

The Mann–Kendall test is a popular method used to test the trend and intercept break point of long time series (Moraes et al., 1998; Zhang and Lu, 2009; Li et al., 2017). UF_k and UB_k are two key statistical parameters. Set m_i as the cumulative number when the value of sample “i” is larger than sample “j” ($1 \leq j \leq i$):

$$d_k = \sum_{i=1}^k m_i$$

Assume that the original sequence is random and independent:

$$E(d_k) = \frac{k \cdot (k - 1)}{4}$$

$$\text{var}(d_k) = \frac{k \cdot (k - 1) \cdot (2k + 5)}{72}$$

$$UF_k = \frac{d_k - E(d_k)}{\sqrt{\text{var}(d_k)}}$$

Reverse the time series and repeat the above process, obtaining UB_k . When the significant level $\alpha = 0.05$ and $UF_k > 1.96$, a significant ascend trend is observed, while $\alpha = 0.05$ and $UF_k < -1.96$ implies a significant descend trend. When UF_k and UB_k intersect in the confidence interval, the intersection is a potential intercept break point.

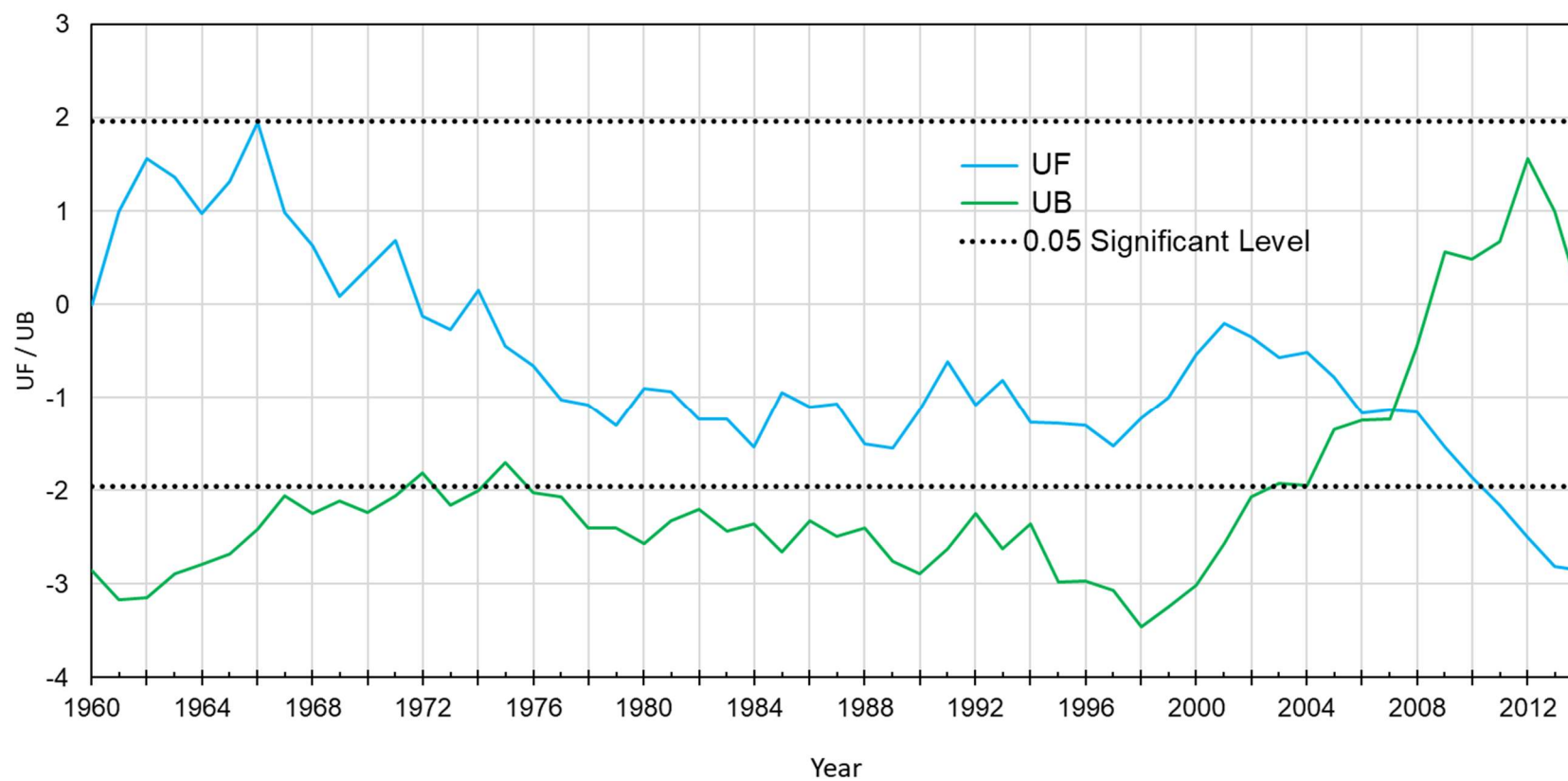


Figure S1. Change point in the time series of annual average runoff at Yunjinghong Station(1960–2014) detected by Mann-Kendall test (the runoff were significantly changed after 2008)

