Dataset of regional vegetation changes from 1981 to 2006 in the Qinghai-Tibet Plateau

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Abstract: The dataset of regional vegetation changes from 1981-2006 in the Qinghai-Tibet Plateau was developed based on the NOAA AVHRR NDVI from 1981-2006. Seven vegetation change clusters and four vegetation change sub-regions are included in the dataset. The seven vegetation change clusters include the significantly decreased cluster, the decreased cluster, the slightly decreased cluster, the no change cluster, the slightly increased cluster, the increased cluster and the significantly increased cluster. The four vegetation change sub-regions include the western vegetation change increasing sub-region; the western vegetation stable sub-region; the middle vegetation change increasing sub-region; and the eastern vegetation degreasing sub-region.

Keywords: vegetation change; Qinghai-Tibet Plateau; NOAA AVHRR NDVI; regression analysis; spatial cluster
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1 Introduction

Qinghai-Tibet Plateau is an ecological defense of China. The vegetation change in the plateau is not only the indicator of responding to global change in this area[1-3], but important factor of greatly impacting the surrounding environment[4]. With the support of time series of NOAA AVHRR NDVI data from 1981-2006 in 8 km resolution data, the dataset of regional vegetation changes from 1981 to 2006 in the Qinghai-Tibet Plateau was developed, which could be the basic data for the geographical discovery in vegetation changes in plateau[5-10].

The descriptions of the dataset of regional vegetation changes from 1981 to 2006 in the Qinghai-Tibet Plateau (DRVC_QTP) are recorded. These information include the dataset full name, dataset short name, corresponding author, authors, geographical region of the dataset content, year of the dataset, number of the dataset tiles, dataset spatial and temporal resolution, dataset format and size, data publisher, data sharing platform and contact information, technical editors, foundation and the data sharing policy.

2 Methodology

The NOAA AVHRR NDVI data from 1981 to 2006 in the Qinghai-Tibet Plateau was

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Table 1 Summary of the DRVC_QTP metadata

Dataset full name	Dataset of regional vegetation changes from 1981-2006 in the Qinghai-Tibet Plateau		
Dataset short name	DRVC_QTP		
Corresponding author	YU Bohua(yubh@igsnrr.ac.cn)		
Author(s)	YU Bohua, Institute of Geographic Sciences and Natural Resources Research, CAS, yubh@igsnrr.ac.cn LV Changhe, Institute of Geographic Sciences and Natural Resources Research, CAS, luch@igsnrr.ac.cn LV Tingting, Institute of Remote Sensing and Digital Earth, CAS, lvtt@radi.ac.cn YANG Aqiang, Institute of Remote Sensing and Digital Earth, CAS, yangaq@radi.ac.cn LIU Chuang, Institute of Geographic Sciences and Natural Resources Research, CAS, lchuang@igsnrr.ac.cn		
Geographical region	The region covers from 26°00′12″N - 39°46′50″N, 73°18′52″E -104°46′59″E, including Qinghai and Tibet, western Sichuan, southern Xinjiang, and part of Gaunsu and Yunan provinces[12-14].		
Year of dataset	1981-2006		
Spatial resolution	8km	Frequency	yearly
Data format	tif, shp	Data Size	161 KB
Data publisher	Global Change Research Data Publishing and Repository, DOI: 10.3974/		
Data access and services platform	Global Change Research Data Publishing and Repository, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, http://www.geodoi.ac.cn National Data Sharing Infrastructure of Earth System Sciences of China, http://www.geodata.cn		
Academic editors	SHI Ruixiang, XU Xinliang, HE Shujin		
Data Sharing Policy	The authors of the dataset agree to publish the data here according to the Article I of Data Sharing Policy of the Global Change Data Publishing and Repository, which states that the dataset can be used freely for research, education, and decision making; any users for commercial uses should get formal permission from IGSNRR/CAS.		

