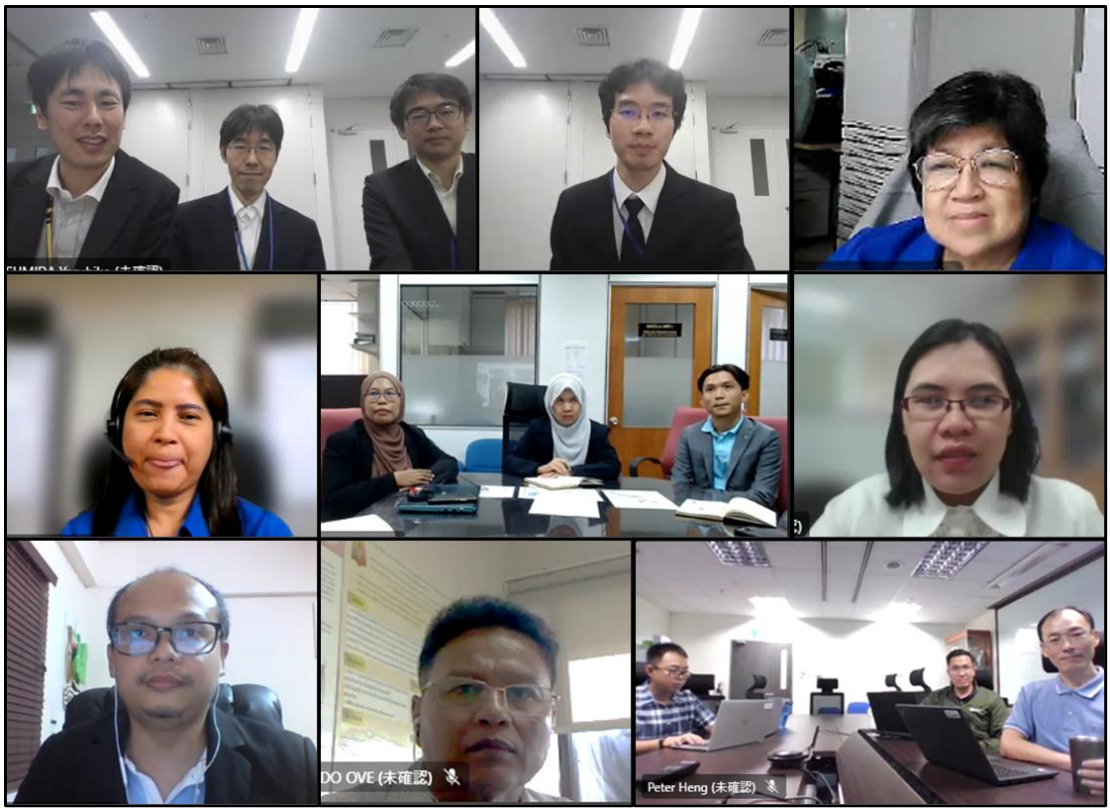
SUMMARY REPORT

Technical meeting on Himawari-8/9 Rapidly Developing Cumulus Area (RDCA) products

(Virtual, 18 March 2025)



The 3rd technical meeting on Himawari-8/9 Rapidly Developing Cumulus Area (RDCA) products was held online by the Japan Meteorological Agency (JMA) on 18 March 2025. This was part of activities conducted under the Annual Operating Plan (AOP) 2024 – item 7 "Enhancing Utilization of Himawari 8/9 Products" of the Working Group on Meteorology (WGM) of the ESCAP/WMO Typhoon Committee (TC), which was endorsed at the 56th session of TC held in Kuala Lumpur, Malaysia from 27 February to 1 March 2024. Attendees included representatives from National Meteorological and Hydrological Services (NMHSs) in Malaysia, Singapore, Thailand and Vietnam, as well as the Philippines.
The project aims to enhance NMHSs' utilization of observation data from the Himawari-8/9 geostationary meteorological satellites by developing RDCA detection techniques based on such data. Discussions at the meeting covered recent activities/challenges relating to RDCA development and future work in the field.
Mr. SUMIDA Yasuhiko from JMA served as a moderator. The meeting program and attendees list are provided in Appendix I and II, respectively.

