Calculation of extreme precipitation rates of river basins using different rainfall maps

*Shinta Seto[1], Tatusya Shimozuma[1], Yumiko Nakayama[2]

1. Graduate School of Engineering, Nagasaki University, 2. Department of Engineering, Nagasaki University

To produce heavy rainfall scenario under near-future climate, extreme precipitation rates of river basins are calculated using different rainfall maps. Watanabe et al. (2017) used rainfall analysis of JMA and apply flexible elements method and monte carlo simulation to calculate extreme precipitation rates in Kinu river basins. They also applied the same method for other river basins in Japan. In this study, a satellite-based global precipitation map (GSMaP), high-resolution ground-based radar measurements (XRAIN) and a long-term gauge-based gridded dataset (AphroJP) are used to calculate extreme precipitation rates. Calculated extreme precipitation by GSMaP is smaller than that by rainfall analysis of JMA, partly because GSMaP’ s spatial resolution is as coarse as 0.1 degrees and it cannot get small-scale heavy rainfall events well. It may be better to apply GSMaP for larger river basins than those in Japan. As XRAIN sometimes shows abnormally high rain rates over mountains, space-borne radar (DPR) is used to correct the XRAIN estimates. Corrected XRAIN data is applied to calculate extreme precipitation rates. For Kinu river basins, the estimates by XRAIN is smaller than those by rainfall analysis of JMA. To make use of higher resolution of XRAIN, it is applied to the upper basins of Terauchi dam, where heavy rainfall happened in 2017 summer. As the data period of XRAIN is several years, to increase the reliability of the extreme rain estimates, data from different regions are combined to be used. Finally, AphroJP is used to calculate extreme precipitation rates in Kuma river basin. AphroJP has data from 1900 to 2011, but the data in the first half of 20th century shows quite different extreme rain rates, so they are excluded for this analysis. Changing the period and area of the data, extreme rain rates are calculated.

Keywords: heavy rain scenario, extreme rain rates, rainfall maps

