

MS IHL GIS / Remote Sensing Software Licensing Program

2011 Report

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I- MS IHL Site License Program

Purpose of the Program

The Software Licensing Program has been instituted and maintained to economically provide Geographic Information System (GIS) / Remote Sensing (RS) software resources that are critical to the research, development, and training mission of higher education in Mississippi. The Licensee is the Mississippi Board of Trustees of the Institutions of Higher Learning (IHL). Since April 2006, the Mississippi Legislature has provided funding for the cost of the geospatial site licenses program. From 2006 – 2009, the funds were provided through the budget of the Enterprise for Innovative Geospatial Solutions (EIGS). In 2010, the funds were placed in the budget of the State Board for Community/Jr Colleges- renamed the Mississippi Community College Board (MCCB) in July 2011. In 2011, the Legislature placed funds in the MCCB and University budgets to cover costs. The program is administered by the Mississippi Automated Resource Information System (MARIS) www.maris.state.ms.us - part of the IHL Board offices.

IHL Geospatial Council

The Remote Sensing Council was established in the late 1990's by IHL as an effort to ensure communication among all Mississippi Institutions of Higher Learning that participate in remote sensing or GIS research and/or training. In order to more accurately describe the work of the Council, the Remote Sensing Council was renamed the IHL Geospatial Council in June 2005. The Council meets on a regular basis to discuss technical issues and policies applying to all 8 universities and 15 participating community and junior colleges. Dr. George Raber of USM was elected Council chairman in October 2010. Jim Steil of MARIS is serving as vice-chairman.

Current Membership

- Dr. George Raber** – University of Southern Mississippi– *Council Chairman*
- Mr. Jim Steil** – MARIS – *Council Vice-Chairman*
- Dr. Greg Easson** – University of Mississippi
- Dr. Bill Cooke and Mr. Louis Wasson**– Mississippi State University
- Mr. John Young** – Jackson State University
- Mr. Talbot Brooks** – Delta State University
- Dr. Fazlay Faruque** – University of Mississippi Medical Center
- Dr. Raymond Williams** – Mississippi Valley State University
- Dr. Lixin Yu** – Alcorn State University
- Mr. Chad Garick** – Jones Jr. College – CC/JC Representative
- Mr. Steve Walker** – MARIS – Site License Administrator



Organizational Plan

Mississippi's public higher education system consists of eight universities, overseen by IHL, and a network of 15 community and junior colleges overseen by the Mississippi Community College Board (MCCB). The site license program is structured around the four leading research Universities:

- The University of Mississippi
- Jackson State University
- The University of Southern Mississippi
- Mississippi State University

collectively organized as the Mississippi Research Consortium (MRC). The MRC universities each have appointed campus coordinators located on their respective campuses. These coordinators are responsible for installation of software on their own campus as well as making arrangements for installation at their satellite campuses. Each MRC campus coordinator is partnered with one non-MRC IHL institution and up to four community colleges. The non-MRC Universities/Campuses are:

- Alcorn State University
- Delta State University
- Mississippi Valley State University
- Mississippi University for Women
- University of Mississippi Medical Center
- Community/Jr Colleges

At each of these "satellite" partners, there is an official campus representative who reports to one of the campus coordinators. In turn, the hub coordinators communicate with the administrator of the program, located at IHL/MARIS. They also report installation statistics, training sessions, and other information of their campuses to the site license administrator for use in the yearly report. They also aid in determination of proper usage of the software by faculty and staff.

