



The Quality Control and Gauge Adjustment of C-band Weather RADAR for Royal Rainmaking Operation in Thailand



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Introduction

Weather RADAR has played an important role in weather observation and measuring rainfall for many purposes. It can provide clouds and precipitation information for weather modification activities in several countries. In Thailand, Department of Royal Rainmaking and Agricultural Aviation (DRRAA) has conducted clouds seeding activities since 1969 and used weather radar to evaluate the efficiency of clouds seeding. Because of the quality, weather radar information can influence the success of weather modification mission. This study focused on investigating the impact of radar quality control (QC) and radar rainfall estimation (QPE) with gauge adjustment from C-band weather radar of DRRAA.

Study area and Dataset

RADAR: Pathio station, Chumphon province in the southern region of Thailand

Type: C-band weather RADAR, Frequency: 5600 MHz, Power: 350 kW, Wavelength: 5.3 cm,

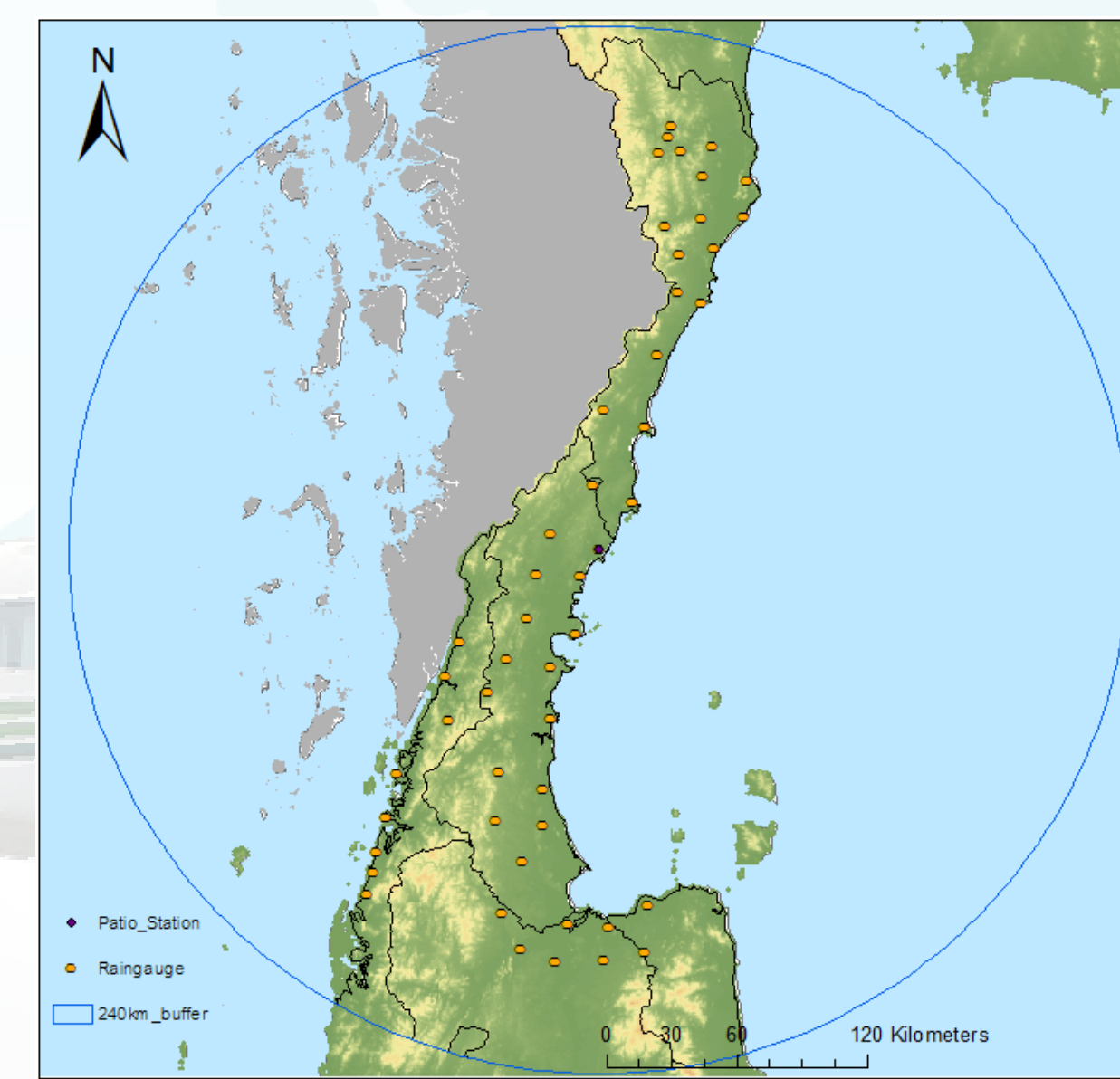
Pulse Width: 0.8 μs, Pulse Repetition Frequency: 625 Hz

