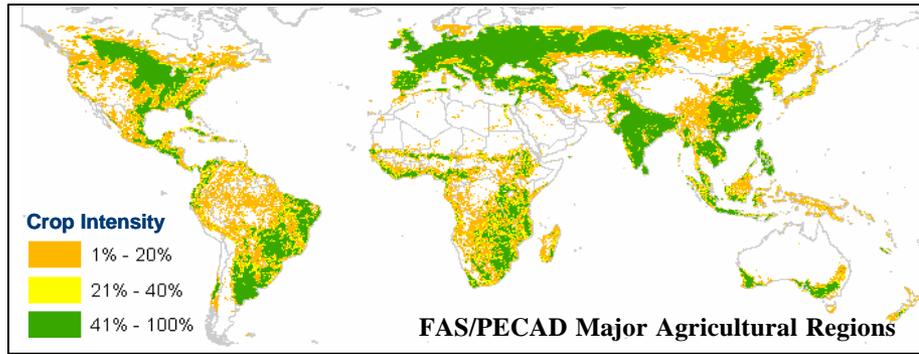


Automated Extraction of Crop Area Statistics from Medium-Resolution Imagery

NASA SBIR 2006 Phase II Proposal: Topic S7.01



Phase II Proposed Work

Task 1: Continued Algorithm Development

1.1: Component Development

1.2: Customization / Extensions

1.3: Algorithm Tests and Validation

Task 2: System Prototype Design and Implementation

2.1: Software Application Development and Testing

2.2: Web Development and Product Delivery

Task 3: Formal Validation and Verification

Task 4: Benchmarking

Task 5: Documentation

Executive Summary

This project is focusing on the strategic, routine incorporation of medium-resolution satellite imagery into operational agricultural assessments for the global crop market. Automated algorithms for rapid extraction of field-level crop area statistics from Landsat and Landsat-class imagery are under development. For prototype development, the project is collaborating with the Production Estimates and Crop Assessment Division of the USDA Foreign Agricultural Service. The Phase I prototype algorithms, based on Bayesian Probability Theory, incorporate multiple lines of evidence and implement an innovative approach to supervised image classification allowing for automated class delineation. The knowledge-based expert classifiers prototyped during Phase I were tested and validated at selected pilot sites across the globe. The results of the Phase I work have clearly demonstrated the technical feasibility of the GDA approach to automated crop area assessment with medium resolution imagery. Development undertaken during Phase I resulted in a robust, fully functional set of modules that are capable of processing large volumes of data and allow for crop detection, area estimation, and crop acreage change assessment with minimal user intervention. The overall results of the project will enhance global agricultural production estimates by improving the timeliness and accuracy of field-level crop area estimates.

Results of Phase I

By constructing algorithms which utilize multiple lines of evidence, GDA has proven a reliable method for crop area assessment that is not replicated by any other automated crop assessment technique. This novel, high-performance design was prototyped and tested on 113 Landsat 5 and 7 scenes covering several different pilot sites and crop types. A non-rigorous validation study proved the reliability and accuracy of the prototype algorithms. Overall comparison gave more than 80% agreement between GDA's crop products and USDA / NASS Cropland Data Layer maps.

Potential Applications

Results of the proposed effort can be used to enhance economic opportunities for agricultural producers and commodities. The results of the project will aid in the provision of accurate and timely information on global crop production at a country or regional level, thereby helping producers make better marketing decisions. The largest potential customers may include the commodity exchanges, U.S. Agribusiness, and U.S. Government agencies. The effort will contribute to NASA's Applied Science Program by addressing the goals of the Agricultural Efficiency and Disaster Management applications of national priority. Furthermore, it will also help to ensure continued use of, and reliance on, NASA data by USDA and other federal agencies in their transition from Landsat to the new medium resolution LDCM mission.

Corporate Contact

Dr. Dmitry L. Varlyguin, GDA Corp.
200 Innovation Blvd., Suite 234, State College, PA 16803
T: 814-237-4060 • F: 814-689-3375 • [http: www.gdacorp.com](http://www.gdacorp.com) • E: dmitry@gdacorp.com