

Analysis of Drought Evolution Characteristics in Southwest China during Recent 50 Years

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Objectives

Drought is the kind of natural disaster with the widest range, the highest frequency, the longest duration and the highest disaster rate in the world, it has become an important factor restricting the development of China's national economy. The spatial and temporal distribution of drought in China has also changed under global climate change, it showed that drought is the exclusive natural disaster not only in traditional arid and semi-arid areas such as northeast, northwest and north China, but also in China's humid and semi humid areas. Drought also occurs frequently in Southwest China, which seriously threaten the social economy and ecological environment. So far, how to quantitatively express the characteristics of propagation from meteorological drought to hydrological drought is a complex problem.

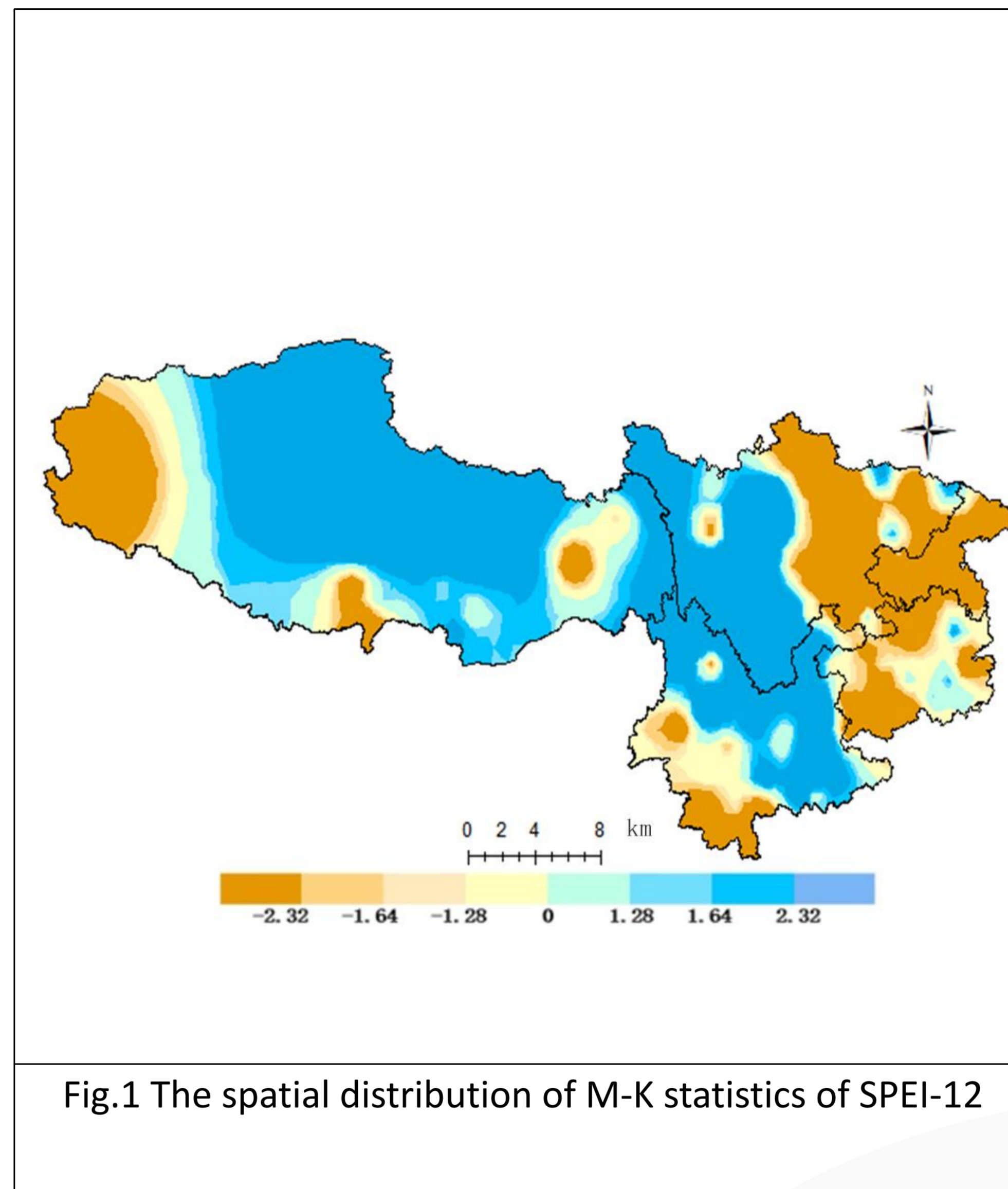


Fig.1 The spatial distribution of M-K statistics of SPEI-12

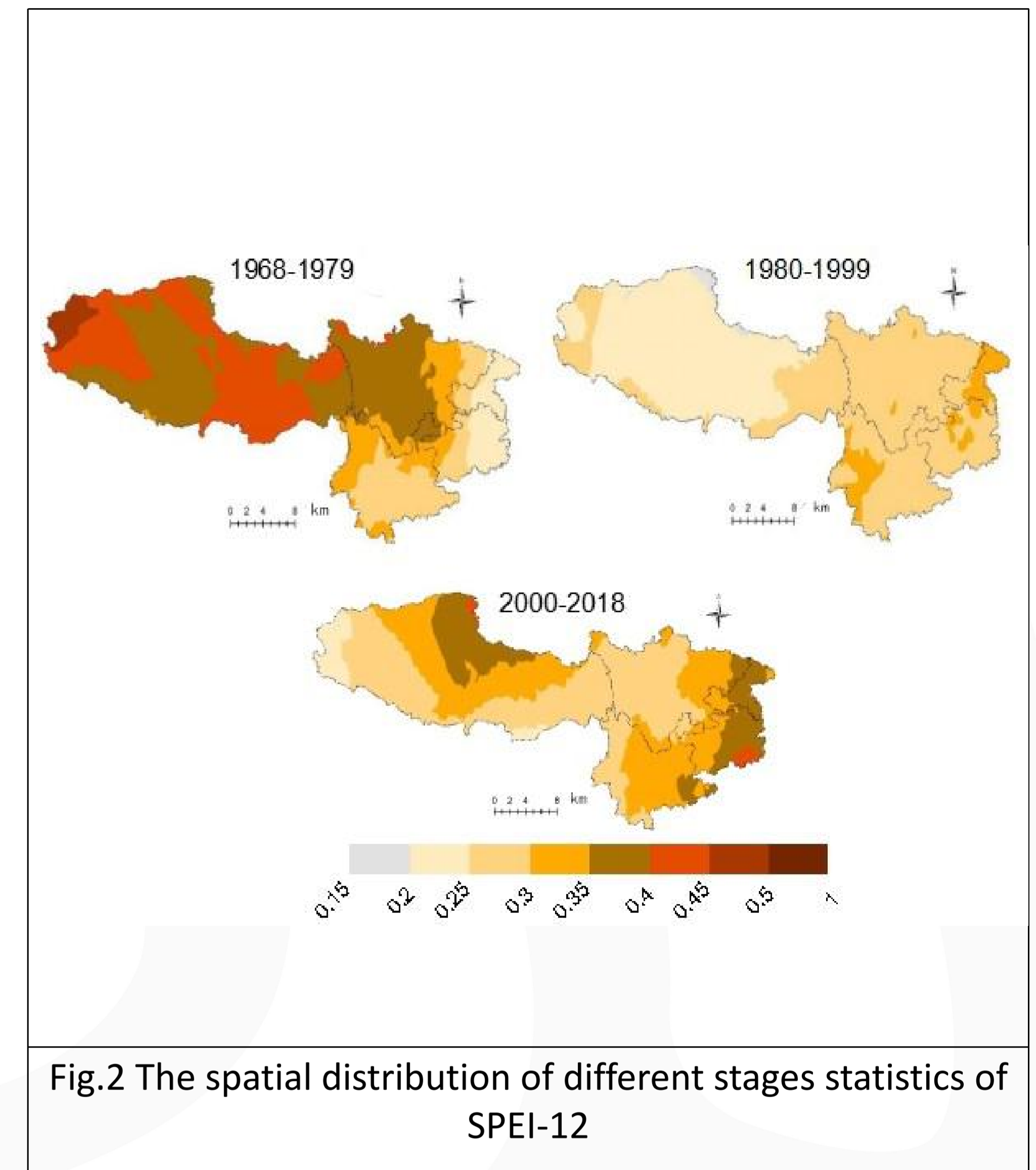


Fig.2 The spatial distribution of different stages statistics of SPEI-12

Methods

To understand the key characteristics of propagation such as the drought response time and drought threshold in Southwest China, in this paper, standardized precipitation evapotranspiration index, soil moisture index and standardized runoff index are chosen to analyze the temporal and spatial changes of meteorological drought, hydrological drought and agricultural drought in Southwest China by M-K trend test method and linear trend method based on nearly 50 years hydro-meteorological data and the actual drought disaster data.