Mode: Volume Coverage Pattern (VCP) 11, Elevations angle: 0.5°, 1.5°, 2.4°, 3.4°, 4.3°, 5.3°, 6.2°, 7.5°, 8.7°, 10.0°, 12.0°, 14.0°, 16.7° and 19.5°

Rain gauge: Department of Royal Rainmaking and Agricultural Aviation (DRRAA)

50 automatic tipping rain gauge

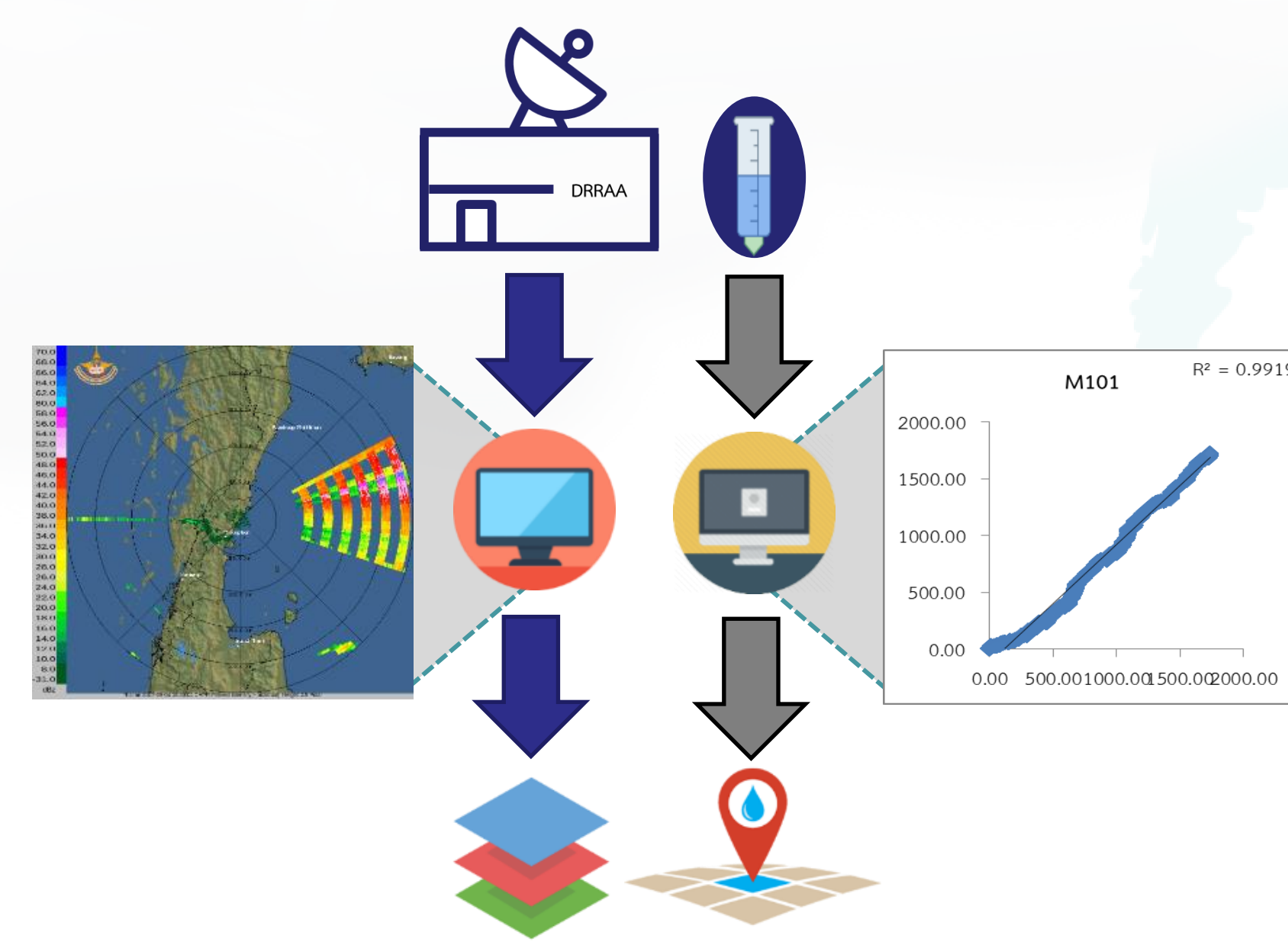
