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Comparison of observed rainfall characteristics by using Multi-Parameter Weather Radars and Single parameter Weather Radars for the typhoon Hagibis in 2019

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In recent years, due to global climate change, flood disaster has become more frequent and intense. Along with this, many researchers in different fields are working on researches to reduce the damage caused by these severe water-related disasters. This study focusses on weather radars, which are mainly used for a countermeasure against flood damage in Japan. Our purpose is to examine the validity of weather radars currently set such as X band multi-parameter radars and C band radars in flood disasters which may cause serious damage in Japan.

The targeted flood disaster is one of the largest water-related disasters which caused severe damages to Japan, the typhoon Hagibis in 2019. It caused floods in more than 140 rivers. We used the observed data from weather radars of Chikuma and Abukuma river which are severely damaged in this disaster. Also, the Tama River in the Tokyo metropolitan area was flooded because of the heavy rainfall caused by Hagibis. we compared the accuracy of the multi-parameter radar and the single-parameter radar. thus, the issues of the current weather radar were extracted.

As a result, the accumulated rainfall of the single-parameter radars was larger than that of the multi-parameter radars. This may cause by the fact that radio wave of the multi-parameter radars will get attenuated when it passesthrough areas with strong rainfall so that it is difficult to observe some area if there is strong rainfall area between the radar and targeted area. In addition, the values observed by multi-parameter weather radars are fitted with the values by the ground rain gauges.

In conclusion, it was found that the multi-parameter weather radars have better accuracy of precipitation observation than that of the single parameter weather radars. Furthermore, it is necessary to consider the optimal position of multi-parameter weather radars to improve accuracy of the observation.