Results

The results indicate that the drought response time in Southwest China is 2-7 months and the sensitivity distribution of hydrological drought is consistent with the drought translation rate of meteorological drought. The duration of hydrological drought event is longer in the basins with smaller propagation threshold of drought intensity. Results also show that rainfall, river runoff, and soil moisture decrease obviously, and drought frequency increases significantly since 21st century.

Conclusions

In general, the drought in Southwest China is intensifying, with a trend of decreasing rainfall, runoff and relative soil moisture. Engineering measures such as the construction of irrigation areas and farmland water conservancy projects need to be strengthened, combined with medium- and long-term predictions of drought, to promote the issuance of drought warnings and improve drought mitigation and defense capabilities.

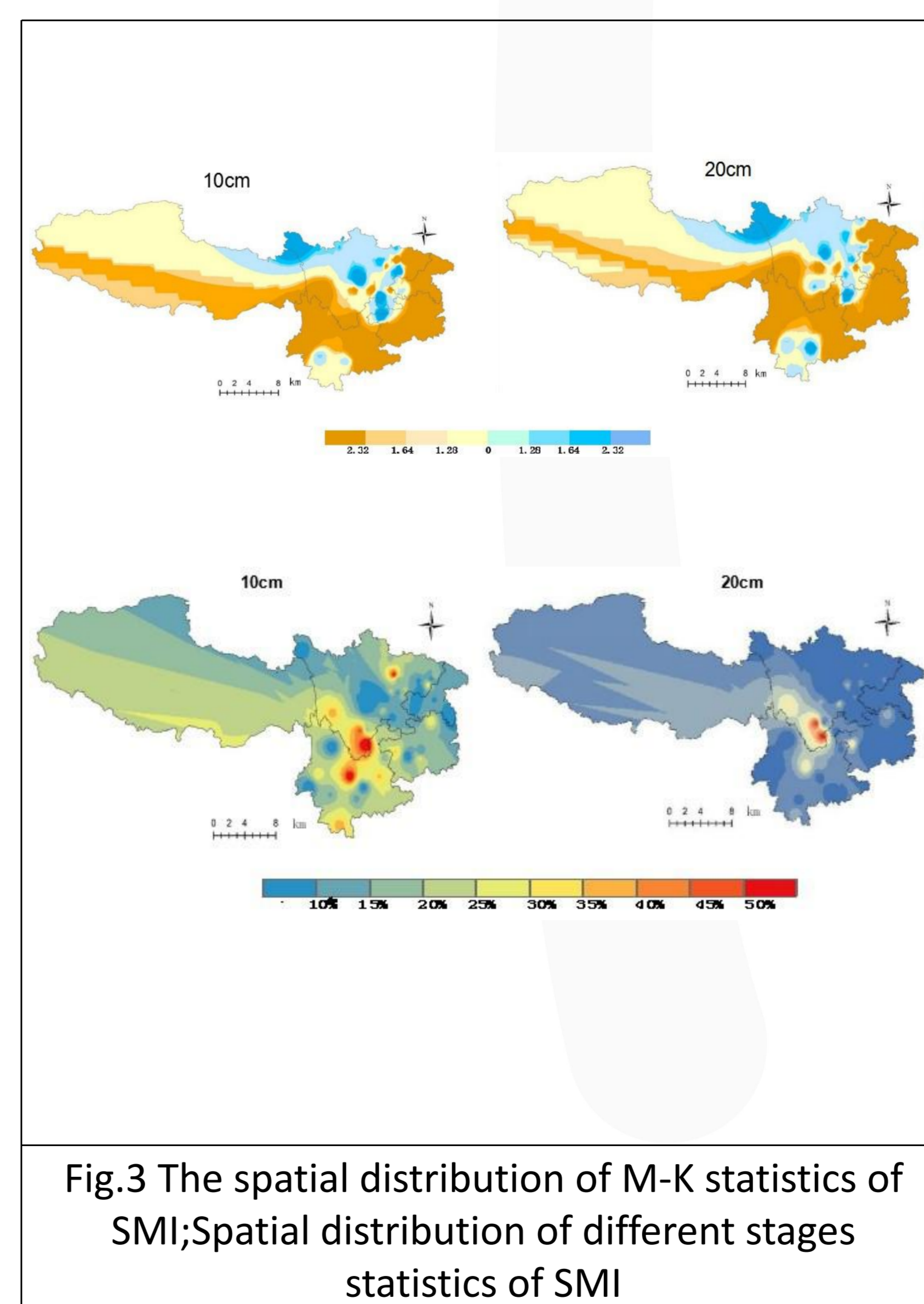


Fig.3 The spatial distribution of M-K statistics of SMI; Spatial distribution of different stages statistics of SMI

