1 km grid population dataset of China (2005, 2010)

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Abstract: Census data with the spatial scale of administrative district cannot reveal the spatial differences sufficiently. Meanwhile, this kind of statistical population data cannot be integrated and analyzed with most of other gridded geographic datasets. People in pixels provide an effective way to solve this problem. We established multivariate statistical models for population in 1 KM pixels based on the correlation relationships between population and land use types. The urban population density, traffic conditions, DEM and total amount control were used for model correction. Forty counties with township population data from east, west and middle of China were chose for precision verification. The errors of the spatial population data in these counties are between 4.5% and 13.6% and most of them are less than 10%.
Keywords: China; GDP; grid; spatial data; 2005, 2010.

1 Introduction

The 1 km grid population dataset of China in 2005 and 2010 was developed based on the remote sensing- derived land use types and statistical census data. The models for population in 1KM pixels were established using the spatial analysis function of geographic information system.

2 Metadata of the PopulationGrid_China

The descriptions of the 1 km grid population dataset of China in 2005 and 2010 (Population_1kmGrid_China for short) dataset are recorded. The information includes 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 Population_1kmGrid_China dataset.

3 Methods

Land use pattern is an important factor which can affect the distribution of population.

Table 1 Summary of the Population_1kmGrid_China Metadata

Full name of dataset	1 km Grid Population Dataset of China
Short name of dataset	PopulationGrid_China
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Geographical region	The region extends from 3°51'N to 53°33'N and 73°33'E to 153°5'E covering the mainland of China.
Year of the dataset	2005, 2010
Spatial resolution	1 km
Data format	ARCGIS GRID Dataset size 11MB
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, ZHOU Xiang, 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.

This dataset was produced based on the remote sensing- derived land use and statistical population data and the correlation relationships between them by establishing the multivariate statistical models for population in grid. The specific procedure of population in grid is quoted from reference [1] and the flow chart represented Figure 1.

First, we analyzed the spatial characteristics of population distributions in different regions and divided the whole country into eight regions (Northeast China, North China, Central China, East China, South China, Southwest China, Northwest China and Qinghai-
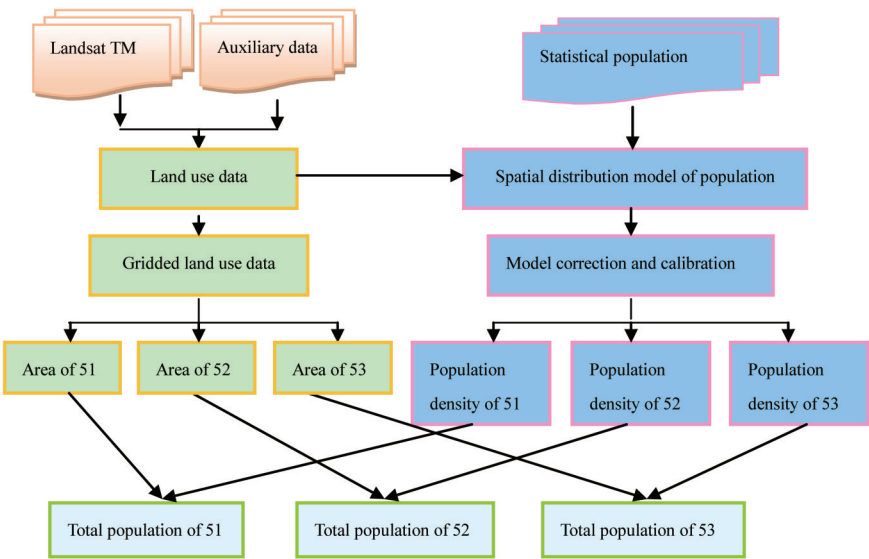

Figure 1 Procedure of grid population dataset production
(Note: 51-urban residential land; 52-rural residential land; 53-industrial and transportation land)

Tibet) based on the location theory and the support of spatial statistics method. Then we choose some representative counties in each region as the samples for modeling. The land use type which has strong correlation with the distribution of population will be chosen as the parameter for population in grid model establishing. We used an unified model for the eight regions with different parameter settings. Detail about the model has been published in 2002[2- 4]. The statistical population data in each region will then be specialized using the model corrected by the factors of urban population density, traffic conditions, DEM and total amount control. The statistical GDP come from references [5- 6] and the boundary data come from reference [7]. A set of gridded population data with an unified spatial coordinate parameters and metadata was then obtained.