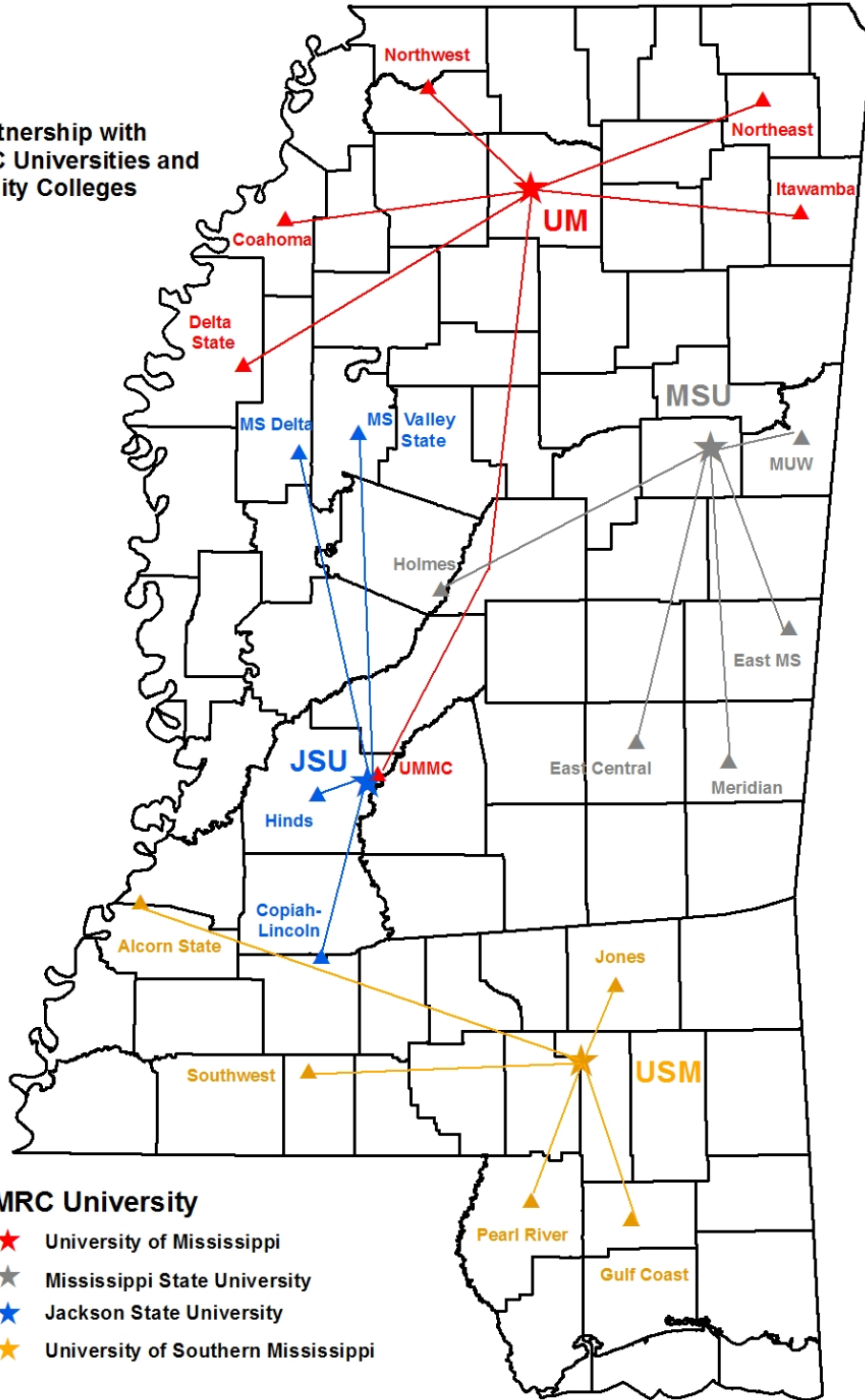
New software releases are sent to each of the four hub coordinators and the site license administrator at MARIS. All communications with the software vendors concerning contracts and resolution of any usage disputes is through the site license administrator. IHL Board staff aid in processing of the contracts with vendors and payment of invoices. To help with day-to-day technical issues, the vendors have allowed for twenty (20) designated technical support contacts within the institutions that can issue technical support calls on specific software concerns. These contacts are chosen by the hub coordinators and approved by the site license administrator. They are divided among all active institutions.

(See Appendix A for letters of support from some of the IHL Geospatial Council members.)

Figure 1 on the next page graphically depicts this organizational plan for the State.

IHL Statewide Software License Program

MRC Partnership with Non-MRC Universities and Community Colleges



MRC University

- ★ University of Mississippi
- ★ Mississippi State University
- ★ Jackson State University
- ★ University of Southern Mississippi

Figure 1

Council Activities: July 2010 – November 2011

This past year and a half, the Council dealt with many issues of concern to the universities and community colleges. During the above mentioned time period, the IHL Geospatial Council met four times. The University of Mississippi started allowing WebEX video/internet conferencing through their account allowing more members to attend without the expense of travel. The following is a synopsis of Council meetings and accomplishments.

- **October, 2010** – held at the MARIS Conference room at the IHL Board offices. Steve updated the Council Erdas payment and ESRI FY 11 contract. George Raber from USM was elected president and Jim Steil assumed the Vice Chairman position. FY11 Funding was discussed
- **January, 2011** – held at the MARIS Conference room at the IHL Board offices. Steve stated ESRI had been paid. George gave a summary of the CAO meeting concerning FY 11 funding. We were waiting on a vote on the 80/20 funding. Jim Steil mentioned the GIS Conference on the Coast as part of the CRMP Conference May 11th and 12th.
- **March, 2011** – held at the MARIS Conference room at the IHL Board offices. Users were encouraged to stay with Erdas 2010 due to issues with the Erdas 2011. Jim Steil gave an update on Fy11 funding stating the CAOs would wait until final funding bills were signed.
- **September, 2011** – held at the USM Walker Science Building. Steve Walker gave an update on the contracts. We have a new ESRI support administrator. ITT had been paid via money from MCCB. Erdas has been purchased by Intergraph. We will check on any changes to support. Discussion was made on adding Business Analyst to the ESRI software suite. Funding for the site license was handled via Senate Bills 3032 and 3041. Steve stated that each campus would be allocated their portion of the funding, and then invoiced back to cover software costs of the site license. George Raber and other faculty gave presentations on projects ongoing at USM and gave a tour of their facilities.



