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Mapping rice planting areas in southern China using the China Environment Satellite data

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ABSTRACT

The objective of this research is to investigate the potential of application of China Environment Satellite HJ-1A/B in monitoring rice cultivation areas in Guangdong province in southern China. Information on the rice cultivation areas is of global economic and environmental significance. A CCD camera sensor with 30 m spatial resolution onboard China Environment Satellite HJ-1A and B has visible and near infrared bands and a revisit period of four days; the temporal Normalized Difference Vegetation Index (NDVI) can therefore be obtained from HJ-1A and B data. The characteristics of the temporal NDVI derived from HJ-1A and B images of rice fields and other crops at rice growth stages in the western part of Guangdong province of China with an area of about 67000 km^2 were first analyzed in this research and an algorithm for mapping paddy rice fields was developed based on the temporal changes of NDVI of rice fields from January to July, 2009. The mapping result was evaluated by field survey and the data from China Ministry of Agriculture and the promising accuracy was found with a Kappa factor of 0.71. The result of this study suggests that the China Environment Satellite HJ-1A/B has great potential in the development of an operational system for monitoring rice crop growth in southern China.

1. Introduction

Rice is the most important primary food in Asia. It constitutes the foundation of the economy of many Asian countries and provides staple food of the people. Rapid population growth puts increasing pressure on the already strained food supply. The increasingly growing price of rice has put great negative impact on the life of the people in recent years. Rice accounts for more than 42% of the crop yield in China. Its cultivation is strongly related to social stability and economic sustainable development for China. Guangdong province is one of the most economically developed regions in China. With the development of infrastructure and the change of agricultural management, the cropping system in this region has changed rapidly with the tendency of the greater diversification (i.e., increasing the variety of crops planted) and more frequent changes of crop cultivation, which reflects the farmers' strategies in adapting their cropping practices to the change of market demand. Regarding the global environment aspect, the knowledge of rice cultivation areas is important to estimate the fluxes of methane (CH_4) from irrigated rice fields to the atmosphere [1,2]. So the above socio-economic and global environmental factors have put forward a strong demand on timely and effective operational system for monitoring rice plantation areas and growth conditions.

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