Application of Background Information Database in Drought Monitoring of Guangxi in 2010

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Abstract. In this paper, use Nanning city as an example to show application of Background information database in drought monitoring. A near-real time drought monitoring approach is developed using Terra-Moderate Resolution Imaging Spectoradiometer (MODIS) Normalized Difference Vegetation Index (NDVI) and Land Surface Temperature (LST) products. The approach is called Vegetation Temperature Condition Index (VTCI), which integrates land surface reflectance and thermal properties. VTCI is defined as the ratio of LST differences among pixels with a specific NDVI value in a sufficiently large study area; The ground-measured precipitation data from a study area covering Nanning in Guangxi , CHINA, are used to validate the drought monitoring approach. Taking the result of drought monitoring in background information of Nanning city ,the area of farmland drought of Mild drought Moderate droughts Severe drought were 223607.2 Ha ,310596.9 Ha and 513.2 Ha.

Key words: Background Information Database, Drought Monitoring, MODIS, Guangxi

1 Introduction

Drought is a normal, recurrent feature of climate. It occurs almost everywhere, although its features vary from region to region. Drought is one of the major environmental disasters in China, whereas in recent years it have happened in mid and southern of china seriously, so it is very important to detect and monitor drought periodically at large scale for decision making. Droughts can be assessed with many kinds of indices but it is extremely difficult to quantitatively monitor and predict. Remote sensing is able to supply us with an update on crop condition over a large geographic area using a series of coarse resolution satellites and this technology has become the important means of drought monitoring. In the past decades, many

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methods using remote sensing information to monitor drought, such as Normalized difference vegetation index (NDVI), Vegetation Condition Index (VCI), Temperature Condition Index (TCI) and others. These indices have been developed and successfully used for monitoring drought and have the advantage in monitoring spatial and temporal variation of drought at regional, continental, and even at global scales due to their large and frequent coverage. At present, remote sensing methods for drought monitoring are mainly classified into four categories: Vegetation Index-based, Temperature-based, Vegetation and Temperature-based, and Cloud-based. The representative indicies include Vegetation Supply Water Index (VSWI), Temperature/Vegetation Dryness Index (TVDI); Apparent Thermal Inertia Index (ATI), and Cloud Parameters Index (CPI). MODIS data is calibrated on orbit and it uses the complicated re-correcting technology to locate when it scans. Because of high-quality and effective monitoring, MODIS has become a widely used data source in drought monitoring. In this study, the vegetation temperature condition index(VTCI)model based on NDVI—LST feature space was applied to validating a series of drought disaster which occurred in Guangxi Province during the spring in 2010, and use Nanning city as an example to show application of Background information database in drought monitoring.

2 Materials and methods

2.1 Study area

Nanning is the capital of Guangxi autonomous region in southern China. Nanning is located in the southern part of Guangxi Zhuang Autonomous Region, 160 km from the border with Vietnam. It has an area of 22,293 square kilometers. The city is located on the north bank of the Yong River, the chief southern tributary of the Xi River, and lies some 30 km below the confluence of the Yu and the Zuo rivers. The Yong River (which later becomes the Yu River) affords a good route to Guangzhou and is navigable by shallow-draft junks and motor launches, even though it is obstructed by rapids and sandbanks. Nanning is situated in a hilly basin with elevations between 70 and 500 m above sea-level. Average temperature is 21.7°C. It is often windy or breezy and very rainy, with more than 1300 mm of precipitation annually. It is also frost-free for all but 3 or 4 days a year and never snows.

2.2 Data acquisition

In this study, MODIS images April, 8 in 2010 were required. According to remote sensing image interpretation target mark and image spectral characteristics, found remote sensing interpretation model of the background information of forest, shrub and grass, agricultural land, surface water, towns, roads from TM and ETM data from 1988 to 2008, using supervision, unsupervised, maximum classification of natural law to retrieve background information from simple to complex interpretation

of each classification. Meanwhile ,using human-computer interaction to refine the results. The output shp format data Vector file of disaggregated data edited in the GIS system, and get the background information on various types of remote sensing data each time(Fig. 1), then to map the agricultural land of Nanning City(Fig.2).