September, 2011 IHL Geospatial Council meeting at USM Walker Science Building.

II- Software Licenses

The IHL site license agreement is with three (3) software vendors which are the leading companies in the GIS/remote sensing field:

- 1) Environmental Systems Research Institute (ESRI) www.esri.com
- 2) ERDAS www.erdas.com
- 3) ITT Visual Information Solutions (ITT) www.itvis.com

(See Appendix B for letters from the three vendors about the site license.)

The site license allows for full use of the three companies' software at all 8 universities and all 15 community and junior colleges. Each MRC campus coordinator has the authority to copy and distribute the software as necessary on all computers at their university and all their assigned non-MRC IHL sites. Use of the software is limited to purely educational and research purposes. The entire list of software available for use under the software site license is on the next page.

ESRI

Since August 2010, ESRI has created sub-customer numbers for each MRC with an online interface system to allow the hub coordinators to more easily keep up with the licensing, training, and technical requests from their own and their satellite campuses. The site license administrator has access to all of the hub customer interfaces to help in technical issues as well as generate system-wide reports.

In October 2011, ESRI added several software packages including Business Analyst and Workflow Manager at no extra cost.

ERDAS /Intergraph

In 2010, added more options to their Core package without increasing the cost. In fact, they reduced the cost of the Core package from \$24,084 to \$18,574 per license. In August 2011, Erdas was purchased by Intergraph. All contracts have been renewed and full support has been maintained.

ITT

reduced the costs of the ENVI+IDL Core package from \$1894 to \$1820 per license.

The above adjustments were reflected in another significant drop in the product value from over \$24 million in 2009 to \$16.3 million this year. **NOTE: Product value represents the cost of individual faculty purchasing software licenses/extensions outside of a campus-wide agreement.** However, the lower cost per license will allow more of the general public to purchase this software increasing the number of workforce users statewide. The current \$16.7 million in product value using the site license, still results in an outstanding cost-benefit ratio.



FY12 Site License Software

ESRI

ArcGIS ArcView Desktop (3.x, 9.x, 10.x) Single Use and Concurrent

ArcGIS ArcEditor Desktop (9.x, 10.x) Single Use and Concurrent

ArcGIS ArcInfo Desktop (9.x, 10.x) Single Use and Concurrent

ArcGIS extensions - Spatial Analyst, 3D Analyst, Geostatistical Analyst, Tracking Analyst, Publisher, Schematics,
ArcScan, Maplex, Network Analyst, Workflow Manager, VBA

ArcGIS Server (SDE) - Advanced Enterprise with Extensions

ArcGIS Server (SDE) - Advanced Workgroup with Extensions

ArcGIS Server Extensions - 3D, Geostatistical, Network, Spatial, Geoportal, Image, Schematics, Workflow Manager

ArcIMS

ArcPad/ArcGIS Mobile

ArcLogistics

ArcGIS Engine Developer Kit (EDN)

Production Mapping with Data Reviewer

Business Analyst (Desktop Premium, Server, and Online Premium)

ERDAS

Imagine Core (Includes Professional, Vector, VGIS, Easytrace, ER Mapper, ECW Compressor, IMAGINE Radar Interpreter,
IMAGINE Ortho Radar, StereoSAR DEM, NITF, Leica Mosaic Pro, IMAGINE Autosync)

ArcGIS Extensions (Includes Image, Stereo Analyst, Terrain Editor, and Feature Assist)

IMAGINE Objective

LPS Photogrammetry Suite (Includes Core, Terrain, ATE, Stereo, Image Equalizer, Pro600 for LPS/DPW, SA for IMAGINE)

ATCOR

Toolkit

HEAK Apollo

ITT / RSI

ENVI+IDL

List of software available under the current FY 12 software site license.

Including software extensions and modules, almost 30,000 licenses have been issued since the program began in 1999. Figure 2 illustrates the history of license usage over the past twelve years. With over 1000 licenses utilized in 1999, the program has increased to a peak of over 3400 in 2006 then leveling off the past two years around 2500. This chart includes the number of core licenses or the main products of each software company. These numbers do not include the extension modules that are used for specific purposes. The numbers of extensions used on campuses dramatically increased until 2007 then leveled off over the past few years.

