RESPONSE OF VEGETATION COVERAGE ON CLIMATE CHANGE IN ARID MOUNTAIN OF NORTHWEST CHINA

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Land vegetation plays a major role in the global climate change through carbon cycle, and climate change in turn affects vegetation growth and its photosynthetic activity. In arid and semi-arid area, sparse vegetation cover characterizes the environments. Analysis of vegetation distribution and its variations enables observing annual trends, helps to find out the reason for environment variability. NDVI is an indicator of vegetation growth and its spatial distribution, and which has a close relationship with climate conditions. Based on the remote sensing data GIMMS NDVI (normalized difference vegetation index) and software of ArcGIS, this paper analyzed the spatial-temporal correlations of NDVI with the precipitation and temperature in the Qilian Mountain located in the arid Northwest China.

We built the time series of vegetation change by the NDVI covered Qilian Mountain in recent 22 years (from 1982 to 2003) by MVC (maximum value composites), and analyzd the trends of NDVI variability using linear regression. The result showed that in the central and eastern of the study areas, where the upper reaches of Heihe River and Shiyang River lying in, the areas mainly covered with grass, shrub and forest. In western of the Qilian mountian, which is also the upper reaches of the Shule River, the area are mainly covered with grass and Gobi. In the study area, the value of NDVI decreased in 18% of the area, increased in 42% of the area, and had no marked variance in 40% of the area.

Combining to the database of precipitation and temperature of the same period

from seven climatological stations, we analyzed the impact of climate changes on vegetation. The names of the climatological stations are Subei, Minle, Sunan, Qilian, Wushaoling, Yeniugou, and Tuole. The elevation of the Subei, Minle and Sunan are less than 2500m, and the elevation the Qilian, Wushaoling, Yeniugou and Tuole are above 2500m. Because the climatological stations are usually sitted in city, we clipped the NDVI image in the scale of 3*3 cells near the climatological stations avoiding the city disturbing to analyse the trend of NDVI, and the correlation analysis between NDVI with the temperature and precipitation was carried out. There was significant positive correlation between NDVI and temperature in the areas above the elevation of 2500m, and significant negative correlation between NDVI and temperature in the areas below the elevation of 2500m. The value of NDVI was not strong correlation relatively with in the precipitation in the both elevation areas. There is little rainfall in the lower elevation area, and where there is little increasing precipitation. The little increasing precipitation can not fill up the increasing evaporation caused by the increasing temperature, which induce the soil moisture be more scarce and the land have less vegetation coverage in the lower elevation areas. There is enough rainfall in the higher elevation areas for the vegetation growth, and where the main limiting factor of the vegetation growth is lower temperature, therefore the increasing temperature aids the vegetation growth. All of these results indicate that the vegetation coverage in lower elevation areas will be worse with the climate warming.

Key words : NDVI; vegetation coverage changes; precipitation; temperature;
arid mountain; Northwest China