

## Extreme drought analysis using Natural drought index and Gi\* statistic

Vo Quang Tuong\*, Jae-Min So\*\*, Deg-Hyo Bae\*\*\*

.....  
**Abstract**

This study proposes a framework to evaluate extreme drought using the natural drought index and hot spot analysis. The study area was South Korea. Data were used from 59 automatic synoptic observing system stations. The variable infiltration capacity model was used for the period from 1981 to 2016. The natural drought index was constructed from precipitation, runoff and soil moisture data, which reflect the water cycle. The average interval, duration and severity of extreme drought events were determined following Run theory. The most extreme drought period occurred in 2014-2016, with 46 of 59 weather stations exhibition drought conditions and 78% exhibition extreme drought conditions. The Inje and Seosan station exhibited the longest drought duration of 6 months, and the most severe drought was 5 times higher than the extreme drought severity threshold. The hot spot analysis was used to explore the extreme drought conditions and showed an increasing trend in the middle and northeastern parts of South Korea. Overall, this study provides water resource managers with essential information about locations and significant trends of extreme drought.

**Keywords :** Extreme drought, Gi\* statistic, Natural drought index

### Acknowledgements

This work was supported by KOREA HYDRO & NUCLEAR POWER CO., LTD. (No. H18S023000)

---

\* Member · PhD student, Dept. of Civil and Environ. Eng., Sejong University · E-mail : [tuong@sju.ac.kr](mailto:tuong@sju.ac.kr)

\*\* Member · Post-doctoral researcher, Dept. of Civil and Environ. Eng., Sejong University · E-mail : [enjoy0517@nate.com](mailto:enjoy0517@nate.com)

\*\*\* Member · Professor, Dept. of Civil and Environ. Eng., Sejong University · E-mail : [dhbae@sejong.ac.kr](mailto:dhbae@sejong.ac.kr)