1. Opening

1.1. The meeting was opened by Mr. KATSUYAMA Kenichi, the Senior Coordinator for Satellite Systems in the Satellite Program Division of JMA. He welcomed the development of this project and introduced the JMA's successor satellite, Himawari-10, which will carry a hyperspectral infrared sounder, and he expressed the hope that the combination of the new observation data will lead to improvements in the RDCA products. In addition, he wished that the weather services of participating NMHSs would continue to develop through the use of Himawari data.

2. Outline of the project and purpose of the meeting

2.1. Mr. SUMIDA Yasuhiko from JMA gave an introductory presentation at this technical meeting. He made a brief explanation of RDCA products based on Himawari-8/9 data and insisted the goal of this

project was to enhance the utilization of Himawari-8/9 among NMHSs via developing the RDCA detection techniques. In addition, he explained this meeting aimed at sharing the development status, issues and challenges of each country and confirming specific possible steps after that.

3. Data utilization of Himawari-8/9 and the follow-on satellite

3.1. Mr. YASUI Kazuki from JMA presented the current status of Himawari-8/9 data distribution via HimawariCloud and HimawariCast. He also explained data distribution for R&D users and the Regional Specialized Meteorological Center (RSMC) Tokyo for Nowcasting to support NMHSs in the Asia and Pacific regions to provide early warnings, and the overview of the Himawari-10 which will start operation in JFY 2029.

4. The outline and recent efforts of the Himawari-8/9 RDCA products

4.1. Mr. SUZUE Hiroshi from JMA gave a presentation on the overview and recent efforts of the RDCA product. First, he explained the RDCA verification method using lightning data (WWLLN: World Wide Lightning Location Network) from the University of Washington, and presented verification results by regions (mid-latitudes, tropics) as well as by land and sea. After that, he shared inquiries from Singapore and Malaysia along with the corresponding responses to other participating countries, which are expected to aid future development.

5. Country reports

5.1. Ms. Mahani Binti Abllah from the Malaysian Meteorological Department (MET Malaysia) delivered a progress report regarding the verification of the RDCA product at MET Malaysia. She detailed the process of preparing data for the Lightning Detection & Alert System (LDAS), which included data collection, filtering, and

conversion. The converted LDAS data was then utilized in the RDCA verification program supplied by JMA. The initial results from MET Malaysia's verification indicated lower values for both the Probability of Detection (POD) and False Alarm Rate (FAR) in comparison to JMA. Additionally, she mentioned ongoing initiatives aimed at enhancing the verification outcomes.

5.2. Mr. Lim Yi Xiang from the Meteorological Service Singapore (MSS) presented a country report on Singapore. The RDCA is produced every 10-minutes upon reception of Himawari Standard Data (HSD) via HimawariCloud.

The algorithm has been edited to accommodate the generation of RDCA for a larger region (90E to 190E, 50S to 50N), through horizontal segment stitching. This has reduced the processing time as compared to generating for the region natively (10 segments in-one-go).

The larger domain RDCA is then coupled with cloud-top height change information (obtained from JMA’s HCAI product) relative to the preceding observation. This product aids pilots in tactical air navigation as well as serve as forecast guidance for our forecasters, through our internal satellite visualization portal.

A key challenge was raised regarding the latency with which (a) HSDs are received (downloads complete approx. 14-18mins after their respective datetimes) and (b) 11-12mins is added to the lead time of this product for processing.

MSS aims to reduce the lead time by adopting the methodology presented by Mr SUZUE Hiroshi in stitching the RDCA segments longitudinally instead of latitudinally.

Further, MSS has purchased WWLLN global lightning data from University of Washington and plans to generate statistics using the verification suite provided by JMA.

MSS expresses gratitude to JMA for continued collaboration and sharing of tools and knowledge. Our forecasters regularly use these tools for operations.