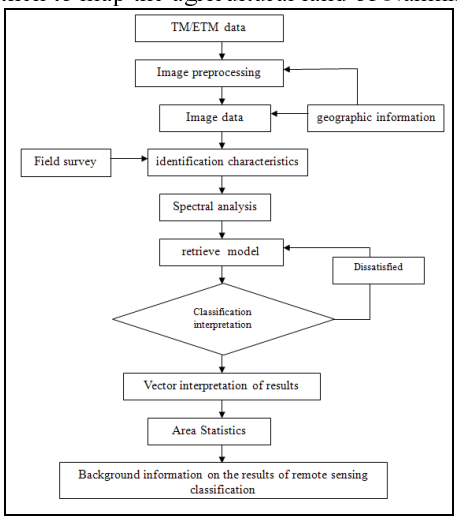

Fig. 1. The flow chart of background information of remote sensing classification

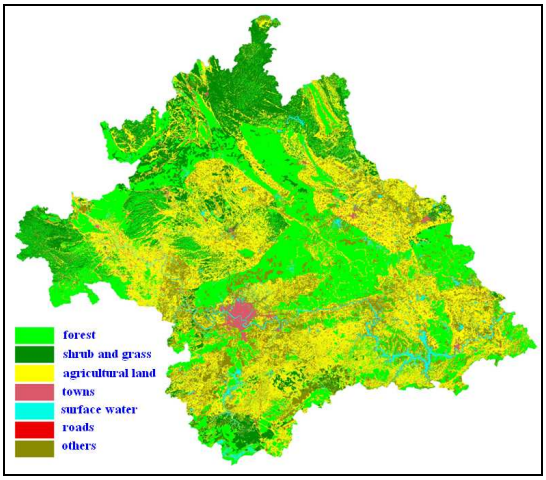

Fig. 2. Background information classes of Nanning City

2.3 Data processing

Land surface temperature derived from brightness temperatures and NDVI from MODIS data are used to calculate VTCI .The temporal-spatial distribution of drought

of 2010 in Nanning City in Guangxi was made by using the VTCI(Fig.3). Taking the result of drought monitoring in background information of Nanning city ,the distribution of arable land drought is made(Fig.4).

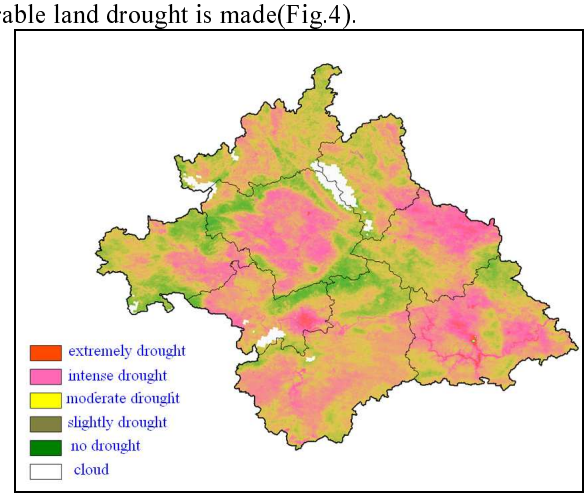

Fig. 3. Temporal-spatial distribution of drought of 2010 of Nanning City

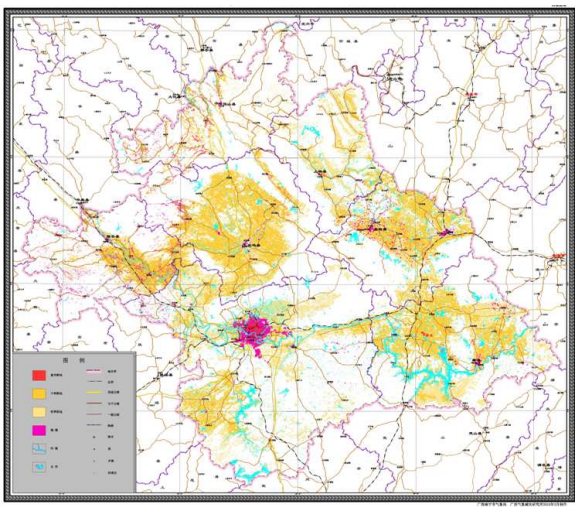

Fig. 4. Distribution of arable land drought

3 Discussion and conclusion

The result of drought monitoring in background information of Nanning city shows that the area of arable land drought of Mild drought Moderate droughts Severe drought were 223607.2 Ha ,310596.9 Ha and 513.2Ha(Table1).

Table 1. the area of arable land drought results(Ha)

	Slightly drought	Moderate drought	Intense drought
Binyang County	22957.2	52453.1	6.0
Heng County	34354.5	67289.3	501.4
Long'an County	17494.1	35137.4	0
Mashan County	23562.7	5611.5	0
Nanning area	66210.9	43871.8	0
Shanglin	31747.1	10546.8	0
Wuming County	27280.7	95687.0	5.8

The following conclusions can be reached on the basis of above analysis: Taking the result of drought monitoring in background information can provide more detailed surveillance. The background information can provide services to support decision-making for government departments. Based on the above study and analysis, some conclusions can be drawn as follows:

1. It is an effective way to use background information in drought monitoring to provide more detailed surveillance.
2. The information of drought monitoring can support disaster assessment for government .

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