

SUMMARY REPORT

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

(Online, 7 March 2024)



A technical meeting on Himawari-8/9 Rapidly Developing Cumulus Area (RDCA) products was held online by the Japan Meteorological Agency (JMA) on 7 March 2024, as a follow-up to a similar event in February 2022. This was part of activities conducted under the Annual Operating Plan (AOP) 2023 – 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 55th session of TC held in Macao, China from 7 to 9 March 2023. Attendees included representatives from National Meteorological and Hydrological Services (NMHSs) in Malaysia, Singapore, Thailand and Vietnam, as well as the Philippines (which joined this project this year).

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. HAGIYA Satoshi 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. MUROI Chiashi, the Director-General of the Atmosphere and Ocean Department of JMA. He welcomed the development of this project and mentioned his high expectation that this project would certainly contribute to the enhancement of meteorological services and further advanced utilization of Himawari-9 among participating NMHSs.

2. Outline of the project and purpose of the meeting

2.1. Mr. HAGIYA Satoshi 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 dissemination and distribution of Himawari-8/9 and future plan

- 3.1. Mr. SAKASHITA Takuya from JMA presented the current status of Himawari-8/9 data distribution via HimawariCloud and HimawariCast. He also explained a plan to upgrade the products and add new ones of 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 detection method using Himawari-8/9 data and a statistical method called logistic regression analysis. After that, he introduced examples of RDCA detection results in Malaysia, Singapore, Thailand and Vietnam so far as recent efforts after providing the source codes.

5. Country reports

- 5.1. Mr. Afizal Haqem Shapee from the Malaysian Meteorological Department (MET Malaysia) presented the progress report on the RDCA product in MET Malaysia. The RDCA program operated well as one of the supporting tools for monitoring and forecasting thunderstorm activities in Malaysia. RDCA detection is observed to match the intensified convective cloud areas when compared to radar images for forecaster to identify in issuing a weather warning. He also reported the progress in validating the RDCA product with lightning data sample in 2023 over Peninsular Malaysia. Currently, the data is being collected and filtered from unnecessary parameters. Once this process is done the data will be converted into compatible format for RDCA validation program.
- 5.2. Mr. Lim Yi Xiang from the Meteorological Service Singapore (MSS)

presented a country report on Singapore. The RDCA program has been well received from JMA and validated by MSS. It is presently run on an ad-hoc basis when needed. MSS actively utilizes RDCA information to guide the Significant Meteorological Information (SIGMET) issuances through the SIGMET Coordination Website.

Presently, the Himawari Standard Data (HSD) datasets that are necessary for RDCA are being retrieved through the HimawariCloud. HimawariCast is almost never used due to the stability of HimawariCloud. All 16 bands and all 10 segment numbers are acquired in a 10-minute interval, in DAT format. The HSD DAT files are further archived for 5-month periods, totalling 1.4 terabytes of storage at a time. Full-disk JPG files are also kept for 1 year, specifically only four bands: 3, 10, 13 and 15.

The period of RDCA evaluation is a short 1-hour period on 30 July 2022 based on the lightning data from WWLLN (World Wide Lightning Location Network). By mapping the detection over Singapore and the region, RDCA was found to provide limited utility for nowcasting of small convective cells over the country and is more suitable for regional forecasting of large convective cells, applicable to forecasting over the critical flight information regions. The RDCA validation suite was also used to calculate daily confusion matrix scores. Given the limited case-study period (1-hour only), “high False Alarm Rate (FAR)” scores were seen but are likely due to our use of a limited lightning dataset. Presently, MSS has no further plans of acquiring regional/global lightning datasets, so validation is limited to the above case-study.

MSS is grateful for the provision of both the RDCA programme and the HSD datasets. Our operational forecasters regularly use the tools provided by JMA.

- 5.3. Mr. Peeranat LONGSOMBUN from the Thai Meteorological Department (TMD) gave an overview of Thailand Country Report. At TMD, the current status of data usage involves utilizing Himawari-8/9 data to monitor tropical cyclones and establishing a war room for severe weather conditions, supported by Himawari-8 data. Additionally, there is an ongoing

development of software to automatically ingest data into the SATellite Animation and Interactive Diagnosis (SATAID). Regarding the RDCA program execution at TMD, it has been implemented on a Linux operating system (Ubuntu 22.04) and undergoes post-processing using Matplotlib (a Python module). TMD utilizes all 16 bands and 10 segments (Full Disk) of the data, which are stored entirely. However, there haven't been statistical reports generated from the use of RDCA products at TMD yet. Generally, the system is proficient at detecting cloud clusters or convective clouds. Common issues faced by TMD mostly revolve around outdated computer resources and verifying data. In the future, TMD aims to use RDCA products for risk areas prone to thunderstorms and implement nowcasting using machine learning.