Time resolution 6 minute



Methodology

Radar quality control (QC)

- Clutter identification
- Correction of signal attenuation



Radar rainfall estimation (QPE)

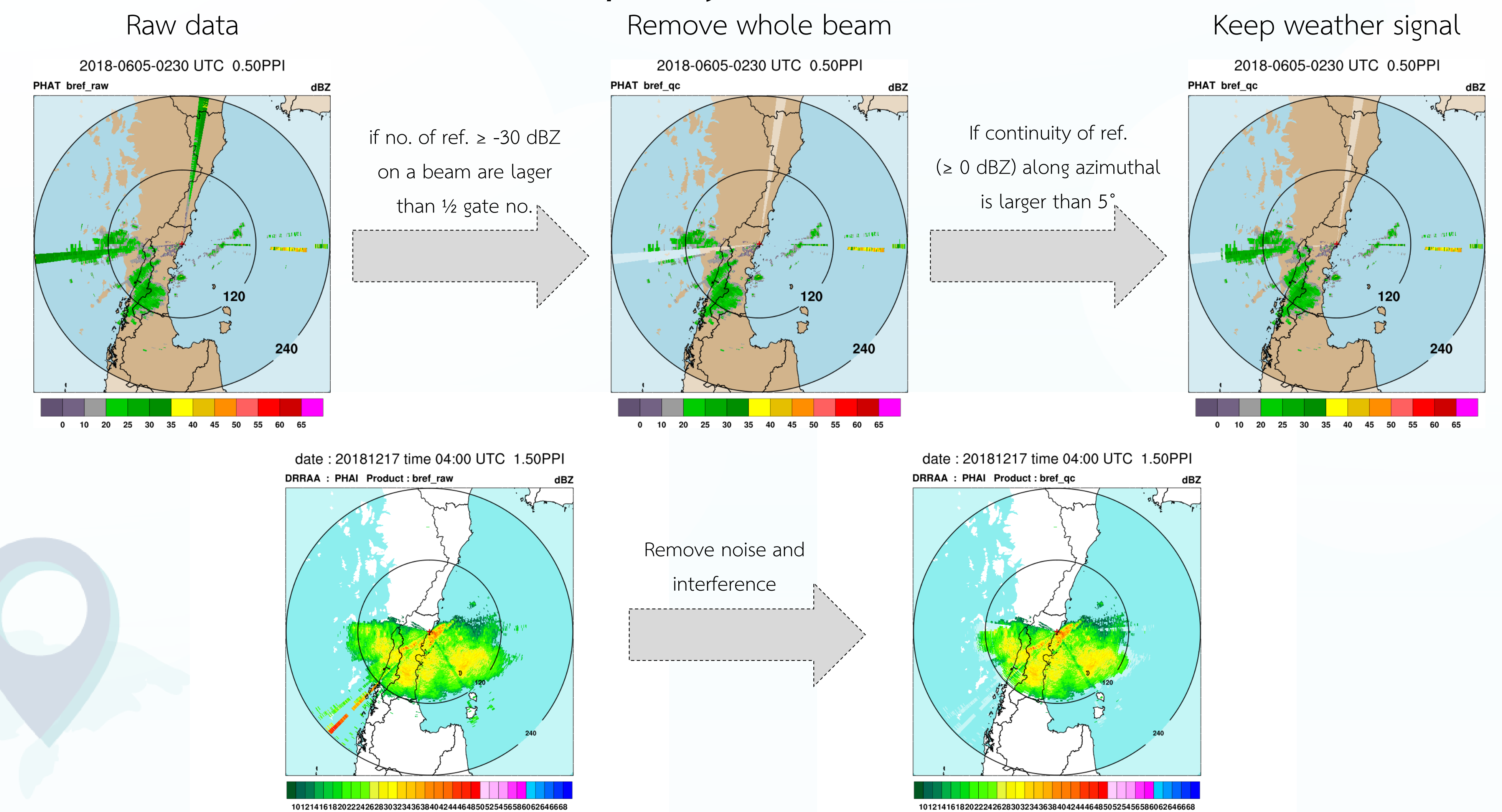
- Double mass curve
- Radar rainfall estimate by ZR relationship

