

Three-dimensional Perspective Analysis of Spatio-Temporal Drought Characteristics for Developing a Drought Risk Map

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(a) Purpose of study or research hypothesis

Drought risk mapping is a key element of drought management as to identify drought-prone areas. Drought risk is calculated as the probability of negative impact caused by interactions between hazard, exposure and vulnerability. The main purpose of this study is to define a drought events based on the continuity of three-dimensional (longitude, latitude, time) concepts.

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

Generally, the effect of drought event gradually appears when it is accumulated for a considerably long duration. Due to the disguise behavior of drought, the effect of drought spreads over several years even after relieving from drought. Namely, low-dimensional drought analyses are limitations in analyzing the drought occurrence and propagation characteristics in time and space. Therefore, this study defines a drought event based on the continuity of three-dimensional (longitude, latitude, time) concepts. This helps us to identify when a drought event begins and ends. Drought exposure is a scale of asset and population in the area and drought vulnerability is probability of assets and population being affected by droughts in the areas.

(c) Methodology or approach used

We will develop a drought hazard map that can be used to understand the drought situation caused by the expansion of the spatial and temporal range of drought. Then, the drought risk map is developed to analyze the characteristics drought events in the 3D concept. The spatio-temporal drought event is identified using simple clustering algorithm, in which the evolution of drought is viewed as continuum longitude, latitude, and time. Finally, drought risk is calculated as the probability of negative impact caused by interactions between hazard, exposure and vulnerability.

(d) Results or conclusions derived from the project

It is expected that the use of drought risk map, which can interpret the spatio-temporal occurrence characteristics and regional patterns of droughts, will be further improved to prepare future extreme drought response plans.

(e) Implications of the project relevant to congress themes

The theme of Congress is "Water and migration: understanding and mitigating key drivers and risks." The purpose of this study is to develop a spatio-temporal drought risk map by introducing the three-dimensional concept of mitigating to reduce the risk of a disaster (drought). It can be used to understand and to find key drivers to mitigate drought.

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