SUMMARY REPORT

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

(Tokyo, Japan, 22 – 25 October 2018)

The technical meeting on Himawari-8/9 Rapidly Developing Cumulus Areas (RDCA) products was held at the Japan Meteorological Agency (JMA) Headquarters, Tokyo, Japan from 22 to 25 October 2018. The meeting was a part of the project of ESCAP/WMO Typhoon Committee (TC) Working Group on Meteorology's (WGM) Preliminary Project (PP) 2018 – item 2 "Enhancing Utilization of Himawari-8/9 Products", which was endorsed by the 50th Typhoon Committee session held in Hanoi, Vietnam from 26 February to 3 March 2018.

The meeting was held in parallel and partly in conjunction with the technical meeting on a regional weather radar network for Southeast Asia, which was a part of the Annual Operating Plan (AOP) 2018 – item 3 "Development of regional radar network" of TC/WGM.

Mr. Shiro Omori (JMA) served as a moderator.

The meeting agenda is provided as Appendix I.

The list of participants is provided as Appendix II.

1. Opening (22 Oct.)

Joint items with the technical meeting on a regional weather radar network for Southeast Asia

- The two meetings were opened by Naoyuki Hasegawa (Director-General of JMA's Observation Department), who highlighted the achievement of the project of a radar network for Southeast Asia and welcomed the radar experts from not only Southeast Asian countries but also United Arab Emirates (UAE). He also highlighted the usefulness of the satellite data and welcomed the Malaysian satellite experts. He expected that combining the two meetings would eventually lead to more effective products to serve the purposes of all the participating national meteorological services.
- All participants of the two meetings made self-introduction.

2. Session 1 - Current status (22 Oct.)

2.1. Report and Current Status on Himawari-8/9 Rapidly Developing Cumulus Area (RDCA) Product in Malaysia (MMD)

- The production of RDCA has started in October 2017 in MMD
- The verification using radar data began in June 2018
- The product is routinely produced every 10 minutes. The time taken to receive HSD data from HimawariCloud has been unstable; it may take 10 minutes, or in some cases 40 minutes.

- Currently the product is used for internal purpose only.
- In MMD, the priority is relatively higher in monitoring heavy rain than monitoring thunders. Hence the events which were used to determine the coefficient of RDCA include heavy rain.
- The production environment is on a single workstation, without redundancy.

2.2. Introduction of RDCA applications (JMA) and RSMC for nowcasting (JMA)

- JMA introduced RDCA product produced in Japan. Explanations on: 1) detections performed using the coefficient generated by logistic regression analysis; and 2) precision may differ between daytime and night due to the limitation in certain data to be available only in daytime.
- JMA introduced the application on RDCA product. Explanations on: 1) the product of the Japan area are provided to civil aviation bureau and aviation industries; and 2) the product of the wide area are provided to SIGMET Coordination Group.
- JMA Informed that JMA has been nominated along with DWD for RSMC for Nowcasting, and JMA also presented the JMA's development plans for the next 10 years.
- JMA explained JMA's intentions to aim for producing QPE/QPF in the Asian region and the severe storm alert combining satellite and radar data.

3. Session 2 – Verification (22 and 23 Oct.)

3.1. RDCA Verification (MMD)

- MMD reported on the verification using radar data.
- Using 2km CAPPI data, verification was made, regarding the area of 30-35dBZ as the rapidly developing cumulus area.
- MMD reported that two methods are used in the verification process: Single Point Verification (5km radius) and Neighbouring Points Verification (15km radius).
- The false alarm rate is higher than the hit rate due to the limitation of radar coverage.
- Stripe shaped area within 3.3°N to 4.2°N with a fewer RDCA detection upon summation were found.

3.2. JMA's approach for RDCA verification (JMA)

- JMA reported on the verification using observation data of lightning (LIDEN).
- The precision is better in summer than in winter.
- The reason for the worse precision in winter is thought to be in the different

mechanisms of cumulonimbus development in summer and winter due to the seasonal differences.

