

**應用創新趨勢法於翡翠水庫集水區溫度、雨量及流量
之季節性與年度趨勢分析**
**Seasonal and annual trend analysis of temperature, rainfall, and
streamflow in Feitsui Reservoir watershed by using ITA
methodology**

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摘要

面對全球氣候變遷對於水資源永續利用之嚴峻挑戰，了解集水區水文氣象參數變化趨勢將有助於擬定相關因應策略以降低極端氣象所導致之災害。本研究應用新近發展之創新趨勢分析(ITA)法進行翡翠水庫集水區相關水文氣象參數，包括溫度、雨量及流量近 20 年之季節性及年度趨勢檢定。受限於資料之完整性，雨量、河川流量兩者分析期均設定為 2004~2021 年，而溫度趨勢分析期則為 1998~2021。季節性及年度分析結果皆顯示分析期間氣溫呈現極微幅上升趨勢。而季節性與年度雨量於 6 處雨量站幾乎均呈現減少趨勢，雨量最豐沛的秋季則為年度雨量下降最大來源。流量最大之坪林測站四季流量皆呈上升趨勢，且上升幅度接近或達 10%以上；中流量之金瓜寮與小流量之逮魚堀測站則是整體呈下降趨勢。坪林站流量上升趨勢並未對應該子集水區雨量下降趨勢，推測可能係坪林流量站所涵蓋的次集水區範圍相對較其他測站更為廣泛且偏東北部，雨量變化更易受東北季風所影響。此外，相較於常用之 Mann-Kendall test 及 Seasonal Mann-Kendall test 法，ITA 具有更靈敏之趨勢偵測率，且利用可視化之 ITA 圖可輔助分析參數於不同變化範圍區間之趨勢變化，同時可利用 ITA 指數進行趨勢量級推估。本研究結果可提供作為有關單位擬定應對氣候變遷下水資源永續利用策略擬定之參考。

關鍵詞：極端氣象、創新趨勢分析法、翡翠水庫、Mann-Kendall 趨勢檢定

ABSTRACT

Facing the severe challenge of global climate change to the sustainable utilization of limited water resources, understanding the variation trends of hydrometeorological parameters in the catchment area will help to formulate relevant responsive strategies to reduce disasters caused by extreme weather. The newly developed innovative trend analysis (ITA) methodology was applied to verify the seasonal and annual trends of related hydrometeorological parameters including temperature, rainfall and streamflow in the Feitsui Reservoir watershed during the past two decades. Limited by the completeness of the data, the analysis period for both rainfall and river flow was set to be 2004-2021, while the temperature trend analysis period was 1998-2021. Both seasonal and annual analysis results show a slight upward trend in temperature during the analysis period. On the contrary, significant decreasing trends can be found in seasonal and annual rainfalls for almost six rainfall gauges. With the most abundant rainfall in a year, autumn rainfall is the major contributor to the decline in annual rainfall. As for streamflow, the Pinglin station with the largest flow shows an upward trend in seasonal discharge, and the increase is close to or more than 10%; the medium-flow in Jingualiao and the small-flow in Daiyuku stations are all showing a downward trend as a whole. The rising trend of streamflow at Pinglin station does not correspond to the falling trend of rainfall in this sub-catchment. It is speculated that the sub-catchment area covered by the Pinglin station is more extensive and northeastward than other stations, rainfall may be more susceptible to the influence of the northeast monsoon. Compared with the analysis results of the commonly used Mann-Kendall test and Seasonal Mann-Kendall test, ITA has a more sensitive trend detection rate, and the visualized ITA chart can assist in detecting trends in different variation ranges. In addition, the ITA index can also be used to estimate the variation magnitude of the trend. The results of this study can be used as a reference for relevant agencies to formulate strategies for sustainable utilization of water resources in response to climate change.

Keywords : Extreme weather, Innovative trend analysis methodology, Feitsui Reservoir, Mann-Kendall trend test