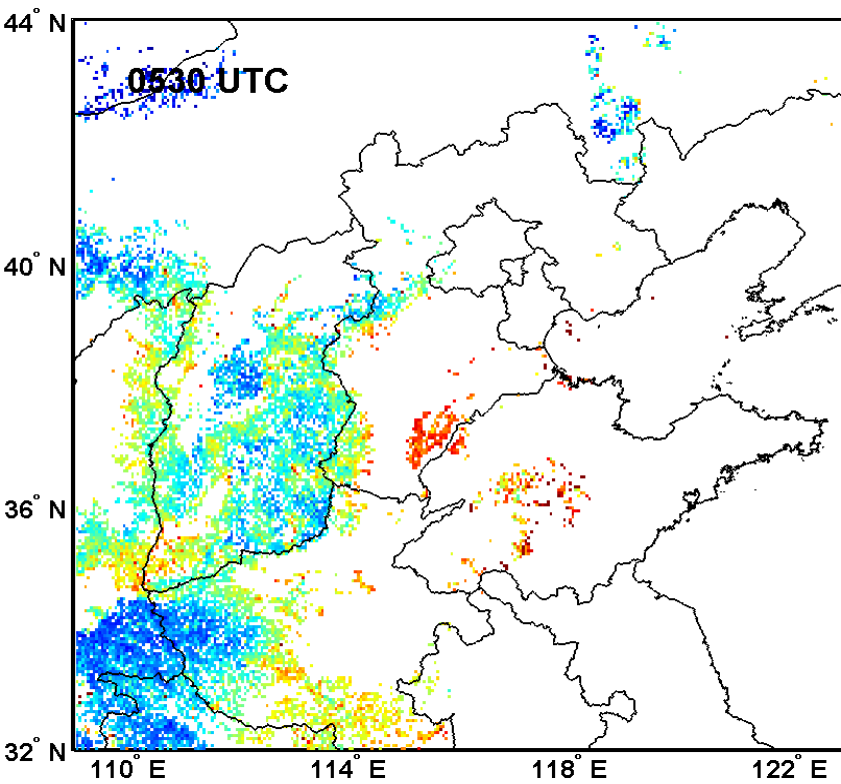


# *Pilot Project 4: Sand and Dust Forecasting*

Regionally consistent Aeolian dust products based on a common algorithm.

- i. There is currently inconsistency of products available in the region
- ii. JMA have conducted experiments applying the GOES-R dust algorithm to the provisional response function of Himawari-8/AHI with closest MODIS channels as pseudo data.
- iii. JMA will validate the algorithm with surface observation data using Himawari-8 data after the launch of Himawari-8.
- iv. It was agreed that this approach could also be adopted by CMA for FY-4A.





AOD products of JMA (left) and CMA (right) using Himawari-8

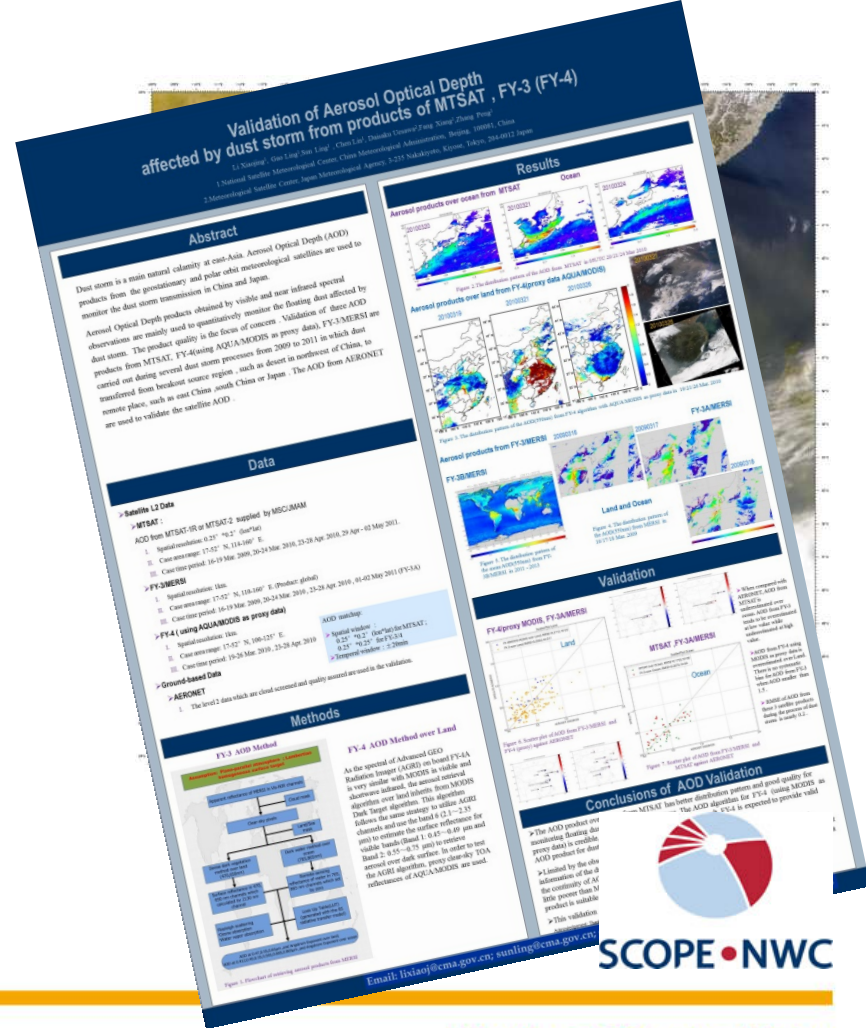


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# Achievements

- Sharing of in situ datasets between CMA, JMA and KMA for validation of selected case studies
- CMA, JMA and KMA are testing and validating present and next-generation dust products against case studies



# Next Steps

- Pilot projects will continue through 2016
- Closer collaboration/coordination with relevant WWRP and GAW Research Projects of WMO, e.g., WWRP SDS-WAS, GAW APP-SAG.
- Formalization of the SCOPE-Nowcasting Steering Group
  - Nominations will be sought from CGMS members
  - Expert members will also be required
  - First meeting in early 2017
- Decision on pre-operational phase from 2017 onward

■ More information:

■ [http://www.wmo.int/pages/prog/sat/scope-nowcasting\\_en.php](http://www.wmo.int/pages/prog/sat/scope-nowcasting_en.php)



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# Recommendation to attendees

- Participants are invited to make recommendations regarding additional pilot projects (note criteria on slide 7)
- Contacts for SCOPE-Nowcasting are:
  - Anthony Rea ([a.rea@bom.gov.au](mailto:a.rea@bom.gov.au), +613 9669 4222)
  - Stephan Bojinski ([sbojinski@wmo.int](mailto:sbojinski@wmo.int))
  - Members of IPET-SUP (see [http://www.wmo.int/pages/prog/www/CBS/Lists\\_WorkGroups/CBS/opag\\_ios/ipet-sup](http://www.wmo.int/pages/prog/www/CBS/Lists_WorkGroups/CBS/opag_ios/ipet-sup))







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Thank you for your attention

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