

6.水土保持与生态修复

Quantifying the land use change and large-scale atmosphere circulation anomalies effects on evapotranspiration over the Loess Plateau during 2000-2020

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摘要: Evapotranspiration (ET) is a key variable in the water cycle and reflects the ecosystem's feedback into the climate system. Quantifying the influencing factors on the ET from the perspective of Land Use Change (LUCC) and large-scale teleconnection is of great importance in the Loess Plateau. Based on the monthly evapotranspiration and gross primary production dataset (PML-V2) during 2000 to 2020, with the Theil-Sen Median analysis method, this research studied the spatiotemporal variations of ET in the Loess Plateau. Meanwhile, we identified the variability of ET affected by LUCC and large-scale atmospheric patterns related to ET anomalies on the Loess Plateau. The results shows that: The ET on the Loess Plateau showed a fluctuated increasing trend during 2000 to 2020, with a significant slope of 1.38 mm/year ($p < 0.05$). Spatially, areas with significantly increasing trends of ET were mainly distributed in Mu Us Sandy land, Ningxia plain, Fenwei plain and Loess Tableland region. Interestingly, we found that the LUCC conversions on the Loess Plateau was not responsible for ET dynamics, while precipitation dominated the variations of ET. Due to the westward extension of western Pacific subtropical high (WPSH), the positive (negative) anomalous years of summer ET witnessed net water vapor influx (outflux) anomalies to the Loess Plateau compared to the climatology, corresponding to anomalous upward (sinking) motions, further leading to more (less) ET in summer over the Loess Plateau, respectively. These findings provide a new perspective for influencing factors of ET variations which has implications for excavating early warning information of ET anomalies.

关键词: climate change; evapotranspiration; land use change; teleconnections; Loess Plateau