Agricultural Land Cover Classification using RapidEye Satellite Imagery in South Korea – First Result –

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ABSTRACT

Global climate changes as well as abnormal climate phenomena have affected the agricultural environment on a great scale. Thus, there is a strong need for countermeasures by making full use of agriculture related information. As agricultural lands in South Korea are mostly operated by private farmers on a small parcel level, it is difficult to gather information for an overview on changing crop condition and to construct database necessary for disease management, production estimation and compensation measures on a regional or governmental level. The objective of this study is to evaluate the multispectral reflectance characteristics of RapidEye image data to classify agricultural land cover as well as crop condition in South Korea. As the RapidEye sensor offers the spectral information in red edge range as a first multispectral satellite system, we focus on the usefulness of red edge reflectance for identifying crop species and for interpreting crop growth or stress condition.

Keywords: RapidEye, red edge, spectral vegetation index, object-based classification, agriculture, crop condition

1. INTRODUCTION

Recently, agriculture has been facing new challenges worldwide. Global climate changes as well as abnormal climate phenomena have affected the agricultural environment on a great scale and there is a strong need for countermeasures by making extensive use of agriculture related information. In South Korea, agricultural lands are mostly operated by private farmers on a small parcel level so that seeding, crop dusting, and harvest period usually differ. Further, crop condition usually depends on the owner’s farming skill. Therefore, it is difficult to gather information for taking an overview on a changing crop condition and to construct database necessary for disease management, production estimation and compensation measures on a regional or governmental level. For this purpose, remote sensing offers the technical possibility as an effective and inexpensive method to identify crop fields and to detect crop condition. However, because of high variability of spectral response according to crop species, growth stage, health condition, soil, water and microclimate, remote sensing in agriculture has so far been only applied to a limited extent ([1]).

The new satellite mission RapidEye, developed in Germany and launched in 2008, offers a very fast revisit rate up to one single day on the same area, which is a very important factor to cover nationwide data sets within a growing season and also in order to monitor rapidly changing crop conditions. Also, a new spectral feature in RapidEye sensor, the red edge band (690-730 nm) is supposed to allow better estimates of the ground cover and chlorophyll content of the vegetation. In this study, we examine the spatial resolution of RapidEye image data to detect agricultural land use structures and the spectral reflectance in five multispectral bands to differentiate land cover as well as crop conditions. As first result we will present the inherent spectral reflectance characteristics relative to land cover types and the midterm result of classification with an object and knowledge-based approach.

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