Dataset of winter fallow land in middle and lower reaches of Yangtze River (2007-2008)

XU Xinliang[1], ZHAI Mengyuan[2], LIU Luo[3, 4]

(1. Institute of Geographic Sciences and Natural Resources Research, CAS, Beijing 100101, China;
2. College of Resources and Environmental Science, Nanjing Agriculture University, Nanjing 210095, China;
3. Xinjiang Institute of Ecology and Geography, CAS, Urumqi 830011, China;
4. University of Chinese Academy of Sciences, Beijing 100049, China)

Abstract: The winter fallow land is significant to agriculture in Yangtze River, because it could be used to increase the grain yield. The information included in the dataset of winter fallow land in middle and lower reaches of Yangtze River (WFL_MLYR) is helpful for understanding agriculture production condition, exploring agriculture production potential and keeping agriculture development sustainable. The dynamic threshold method based on time series MODIS NDVI is an useful practical method to extract spatial information of winter fallow land. The WFL_MLYR are spatial data of winter fallow land from 2007 to 2008 with a 1km spatial resolution. It includes the data on mature date, sowing date and winter fallow fields. The extraction data were compared with the actual result from agricultural meteorological observation station. The accuracy of mature date is more than 91%, and that of sowing date is 86% approximately.

Keywords: middle and lower reaches; Yangtze River; winter fallow land; dataset

1   Introduction

In the past 20 years, along with the adjustment of China's economic reform, as well as migration of the rural labor force, more and more farmers gave up cultivating and sowing in autumn by the reason of the limited per capita arable land resources. This caused a new phenomenon in agriculture region of Eastern China. A large of good quantities of farmland is idle after the autumn harvest until the next year's planting. As a populous country, food and energy security is not only the top priority in the maintenance of social stability, but also the cornerstone in the social economic growth. Therefore, strengthen the effective development and utilization of winter fallow land, especially the area in the southern where the climate condition such as heat and water resources is relatively rich in winter, are of great significance to ensure the resources safety of the country. The spatial distribution data of the winter fallow land in the middle and lower reaches of Yangtze River region is an important

Table 1 Summary of the WFL_MLYR metadata

Full name of dataset	Dataset of winter fallow land in middle and lower reaches of Yangtze River
Short name of dataset	WFL_MLYR
Corresponding author:	XU Xinliang (xuxl@lreis.ac.cn)
	XU Xinliang, Institute of Geographic Sciences and Natural Resources Research, CAS, xuxl@lreis. ac.cn
Author(s) and owner (s) of the dataset	ZHAI Mengyuan, College of Resources and Environmental Science, Nanjing Agriculture University, dreamwar2005@yahoo.com.cn
	LIU Luo, Xinjiang Institute of Ecology and Geography, CAS; University of Chinese Academy of Sciences, liuluo87930@qq.com
Geographical region	The region covers from 20° to 37°N and 104°to 122°E, consisting 11 provinces of China, including Henan, Hubei, Hunan, Guangdong, Guangxi Jiangxi, Anhui, Shanghai, Jiangsu, Zhejiang and Fujian.
Year of the dataset	2007-2008
Spatial resolution	1 km
Data format	ARCGIS GRID Dataset size 862kb
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	LIU Chuang, SHI Ruixiang, JIANG Dong, 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.

achievement in the area of crop research. The "A Method on Information Extraction of Winter Fallow Fields in Middle and Lower Reaches of Yangtze River by Remote Sensing" has been published in 2012 [1]. The detail information is as following.

2   Metadata of the WFL_MLYR

The descriptions of the winter fallow land in middle and lower reaches of Yangtze River (2007-2008) (WFL_MLYR_2007-2008) 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. Table 1 below summarizes the main metadata elements of the WFL_MLYR_2007-2008 dataset.

3   Methods

A time series of dataset of SPOT-VEGETATION NDVI and farmland distribution data were used to calculate winter fallow land dataset in middle and lower reaches of Yangtze River based on remote sensing extraction of winter follow model[1]. More detail extraction process has been described in the paper "A Method on Information Extraction of Winter Fallow Fields in Middle and Lower Reaches of Yangtze River by Remote Sensing" which was published in "Journal of Geo-Information Science". The remote sensing extraction of winter fallow farmland selected the agriculture region in the middle and lower reaches of the

Yangtze River as experimental area. Based on the time series of NDVI data, considering the spatial distribution of farmland in the study area and the NDVI change features of crops in seedling stage and mature stage, 20% of NDVI amplitude was set as the threshold to determine the seedling stage and mature stage. If the NDVI of a center pixel reached the threshold and showed a decreasing trend, the pixel was decided in mature stage. If the NDVI pixel reached the threshold and showed an increasing trend, the pixel was decide in seedling stage. After the extraction of seedling stage and mature stage, based on the overlay analysis of the extraction results, we used the past harvest time and the coming sowing time of crop to judge the fallow length of farmland in winter.

