Spatiotemporal variations of rainy season precipitation in the Tibetan Plateau during the past two millennia

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The quantitative reconstruction of the length of the rainy season and precipitation on the Tibetan Plateau (TP) is crucial for revealing the spatiotemporal evolution of the Westerlies and South Asian monsoon, as well as its ecological and environmental effects.

Accurately determining the start and end times of the rainy season on the Plateau remains challenging. A recent study, published in the journal *Science China Earth Sciences*, quantitatively reconstructed the spatiotemporal variations of rainy season precipitation from northern TP (Kusai Lake) and central TP (Jiang Co) during the past two millennia.

This study determined the start and end times of the rainy season in different locations on the Plateau by identifying the inflection points of the accumulation of the daily precipitation anomaly. The date of the minimum value of the precipitation anomaly corresponds to the start of the rainy season, and the date of the maximum value is consistent with the end time of the rainy season.

This study calculated the duration and precipitation amount of the rainy season and established a transfer function between the modern pollen assemblage and the rainy season. Then, they reconstructed the rainy season precipitation from Kusai Lake and Jiang Co during the past two millennia.

The results showed that the rainy season precipitation in Kusai Lake recorded five periods of high precipitation: 580–680, 1000–1100, 1200–1450, 1550–1780, and 1920–present, corresponding to long rainy seasons. The rainy season precipitation sequence in Jiang Co recorded four periods of high precipitation: 80–500 AD, 800–950 AD, 1250–1450 AD, and 1780–present, consistent with the long rainy season before 1000 AD but unclear afterward.

Spatially, rainy season precipitation on the Plateau exhibited four patterns: "wet in both north and south" may be related to abnormally strong summer monsoons; "dry in both north and south" likely associated with weak westerly winds and monsoons; "wet in the south and dry in the north" linked to strong monsoons and weak westerly winds; and "dry in the south and wet in the north" connected to weak monsoons and strong

Westerly winds.

This study provides natural background support for further understanding the coupling between Westerly winds and Asian monsoons.

More information: Anning Cui et al, Spatiotemporal variation of rainy season span and precipitation recorded by lacustrine laminated pollen in the Tibetan Plateau during the past two millennia, *Science China Earth Sciences* (2024). DOI: 10.1007/s11430-023-1255-3

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