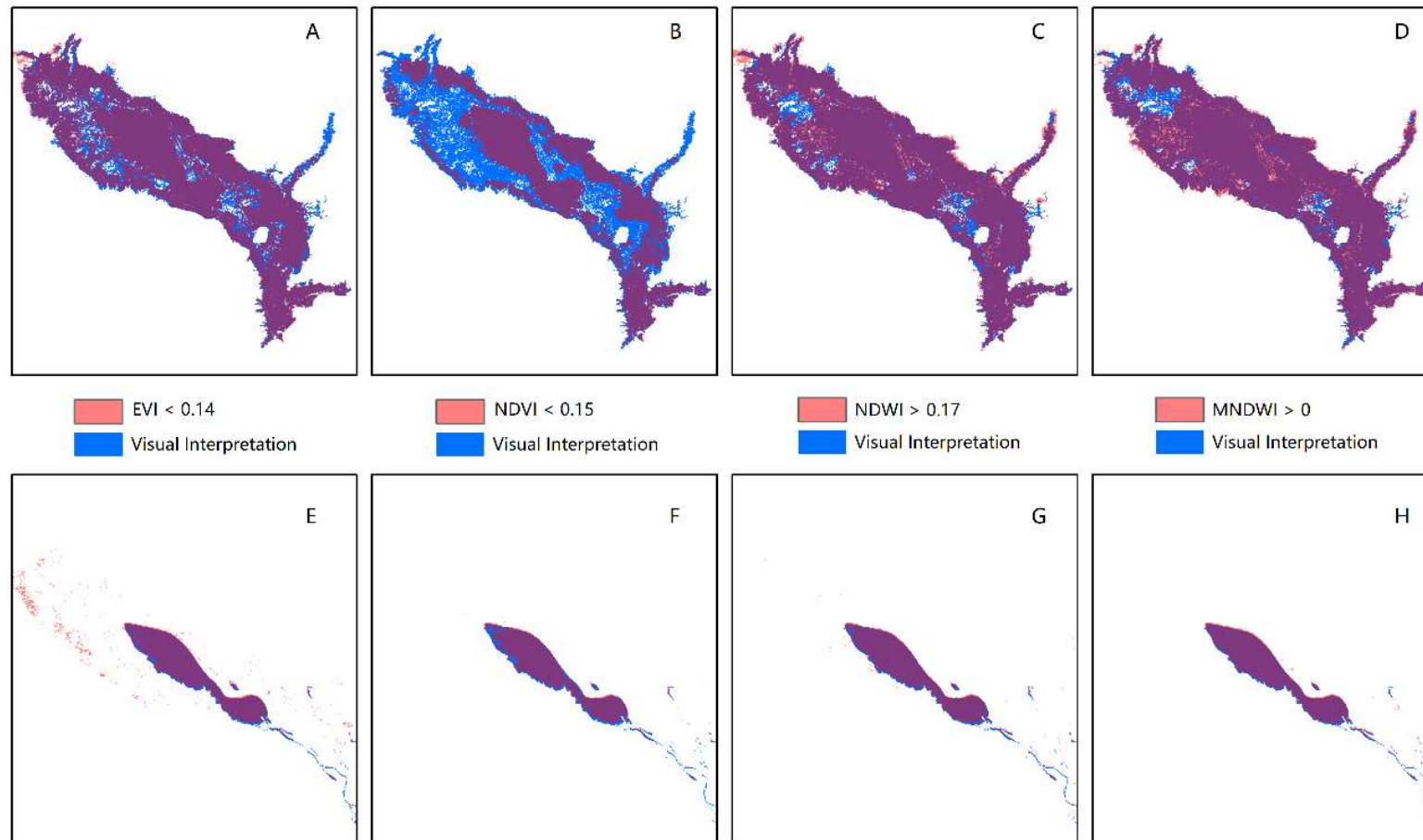


Figure S2. Comparison of the water boundary extracted by four water index methods (A/B/C/D for flood season, E/F/G/H for dry season)

Table S1 Comparison of the minimum lake area extracted by four different methods

References	Method-Data	Year						Average
		2000	2001	2002	2003	2004	2005	

Kummu and Sarkkula, 2008	GIS – Water Level data and DBM(digital bathymetry model)	2841.0	2751.0	2580.0	2605.0	2579.0	2841.0	2699.5
Arias et al., 2012	GIS – Water Level data and DEM	3072.0	3096.0	2433.0	3003.0	2281.0	3177.0	2843.7
Arias et al., 2012	Unsupervised Classification - MOD09Q1	2841.0	2751.0	2580.0	2605.0	2579.0	2841.0	2699.5
This Study	MNDWI - MOD09A1	3029.2	2885.1	2884.4	2772.5	2771.1	2444.6	2797.8

Table S2 Comparison of the maximum lake area extracted by four different methods

References	Method-Data	Year						Average
		2000	2001	2002	2003	2004	2005	
Kummu and Sarkkula, 2008	GIS – Water Level data and DBM(digital bathymetry model)	15278.0	14478.0	14834.0	11805.0	13327.0	13475.0	13866.2
Arias et al., 2012	GIS – Water Level data and DEM	14030.0	13792.0	13103.0	10863.0	10894.0	12665.0	12557.8
Arias et al., 2012	Unsupervised Classification - MOD09Q1	14763.0	14392.0	14264.0	12037.0	12264.0	13026.0	13457.7
This Study	MNDWI - MOD09A1	15579.5	13689.6	14246.9	8492.1	11389.5	11898.3	12549.3

References :

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