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Estimation of Change in Extreme Rainfall Across Korea under Climate Change using Bartlett-Lewis Rectangular Pulses Model (BLRPM) and Adjusting Method

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Recent scientific studies indicate that the mean annual global surface temperature has increased by 0.3° to 0.6° since the late 19^{th} century, and a report by the Intergovernmental Panel on Climate Change (IPCC) estimates a further increase between 1° to 3.5° over the next 100 years (IPCC, 1995, 2001). As a result, the hydrologic cycle is expected to become more active and intensive, leading to an increase in the rainfall intensity and the number of extreme rainfall events (IPCC, 1995, 2001). Climate change will change the magnitude, intensity and spatial distribution of extreme rainfall and increase the magnitude of the design discharge and that would likely result in adverse effects on existing water resource infrastructures. Recently, extreme rainfall events

have pushed drainage infrastructures beyond their design limits and caused failure of many systems, including flood defense (Lawrimore et al, 2001).

In this study, we first construct global climate change scenarios using the YONU CGCM control run and transient experiments, and then transform the YOUN CGCM grid-box predictions with coarse-resolution of climate data into the site-specific values by statistical downscaling techniques. Using Bartlett Lewis Rectangular Pulse Model (Onof and Weather, 19993; Onof 2000) and Adjusting method (Koutsoyiannis, 2000), we disaggregate the daily rainfall time series to hourly rainfall values. We also conduct frequency analysis on the annual maximum series (AMS) derived from the disaggregated hourly rainfall time series. Intensity-duration-frequency (IDF) curves are analyzed in order to investigate changes in extreme rainfall patterns at different temporal scales.

Keywords: climate change, YONU CGCM, extreme rainfall, BLRPM, disaggregation, IDF