Table 2 Statistics of the SLOPE clusters

Cluster	Slope value (Max.)	Slope value (Mi.)	Number of grids	Area (km^2)	(%)
Significantly decreased		-0.005353501	805	5.15	2.02
Decreased	-0.005353501	-0.002672371	2694	17.24	6.75
Slightly decreased	-0.002672371	-0.000884951	5949	38.07	14.91
No change	-0.000884951	0.00051945	15900	101.76	39.86
Slightly increased	0.00051945	0.002051524	9285	59.42	23.27
Increased	0.002051524	0.004221963	4199	26.87	10.52

used for finding the differences in different regions of the plateau. The methodology for analysis is based on two researches, one is the regression analysis[11], and the other one is the spatial clustering analysis.

2.1 Regression analysis

In order to establish the relationship between the time t and the NDVI, regression analysis is applied. The indicator SLOPE is calculated by the regression analysis equation (1):

$$SLOPE = \frac{n*\sum_{i=1}^{n} i*NDVI_i - (\sum_{i=1}^{n} i)(\sum_{i=1}^{n} NDVI_i)}{n*\sum_{i=1}^{n} i^2 - (\sum_{i=1}^{n} i)^2} \quad (1)$$

Where n represents year, and i ranges from 1 (1981) to n (2006).

If the SLOPE value is positive, it indicates that the NDVI change is increasing, the bigger number of the SLOPE, the more increasing vegetation change. In the opposite, if the SLOPE value is negative, it indicates that the NDVI change is degreasing.

2.2 Spatial clustering analysis

Based on the SLOPE data and spatial cluster analysis, 7 clusters are identified. They are:

(1) Significantly decreased (Slope < -0.005353501);

(2) Decreased (-0.002672371>=Slope>-0.005353501);

(3) Slightly decreased (-0.000884951>=Slope>-0.002672371);

(4) Not change (0.00051945>=Slope>-0.000884951);

(5) Slightly increased (0.002051524>=Slope>0.00051945);

(6) Increased (0.004221963>=Slope>0.002051524); and

(7) Significantly increased (Slope>0.004221963).

The SLOPE values distributed in different areas are very obviously, especially from the western to eastern of the plateau. Four different vegetation change sub- regions are identified. They are (1) Western vegetation change increasing sub- region; (2) Western vegetation stable sub- region; (3) Middle vegetation change increasing sub- region; and (4) Eastern vegetation degreasing sub- region (Figure 1).

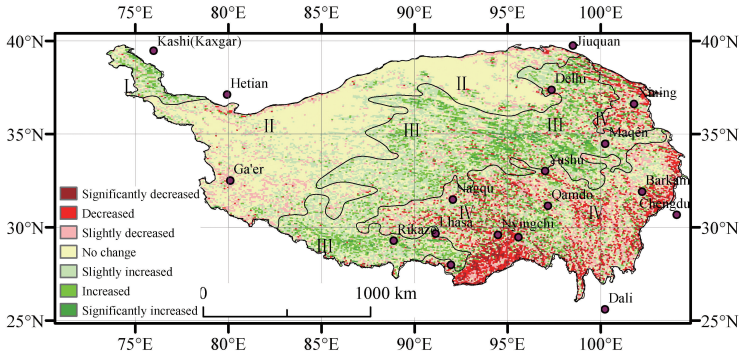

Figure 1 Sub-regions of vegetation changes from 1981-2006

3 Field survey for data validation

In order to check the basic conclusion from the above research, a field surveying in Qinghai-Tibet Plateau was taken in 2009. From the samples in each of the four sub-regions, the general spatial trend and the sub-regions' characteristics are reliable.

4 Conclusion

Qinghai- Tibet Plateau is the very sensitive region in the global climate change background. Vegetation change is the most important indicator for global change studies in the broad area. Long term and time series of NDVI analysis with the spatial- temporal analysis methodology could be the practical way to find the regional and sub-regional scale changes.

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