Special Section Guest Editorial: Remote Sensing and Sensor Networks for Promoting Agro-Geoinformatics

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Agro-geoinformatics, the agricultural-related geoinformation technology, is critical for agricultural policy formulation and decision making, land use monitoring, agricultural sustainability, crop acreage and yield estimation, disaster assessment, bioenergy crop inventory, food security policy, environmental assessment, carbon accounting, and other research topics that are of vital importance to American agriculture and its economy. Agro-geoinformatics addresses issues such as collecting (including field surveys and remote sensing), processing, storing, archiving, preservation, retrieving, transmitting, accessing, visualization, analyzing, synthesizing, presenting, and disseminating geospatially distributed agricultural geoinformation. The geospatially distributed *in situ* data of crop plants and fields are collected in person or measured by sensor networks while large scale field level or regional measurement of crops growth and land cover condition could be remotely sensed via satellite or aerial sensors. Recent advances in remote sensing and sensor networks have created a suite of new opportunities as well as challenges in agro-geoinformatics, and incurred an increased interest in recent years to further promote this technology, as evidenced by numerous new research and applications on this topic. This special section provides a snapshot of the most recent research developments in methods, technologies, and applications of remote sensing and sensor networks in agro-geoinformation. Many of the papers included in this special section are extended versions of materials that were presented at the Third International Conference on Agro-Geoinformatics (Agro-Geoinformatics 2014) in Beijing, China, in August 2014.

The special section covers a wide spectrum of research applications. The first part of the section contains six papers. "Three-dimensional geospatial information service based on cloud computing" by P. Yue et al. investigated how performance of the OGC Web 3D Service (W3DS) for geospatial data could be improved by cloud computing technologies and how W3DS could be developed in a cloud computing environment. They presented a design and implementation of the three-dimensional geospatial information cloud service using the Apache Hadoop as the framework. "Does simultaneous variable selection and dimension reduction improve the classification of Pinus forest species?" by K. Peerbhay et al. compared using the sparse partial least squares discriminant analysis (SPLS-DA) and variable importance in the projection (VIP) methods to perform simultaneous variable selection and dimension reduction of hyperspectral remotely sensed data in classifying three commercial Pinus tree species. They concluded that the SPLS-DA yielded better classification accuracies and selected fewer wavebands within visible spectrum region. "Estimating plant area index for monitoring crop growth dynamics using Landsat-8 and RapidEye images" by J. Shang et al. investigated using Landsat-8 and RapidEye images to map within-field variability of crop growth conditions and tracking the seasonal growth dynamics. The study showed that two sensors had a good agreement. They also observed that the plant area index (PAI) and Enhanced Vegetation Index (EVI2) had a good linear relationship and EVI2 was more resistant to saturation at high biomass range than NDVI. "Spatial evaluation of crop maps by the spatial production allocation model in China" by Z. Li et al. evaluated the performance of the Spatial Production Allocation Model (SPAM) by comparing spatial pixel distribution maps allocated by the SPAM from the known spatial statistical data of rice, maize, and wheat crop production in China with remote sensing results. They found the SPAM allocation could provide the limited spatial accuracy. "Assessing

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bioenergy-driven agricultural land use change and biomass quantities in the U.S. Midwest with MODIS time series," by C. Wang et al. used support vector machine classifier to identify and map the spatial distributions of major annual crops corn, soybean, winter wheat and spring wheat and three perennial energy crops (shortgrass, warm-season tallgrass and cool-season tallgrass) in the Midwest based on 500-m MODIS NDVI composites. This study indicated that frequent satellite observations might provide an efficient tool of monitoring biomass supplies and land use changes to assist national bioenergy decision-making. Finally, "Object-based spatio-temporal analysis of vine canopy vigor using an inexpensive unmanned aerial vehicle remote sensing system" by A. Mathews employed a low-cost UAV and digital camera remote sensing system for aerial imagery acquisition and successfully identified spatial variability in vine canopy vigor using a vine performance index based on the acquired aerial imagery.

The second part of this special section will be published in Vol. 9 (2015) of the *Journal of Applied Remote Sensing* and will cover a number of different topics. We want to express our deep appreciation to all authors and reviewers for their high-quality contributions and enthusiastic efforts to this special section.