THE RELATIONSHIP BETWEEN NDVI AND PRECIPITATION ON THE TIBETAN PLATEAU, CHINA

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The temporal and spatial changes of NDVI on the Tibetan Plateau, as well as the relationship between NDVI and precipitation, were discussed in this paper, by using 8-km resolution multi-temporal NOAA AVHRR-NDVI data from 1982 to 1999. Monthly maximum NDVI and monthly rainfall were used to analyze the seasonal changes, and annual maximum NDVI, annual effective precipitation and growing season precipitation (from April to August) were used to discuss the interannual changes. The dynamic change of NDVI and the correlation coefficients between NDVI and rainfall were computed for each pixel. The results are as follows:

(1) The NDVI reached the peak in growing season (from July to September) on the Tibetan Plateau. In the northern and western parts of the plateau, the growing season was very short (about two or three months); but in the southern, vegetation grew almost all the year round. The correlation of monthly maximum NDVI and monthly rainfall varied in different areas from 1982 to 1999. It was weak in the western, northern and southern parts, but strong in the central and eastern parts.

(2) The spatial distribution of NDVI interannual dynamic change was different too. The increase areas were mainly distributed in southern Tibet montane shrub-steppe zone, western part of western Sichuan-eastern Tibet montane coniferous forest zone, western part of northern slopes of Kunlun montane desert zone and southeastern part of southern slopes of Himalaya montane evergreen broad-leaved forest zone; the decrease areas were mainly distributed in the Qaidam montane desert zone, the western and northern parts of eastern Qinghai-Qilian montane steppe zone, southern Qinghai high cold meadow steppe zone and Ngari montane desert-steppe and desert zone.

(3) The spatial distribution of correlation coefficient between annual effective rainfall and annual maximum NDVI was similar to the growing season rainfall and annual maximum NDVI, and there was good relationship between NDVI and rainfall in the meadow and grassland with medium vegetation cover, and the effect of rainfall on vegetation was small in the forest and desert area.

The results proved that this method is a convenient, quick and cheap way to study vegetation change and its drivers on large scale area. From analyzing the NDVI trend, we came to the

conclusion that the area with increasing NDVI is mainly distributed in the Yarlung Zangbo River Basin, a food production base for Tibet. Recently, the cultivation has developed very quickly for chemical fertilizer application, irrigation practices and afforestation, which enhanced vegetation cover there. Meanwhile, the warm-humid trend also can boost the vegetation growth.

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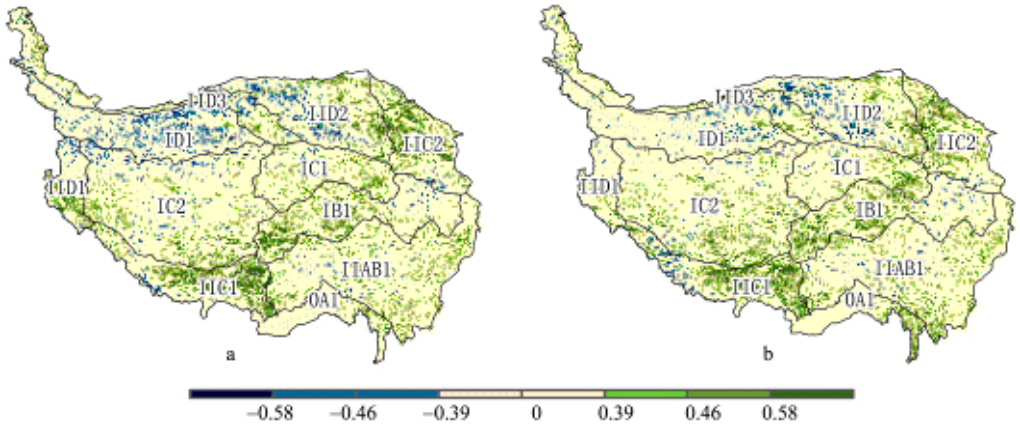

Fig.1 Correlation coefficient images between NDVI and precipitation at different periods on the Tibetan Plateau, China
(a, Correlation coefficient between annual precipitation and annual maximum NDVI; b, Correlation coefficient between precipitation from April to August and annual maximum NDVI)

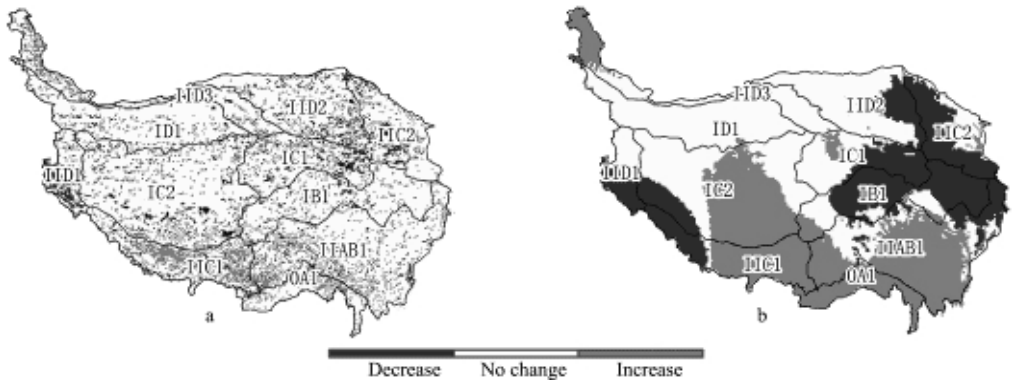

Fig.2 Spatial distribution of annual maximum NDVI and annual rainfall changes between the beginning of the 1980s and the late 1990s on the Tibetan Plateau, China
(a. Spatial distribution of annual maximum NDVI change; b. Spatial distribution of annual rainfall changes)