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Impact assessment of climate change on occurrence of weather events in South Korea using extreme indices

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Climate change refers to the transformation of climate under the influence of natural and human-made factors. The change stems from a long-term accumulation of minute weather changes. Humans living in the 21st century are getting more accustomed to “climate change” as a term and living environment. It is because, unlike in the past, climate change is occurring at a considerable speed and abnormal weather events that are difficult to predict are common in diverse locations of the world. Salient examples include, increased precipitation intensity and rainfall days, extreme drought, and winters marked by higher temperatures. Because such phenomena, unfortunately, do not display cyclical or other climate patterns, it is considerably difficult to assess and analyze them. How will the frequency and intensity of extreme weather events influenced by global warming change evolve in the 21st century? This research question challenges hydrologists who have to forecast extreme weather events to prevent future natural disasters.

The goal of this study is to use extreme weather data–daily precipitation in the Korean Peninsula and minimum/maximum temperature–to analyze the impact of climate change on temporal and spatial distribution of extreme weather events in the Korean Peninsula. First, global climate change scenarios using the YONU CGCM ( ) control

run and transient experiments are constructed. Next, YONU CGCM grid-box predictions with coarse resolution of climate change are transformed into the site-specific values by statistical downscaling techniques. Then, past data and future (2CO2) data extracted from downscaled YONU CGCM are used to calculate each of extreme indices and to analyze their trends. Finally, the results are compared in terms of temporal and spatial variation for a comparative analysis of the impact of climate change on occurrence of extreme weather. The outcomes reveal that spatially coherent and statistically significant changes in the extreme events of temperature and rainfall have occurred in Korea.

Keywords: climate change, YONU CGCM, statistical diagnostic, extreme weather, extreme indices.