The future drought prediction in the Korean Peninsula

Chang-Kyun Park*, Hi-Ryong Byun**

Abstract

This study predicts the future drought that might occur in the Korean Peninsula from 2014 to 2100 based on the latest climate change scenario of the Representative Concentration Pathway (RCP) 8.5. The intensity of drought was evaluated by the Effective Drought Index (EDI) that was converted from the daily precipitation data calculated in the regional climate model of HadGEM3-RA along the RCP 8.5.

The spatiotemporal distributions of drought were investigated after dividing the Korean Peninsula into four regions by the similarity of EDI distribution and dividing the entire period into early (2014-2040), middle (2041-2070), and latter periods (2071-2100). As a result, there were 17 cases of severe droughts with the intensity of EDI less than -1.5 and lasted for two years or longer, and the longest of them was predicted to occur in the northeast region for five years (2026-2030). Moreover, there were two years (2033, 2034) in which the extreme drought of the intensity of EDI less than -2.0 in two or more out of the four regions were predicted.

The most extreme drought was predicted to occur in 2027 in the northeast region with the intensity of -2.85. This region also showed a trend that severe drought occurred periodically every 6-8 years during the early period. But in general, the intensity and duration of drought weakened in the middle period and the latter period over the Korean Peninsula, and this trend became stronger as it was closer to the southern coast region.

In all except the southern region, the number of drought days decreased in the spring (March – May) and increased in the autumn (September – November) and the early winter (December). In the southern region, the number of drought days increased a little in June and July in the latter period, but it decreased in all the other seasons, indicating a trend that the drought generally weakened throughout the year.

Key words: Effective Drought Index, extreme drought, future drought, RCP 8.5, severe drought

* Department of Environmental Atmospheric Sciences, Pukyong National University · E-mail : qkxp2@naver.com
** Department of Environmental Atmospheric Sciences, Pukyong National University, Professor · E-mail : hrbyun@pknu.ac.kr