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GEOSPATIAL PROJECTIONS OF PADDY PRODUCTIVITY IN KOREA USING A CROP MODEL INCORPORATED WITH SATELLITE IMAGERIES

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Satellite images are promising scientific tools for monitoring of inaccessible crop lands, a design of decision support systems and other practical applications that may require remote sensing information. Crop models are useful tools to continuously monitor and simulate information on the crop growth and crop productivity. Combining these approaches, one can provide adequate and continuous monitoring of region wide crop productivity. This study aims to simulate the productivity of paddy - *Oryza sativa* and the yield of all paddy fields in Korea using a grid crop model combined with satellite imageries. Vegetation Indices and solar insolation data were obtained from the geostationary ocean color imager and the meteorological imager sensors of the communication ocean and meteorological satellite. Reanalysis data of air temperature were collected from the korea local analysis and prediction system. The model was calibrated to simulate rice yields using data obtained from 11 countries and applied to 62 countries with an area of more than 5,000 ha in South Korea for four years from 2011 to 2014. Simulated rice yields were in statistically acceptable agreement with the observed data with a range of model efficiency from -0.21 to 0.55 and a variety of root mean square error from 0.33 to 0.44 ton ha-1, respectively. In the inaccessible North Korea (NK) for the same period, rice yields were well reproduced upon calibration of the model on 500 m grid paddy fields in Cheorwon as well as verification of the simulation performance accuracy for Cheorwon and Paju, located at the borders of NK. Results show that the paddy productivities were reproduced with reasonable accuracy. The study demonstrates that incorporating a crop model with satellite images can be utilized as a reliable technique for monitoring of crop productivity, particularly in remote, data-sparse regions.

Biography

Jonghan Ko holds an Associate Professor position at Chonnam National University, Gwangju, South Korea. He is a Crop Modeler and Agricultural Remote Sensing Researcher. His research fields include agronomic applications of crop modeling techniques, quantitative agricultural remote sensing and environmental crop ecology. He was awarded a PhD degree in Agronomy at Texas Tech University, Lubbock, Texas, the USA with a dissertation topic entitled: Development of a cotton crop model that uses remote sensing data in 2004. He received both Bachelor's and Master's degrees in Agronomy at Kangwon National University, Chuncheon, South Korea in 1995 and 1998, respectively.

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