INVESTIGATION ON LAND DATABASE UPDATING BASED ON HIGH RESOLUTION AIRBORNE IMAGES

Jie YIN[2] Guomin ZHU[1] Jiguo WANG[1] Chengming LI[2]

(1. Yiwu Design & Science Research Institute of Surveying and Mapping,

2. Chinese Academy of Surveying and Mapping)

cmli@casm.ac.cn

Abstract

China has the biggest population all over the world. The food is always a problem faced by Chinese government. Therefore, to protect the land, which can grow the grain on, from decreasing is very important. However, with the development of economy, great deal of lands have been occupied by the factories and urban building. Development will make the land less, the food demand from the land is not decreasing even increasing, how to balance the relations between development and increasing food demands is a controversial question. In China two measures were used to overcome the question, one is to increase the production per mu, the second is to protect the land from reducing. Monitoring the land changes and updating the existed land database is the base of the second ways.

There exist many methods to update the land database. Field surveying is suitable to a small area, remote sensing -based method is suitable to the large scope. For a middle scope such as 1000-10000 square kilometers, field surveying is not economic; the resolution of TM or SPOT image is not enough to monitor the changes of land. Maybe airborne- based method is rather suitable.

In this paper a method based on airborne was proposed to monitor the land changes and update the land database. According to the airborne image, there are two cases. One is that two period of time color airborne image have existed, the second is that one period of time image is black airborne image and another is color image. For different cases, the method has little difference. They are used in Yiwu city and was testified operable and useful to manage land effectively.

Keywords: Land database, the changes of land, update the land database, airborne- based method, remote sensing -based method

1. Introduction

Land resource is one kind of important resource, because it is related to the food of people. With the quickly deducing of land, which can grow grain, the measures must be taken to protect it from erosion. It demands the land management division know the detail information about the land and land changes. In 1988 the detail information on land was investigated all over the China, thirteen years later, it has changed a lot. The land resource database needs to be updated. If the line graph was used as base map in traditional method, in fact the line graph was been produced ten years ago in most parts of China, especially in west China. The precise of the land resource gotten according to this kind of base map is not enough to update land database. Furthermore, these base maps

only were updated every ten years or fifteen years. Obviously, the above idea is not suitable to be used to update the land database at present.

Of course the total field surveying can get the high precise land detail information, but it will last several years and also will spend much money. This can't meet the demands of land management, can't match the speed of economical and modern technology development. So this line also is abandoned.

Airborne and remote sensing Image-based method was used in Chinese land resource updating, remote sensing image such as TM/SPOT is suitable for large scope even the total China. Only is the airborne image suitable for the middle and small urban territory.

Following the introduction, the existing work was reviewed, part three proposed the basic line of land database update, and several key steps were described in detail. Part four gave an example. At last, the concluded remarks were drawn.

2. Existed research works

From the Internet, many papers and web pages can be queried. After studying it closely, it is not difficult to know that image-based land database update was rather matured in abroad. However, if these technologies were extended to use in China, there will occur some problems, because the actualities of the land resource and land resource using are rather complex. Furthermore, the difference to use modern technology between rich territory and poor territory is much great in China.

Under the support of national department of land resource of China, our academy, with other two institutes, began the land resource of China investigation in 1998, and it will last about twelve years. This work is based on TM/SPOT image. But this method is not suitable to the middle and small areas.

3. Basic Line and Methods

Several years ago, the line graph map was used as the base map in traditional methods. It lagged the progress of scientific technology. At present, the remote sensing image TM/SPOT or airborne image will substitute for the traditional line graph as base map. The total process will be divided into the following steps:

3.1 Ortho-image

The projection mode of the airborne image is a central projection. It needs to be transferred into the ortho-projection mode. The process includes air-photo scanning, selecting control points in topographical maps, air-triangulation, image mosaic, colors and brightness adjustment. After the total digital photogrammetry, the digital elevation model (DEM) and ortho-image can be gotten. These are the base maps of land detail information investigation. Sometimes, the airborne image is black, we had better merge it with TM image, make it change into color and high resolutions image. It will be helpful to extract land resource information.

3.2 Image interpretation and field checking

On the computer the image processing software such as Erdas, PCI and ERMAP were used for drawing the land boundaries, statistic the area, and justify which kind of land it is with the help of experienced RS workers. 10-20 percent results of these interpretations will be testified by field investigation or checking.

3.3 Digitization of modifying information in field checking

After field checking, part results will modified in paper base map. These changes information will return to the experienced RS workers, they will put the changed land information into the computer.

3.4 Updating the land detail investigation database

The software such as arc/info is used to overlap old land resource information and the new investigation

information. By the software functions developed by us find the changes automatically, and label it in bright color. If operation workers are sure it is right, the changed land resources information will go into database and update the old information automatically. If they are sure it is right, the changed information will be ignored. Through this process, the detail land investigation database, which is built in 1988, will be updated.

4. An example

The Yiwu city was selected as the test territory. The total area of Yiwu testing territory is about 1100 square kilometer. It has land database built in 1995, and the color airborne image, which were taken in1999. This test was finished in2000. The workflow is showed in Figure 1.

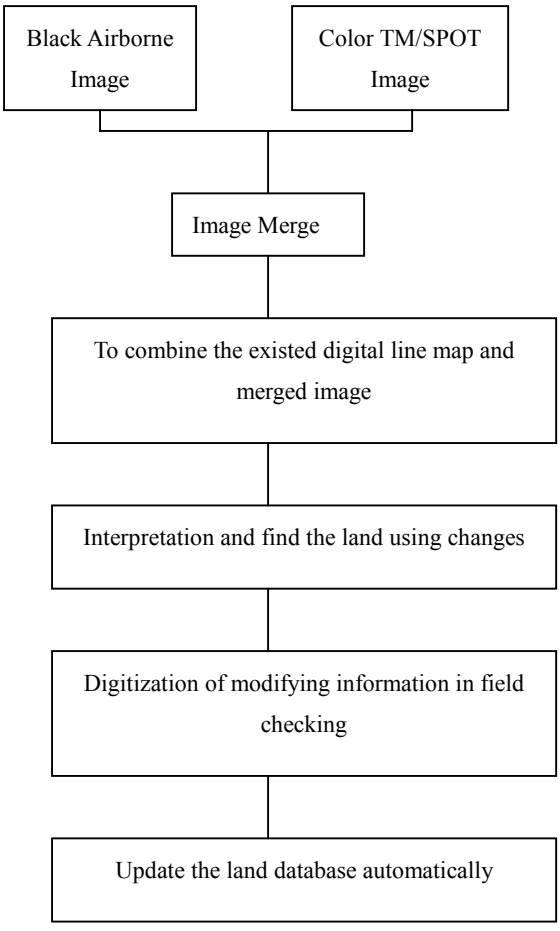

Fig. 1 Workflow of Updating land using changes

At last after finishing updating, the results of land using changes were gotten and listed in table 1.

No.	Before changes	After changes	Area(mu)
1	infield	Build field	11004
2	Non-infield	Build field	718
3	Infield	pothole	8.2

5. Concluded remarks

In this paper after reviewing the traditional methods in China to use for updating land resource database and actualities in abroad, an airborne image-based method was proposed. And the detail steps were also introduced. By the test territory experiment, this kind of method to update land database is effectively. The precise is rather high, it can meet the needs of land management and decision support of government.

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