3.3. Thunder Nowcast (JMA)

- JMA introduced Thunder Nowcast produced by JMA.
- Thunder Nowcast is produced using data from radar and NWP along with the lightning observation data (LIDEN).

3.4. Discussion on verification method for RDCA using radar data

- In JMA, the hit rate is higher than the omission rate in summer. In MMD, the hit rate is lower than the false alarm rate; is there any reason to be proposed for this? (MMD)
- There is a high possibility of a problem in the verification for the 30-35dBZ area of 2km CAPPI data. As for cumulonimbus emerges in the Japan area, echo above 50dBZ can be observed at around 5 km altitude. Re-examining the altitude and the threshold of the radar echo intensity may be necessary. (JMA)
- As for the evaluation procedure using radar data, 40dBZ at -10°Caltitude surface is used as an indicator for thunder, and so it could suitably be aimed for (JMA).

4. Session 3 - Algorithm and software (23 Oct.)

4.1. RDCA Product Development and Technical Challenges (MMD)

- HSD data retrieval takes a long time, in some cases delaying the data preparation.
- As the false alarm rate is higher than the hit rate, coefficient may need to be re-evaluated.
- MMD concerns appropriateness and inappropriateness of the verification procedure using radar data.

4.2. Discussion to find solutions

- It is possible to make verification using the lightning data for the globe (WWLLN) received by JMA (JMA).
- Upon checking the coefficient, a possible problem was recognized for the coefficient currently used operationally in MMD; hence a correction was suggested, for instance to apply a different coefficient produced at the last visit in March 2017 (JMA).

5. Session 4 - RDCA application (23 Oct.)

Discussion on developmental collaboration for RSMC for nowcasting

- MMD and JMA discussed further plans in collaborations to generate RDCA global coefficient.
- As for the different coefficient identified in Session3, following action plans were proposed:

Action1: To provide the result of experiment with two different coefficients which MMD has. The experiment term is 03-18UTC 23th October 2018.
Actionee: JMA, **Due date** : End of 2018

Action2 To provide the RDCA data to JMA in the term of 03-18UTC 23th October 2018.
Actionee : MMD, **Due date** : End of November 2018

Action3 To make comparison RDCA data which is made by MMD with WWLLN lightning data. And return the result to MMD (The comparison term is 03-18UTC 23th October 2018)
Actionee : JMA, **Due date** :End of February 2019

- To produce the RDCA global coefficient in collaboration between MMD and JMA, an agreement was made to make further progresses in the following schedule:
  - A joint development commences in 2019, for the coefficient generation applicable to the global RDCA. In doing so, JMA prepares a draft document necessary for the RDCA global coefficient's specifications, and MMD reviews it.
  - A meeting is held between JMA and MMD in the late 2019 to exchange views and opinions.
  - RDCA Global coefficient development is done until the end of 2019. In doing so, JMA provides a coefficient set to MMD. MMD tests it, and sends the results to JMA. JMA tries to provide test environments.
  - A paper is to be prepared, summarizing the development on coefficient generations for the global RDCA in the early 2020. In doing so, JMA prepares a draft, and MMD reviews it.
  - A preparation is to be made for operations using the RDCA global coefficient in the late 2020. Then upgrade on the operation software is expected to be minimized.

- In the late 2020, a potential “kick-off” meeting for Asian version of Thunder Nowcast will be expected in collaboration between JMA and MMD as a continuity of the collaboration for RDCA product development.

6. Public Weather Service (25 Oct.)

- Participants listened to the lecture on Public Weather Service including QPE of the ESCAP/WMO Typhoon Committee Attachment Training 2018 at the RSMC Tokyo as reference for the application of radar to DRR.

7. Sharing summary of projects on a weather radar network and Himawari-8/9 RDCA products (25 Oct.)

- Participants of the technical meeting on a regional weather radar network for Southeast Asia and the technical meeting on Himawari-8/9 Rapidly Developing Cumulus Areas (RDCA) products shared summary of their projects on the weather radar network and Himawari-8/9 RDCA products and exchange viewpoints each other.
- Mr. Shiro Omori (JMA) reported the overview of Himawari satellite system and explained about the RDCA product. Mr. Asmadi bin Abdul Wahab (MMD) shared the achievement of the RDCA project in MMD, summary of the discussion of the meeting and the further cooperation plan with MMD and JMA.

