



# GeoTREE News

Volume I, Issue II— July 2006



## About GeoTREE

The National Aeronautics and Space Administration (NASA) awarded the University of Northern Iowa (UNI) a research grant for the purpose of establishing a Geoinformatics Training, Research, Education and Extension (GeoTREE) Center. The funding period for this new grant began January 15, 2006. This new Center is housed in the Department of Geography (see page 4 for more about the department) on the UNI campus on the second floor of the Innovative Teaching & Technology Center (ITTC) building. This new facility provides state-of-the-art technologies with more than 15 staff computers, 25 lab computers and two servers for research and training purposes.

### Goals & Objectives

The primary goal of this project is to establish GeoTREE as the center for education, multidisciplinary research, and outreach services in the geospatial technology areas for individuals from federal, state, local and tribal government (FSLT) agencies. GeoTREE is an interdisciplinary center and is unique in transferring the geospatial technologies to FSLT agencies by bringing NASA scientists, academic members, and members from FSLT agencies together to integrate remote sensing data into Geographical Information Systems (GIS) and help in improved deci-

sion-making through Decision Support Systems (DSS).

The purpose of the GeoTREE Center is multi-faceted with three major areas:

- 1) Education and Training
- 2) Research and Development
- 3) Extension and Outreach in geospatial data and technologies

The outcome from this project includes:

- a) To understand or learn the geospatial technology needs of FSLT agencies by researchers from both NASA and academic members,
- b) To develop new geospatial tools and techniques to solve FSLT agencies day-to-day problems, and
- c) Transfer the techniques and tools developed in this project to other communities across the country.

To learn more about GeoTREE, please go to the following web site:



Check us out at: [www.geotree.uni.edu](http://www.geotree.uni.edu)

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### GeoTREE Staff

- Dr. Ramanathan Sugumaran
- Mr. John DeGroot
- Ms. Jane Gillen
- Mr. Nathan Green
- Mr. Scott Larson
- Mr. Nick Nwasike
- Mr. Nick Phillips
- Mr. Derek Rieckmann
- Mr. Taylor Sinclair
- Mr. John Voss
- Mr. Matt Voss
- Dr. Yanli Zhang

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## GeoTREE Employee Awards

### NASA-Iowa Space Consortium Fellowship

Nick Phillips and Derek Rieckmann, both UNI students, have received Iowa Space Consortium fellowships.

Nick Phillips is currently a graduate student from Computer Science and creating a web-based remote sensing educational tool using Macromedia Flash. His interactive software will allow novice users to understand and learn basic principles and techniques of satellite remote sensing. In the picture in the right, Nick is collecting the spectral information for the agrobioterrorism project from field corn.



Derek Rieckmann is working on the West Nile Virus project for GeoTREE. He is an undergraduate student from the Geography Department at UNI.

### NASA Summer Internship

Matt Voss was awarded prestigious NASA summer internship at the Ames Center in California.

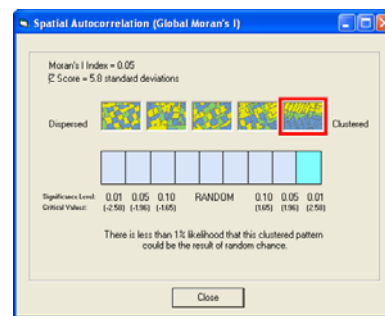
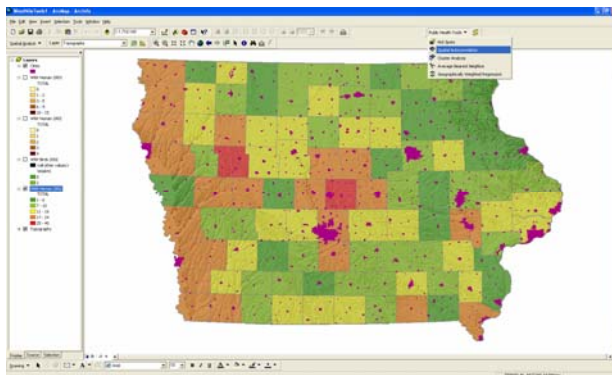
Matt is currently the leader of a group working on a project to verify the suitability of MODIS satellite data for use by the National Park Service. He spent a week in Yosemite National Park collecting leaf area index measurements which will be used to verify several MODIS products. The end goal is to encourage Yosemite National Park to use remotely sensed products for park management. Matt (second from the left) and his co-workers are pictured in the image at the right.