5.3. Mr. Jaral Yiemwech from the Thai Meteorological Department (TMD) presented a country report as follows;

1. Current Situation in Our Organization

a) Himawari Data Status

TMD receives Himawari-8/9 satellite data through HimawariCast and from the JMA server. HimawariCast is working well and used daily. Data is saved for future use. Sometimes there are small problems with internet speed.

b) RDCA Program Usage

TMD is not yet using RDCA in daily operations. We are currently testing RDCA products and learning how to use them. In the future, we plan to use them in weather forecasting. Additionally, we also use RDCA for ad hoc cases, such as tropical cyclone monitoring.

c) Detection Area Settings

Right now, RDCA uses a fixed area for detection. We think it would be useful to allow smaller areas to make the program faster, especially for short-term forecasts.

d) Data for Validation – Lightning

TMD receives lightning data from local data systems at aerial (meteorological) stations. We have just started collecting this data. It is stored and can be used to verify RDCA products. Currently, we keep the lightning data for at least 3 months. The verification output is expected to be completed by the end of this year.

2. Case Studies and Verification

a) RDCA Detection Case Studies

TMD tested RDCA using Himawari-8 AHI data during the rainy season. The goal was to see how well RDCA can detect strong convective clouds over Thailand. These were early case studies to learn how the product works.

b) Accuracy Feedback

The first results show that RDCA can help detect deep

convection early. However, sometimes it gives false alarms or misses clouds, especially mid-level clouds. We are still checking accuracy by comparing with ground data and lightning information.

5.4. Ms. Bui Thi Khanh Hoa from the Viet Nam Meteorological and Hydrological Administration (VNMHA) briefly presented the current status of RDCA development at VNMHA and gave some assessments on the accuracy of RDCA. VNMHA tried to change the RCDA detection range to a smaller one (only focusing on the Vietnam area) to speed up the algorithm's calculation speed. However, the results showed that the accuracy of RDCA was still limited with a high POD index; the FAR was also high, and there was a difference between a and aa, proving that the detection of RDCA before and after the time of the national lightning detection network will affect POD and FAR. In addition, it is also necessary to recalculate the logistic regression coefficients to improve the FAR index after adjusting the RDCA detection range.

5.5. Ms. Samantha Christine Monfero from the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) presented the "Report on RDCA Utilization-Republic of the Philippines," which highlighted ongoing efforts and future plans for the RDCA system. The RDCA aims to enhance the accuracy and lead time of thunderstorm advisories, benefiting both public weather services and aeronautical meteorology. PAGASA is currently acquiring Himawari-8/9 satellite data through various sources, including HimawariCloud, HimawariCast, and the JMA WIS Portal. These data are converted into SATAID format and stored in a 1.9PB cluster system, with plans to expand capacity by an additional 3PB to support increasing data volumes. As of March 2024, PAGASA has gained access to the RDCA source code, which is now being studied. The system is slated for future deployment on the “Remote Sensing Severe Weather Monitoring System” (MIRAGE) server, developed under the JICA Technical Cooperation Project (J-POW2). Verification

of RDCA data is supported by PAGASA's lightning detection network, which provides high-resolution flash and pulse data. Additionally, a technical staff member currently pursuing a master's degree in Japan is working on integrating total lightning data to improve RDCA's sensitivity and lead time. However, several challenges remain, including a shortage of staff skilled in Fortran programming, limited capacity among end-users, and the increasing demand for storage. Addressing these issues through training and infrastructure development is crucial.

Despite these hurdles, the RDCA system holds significant promise for improving weather forecasting and disaster preparedness in the Philippines. Continued collaboration with international partners and strategic investments will be key to fully realizing its potential.

6. The way forward to develop techniques about Himawari-8/9 RDCA products

6.1. Mr. SUZUE explained the future plans of this project. First, he instructed PAGASA to compile and install the source code provided by JMA, use the regression coefficients from JMA, and check whether the RDCA detection process operates correctly. Additionally, he advised other countries to aim for improving the accuracy of RDCA detection by conducting case studies, verification, selection of cases for recalculation of regression coefficients, and the recalculation itself. Furthermore, he mentioned reconsidering the selection of detection parameters if resources permit. Finaly, he explained the specific verification procedures for RDCA detection results and the procedures for recalculating regression coefficients. He also announced plans for further meetings and cooperation within the next year.

