

Drought frequency analysis in China using a 55-year dataset of reconstructed soil moisture

Z.Y. WU^{1,2,3}, X.Y. LI^{1,2} & G.H. LU¹

1 National Engineering Research Center of Water Resources Efficient Utilization and Engineering Safety, Hohai University, Nanjing, China
wzyhhu@gmail.com

2 College of Hydrology and Water Resources, Hohai University, Nanjing, China

3 State Key Laboratory of Hydrology-Water Resources and Hydraulic Engineering, Hohai University, Nanjing, China

Abstract Drought is a recurring hydroclimatic event. In recent years, drought has become a frequent natural hazard in China with one severe drought event in every two years, causing great losses to society. Therefore, it is important to study drought frequency in China. Since soil moisture is a key factor in revealing the whole process of drought occurrence, a 55-year dataset of reconstructed daily soil moisture was used to calculate the soil moisture anomaly percentage index (SMAPI), a drought index, and to perform drought frequency analysis in China. The Variable Infiltration Capacity (VIC) model with a resolution of 30 km × 30 km was used for the soil moisture reconstruction and was run from 1956 until 2010. This study focuses on the spatial distribution and variability of drought frequency in China. Trends in drought occurrence is analysed using the Mann-Kendall (MK) method. The results indicate that the drought frequency in eastern China is higher than that in western China. Several regional drought centres are identified in southeast Inner Mongolia, the northeast areas of Inner Mongolia, the northeast China region, the H-H-H (Huang-Huai-Hai) region and southwest Tibet. In terms of seasonal distribution, summer and autumn droughts are more frequent than spring and winter droughts. The MK trend test shows the four seasons' drought frequency shares the same changing pattern at the national scale, and is similar to that of annual drought.

Key words soil moisture anomaly percentage index; drought frequency; season drought frequency; trend analysis