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Approach on research of heavy rainfall with water disasters using X-MP radar of University of Yamanashi

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Heavy rainfall often causes disasters such as inundations in a river basin and an urban. In the part of the Global COE program of University of Yamanashi, ”Evolution of research and education on integrated river basin management in Asian region,” the X-band multi-parameter radar was installed in University of Yamanashi (hereafter ”the UYR”) on April, 2009. The UYR has observed the rainfall phenomena occurred on the Kofu Basin and the surrounding for the fundamental studies of precipitation and the applied researches of the prevention of water disasters since the installation. In this presentation, the observing cases of the UYR, the accuracy of estimation of rainfall amount using the UYR and the study of a disaster risk estimation model using the UYR are introduced.

At present, the UYR carries out the volume scan every 5 minutes for 24 hours. The UYR has observed many precipitating phenomena with three-dimensional structures; the heavy rainfall for a short time associated with a cumulonimbus cloud, the heavy rainfall associated Typhoon and so on. We try to indicate the result of the UYR on the web site in real time. This web site is ”http://www.icre.yamanashi.ac.jp/radar/.”

As one of the cases, a thunderstorm developed on the south part of the Kofu Basin on September 4, 2009 was investigated. From the analyses of polarimetric parameters, the thunderstorm was composed of many tall precipitating cells with solid precipitating particles at the upper part and raindrops at the lower part. One of the precipitating cell brought heavy rainfall of 37 mm in 30 minutes at Furuseki on the south part of the Kofu Basin.

To check the accuracy of the estimation of rainfall amount using the UYR, we compared the surface rainfall intensity derived from rangage at Furuseki and the rainfall intensity over Furuseki estimated using KDP observed by the UYR using the above case. Each temporal variation of rainfall intensity had similar tendency. The normalized error between them was 24 %. In the case between May and October, 2010, the normalized error between the surface rainfall intensity and the rainfall intensity estimated by the UYR was 25 %, which was similar to the above result. Thus, it is suggested that the UYR estimated rainfall intensity with high accuracy.

The rainfall intensity estimated by the UYR is applied to hydrological research. The estimation of runoff was improved using the rainfall intensity estimated by the UYR with high-resolution (Hapsari et al. 2010), which proceeded to estimate the risk of inundation by predicting some ensemble short term rainfall forecast using advection model and singular vector method(Hapsari et al. 2011).

We continue to carry out the fundamental studies of precipitation and the applied researches of the prevention of disasters associated with heavy rainfall based on the fundamental knowledge of precipitation using the UYR.

Keywords: X-MP radar, Heavy rainfall, Estimation of rainfall amount, Prediction of the risk of inundation