Wavelet analysis for seasonal precipitation variations of Yuanmou dry-hot valley in recent 50 years

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ABSTRACT. The dry-hot valley is a special kind of degradation ecosystem region in Hengduan Mountains. Variations of seasonal precipitation have important influences on its landscape patterns and agricultural activities. Based on the monthly and annual precipitation data from 1956 to 2006, the multi-time scales characteristics of seasonal and annual variations of precipitation in the past 50a in the Yuanmou County had been analyzed using Meyer wavelet analysis in this paper. The periodic oscillation of precipitation variation and the points of abrupt change at different time scales along the time series are discovered and the main periods of every serial are confirmed. It was showed that the periodic oscillation of 8-12a and 4-6a for the seasonal and annual precipitation variation are obvious. The time-frequency local change characteristic of Meyer wavelet analysis can demonstrate the fine structures of precipitation and the method provides a new way in analyzing climate multi-time scales characteristics and forecasting short-term climate. The localization characteristics of time-frequency for wavelet analysis can demonstrate the detailed structures of rainfall. The wavelet analysis can be an alternative approach to analyze climate multi-time scales characteristics and forecast short-term climate variations. The research on the regularity of seasonal precipitation variation in the dry-hot valley region has a great guidance meaning to the agriculture production and resilience in flood prevention.

Key words – Precipitation, Wavelet transform, Yuanmou county, Wavelet variance.