4　Dataset description

The WFL_MLYR is a spatial data of winter fallow land from 2007 to 2008 with a 1km spatial resolution. It includes the data including the attribute items on mature date, sowing date and winter fallow fields.

4.1　The mature date in the middle and lower reaches of Yangtze River in 2007 (WFL_MLYR-1.zip)

WFL_MLYR- 1.zip file is a compressed file of mature date in the middle and lower reaches of Yangtze River in 2007 with data format of ARCGIS GRID, and its size is 218KB (Figure 1).

4.2　The sowing date in the middle and lower reaches of Yangtze River in 2008 (WFL_MLYR-2.zip)

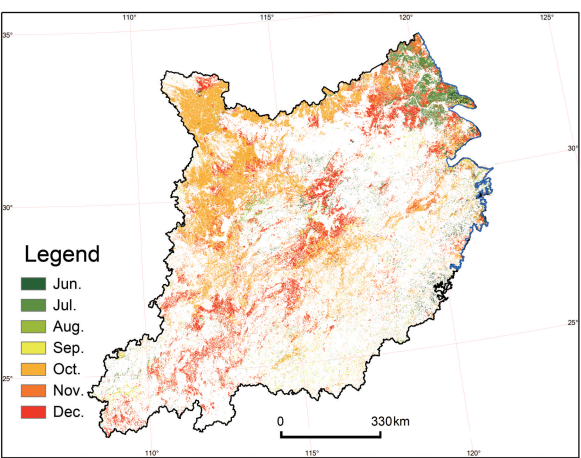WFL_MLYR- 2.zip file is a compressed file of sowing date in the middle and lower reaches of Yangtze

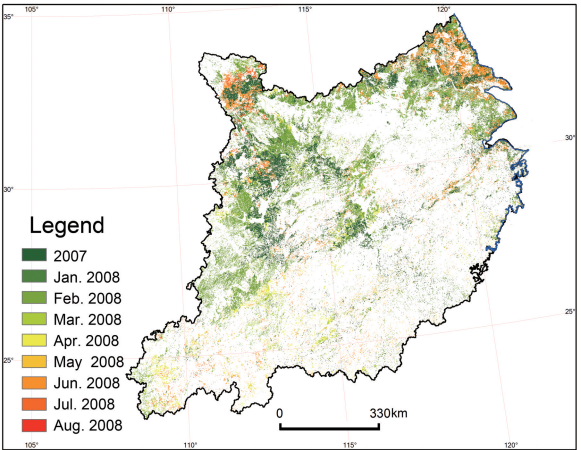Figure 1　Map of mature date distribution in the middle and lower reaches of Yangtze River[1]

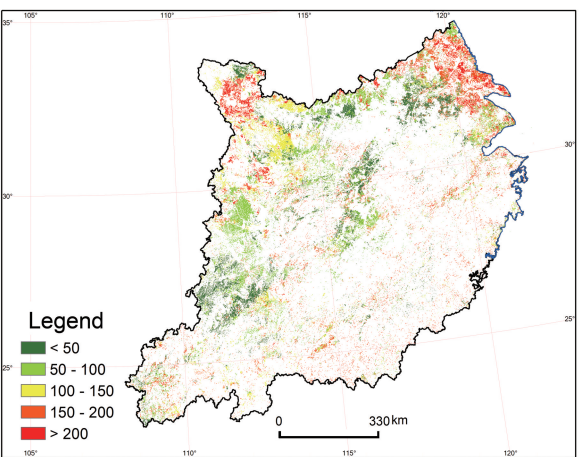Figure 2　Map of distribution of sowing date in the middle and lower reaches of Yangtze River[1]

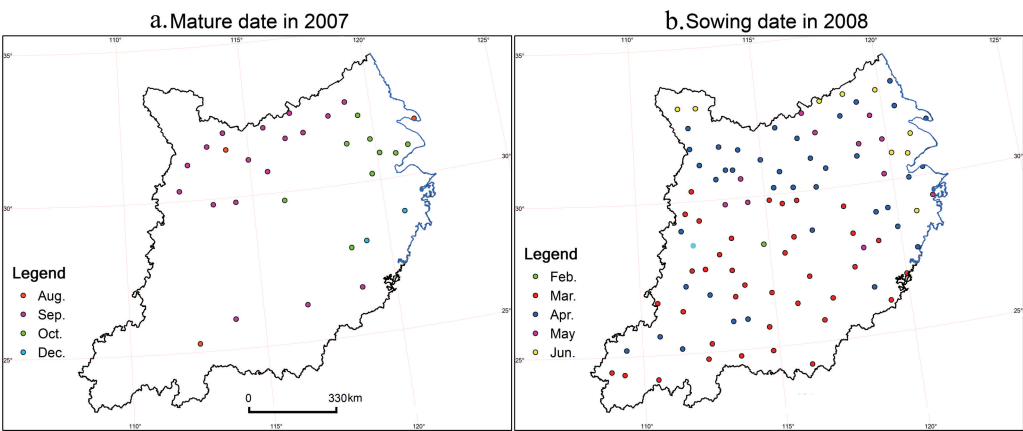Figure 3　Map of winter fallow fields distribution of the lower reaches of The Yangtze River from 2007 to 2008[1]

Figure 4　The sowing date and mature date of crops in middle and lower reaches of Yangtze River[1]

River in 2008 with data format of ARCGIS GRID, and its size is 200 KB (Figure 2).

