

Joint Research on Real Time Storm-water Information Network Utilizing X band MP radar

Year of Research

2012

Implementation of anti-inundation measures

(Purpose)

In Ministry of Land Infrastructure Transport and Tourism, Water and Disaster Management Bureau, X band MP radar under maintenance can observe high frequency and high resolution than conventional radar (C band radar).

Using this, it is expected that accuracy of the present value and the predictive value of rainfall and water level in a sewer culvert, etc, will improve. In this study, we carried out for the purpose of verification of the accuracy related to the real time rain water information network which utilized the rainfall prediction technique and the information of X band MP radar.

(Results)

(1) Rainfall prediction

Accuracy evaluation was carried out about the interactive value and the predictive value of the X band MP radar. The candidate which carried out accuracy evaluation is S drainage division in A City which can be observed by two X band MP radars.

① Accuracy evaluation of present value

In the accuracy evaluation of radar rainfall by the ground rain gauge, the correlation coefficient in 60-minutes rainfall is 0.95 in X band MP radar compared with 0.75 in C band radar, so there is high correlativity. Additionally, the correlation coefficient in 10-minutes rainfall is 0.90 in X band MP radar compared with 0.56 in C band radar, this also indicate good correlativity. Furthermore, it was obtained the result that there was not much difference arising from the strength of the rainfall.

② Accuracy evaluation of predictive value

In 60-minutes rainfall, the predicted value by X band MP radar, the correlation coefficient is 0.66 in pinpoint rainfall, and the correlation coefficient value is 0.71 in the basin average. In 10-minutes rainfall, the result was a markedly better than the prediction by using C band radar information (**Fig.2**), there is good correlativity that the correlation coefficient value is 0.82 in 10-minutes ahead predict.

However, in 30-minutes ahead predict, the correlation coefficient is less than 0.5, after that, the result considered not to be practical was obtained.

As the prediction of the whole basin average (**Fig. 3**), the accuracy improves than the pinpoint prediction, also about this, with the prediction technology in this time, it is considered to be a practical range even in 30-minutes ahead predict.

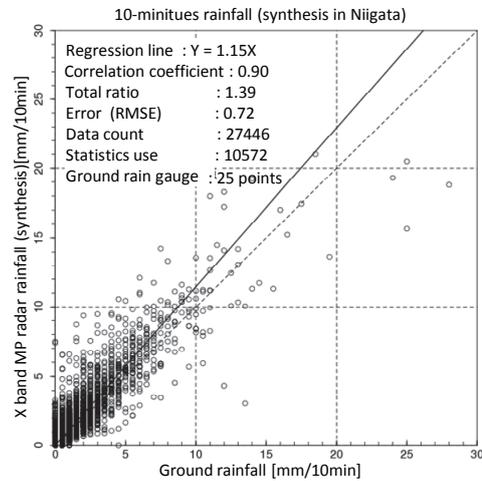


Fig.1 Accuracy evaluation of present rainfall value (10-minutes rainfall)

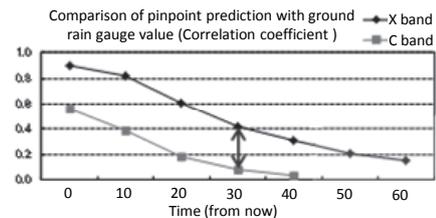


Fig.2 Accuracy evaluation of rainfall prediction (10- minutes rainfall)

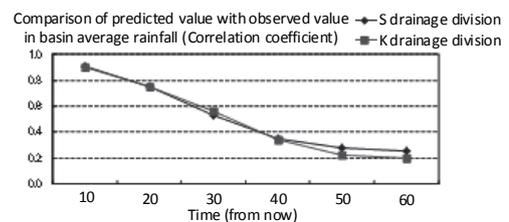


Fig.3 Accuracy evaluation of rainfall prediction (10-minutes rainfall)

(2) Prediction of rainwater runoff in culvert

Using above the predictive value of 10-minutes rainfall, the rainwater runoff analysis in a sewer culvert in S drainage division was carried out. In consequence, it obtained the result which can be predicted with sufficient accuracy in the case of outflow waveform and peak value until about 30-minutes ahead predict. In 60-minutes ahead predict, although a margin of error becomes large, the result which is considered that can support the judgment of the pump operation was obtained.

(Conclusion)

In this study, the accuracy of the prediction with X band MP radar has a certain amount of accuracy as long as the whole drainage division, so it is considered to be the practical accuracy until about 30-minutes ahead predict.

In the prediction inside the sewer culvert, it is considered that the accuracy further improves, because of taken account of the concentration time and the prediction reflected the past interactive rainfall.

It is thought that the rainfall prediction by X band MP radar can perform high-precision prediction by using for the rain runoff analysis in sewer culvert, it is expected that the use will spread by predictive accuracy continues to improve.

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Key words

Anti-inundation measure, Improved confluence, Real time control