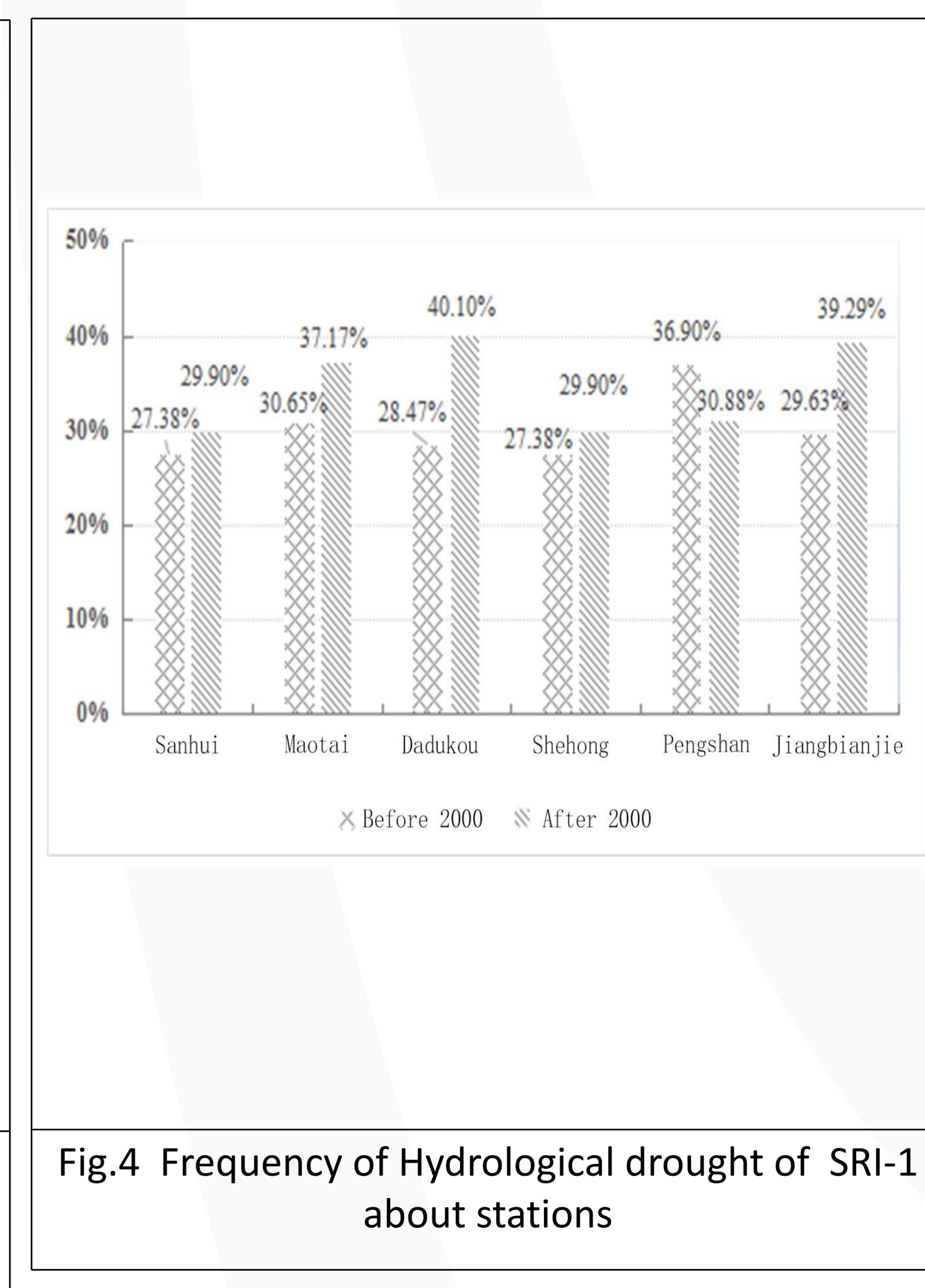


Fig.4 Frequency of Hydrological drought of SRI-1 about stations