Analysis of Vegetation Dynamic Change in Five Countries of Central Asia Based on Google Earth Engine

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Abstract:
The changes of vegetation in Central Asia and its response to climate change are particularly important for understanding the contribution of climate change in the ecologically sensitive and fragile regions in the five countries of Central Asia, including
Turkmenistan, Uzbekistan, Tajikistan, Kyrgyzstan, Kazakhstan. This paper obtained the temporal and spatial variation characteristics of NDVI in the five countries of Central Asia from 1987 to 2017; and then explored the response of vegetation changes to climate change based on the remote sensing images and data processing capability provided by the GEE platform, and used the annual maximization synthesis method to process the Landsat surface reflectance data combined the simple linear regression. The results showed that: the vegetation activity in Central Asia was generally enhanced between 1987 and 2017, especially vegetation enhancement was more significant in mountain-based Kyrgyzstan, while the trend of vegetation degradation in Turkmenistan was obvious; The vegetation improvement areas in Central Asian had been concentrated in the central desert region of Turkmenistan and Uzbekistan, the central of Tajikistan, most of Kyrgyzstan and the central and northern parts of Kazakhstan in the past 30 years; vegetation degradation areas were concentrated in the Amu Darya Basin in the southern Aral Sea, and densely populated areas in Uzbekistan, Tajikistan and Kyrgyzstan, and arid areas in northwestern Kazakhstan; vegetation changes in Central Asia were closely related to climate change and human activities. Vegetation changes in Turkmenistan and Uzbekistan were mainly affected by climate improvement and human activities such as water resources utilization, agricultural planting structure, and carrying capacity. The impact of human activities on vegetation had gradually changed from a strong negative impact to a positive effect; Tajikistan and Kyrgyzstan were mainly affected by the positive climate, while human activities had a negative impact on vegetation growth; vegetation changes in Kazakhstan were mainly dominated by climate, and increasing temperature had an inhibitory effect on grassland vegetation growth.