Figure 2   The gridded population data of China in 2005

Figure 3 The gridded population data of China in 2010

4   Dataset product

The gridded population dataset of China provide the population distribution in 2005 and 2010 with the total data size of 11 MB (see Figures 2 and 3). The data format is ARCGIS GRID and the unit is person.

5   Dataset quality control and validation

To verify the accuracy of the gridded GDP data, we chose ten counties with township GDP data in Beijing and Shanghai in the east of China, Jilin and Henan in the middle of China, Xinjiang and Chongqing in the west of China. The counties (districts) are listed as follows: Beijing: Dongcheng, Chaoyang, Fangshan, Daxing, Yanqing; Shanhai: Huangpu, Xuhui, Zhabei, Songjiang, Chongming; Jilin: Nanguan, Yongji, Lishu, Dongliao, Tonghua, Fusong, Tongyu, Changling, Wangqing; Henan: Zhongmeng, Tongxu, Ruyang, Shanxian, Neihuang, Gixian, Fengqiou, Wenxian, Taiqian; Xinjiang: Urumqi, Dushanzi, Shanshan, Yiwu, Hutubi, Wenquan, Qiewei, Wensu; Chongqing: Wanzhou, Qianjiang, Beiling, Yuzhong, Daduko, Jiangbei.

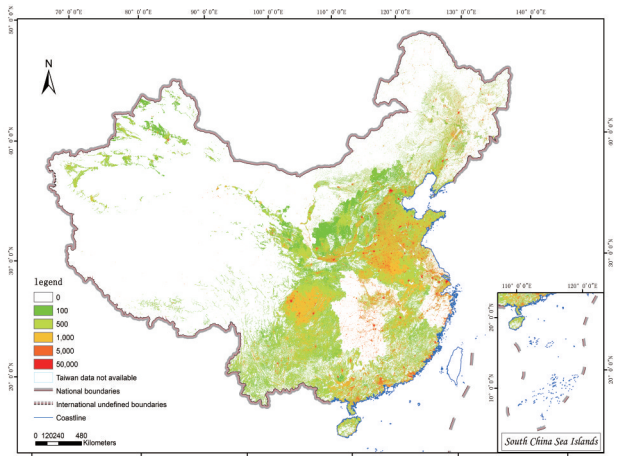We use the township boundaries data in vector format and converted them into a unified
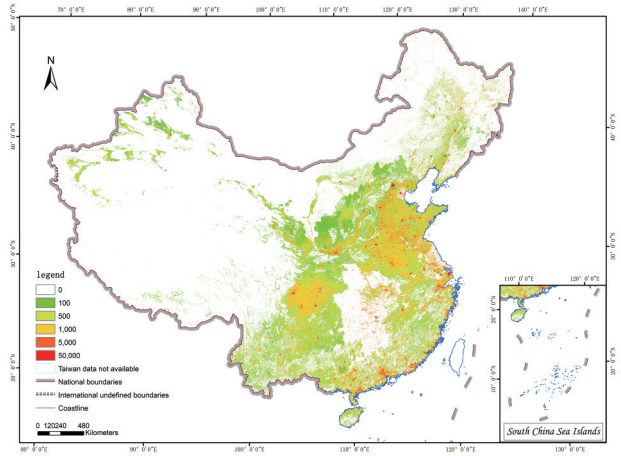
coordinate system with the gridded population data. Then the gridded population data of each town were calculated using the spatial statistical analysis function of geographic information system. In comparison of the statistical population data, the errors of the gridded population data in these counties are between 6% and 17% and most of them are less than 10%.

6 Conclusion

The gridded population dataset of China is of great value in implementation of the share of statistical data and multi- sources geographic datasets. The production of the gridded population dataset with the resolution of 1 km solved the problems of the disconnection between the statistical population and other spatial geographic datasets in the same region and provided an important support to comprehensive analysis of spatial statistics.

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