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• RESEARCH PAPER •

A comparative analysis of five global cropland datasets in China

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Abstract Accurate information of cropland area and spatial location is critical for studies of national food security, global environmental change, terrestrial ecosystem geophysics and the geochemical cycle. In this paper, we compared five global cropland datasets in circa 2010 of China from in terms of cropland area and spatial location, including GlobalLand30, FROM-GLC, GlobCover, MODIS Collection 5, and MODIS Cropland. The results showed that the accuracies of cropland area and spatial location of GlobeLand30 were higher than the other four products. The cropland areas of the five products varied in most of the provinces. Compared with the statistical data, the best goodness of fit was obtained using GlobeLand30, followed by MODIS Collection 5 and FROM-GLC, with MODIS Cropland and GlobCover having the poorer accuracies. Regarding the spatial location of cropland, GlobeLand30 achieved the best accuracy, followed by FROM-GLC and MODIS Collection 5, with GlobCover and MODIS Cropland having the poorer accuracies. In addition, the spatial agreement of the five datasets was reduced from agricultural production area to pastoral area and significantly affected by elevation and slope factors. Although the spatial resolution of MODIS Collection 5 was the lowest, accuracies of the cropland area and spatial location were better than those of GlobCover and MODIS Cropland. Therefore, high spatial resolution remote sensing images can help to improve the accuracy of the dataset during land cover mapping, while it is also important to select a suitable classification method. Furthermore, in northwestern and southeastern China, spectral mixing pixels are universal because of the complicated landscape and fragmentized topography and result in uncertainty and poor consistency when using the five products. Therefore, these regions require additional attention in future cropland mapping studies.

Keywords Land cover, Cropland area, Spatial location, Accuracy, Spatial agreement

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1. Introduction

Land cover plays an important role in studies of climate change and the biogeochemistry of earth systems (Chen et al., 2011). With the development of satellite sensors and computer cartography, remote sensing has become an increasingly important technology for obtaining land cover information from the regional to global scales (Giri et al., 2013; Ban et al. 2015; Chen et al., 2013). Early global land cover datasets were produced with 1 km spatial resolution satellite imagery, such as the UMD (University of Maryland) product (Hansen et al., 2000), IGBP-DISCover (International Geosphere-Biosphere Programme Data and Information Systems Cover) product (Hansen et al., 2000; Loveland et al., 2000), MODIS land cover product (Friedl et al., 2002), and GLC2000 (Global Land Cover 2000) (Bartholome and Belward, 2005) dataset. Although these datasets have been widely used, their accuracies and qualities

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