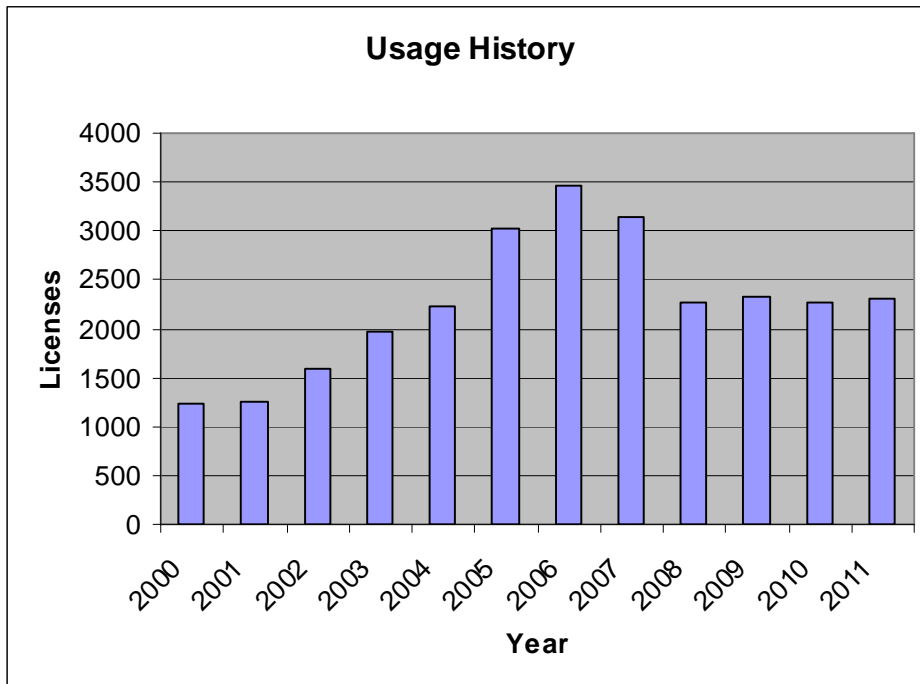


Figure 2

As more interest in a wider diversity of disciplines develops at the community college level and with the smaller universities, the number of both the core and extension modules is expected to rise. This will result in additional departments and areas of study exposing students and their communities to the capabilities of GIS and remote sensing. However, this year with the budget crisis causing cuts in many colleges, the amount of resources allocated to this technology has decreased.

Figure 3 shows that the ESRI product line remains the most popular; followed by ERDAS' Imagine software, and ITT products. This reflects the growing availability of the ArcGIS products and the decrease in costs over the years. ESRI has a very extensive training system developed that allows users to take classes at their many branch offices, through Authorized Trainers at local sites and through their Virtual Campus system. This has allowed training of their software for both the educational and private sectors. There still exists a gap in the use of the ESRI products and the primarily raster based packages ERDAS and ENVI. This gap has been decreasing over the years as more campuses are getting involved in remote sensing which is the strength of both the Leica and ITT software. This past year, the number of core ESRI licenses increased while those for ERDAS and ITT actually decreased.

