

# Analysis of Temporal Evolution Characteristics of Precipitation in Beijing

Zhang Chengze<sup>1</sup>, Sun Jichao<sup>1\*</sup>

<sup>1</sup>School of Water Resources and Environment, China University of Geosciences (Beijing),  
Beijing 100083, China

\* Correspondent Author: Sun Jichao, [sunjc@cugb.edu.cn](mailto:sunjc@cugb.edu.cn)

**Abstract:** To master the law of precipitation evolution in Beijing and better implement the management of water resources. Based on the monthly precipitation data of Beijing from 1978 to 2020, the trend, mutation and periodicity of annual and seasonal precipitation in Beijing were studied by using linear regression, anomaly analysis, 5a moving average, Mann-Kendall mutation test and Morlet wavelet analysis. The results show that the annual, spring, summer, autumn and winter tilt rates are - 1.81mm/3a, - 0.17mm/3a, - 3.11 mm/3a, 1.42mm/3a and 0.02mm/3a respectively. The precipitation in summer decreased significantly in 2005, in autumn increased significantly in 2012, and in winter decreased significantly in 1982. There was no significant change in inter-annual and spring precipitation. The annual and seasonal precipitation had many mutations in this time series, and the mutations were 7 times, 13 times, 2 times, 5 times and 7 times respectively. There are three kinds of periodic changes in annual precipitation, and the intensity of periodic changes is the largest in the 20-32 year scale. There were 3 types, 2 types, 2 types and 2 types of periodic changes in each season respectively. The intensity of periodic changes in winter precipitation was the largest on a 10-20 year scale, and the intensity of periodic changes in the other three seasons was the largest on a 20-32 year scale. In general, the annual and seasonal precipitation in Beijing has obvious trends, mutations and periodicity, and the research results have certain reference values for Beijing water resources planning and other related work.

**Key words:** precipitation; Trend; Respectively; Periodically; Morlet wavelet analysis; M-K mutation test



This paper DOI: [10.5281/zenodo.7861989](https://doi.org/10.5281/zenodo.7861989)

Journal New Website web1: <https://ijgsw.eu.org/>  
web2: <https://ijgsw.net/>

Journal Old Website: <http://ijgsw.comze.com/> is no longer used

You can submit your paper to email: [Jichao@email.com](mailto:Jichao@email.com)

Or [IJGSW@mail.com](mailto:IJGSW@mail.com)