

## Application of Hidden Markov Chain Model to identify temporal distribution of sub-daily rainfall in South Korea

Chandrasekara, S.S.K\*, Yong-Tak Kim\*\*, Hyun-Han Kwon\*\*\*

.....

### Abstract

Hydro-meteorological extremes are trivial in these days. Therefore, it is important to identify extreme hydrological events in advance to mitigate the damage due to the extreme events. In this context, exploring temporal distribution of sub-daily extreme rainfall at multiple rain gauges would be informative to identify different states to describe severity of the disaster. This study proposes a hidden Markov chain model (HMM) based rainfall analysis tool to understand the temporal sub-daily rainfall patterns over South Korea. Hourly and daily rainfall data between 1961 and 2017 for 92 stations were used for the study. HMM was applied to daily rainfall series to identify an observed hidden state associated with rainfall frequency and intensity, and further utilized the estimated hidden states to derive a temporal distribution of daily extreme rainfall. Transition between states over time was clearly identified, because HMM obviously identifies the temporal dependence in the daily rainfall states. The proposed HMM was a very useful tool to derive the temporal attributes of the daily rainfall in South Korea. Further, daily rainfall series were disaggregated into sub-daily rainfall sequences based on the temporal distribution of hourly rainfall data.

### Acknowledgement

This work is supported by the Korea Agency for Infrastructure Technology Advancement(KAIA) grant funded by the Ministry of Land, Infrastructure and Transport (Grant 18AWMP-B083066-05).

**Keywords** : Hidden Markov chain Model, Rainfall, South Korea

---

\* Member. Ph.D, Department of Civil Eng., Chonbuk National University · E-mail: sewwandhi@jbnu.ac.kr)

\*\* Member. Ph.D, Department of Civil Eng., Chonbuk National University · E-mail: dydxkr@jbnu.ac.kr)

\*\*\* Member · Associate Professor, Dept. of Civil Eng., Chonbuk National University · E-mail: sewwandhi@jbnu.ac.kr)