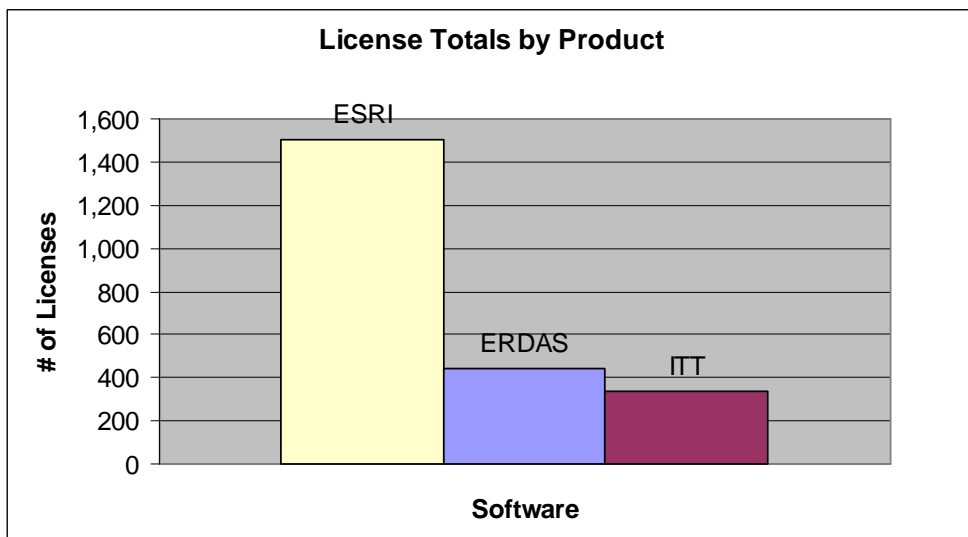


Figure 3

Depending on department, faculty expertise, and number of students, each IHL site has a varying number of active licenses for each product. Table 1 shows a breakout of core licenses at each IHL site including a total for community college usage as of September 2010. All three vendors require the renewal of licenses on a yearly basis. By September of each year, on most campuses, the GIS/remote sensing labs' licenses have been cleared from the previous school year's computers. Also, faculty members have determined the upcoming courses to be taught and estimated class sizes. They have then configured the lab servers and computers with the particular number of core software and extension licenses needed based on this evaluation. The Council determined that a September snapshot gives a more accurate look at the site license inventory for the upcoming school year on a particular campus.

Table 1 on the next page shows core licenses of each software package and the percentage of the total core licenses by each site. (A detailed chart showing extensions used on each campus is available. It was not included in this document due to the size of the chart). Table 1 also shows the product value of both the core licenses and extensions being used. This is the cost that each IHL site would have to pay to keep their current software configuration if the site license agreement was not renewed.

Table 1. IHL Site License Software - License Totals (2011-12 School Year)

<u>Description</u>	<u>UM</u>	<u>MSU</u>	<u>USM</u>	<u>JSU</u>	<u>ASU</u>	<u>DSU</u>	<u>UMMC</u>	<u>MVSU</u>	<u>MUW</u>	<u>C/JC</u>	<u>Totals</u>
<u>ESRI</u>	381	358	241	173	30	60	74	22	0	168	1,507
<u>ERDAS</u>	101	100	80	63	30	10	11	0	0	50	445
<u>ITT</u>	96	81	46	54	0	31	11	10	0	20	349
TOTALS:	578	539	367	290	60	101	96	32	0	238	2,301
Percentage:	25.12	23.42	15.95	12.60	2.61	4.39	4.17	1.39	0.00	10.34	100
Product Value:	\$4,626,417	\$4,505,070	\$1,757,090	\$2,603,642	\$564,720	\$583,190	\$563,837	\$53,400	\$0	\$1,066,950	\$16,324,316

III - Funding

Current Funding - FY12: (July 2011 – June 2012)

The statewide site license program provides all university and community college students, professors and staff with unlimited access to the industry leading software used in the Geospatial Information Science and Technology (GIS & T) industry. This program has helped the educational institutions in Mississippi establish a wide range of GIS&T educational and research activities. **Mississippi was the first state in the nation to establish such a program** and is one of only a few existing in the country. Our program is still used as the model by ESRI Incorporated, the leading maker of GIS & T software.

During the 2011 MS Legislative session, Dr. Hank Bounds, Commissioner of IHL and Dr. Eric Clark, Executive Director of MCCB (formerly SBCJC), recommended to the Legislature an equitable distribution of obligations for costs of the site license. As a result, Senate Bills 3032 and 3041 were passed and signed by the Governor to provide funding for FY12 geospatial site licenses. This will serve as a model for upcoming years' funding.

SB 3041 - Section 17 provides the Mississippi Community College Board (MCCB) with **\$37,626** for their portion of the FY12 site license costs. *This amount has been invoiced and received from MCCB the end of July, 2011.*

SB 3032 – Section 28 provides the universities' total of **\$197,536** for their portion of the FY12 site license costs. This year, each university's budget contained their portion as follows:

University of Mississippi (including UMMC) – \$ 47,032.40
Mississippi State University - \$ 37,626.00
University of Southern Mississippi – \$ 37,626.00
Jackson State University – \$ 37,626.00
Alcorn State University – \$ 9,406.40
Delta State University – \$ 9,406.40
MS Valley State University – \$ 9,406.40
MS University for Women - \$ 9,406.40

Each campus was invoiced and monies received to cover software costs.

The funding has been used to secure software access for all university and community college students, faculty, and staff through the following dates:

- 1) ITT – paid through August 2012
- 2) ERDAS – paid through October 2012
- 3) ESRI – funds are in the account to pay through February 2013

Funding History: (1999 – 2010)

From 1999 to June 2005, the cost of the site license agreement was funded through a grant from the National Aeronautics and Space Administration (NASA) facilitated by the Mississippi Space Commerce Initiative (MSCI) subsequently by the Enterprise for Innovative Geospatial Solutions (EIGS). The program has been administered by MARIS since July 2002 through a contract with MSCI, then EIGS, then SBCJC. When the Council learned in 2004 that NASA funds would not be available after June 2005, it developed a way to divide the costs of the site license program among the universities and the State Board for Community and Junior Colleges (SBCJC) for FY06.