Bias correction

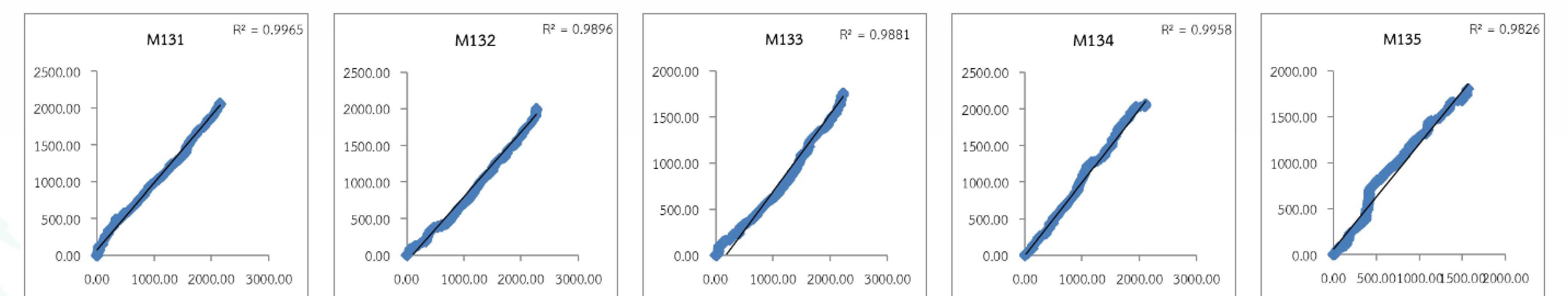
$$\text{Bias} = \frac{\text{Rain estimation (RR)}}{\text{Rain gauge (RG)}}$$

Results

Radar quality control (QC)



Rain gauge quality control (QC)



Reference

- Chantraket, P., Detyothin, C., Pankaew, S. and Kirtsang, S. 2016. *An Operational Weather Radar-Based Calibration of ZR Relationship over Central Region of Thailand*. International Journal of Engineering. 2: 92-100.
- Pao-Liang, C., Pin-Fang, L., Ben Jong-Dao, J. and Jian, Z. 2009. *An Application of Reflectivity Climatology in Constructing Radar Hybrid Scans over Complex Terrain*. Journal of Atmospheric and Oceanic Technology. 26: 1315-1327.

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