STUDY OF OPERATIONAL APPLICATIONS IN CROP GROWTH AND DROUGHT MONITORING USING MULTIPLE SATELLITE DATA: CASE STUDY IN XINJIANG, CHINA

Chuanfu Xia, Jing Li, Qiang Liu, Qinhuo Liu, Yong Tang, Yanjuan Yao

State Key Laboratory of Remote Sensing Science, Jointly Sponsored by the Institute of Remote Sensing Applications of Chinese Academy of Sciences and Beijing Normal University, Beijing 100101, China
xiachuanfu2897@163.com

1. INTRODUCTION

Crop monitoring is an important aspect of remote sensing applications. In the operational agricultural applications of remote sensing generally the high spatial and high temporal satellite data is needed. But till now the advantages of high spatial and high temporal resolution still can not be realized in single sensor. Thus to combine the high spatial and high temporal resolutions of different satellite data to realize the operational applications is of great significance.

Xinjiang is one of the most important cotton production areas in China. In Xinjiang, the cotton growing area is about 1.6 million hectare, about 22% of China cotton area. The operational application of cotton growth and drought monitoring using multiple satellite data is of great significance in Xinjiang. This paper is focusing on the design of operational crop monitoring using multiple satellite data. And at last the software to realize this operational application will be designed and realized.

2. METHODOLOGY

To obtain the information with high spatial and high temporal resolution, the multiple satellite data are used, including MODIS, Landsat/TM, and CBERS02. The remote sensing data processing flow is shown in figure 1. There are mainly three parts in this flow, data preprocessing, parameter inversion from multiple satellite data, and parameter analysis. The data preprocessing includes radiative correction, geometric correction and atmosphere correction. The atmosphere correction uses the 6S model and Dark Dense Vegetation (DDV) algorithm [1]. To realize parameter inversion from multiple satellite data, the PSP Method (Patch Spectral Purification Method) is applied [2] [3]. PSP method obtains the pure radiant information of field patches from low spatial resolution images pixels based on the field patch distribution map generated from high spatial resolution images. In this case, we use 250m and 1km daily MODIS data (MOD02) and 30m field patch map generated and updated based on Landsat/TM images to calculate the reflectance of the field patches by PSP method. Then the daily crop parameters (e.g. LAI, NDVI, TVDI etc.) of each field patch are calculated. Besides the crop parameters of pixels are also calculated using Landsat/TM and CBERS02 image data. So we can obtain the daily average crop growth information of field patches, and the detailed crop growth information inside the field patches every 16 days or 26 days. The monitoring with different details and different updating frequency is realized using multiple satellite data. To monitor the crop growth situation the LAI and NDVI are used, and TVDI and NDWI are used to monitor the crop drought situation. To make the processing flow easy to use, a software AgRsis(Agricultural Remote Sensing Inversion System) will be designed and realized. In the operational software a processing part to generate the standard crop monitoring map will be added.

3. APPLICATION DEMONSTRATION

To testify the processing flow and the software an application demonstration will be made in Xinjiang, China to monitor the cotton growth. The MODIS, Landsat TM, and CBERS data in 2008 in Xinjiang will be collected. The designed processing flow will be applied in the main cotton production areas to get the daily crop information of field patches and the crop information inside field patches every 16 days. The cotton growth map and cotton drought map will be generated by AgRsis software.

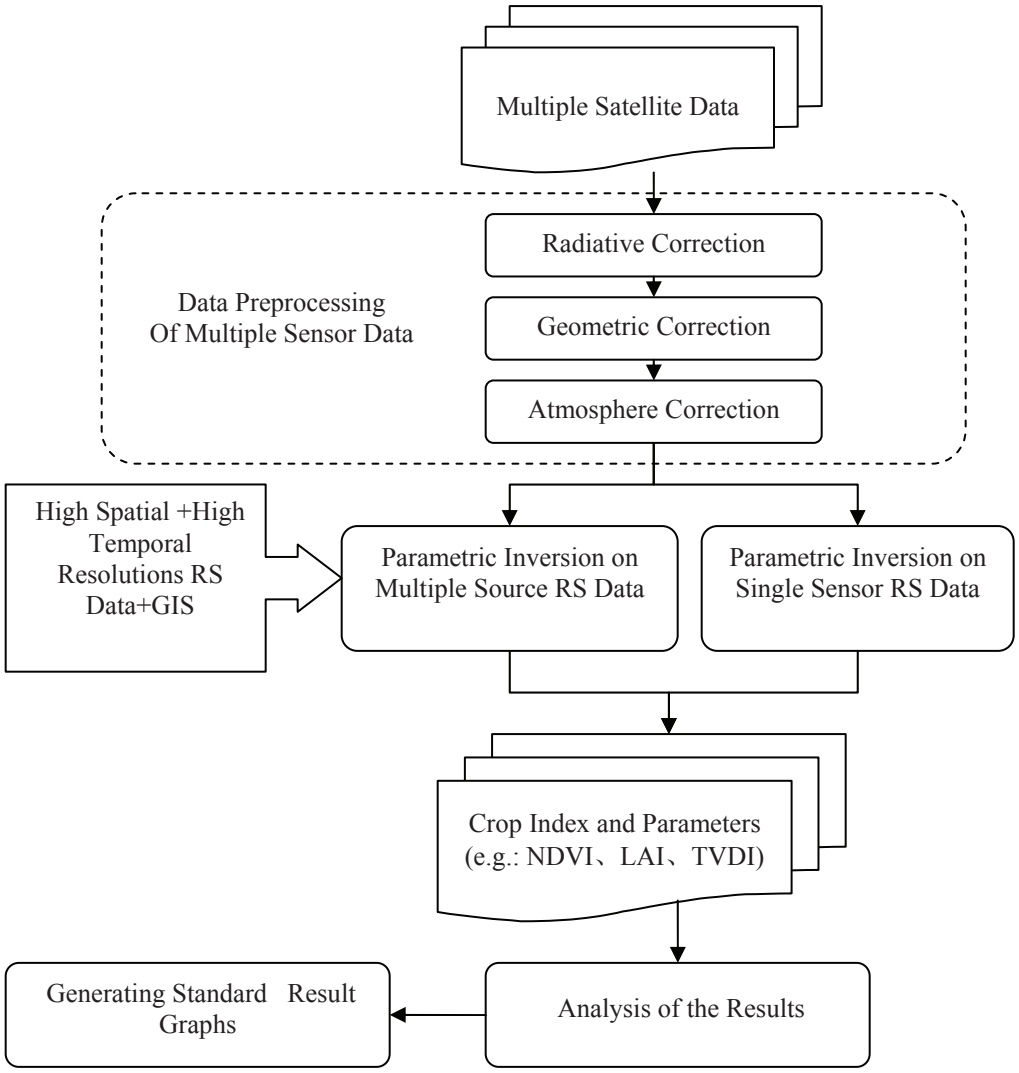

Figure 1 Data processing flowchart

4. REFERENCES

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