- 5.4. Ms. BUI THI KHANH Hoa from the Viet Nam Meteorological and Hydrological Administration (VNMHA) presented a country report on the current status of RDCA applications, challenges as well as plans for developing RDCA in the future. Currently, the RDCA product is generated every hour at VNMHA and is considered quite good in detecting convective cloud areas that can cause dangerous weather. However, the false alarm index is still quite high, so it is necessary to adjust the algorithm's logistic regression parameters. VNMHA will continue to evaluate more RDCA cases to improve its quality for the Vietnamese region.
- 5.5. Ms. Teresa Millanes from the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) presented the current ways of satellite data utilization especially the Himawari 8/9. PAGASA uses satellite data in monitoring tropical cyclones and other tropical disturbances to provide public weather services, aviation and marine weather services, volcanic ash interpretation and guidance and post re-analysis of tropical cyclone track for best track analysis. With the implementation of the RDCA, PAGASA aims to increase the lead time of thunderstorm detection for warning purposes especially those that may cause flash floods, rain-induced landslides and short-duration rough seas and increase the lead time for SIGMET issuance and other operational meteorological (OPMET)

information for safety of flight operations.

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

6.1. Mr. SUZUE explained the future plans of this project. He said the plan for PAGASA after the exchange of official letters including condition of use, JMA would provide the source codes of RDCA detection computer programs to PAGASA. He requested PAGASA to try to start operation in their computer environment as a trial. He also said the plan for other participant members. He mentioned that they could recreate the regression coefficients and select new parameters for tuning the statistical model of the RDCA detection based on the case studies. In addition, he gave instructions against the participating members' issues. Finally, he expected the project members would compile the results of the test operation and provide feedback.

7. Closing

7.1. Mr. HAGIYA mentioned the technical cooperation between JMA and participant NMHSs would continue to improve the accuracy of the RDCA products, and announced the technical development in PAGASA would start after exchanging official letter which contained the condition of use of the RDCA-related computer programs as preparation of source codes provision.

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

PROGRAM

Technical meeting on Himawari-8/9 Rapidly Developing Cumulus Area
(RDCA) products
(Online, 7 March 2024)

Time (UTC)	Title
6:00-6:10	Opening
6:10-6:20	Outline of the project and purpose of the meeting
6:20-6:30	Data dissemination and distribution of Himawari-8/9 and future plan
6:30-6:40	The outline and recent efforts of the Himawari-8/9 RDCA products
6:40-7:00	Country report (Malaysia)
7:00-7:20	Country report (Singapore)
7:20-7:40	Country report (Thailand)
7:40-8:00	Country report (Viet Nam)
8:00-8:20	Country report (the Philippines)
8:20-8:30	The way forward to develop techniques about Himawari-8/9 RDCA products
8:30-08:40	Closing

LIST OF ATTENDEES

Technical meeting on Himawari-8/9 Rapidly Developing Cumulus Area
(RDCA) products
(Online, 7 March 2024)

Malaysia / Malaysian Meteorological Department

Mr. Asmadi Abdul Wahab

Director

Radar & Satellite Meteorological Division

Mr. Afizal Haqem Shapee

Senior Assistant Director

Radar & Satellite Meteorological Division

Ms. Mahani Abllah

Assistant Director

Radar & Satellite Meteorological Division

Singapore / Meteorological Service Singapore

Mr. LIM Yi Xiang

Assistant Manager (Technology Solutions)

Forecast Applications Development Department, Weather Services
Division

Thailand / Thai Meteorological Department

Mr. Fatah Masthawe

Director

Hydrometeorological Sub-division

Mr. Thaweesak CHANTABURI

Director

Meteorological Satellite Sub-division

Mr. Peeranat LONGSOMBUN

Meteorologist

Numerical Weather Prediction Sub-division, Weather Forecast Division

Mr. Jaral Yiemwech

Meteorologist

Meteorological Radar and Satellite Data Analysis Sub-division, Weather
Forecast 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

Mr. Nguyen Vinh Thu

Director

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. HAGIYA Satoshi

International Strategy Officer for Meteorological Observations

Observation Division, Atmosphere and Ocean Department

Mr. OMORI Hidehiro

Scientific Officer

Observation Division, Atmosphere and Ocean Department

Mr. MOURI Kouki

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. MARUYAMA Takumi

Assistant Scientific Officer

Office of Meteorological Analysis and Application Development

Administration Division, Atmosphere and Ocean Department

Mr. BESSHO Kotaro

Senior Supervisor for Satellite Operations

Satellite Program Division, Information Infrastructure Department

Mr. SAKASHITA Takuya

Senior Scientific Officer

Satellite Program Division, Information Infrastructure Department

Mr. SUMIDA Yasuhiko

Senior Scientific Officer

Satellite Program Division, Information Infrastructure Department

Mr. YASUI Kazuki

Scientific Officer

Office of International Affairs

Planning Division, Administration Department