

Further Strengthening of Local Heavy Rain Monitoring System

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1. Introduction

The Water and Disaster Management Bureau of the Ministry of Land, Infrastructure and Transport (MLIT) has allocated 26 units of C-band wave (wavelength of approx. 5 cm) radar, which is a single polarization radar that transmits / receives one type of radio wave, and 38 units of X-band (wavelength of approx. 3 cm) MP radar ("XMP radar"), which is a dual-polarization radar that transmits / receives two types of radio waves (horizontal and vertical). With these radars, the Bureau monitors local heavy rain, which causes inland flood and other water disasters in various locations in Japan.

As compared with XMP radar, C-band radar has a wider range of quantitative observations but is inferior in accuracy of observation and needs correction of observation data with a ground rain gauge, and therefore cannot distribute real-time precipitation information. XMP radar has the minimum observation area of 250m mesh and requires only one or two minutes for transmission. It can distribute high-resolution and real-time precipitation information but strong rain may cause a radio wave dissipation area. This study aims to interpolate the unobservable area of XMP radar to further upgrade radar precipitation observation by synthesizing the precipitation observation data obtained from the C-band MP radar ("CMP radar"), which was developed by upgrading (converting to MP radar) C-band radar to dual polarization radar and XMP radar.

2. Rainfall observation by synthesis of XMP radar and CMP radar

With the radar precipitation image (Left Figure) of XMP radar in Typhoon No. 12, which developed in August 2014 and the synthesized precipitation ("MP radar precipitation) image (Right Figure) of XMP radar and CMP radar, it is confirmed that the radio wave dissipation area of XMP radar is covered by synthesis of CMP radar. Moreover, as the result of comparison of the time series data on ground precipitation and XMP radar / MP radar precipitation, precipitation underrated by XMP radar due to the effect of radio wave dissipation could be grasped and it was confirmed that MP radar precipitation is almost the same as ground precipitation from the beginning to end of rainfall.

3. Future perspective

We have confirmed that the unobservable area of XMP radar can be interpolated with CMP radar by synthesizing the radar precipitation of XMP radar and CMP radar. In the future, we plan to systematize the above-stated technologies and start test operation. At present, MLIT allocated 5 units of CMP radar and plans to allocate additional 4 units of CMP radar by the end of fiscal 2015. Expansion of rain gauge network using high-precision MP radar is expected to further strengthen the flood disaster monitoring system.

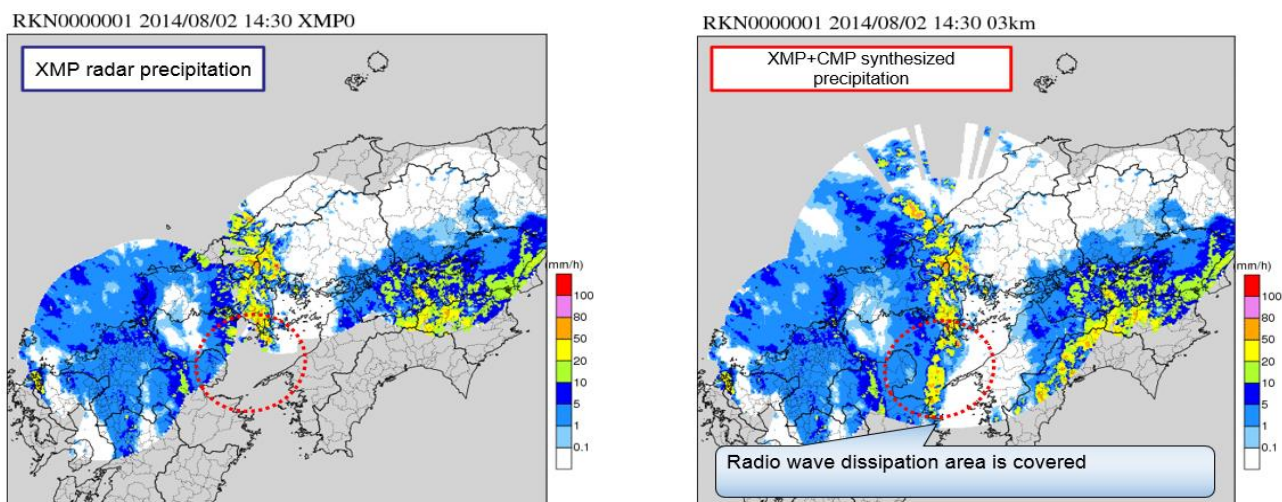


Figure. Radar Precipitation Image of Typhoon No. 12 in August 2014