8. RSMC for Nowcasting (25 Oct.)

- Mr. Seiichiro Kigawa (JMA) gave a presentation on RSMC for Nowcasting, covering the mission, products, development plan and collaboration with NMHSs in the region and the Japan Aerospace Exploration Agency (JAXA) on satellite-related matters. He explained that key components on RSMC for nowcasting are RDCA, Global Satellite Mapping of Precipitation (GSMap) by JAXA, Southeast Asian radar network and Tokyo Action Plan 2018 (TAP2018) regarding surface observation instruments.
- Dr. Takuji Kubota, an invited expert from JAXA, presented a multi-satellite rainfall product known as GSMaP. He explained about satellite microwave remote sensing, GSMaP and its real-time version named GSMaP_NOW. He mentioned that the domain of GSMaP_NOW would be extended to GEO-satellite Meteosat domain soon.

¥

Appendix I

AGENDA

Monday, 22 October

- Opening Remarks
- Session 1 - Current status
  - Report about the current status of RDCA product in Malaysia (MMD)
    - Development plan and status
    - System and software summary
    - Rate of receiving and processing Himawari data
    - Plans for RDCA application in MMD
    - Expectation of RDCA in MMD
  - Report about the current status of RDCA product in Malaysia (JMA)
    - Introduction of RDCA applications
    - RSMC for nowcasting
- Session 2 – Verification
    - MMD's approach for RDCA verification (MMD)
    - JMA's approach for RDCA verification (JMA)
    - Thunder nowcast (JMA)
    - Discussion on verification method for RDCA using radar data (All)

Tuesday, 23 October

- Session 2 - Verification (Cont.)
  - Discussion on verification method for RDCA using radar data (All)
- Session 3 - Algorithm and software
  - Report about the current issues and challenges of RDCA development (MMD)
  - Discussion to find solutions (All)
- Session 4 - RDCA application
  - Discussion on developmental collaboration for RSMC for nowcasting (All)

Wednesday, 24 October

- Session 5 - Wrap-up and Progress report
  - Discussion about the progress report for typhoon committee
  - Preparation for next day's joint meeting

Thursday, 25 October

Joint items with the technical meeting on a regional weather radar network for Southeast Asia

Public Weather Service

Sharing summary of projects on a weather radar network and Himawari-8/9 RDCA products

RSMC for Nowcasting

Appendix II

LIST OF PARTICIPANTS

Malaysia

Mr. Asmadi bin Abdul Wahab
Principal Assistant Director of Radar and Satellite Meteorology Division
Malaysian Meteorological Department (MMD)

Ms. Nadia binti Kamis
Assistant Director of Radar and Satellite Meteorology Division
Malaysian Meteorological Department (MMD)

Mr Muhamad Sofian bin Muhamad Yusof
Meteorological Officer of Research and Technical Development Division
Malaysian Meteorological Department (MMD)

Japan

Mr. Seiichiro Kigawa
Senior Coordinator for Development Collaboration
Office of Meteorological Analysis and Application Development,
Administration Division, Observation Department
Japan Meteorological Agency (JMA)

Mr. Shiro Omori
Senior Scientific Officer
Office of Meteorological Analysis and Application Development,
Administration Division, Observation Department
Japan Meteorological Agency (JMA)

Mr. Takumi Maruyama
Assistant Scientific Officer
Office of Meteorological Analysis and Application Development,
Administration Division, Observation Department
Japan Meteorological Agency (JMA)

Mr. Masanori Oigawa
Assistant Scientific Officer
Office of Meteorological Analysis and Application Development,
Administration Division, Observation Department
Japan Meteorological Agency (JMA)

Dr. Takuji Kubota
Earth Observation Research Center (EORC)
Japan Aerospace Exploration Agency (JAXA)