"Gheorghe Asachi" Technical University of Iasi, Romania

SPATIOTEMPORAL DISTRIBUTION AND PERIODICITY
OF RAINFALL IN A TYPICAL ALLUVIAL PLAIN OF CHINA

Dan Huang[1], Zaibin Liu[1,2]*

[1]*School of Environmental Science and Engineering, Chang'an University, Xi'an, 710054, Shaanxi, China*
[2]*Xi'an Research Institute Company of China Coal Technology and Engineering Group, Xi'an, 710054, Shaanxi, China*

Abstract

This paper aims to disclose the spatiotemporal distribution of rainfall in time domain or frequency domain. For this purpose, the rainfall data at seven stations in Hebei Plain since the 1960s were subjected to trend analysis by innovative trend analysis (ITA), Mann–Kendall (MK) test and linear regression and periodicity analysis by continuous wavelet transform (CWT). The results show that different rainfall intensities obeyed different trends on spatial and temporal scale. Firstly, on the annual scale, the rainfall decreased significantly at the confidence level of 10% at Raoyang, which lies in the centre of the study area, and heavy rainfall declined more significantly than the other four rainfall intensities. Secondly, on the seasonal scale, about half of the stations showed significant rainfall variations: summer rainfall is the major contributor to the decline in annual rainfall. Decreases of heavy rainfall in summer were recorded at Xingtai, Nangong and Huanghua, which may reduce the possibility of flood. Raoyang was highly sensitive to the rainfall with spring increase and summer/winter decrease, requiring more attention on winter drought. Thirdly, the rainfall in the middle of the study area has more significant period in 0.5-year and 0.83~1.17-year period scales. Finally, the results of the four methods agree well with rainfall variables. The research findings provide a valuable reference for water resources planning and drought or flood control.

Key words: continuous wavelet transform (CWT), innovative trend analysis (ITA), linear regression, Mann–Kendall (MK) test, periodicity analysis

Received: September, 2018; Revised final: February, 2019; Accepted: March, 2019; Published in final edited form: May 2019

---

* Author to whom all correspondence should be addressed: e-mail: zaibinliu@163.com; Phone: +86-13572198204