7. Closing

7.1. Mr. SUMIDA expressed his gratitude for the participation in the technical meeting and the lively discussion, and mentioned that the

exchanging the opinions between JMA and participant NMHSs will lead to new discoveries and establishment of further cooperative relationships.

7.2. The technical meeting was closed by Mr. SUMIDA.

Agenda

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Time (UTC)	Title
6:00-6:05	Opening, Opening remarks
6:05-6:15	Self-introduction
6:15-6:30	Outline of the project and purpose of the meeting （Satellite Program Division, JMA）
6:30-6:45	Data Utilization of Himawari-8/9 and the Follow-on Satellite （Satellite Program Division, JMA）
6:45-7:00	Recent effort （Office of Meteorological Analysis and Application Development, JMA）
7:00-7:10	Break
7:10-7:25	Country report (Malaysia)
7:25-7:40	Country report (Singapore)
7:40-7:55	Country report (Thailand)
7:55-8:10	Country report (Viet Nam)
8:10-8:25	Country report (the Philippines)
8:25-8:35	Future Initiative （Office of Meteorological Analysis and Application Development, JMA）
8:35-8:40	Closing

LIST OF ATTENDEES

- **Malaysia / Malaysian Meteorological Department**

・ Ms. Norasmawati Bt Shahlal
Principal Assistant Director
Radar & Satellite Meteorological Division

・ Ms. Mahani Binti Abllah
Assistant Director
Radar & Satellite Meteorological Division

・ Mr. Afizal Haqeem Shapee
Senior Assistant Director
Radar & Satellite Meteorological Division

- **Singapore / Meteorological Service Singapore**

・ Dr. Peter Heng
Senior Meteorologist
Forecast Application Development Department, Weather Services Division

・ Mr. Yi Xiang Lim
Executive Manager (Technology Solutions)
Forecast Application Development Department, Weather Services Division

・ Mr. Zheng Liang Lim
Meteorologist
Forecast Application Development Department, Weather Services Division

- **Thailand / Thai Meteorological Department**

・ Mr. Jaral Yiemwech
Meteorologist
Meteorological Radar and Satellite Data Analysis Sub-division, Weather Forecast Division

・ Mr. Manoon Do Ove

Director of Meteorological Radar and Satellite Data Analysis Sub-division

- Mr. Thaweesak Chanthaburi
  Director of Meteorological Satellite Sub-division
- Ms. Pailin Sangkhao
  Foreign Relations Officer
  International Affairs Sub-division

- **Viet Nam / Viet Nam Meteorological and Hydrological Administration**

- Ms. Bui Thi Khanh Hoa
  Deputy head of Developing and Technology Transfer Division
  National Centre for Hydro-Meteorological Network

- **Philippines / Philippine Atmospheric, Geophysical and Astronomical Services Administration**

- Ms. Samantha Christine Monfero
  Assistant Weather Services Chief
  Weather and Flood Forecasting Center
- Ms. Teresa Millanes
  Senior Weather Specialist
  Weather and Flood Forecasting Center

- **Japan / Japan Meteorological Agency**

- Mr. KATSUYAMA Kenichi
  Senior Coordinator for Satellite Systems
  Satellite Program Division, Information Infrastructure Department
- Mr. SUMIDA Yasuhiko
  Senior Scientific Officer
  Satellite Program Division, Information Infrastructure Department
- Mr. YASUI Kazuki
  Senior Scientific Officer
  Satellite Program Division, Information Infrastructure Department

- Mr. KAMEKAWA Norio
  Senior Scientific Officer
  Office of Meteorological Analysis and Application Development
  Administration Division, Atmosphere and Ocean Department
- Mr. SUZUE Hiroshi
  Assistant Scientific Officer
  Office of Meteorological Analysis and Application Development
  Administration Division, Atmosphere and Ocean Department
- Mr. MINEMATSU Hiroaki
  Senior Scientific Officer
  Office of International Affairs
  Planning Division, Administration Department