## Current Research Activities

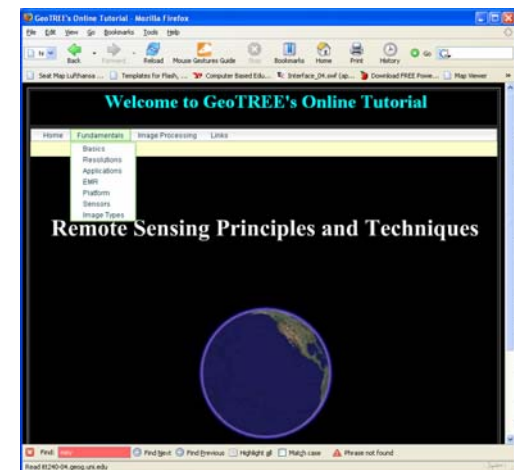
### A. West Nile Virus Habitat Analysis

This research project seeks to identify the habitats for West Nile Virus (WNV) carrying mosquitoes and create a risk map to help decision-makers effectively combat the spread of WNV using geospatial technologies. Current Status: extensive literature reviews have been carried out in relation to all aspects of WNV including mosquito ecology, geospatial analytical techniques for addressing the issue, and general WNV epidemiology. (See below). To investigate WNV regionally, various spatial and temporal data have been attained or investigated for Iowa and the six surrounding states. The future analysis will be carried out to see if any meaningful relationship or patterns can be observed between WNV incidence and data from spatial sources. A field study has been set up to investigate mosquito abundance and distribution patterns in the local area. Scott Larson, a new Geography graduate student, is conducting this field study which is designed to investigate the relationship of mosquito populations to mapped soil drainage and floodplain boundaries. The information gained from this study will potentially be used to develop a GIS-based WNV risk model. In connection with this research, GeoTREE staff members have met with representatives of the Iowa Department of Public Health as well as Black Hawk County Health department. Work has also begun to develop a public health focused extension to ArcGIS. This extension will consolidate and make more easily available spatial statistics tools already available in ArcGIS and also contain newly developed tools that will be of use for public health applications (see below).



### B. Water Quality Monitoring Project

The goal of this project is to examine the use of NASA EOS space-based data sources such as Hyperion and ALI data to study water quality in inland lakes in support of Water Management. Current Status: we have acquired two satellite data (cloud free Hyperion and ALI) for the months of June and July. We have also collected water samples, locations with GPS points and field spectrometer readings parallel with satellite image collection. We are working closely with the Iowa Department of Natural Resources on this project and if the satellite remote sensing method of monitoring lake water quality proves to be successful, it would be a useful tool for federal, state, and local agencies to monitor the water quality. Remote sensing has the ability to provide a more complete representation of the water quality of a lake while traditional methods provide water quality information for a single point in time. We are also working on a project that explores the possibility of using daily collected MODIS satellite data to produce land-cover maps of Iowa. The image on the right shows the data collection at Clear Lake, Iowa.



### C. Remote Sensing Education Project

One major barrier for FSLT agencies in the use of geosciences and related geospatial technology is a shortage of well-trained specialists in the related fields. In order to solve this problem, GeoTREE Center is planning to provide a series of workshops and/or informal training opportunities and online tutorials in geospatial technology. Currently GeoTREE is designing an online tutorial on Geospatial technologies for novice users. This quarter has been spent working on the LiDAR tutorial and Image Difference (swipe) modules for the site. We were also able to successfully connect to mapping software for good quality images on the Internet (Band Combinations) and are now working on getting a database up and running for some other future modules. There are several remote sensing modules under development and will be available at [www.geotree.uni.edu](http://www.geotree.uni.edu) in the near future.

## Current Education and Outreach Activities

- A successful LiDAR workshop was held on May 31st at UNI in conjunction with the Iowa DNR. Twenty-five people were in attendance for this program. It was very well received and we are planning to give one advanced LiDAR workshop either in the fall or in the next summer.
- Sugu and Marc Peterson traveled to NASA-Ames, California in late June. The purpose of their trip was to explore the collaboration potential with Dr. Nemani's team and the use of TOPS data for West Nile virus and crop condition assessment projects.
- John DeGroot attended a two day ESRI course called 'Introduction to Geoprocessing Scripts using Python' in Chicago July 5-7, 2006. This course taught the basics of the Python scripting language as well as useful application of Python scripts to (geo)processing vector, raster, and non-spatial data in the ArcGIS environment. John will utilize the skills he gained to lead a GeoTREE-sponsored Python workshop as well as to assist in data processing for his local and regional research on West Nile Virus.
- Four Free Geospatial Technology Workshops have been scheduled in July and August to address the needs for FSLT agencies originating from the GeoTREE survey results. They are as follows:
  1. **Geodatabase for local and State Governments—July 19**

In this workshop, participants will discover the capabilities of the geodatabase and how to migrate existing GIS data to build a geodatabase of ArcGIS 9 with the focus on federal, state, local and tribal agencies applications. This workshop will demonstrate the core functionality of both the Personal and Enterprise Geodatabase. This the workshop will also focus on the strengths and advantages of migrating to the Geodatabase model. This workshop is ideal for anyone who is thinking about migrating towards the Geodatabase model.
  2. **Remote Sensing Data into GIS—July 26**