It was agreed that each university, including the University of Mississippi Medical Center (UMMC) and the SBCJC, would contribute payment based on the number of core licenses at that campus. In December 2004, the Remote Sensing Council approved a request for \$297,800 in costs - \$267,800 for software and \$30,000 for contract administration and technical support through MARIS. This was approved by the CAOs at their next meeting. The CAOs subsequently received approval from their respective presidents.

The Council then decided that MARIS would initiate contracts with each entity for their portion of the software and administrative costs. Contracts were developed, sent to the presidents, signed, and invoices were sent for the amount specified. The Board offices created a separate fund for storing of these monies and for payments to the software vendors. Each fall, a representative member of the Council will report software usage for their university or community college to the four MRC Coordinators. This information is reported to the site license administrator to generate the site license report.

A trend developed quickly that the four MRC sites- JSU, UM, MSU, and USM- along with the Community/Junior Colleges were using a significant number more licenses than the non-MRC universities – DSU, ASU, MVSU, MUW, and UMMC. Also, the number of licenses among the MRCs and Community/colleges were comparable to each other and the non-MRC university numbers were also comparable to each other. It was proposed, at the November 2006 Council meeting, that an 80-20 division of costs should be adopted to allow entities to budget yearly for a certain amount for their share of costs. The costs for school year 2006-2007 (FY07) were \$240,000 which included \$215,000 for software and \$25,000 for MARIS administration costs. With an 80-20 split, the costs for the MRC universities and SBCJC were to be \$40,000 each and the costs to the non-MRC sites were to be \$8,000 each.

In 2006, payment was received from the universities and the SBCJC. When NASA funding ended, the University of Mississippi formed the EIGS - funded by the Mississippi Legislature, through the Mississippi Development Authority (MDA). EIGS was able to secure funding to cover the costs of the 2006 site license expenses. Monies were sent back to the IHL entities. EIGS, through their appropriations funded the statewide site license program from 2006 - 2009. In 2009, EIGS received only \$205,000 for the software. Through monies saved in the IHL fund and help from MARIS, the full software costs were covered. In 2010, EIGS was unable to fund the site license for FY11. In June 2010, the MS Legislature obligated the SBCJC budget to cover \$230,000 towards the site license for FY11. This did not cover the entire \$235,162 required so MARIS agreed to cover the remaining \$5,162.

Funding Recommendations for FY13: (July 2012 – June 2013)

The total cost of the software for Fiscal Year 2013 (FY13) is **\$235,162** as stated earlier. MARIS has agreed to continue administrating the site license as a service function to higher education.

FY13 Legislative funding is expected to be based on FY 12's funding bills SB 3032 and 3041 as per the explanation in the Current Funding section above. Obligations should be the same at each institution as follows:

IHL Entities - \$197,536

University of Mississippi (including UMMC) – \$ 47,032.40
Mississippi State University - \$ 37,626.00
University of Southern Mississippi – \$ 37,626.00
Jackson State University – \$ 37,626.00
Alcorn State University – \$ 9,406.40
Delta State University – \$ 9,406.40
MS Valley State University – \$ 9,406.40
MS University for Women - \$ 9,406.40

MCCB (formerly SBCJC) - \$37,626

TOTAL \$235,162

IV - Cost Benefit Analysis

The costs to IHL for the site license software under the existing statewide license program are as follows:

- 1) **ESRI** - \$115,000 per year for software, maintenance, and technical support
- 2) **ERDAS** - \$100,000 per year for software and technical support
- 3) **ITT** - \$20,162 per year maintenance and one year of technical support.

TOTAL: \$235,162 / year

Cost benefit analysis of the site license program will be made using the three possible cost schemes available to the campuses:

- Product Value** – Individual faculty pricing per license/extensions
- Campus-Wide Pricing** – Individual campus-wide vendor agreements
- Existing Statewide Site License Pricing and Savings-** Current program

The following shows details about the product value for individual pricing, then an explanation of campus-wide pricing available, then the existing system wide program. It concludes with savings based on the current site license over the estimated individual campus-wide pricing.

