



A Study on the Selection of Optimal Probability Distributions for Analyzing of Extreme Precipitation Events over the Republic of Korea

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This study determined the optimal statistical probability distributions to estimate maximum probability precipitation in the Republic of Korea and examined whether there were any distinct changes on distribution types and extreme precipitation characteristics.

Generalized Pareto distribution, and three parameter Burr distribution were most selected distributions for annual maximum series in the Republic of Korea. Furthermore, in the seasonal basis, the most selected distributions was three parameter Dagum distribution for spring, three parameter Burr distribution for summer, generalized Pareto distribution for autumn, three parameter log logistic distribution, generalized Pareto distribution and log-Pearson type III distribution for winter.

Maximum probability precipitation was derived from selected optimal probability distributions and compared with that from Ministry of Land, Transport and Maritime Affairs(MOLTMA). Maximum probability precipitation in this study was greater than that of MOLTMA as the duration time and return periods increased. This difference was statistically significant when apply Wilcoxon signed rank test. Because of different distributions, as the return period is longer, greater maximum probability precipitation value were estimated.

Annual maximum series from 1973 to 2012 showed that the median was the highest in the south coastal region, but as a duration time was getting longer, Seoul, Gyeonggido, and Gangwondo had higher median values, which located in the central part of Korea. The months of annual maximum series occurrence were concentrated between June and September. Typhoons affected on annual maximum series occurrence in September.

Seasonal maximum probability precipitation was greater in most of the south coastal region, and Seoul, Gyeonggido and Gangwondo had greater maximum probability precipitation in summer. Gangwondo had greater maximum probability precipitation in autumn while Ulleung and Daegwallyeong had a greater one in winter.

In temporal changes of annual maximum series, most of observation stations except Mokpo showed a increasing trend. It means that amplitude of annual maximum series in the Republic of Korea is getting larger. When comparing the difference of annual maximum series between the first half period(1973-1992) and the second half period(1993-2012), the most selected distribution was generalized extreme value distribution, three parameter Burr distribution, and generalized Pareto distribution for the first half one while generalized Pareto distribution, three parameter log logistic distribution for the second half one. Comparing maximum probability precipitation calculated from selected distributions, one for the first half was greater than the second half. This study examined intensity and frequency of extreme precipitation events in the Republic of Korea, so it help establish standards of river construction design and policy making.