This workshop will address how to view, analyze, and integrate remote sensing data in GIS (using ArcGIS Spatial Analyst extension and ER-DAS Imagine software) , and attempt to answer these questions: Why do I need raster data? What are the types of airborne imageries available for free? What types of satellite imagery available for free? Or what are the satellite and airborne imageries available for minimal cost? How do I find the remote sensing data I need? What are the Image Characteristics: Raster data—what it is and how it is stored. Raster data formats and the advantages/disadvantages between them. What is resolution? And what are different types? What does resolution mean to the end user and what limitations are related? What remote sensing software is available? From very basic to full processing packages; from free to very expensive.
  3. **GPS Data into GIS—August 2**

This session will provide participants with a complete overview of the GPS to GIS cycle, from data collection to incorporating into GIS. Each course participant will learn how to complete a mapping project from start to finish. It teaches the basics of GPS and how to collect and process data using Trimble GeoXT GPS equipment. The training will include both a classroom session and a field exercise.
  4. **Customizing ArcGIS—Python—August 16**

In this workshop, participants will learn about the Python scripting language and how it can be used to access the geoprocessing functionality in ArcGIS 9. Participants begin the course by understanding Python scripting syntax; progress to writing scripts for geoprocessing operations; and finish by incorporating Python scripts as tools in ArcToolbox. Scripting is easy to learn, so introductory-level programmers are welcome. However, some knowledge of fundamental programming techniques, such as loops and conditional statements, is required. Participants should have basic knowledge of ArcGIS desktop software.

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## Meet the new GeoTREE Staff Members

- Mr. Scott Larson** - Scott is currently enrolled as a geography graduate student with an emphasis in GIS related to public health. Scott has been hired as a field assistant for the summer. He is working with John DeGroot, and is responsible for the collection and identification of mosquitoes for vital research in conjunction with the West Nile Virus.
- Mr. Taylor Sinclair** - Taylor is also a geography student with a GIS emphasis. He is working alongside Scott as a field assistant this summer, and will be a junior this fall.
- Dr. Yanli Zhang** - Yanli earned his Ph.D. from the University of Massachusetts Amherst in 2006 in Forestry, GIS analysis, and remote sensing. He earned his Bachelor of Engineering from Beijing Forestry University. Yanli will be joining the GeoTREE effective August 1, 2006 as a post-doc fellow, and will be working on implementing a web-based SDSS for TMDL development. He will work closely with the Iowa DNR and the NASA Ames Center.

**To contact us, call: 319/273-3713 (office) or 319/273-3816 or 319/273-3877 (lab)**



IowaView Established at UNI



IowaView, part of AmericaView, (http://www.americaview.org) was established at the University of Northern Iowa. AmericaView (AV) is a nationwide program that focuses on satellite remote sensing data and technologies in support of applied research, K-16 education, workforce development, and technology transfer. The main goal of an "IowaView" in the University of Northern Iowa is to build partnerships and infrastructure in Iowa to facilitate the availability, timely distribution and utilization of Remote Sensing data. In addition it also demonstrates and documents the benefits of remote sensing education, research and outreach activities to local decision-makers. The IowaView goals and objectives will soon be available at: http://www.geotree.geog.uni.edu/lowaview/

Geoinformatics Lab

Geoinformatics Lab: A teaching lab with 25 brand new computers available for students and other faculty members at UNI. These computers are loaded with GIS software, (ESRI suite, IDRISI, AutoCAD, etc.) , Remote Sensing (ERDAS Imagine, eCognition, Sub-pixel classifier, ENVI , etc.), GPS (Trimbles Pathfinder office, AscPad, etc.). Please call to visit with us, or stop by to see our new facilities.



GeoTREE Calendar

Table with 3 columns: Event, Date(s), Location. It lists various workshops and presentations scheduled for 2006, including Geodatabase Workshop, Remote Sensing into GIS Workshop, and upcoming presentations at IGARSS, GI Science, and ESRI conferences.

The Department of Geography at UNI offers various educational opportunities including GIS Certificate, GI science emphasis major at undergraduate level and MA in Geography.



For further information regarding the Department of Geography, please contact Dr. Patrick Pease at: Patrick.Pease@uni.edu or by phone at 319/273-2772., or go to: <http://www.uni.edu/geography>

GeoTREE Lab



GeoTREE Center is housed in the newly remodeled Innovative Teaching & Technology Center (ITTC) on the UNI campus. Our Center includes over 1,000 square feet. The lab has "state-of-the-art" technologies that include 15 Dell staff computers with the latest multi-media, and two servers with gigabyte Ethernet connection.