

Dealing with Observed Zero Data in Hydrologic Frequency Analysis of Snow Depths

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(a) Purpose of study or research hypothesis

The purpose of this study is to estimate design hydrologic quantities for zero-containing observations.

(b) Key issue(s) or problem(s) addressed

Although there are lots of efforts to reduce the damage caused by heavy snow, the damage is still increasing in South Korea due to climate change and lack of design standard. The design standards are usually established by statistical frequency analysis. However, if the data includes zeros, there is a limit using conventional methods since the statistical characteristics of the data are sensitive and may be impossible for getting proper estimates.

(c) Methodology or approach used

In this study, the statistical frequency analysis of snowfall data containing zeros is performed using mixed distributions. The alternative method for conventional frequency analysis is also performed using bounded distributions. The data used in this study are maximum snow depth values collected more than 30 years.

(d) Results or conclusions derived from the project

The results of the study show the design hydrologic quantities calculated using mixed distributions and bounded distribution are 5~10% smaller than those calculated using conventional frequency analysis method. In addition, the results show the current greenhouse design standards are 2~5% over-calculated by 2~5% when comparing with the results of this study.

(e) Implications of the project relevant to congress themes

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The theme of Congress is “Reducing disaster risks: improving preparedness and resilience. The results of this study can be referred to the re-adjustment of greenhouse design standards.

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Keywords : Snow Depth, Frequency analysis, Bounded distributions, Mixed distribution