Product Value

As stated earlier, product value is **the amount per license/extension that an individual professor/staff would pay without any cost savings from either a campus-wide agreement or the existing statewide site license program.**

Table 3 on the next page shows the different software modules and extensions for each vendor along with the normal educational unit cost. This cost includes one year of maintenance and technical support. The next column shows the total number of licenses active at all the IHL sites then its total product value. The total product value for FY12 is over **\$16.3 million.**

Table 3. IHL Site License Software Value Nov. 2011

Includes Software plus 1 year maintenance

<u>Description</u>	<u>Val/Lic.</u>	<u>No. Licenses</u>	<u>Product Value</u>
ESRI (Brenda 11-11)			
I- ArcGIS ArcView Desktop (3.x, 9.x , 10.x) Single + Conc.	\$250	82	\$20,500
II- ArcGIS ArcEditor (9.x and 10.x) Single + Conc.	\$250	30	\$7,500
III- ArcGIS ArcInfo Desktop (9.x and 10.x) Single + Conc.	\$250	1395	\$348,750
3-D Analyst	\$150	1204	\$180,600
Geostatistical Analyst	\$150	1141	\$171,150
Network Analyst	\$150	1204	\$180,600
Publisher	\$150	1141	\$171,150
Schematics	\$150	1011	\$151,650
Spatial Analyst	\$150	1224	\$183,600
Tracking Analyst	\$150	1011	\$151,650
ArcScan	\$150	1011	\$151,650
Maplex	\$150	1011	\$151,650
Workflow Manager	\$150	611	\$91,650
ArcGIS Server - Advanced Enterprise	\$1,000	68	\$68,000
ArcGIS Server - Advanced Workgroup	\$2,000	1	\$2,000
ArcIMS	\$1,000	2	\$2,000
ArcPad	\$75	18	\$1,350
ArcLogistics	\$1,000	14	\$14,000
ArcGIS Engine Developer Kit (EDN)	\$750	18	\$13,500
Production Mapping (with Data Reviewer)	\$1,000	271	\$271,000
Business Analyst	\$500	5	\$2,500
<u>ESRI Totals (I-III)</u>			\$2,336,450
ERDAS (Diane 10-10)			
Professional License Core	\$18,574	445	\$8,265,430
ArcGIS Extensions	\$700	222	\$155,400
IMAGINE Objective	\$2,438	222	\$541,236
Leica Photogrammetry Suite	\$13,650	286	\$3,903,900
ATCOR2 & ATCOR3	\$1,885	212	\$399,620
Toolkit	\$1,950	11	\$21,450
HEAK Apollo	\$32,825	2	\$65,650
<u>ERDAS Totals</u>			\$13,352,686
ITT (Laura 10-10)			
ENVI+IDL	\$1,820	349	\$635,180
TOTAL -			\$16,324,316

Figure 5 shows the product value of the software site license over the past eight years.

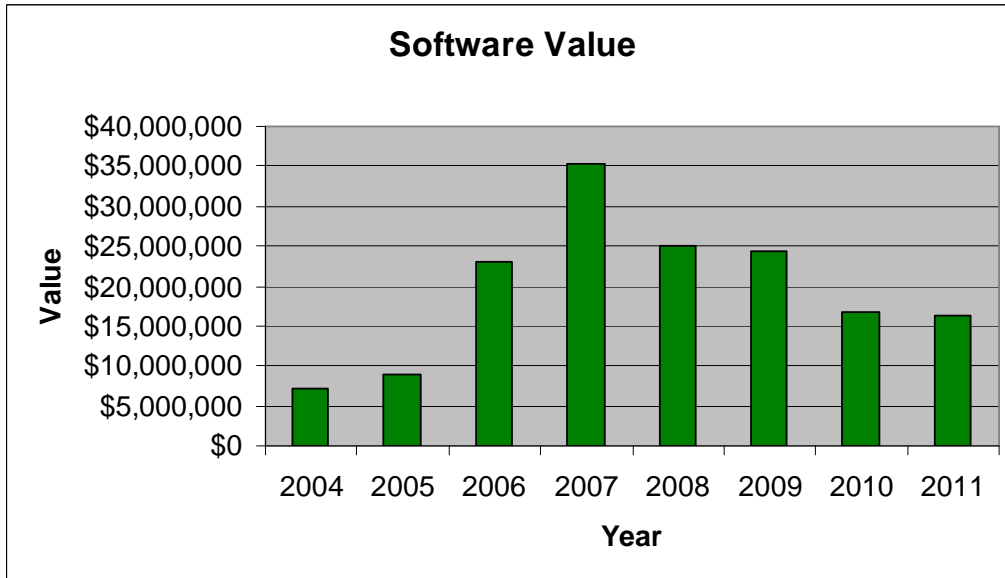


Figure 5

Product Value Breakout by Vendor (2011-2012)

ESRI

There are 1,507 core licenses at a value of \$ 376,750
 The 10,961 extensions have a value of \$ 1,959,700
TOTAL Non-Contract value \$ 2,336,450

ERDAS

There are 445 core licenses at a value of \$ 8,265,430
 The 955 extensions have a value of \$ 5,087,256
TOTAL Non-Contract value \$13,352,686

ITT

There are 349 core licenses at a value of \$ 635,180

Total Product Value - \$16,324,316

Campus-Wide Pricing

Over the past several years, the three vendors have developed discount pricing available to institutions based on campus-wide programs.

