

## **Spatio-temporal Distribution of Drought in the Belt and Road Area during 1998-2015 Based on TRMM Precipitation Data**

### **Data Documentation**

#### **I. Dataset content features**

##### **i. Abstract**

Based on the Tropical Rainfall Measurement Satellite (TRMM) 3B43 precipitation data, we used the Precipitation Abnormity Percentage drought model to study the monthly spatio-temporal distribution of drought in south region of N50° of OBOR area from 1998 to 2015. There were 216 data files in ArcGIS GRID format with a spatial resolution of 0.25 degree.

##### **ii. Elements (content fields)**

The datasets were named as “reclassYYYYMM”, in which “YYYY” means the year and “MM” means the month. The datasets were calculated and classified based on the Precipitation Abnormity Percentage drought index, and there were 5 classifications including extremely dry, severely dry, moderately dry, mildly dry, and no drought, corresponding to 5, 4, 3, 2, 1, respectively. The datasets value were non-dimensional.

##### **iii. Temporal cover**

Time of the dataset ranged from Jan.1998 to Dec.2015.

##### **iv. Spatial cover**

The research area ranges from 10° 55' 48" S to 50° 00' 00" N and 12° 23' 53" E to 155° 24' 17" E, contains 61 countries and regions: Mongolia, Russia, China, Singapore, Indonesia, Thailand, Vietnam, Philippines, Cambodia, Myanmar, Laos, Brunei, East Timor, India, Pakistan, Sri Lanka, Bangladesh, Nepal, Maldives, Bhutan, United Arab Emirates, Kuwait, Turkey, Qatar, Oman, Lebanon, Saudi Arabia, Bahrain, Israel, Yemen, Egypt, Iran, Jordan, Syrian, Iraq, Afghanistan, Palestine, Azerbaijan, Georgia, Armenia, Poland, Albania, Slovenia, Bulgaria, Czech Republic, Hungary, Macedonia, Serbia, Romania, Slovakia, Croatia, Bosnia and Herzegovina, Montenegro, Ukraine, Moldova, Kazakhstan, Kyrgyzstan, Turkmenistan, Tajikistan, Uzbekistan.

#### **II. Subject/industry scope of dataset/atlas**

##### **i. Subject scope**

Earth Science, Meteorology, Remote Sensing.

##### **ii. Industry scope**

Meteorological services and environmental monitoring.

##### **iii. Other classifications (optional)**

#### **III. Accuracy of dataset/atlas**

##### **i. Time frequency**

Monthly.

##### **ii. Spatial reference, accuracy, and granularity**

The spatial reference of the dataset was GCS\_WGS\_1984, with a spatial resolution of 0.25 degree, the minimal granularity of the dataset was a country.

#### **IV. Dataset/atlas storage management**

##### **i. Data quantity**

The volume of the dataset was 853MB.

##### **ii. Type format**

The dataset was stored in hard disk with a format of ArcGIS GRIS.

### iii. Update management

Unscheduled update.

## V. Quality control of the dataset/atlas

### i. Production mode

Raw data of the dataset is TRMM 3B43 satellite precipitation data, the distribution of drought in Belt and Road area was calculated in ArcGIS, Matlab and R software based on the Precipitation Abnormity Percentage drought model.

### ii. Data sources (condition selection)

TRMM 3B43 satellite precipitation data.

### iii. Methods of the data acquisition and processing (condition selection)

The primary TRMM images was a vertical stripe in ENVI software without spatial reference. Then the data was corrected in Matlab according to the data documentation. Firstly, upside down the image after 90 degrees counterclockwise rotation around the center. Then we figured out the longitude and latitude of the center point of the first grid of upper left corner and the last grid of bottom right corner of image were 179.875°W, 49.875°N, 179.875°E, 49.875°S, respectively. Next, the real longitude and latitude of grid were assigned by the georasterref method to correcting images and output in TIFF format, Fig.1 showed the correction results. Finally, the data value were summarized to monthly precipitation from hour scale.

The spatio-temporal distribution of drought in the study area was calculated using the Precipitation Abnormity Percentage drought model. The Precipitation Abnormity Percentage ( $P_a$ ) is one indicator used to measure variations of precipitation compared to the normal value in a certain period. It is suitable for periods where the average temperature is above 10 °C in semi-humid, semi-arid areas. Table below shows the categories of drought levels based on the Precipitation Abnormity Percentage. In this paper, descriptions, such as extremely dry, severely dry, moderately dry, mildly dry, and no drought, are based on the standards given in this drought classification table of Precipitation Abnormity Percentage.

Rank	Category	Precipitation Abnormity Percentage (%)		
		Monthly scale	Quarterly scale	Annual scale
1	No drought	$-40 < P_a$	$-25 < P_a$	$-15 < P_a$
2	Mildly dry	$-60 < P_a \leq -40$	$-50 < P_a \leq -25$	$-30 < P_a \leq -15$
3	Moderately dry	$-80 < P_a \leq -60$	$-70 < P_a \leq -50$	$-40 < P_a \leq -30$
4	Severely dry	$-95 < P_a \leq -80$	$-80 < P_a \leq -70$	$-45 < P_a \leq -40$
5	Extremely dry	$P_a \leq -95$	$P_a \leq -80$	$P_a \leq -45$

The calculation method of the Precipitation Abnormity Percentage during a certain period is described by Equation (1):

$$P_a = \frac{P - \bar{P}}{\bar{P}} \times 100\% \quad (1)$$

Where  $P$  is the precipitation within a certain period (mm), and  $\bar{P}$  is the average precipitation within the same calculation period (mm), the calculation method is shown in Equation (2):

$$\bar{P} = \frac{1}{n} \sum_{i=1}^n P_i \quad (2)$$

Where  $n$  is the number of months for which the average precipitation has to be determined,  $i = 1, 2, \dots, n$ .

## **VI. Sharing and usage method of the dataset/atlas**

### **i. Sharing methods and restrictions**

Full and open sharing.

### **ii. Contact information of the sharing service (condition selection)**

Online link address: <http://drr.ikcest.org/info/9dbf6>.

Contact Information for Service:

Name: Bai Yongqing

Address: 11A, Datun Road, Chaoyang District, Beijing, 100101, China, Institute of Geographic Sciences and Natural Resources Research, CAS.

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### **iii. Conditions and methods of usage**

The dataset can be read by ArcGIS software.

## **VII. Intellectual property rights of the dataset/atlas**

### **i. Property rights (optional)**

Intellectual property of the dataset belonged to Institute of Geographic Sciences and Natural Resources Research, CAS.

### **ii. Reference method of the dataset/atlas**

Bai Yongqing, Wang Juanle. Time and space distribution of monthly drought dataset in One Belt One Road area (1998-2015) [DB/OL]. Science Data Bank. DOI: 10.11922/sciencedb.381.

### **iii. Usage contacts of the datasets/atlas**

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## **VIII. Others (optional)**

In addition to the above, other information must also be explained.

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