4.3　The sowing date in the Middle and lower reaches of Yangtze River in 2008 (WFL_MLYR-3.zip)

WFL_MLYR-3.zip file is a compressed file of winter fallow fields in the middle and lower reaches of Yangtze River during 2007-2008 with data format of ARCGIS GRID, and its size is 138KB (Figure 3).

5　Dataset quality control and validation

To verify the accuracy of the results, the extraction data were compared with the actual result from agricultural meteorological observation station. Figure 4 demonstrates that the sowing date and mature date were consistent with the actual situation overall. The accuracy of mature date is more than 91%, and that of sowing date is 86% approximately.

6　Conclusion

The WFL_MLYR is the spatial dataset of winter fallow land from 2007 to 2008 with a 1 km spatial resolution. It includes the references in understanding agriculture production condition, exploring agriculture production potential and keeping making agriculture development sustainable. It could support decision making in agriculture and land use policies in China.

References

[1] Zhai Mengyuan, Xu Xinliang, Jiang Xiaosan. A method on information extraction of winter fallow fields in middle and lower reaches of Yangtze River by Remote Sensing. Journal of Geo-Information Science, 2012, 3: 389-397.

[2] Li Zhengguo, Yang Peng, Zhou Qingbo et al. Research on spatiotemporal pattern of crop phenological characteristics and cropping system in North China based on NDVI time series data. Acta Ecologica Sinica, 2009, 29(11): 6216-6226.

[3] Xu Xinliang, Su Fuyan, Zhuang Dafang et al. Remote sensing monitoring of impacts of southern ice and snow process on eco-environment in 2008: A case study in Zixing County, Hunan Province. Journal of Geo-Information Science, 2009, 11(2): 237-243.

[4] Zheng Dawei, Li Maosong, Huo Zhiguo. Effects of 2008 snow disaster in southern China on agriculture and

countermeasures. Journal of Institute of Disaster-Prevention Science and Technology, 2008, 10(2): 1-4.

[5] Fan J L, Wu B F. A methodology for retrieving cropping index from NDV I profile. Journal of Remote Sensing, 2004, 8 (6): 6282636.

[6] Jiang Dong, Wang Naibin, Yang Xiaohuan et al. Principles of the interaction between NDVI profile and the growing situation of crops. Acta Ecologica Sinica, 2002, 22(2): 247-252.

[7] Zhang Feng, Wu Binfang, Liu Chenglin et al. A method to extract regional crop growth profile with time series of NDVI data. Journal of Remote Sensing, 2004, 8(6): 515-527.

[8] Xiong Qinxue, Huang Jingfeng. Estimation of autumn harvest crop planting area based on NDVI sequential characteristics. Transactions of the Chinese Society of Agricultural Engineering, 2009, 25(1): 144-148.

[9] Pieter S A Becka, Clement Atzbergerb, Kjell Arild Høgdac et al. Improved monitoring of vegetation dynamics at very high latitudes: a new method using MODIS NDVI. Remote Sensing of Environment, 2006, 100: 321-334.

[10] Heumann B W, Seaquist J W, Eklundh L et al. AVHRR derived phenological change in the Sahel and Soudan Africa, 1982-2005. Remote Sensing of Environment, 2007, 108: 385-392.

[11] Piao S, Fang J, Zhou L et al. Variations in satellite-derived phenology in China's temperate vegetation. Global Change Biology, 2006, 12: 672-685.

[12] Wang Hong, Li Xiaobing, Li Xia et al. The variability of vegetation growing season in the northern China based on NOAA NDVI and MSAVI from 1982 to 1999. Acta Ecologica Sinica, 2007, 27(2): 504-515.

[13] Li Zhengguo, Tang Huajun, Yang Peng et al. Identification and Application of Seasonality Parameters of Crop Growing Season in Northeast China Based on NDVI Time Series Data. Acta Scientiarum Naturalium Universitatis Pekinensis. 2011, 47(5): 882-892.

[14] Jonsson P, Eklundh L. Seasonality extraction by function fitting to time- series of satellite sensor data. IEEE Transactions on Geoscience and Remote Sensing, 2002, 40: 1824-1932.

[15] Yu Xinfang and Zhuang Dafang. Monitoring forest phenophases of Northeast China based on MODIS NDVI data. Resources Science, 2006, 28(4): 111-117.

[16] Yang Xiaohuan, Zhang Xiangping, Jiang Dong. Extraction of multi-crop planting areas from MODIS data. Resources Science, 2004, 26(6): 17-22.

[17] SPOT-4 VEGETATION data, the Flemish Institute for Technological Research (VITO). http://www.vgt.vito.be/.