ESRI has recently re-calculated their campus-wide licensing program based on the total number of students on each campus. This allows the same benefits of the existing statewide license program including virtual campus training, technical support, and unlimited licenses of all core products and most of the available extensions.

Erdas bases their campus pricing based on three products a) Core – including most of the essential modules, b) Add-ons – including ATCOR, IMAGINE Objective, Toolkit, and LPS Photogrammetry Bundle, and c) ARCGIS Extension. Savings is based on number of seats required of each of the three major products.

ITT also bases their campus pricing on the number of seats of their ENVI+IDL product. Volume pricing breaks are given on multiple seat licenses.

Below is a detailed description of costs to a university for campus wide license agreements available from each vendor.

I. ESRI - *Pricing based on Total Students on Campus*

Ole Miss: \$25,000	Miss State: \$25,000	Southern Miss: \$25,000
Jackson State: \$15,000	Alcorn State: \$10,000	Delta State: \$10,000
Miss Valley: \$10,000	UMMC: \$10,000	MUW: \$10,000
Community Colleges: are \$5,000 each		

II. ERDAS – *Based on Number of Seats*

a) Core Software –

5 Seats - \$1,500/yr	60 Seats - \$7,500/yr
15 Seats - \$3,500/yr	100 Seats - \$10,000/yr
30 Seats - \$5,000/yr	500 Seats - \$20,000/yr

b) Add-ons including ATCOR, IMAGINE Objective, Toolkit and LPS Photogrammetry Bundle

5 Seats - \$ 500/yr	60 Seats - \$2,000/yr
15 Seats - \$1,000/yr	100 Seats - \$2,500/yr
30 Seats - \$1,500/yr	500 Seats - \$5,000/yr

c) ArcGIS Extensions

25 seats - \$1,725/yr

III. ITT – *Based on Number of Seats*

ENVI+IDL + 1 year Support

1 Seat - \$1,820/yr 10 Seat - \$7,000 25 Seat - \$10,000 50 Seat - \$13,000

Figure 6 on the next page shows a breakout of software cost requirements by vendor for each IHL entity to duplicate existing configuration using campus-wide pricing estimates.

FY12 Software Costs per IHL Entity -

Individual Campus Licensing

(Based on 2011 numbers and vendor's pricing)

		ESRI			
		Unlimited Campus-wide License			
<u>Campus</u>			<u>Costs \$</u>		
UM			\$25,000		
MSU			\$25,000		
USM			\$25,000		
JSU			\$15,000		
ASU			\$10,000		
DSU			\$10,000		
MUW			\$10,000		
MVSU			\$10,000		
UMMC			\$10,000		
C/JC			\$35,000	(7 colleges at \$5,000 /campus)	
TOTAL -			\$175,000		

Erdas							
pricing is based on # of seats (discounts given for multiple licenses)							
<u>Campus</u>	<u># Core</u>	<u>Core \$</u>	<u>Add-On</u>	<u>Add-On \$</u>	<u>Arc Ext</u>	<u>Arc Ext \$</u>	<u>TOTAL</u>
UM	101	\$11,500	303	\$7,500	101	\$8,625	\$27,625
MSU ^	100	\$30,000	300	\$7,500	100	\$6,900	\$54,400
USM	80	\$10,000	1	\$500	0	\$0	\$10,500
JSU	63	\$9,000	0	\$0	0	\$0	\$9,000
ASU	30	\$5,000	0	\$0	0	\$0	\$5,000
DSU	10	\$3,000	10	\$1,000	10	\$1,725	\$5,725
UMMC	11	\$3,500	22	\$2,000	11	\$1,725	\$7,225
MVSU	0	\$0	0	\$0	0	\$0	\$0
MUW	0	\$0	0	\$0	0	\$0	\$0
C/JC	50	\$7,500	0	\$0	0	\$0	\$7,500
TOTAL -							\$126,975

^ Includes 2 HEAK Apollo at \$10,000 each

ITT		
pricing is based on # of seats (discounts given for multiple licenses)		
<u>Campus</u>	<u># Core</u>	<u>Core \$</u>
UM	96	\$26,000
MSU	81	\$26,000
USM	46	\$13,000
JSU	54	\$20,000
ASU	0	\$0
DSU	31	\$13,000
UMMC	11	\$8,820
MVSU	10	\$7,000
MUW	0	\$0
C/JC	20	\$10,000
		\$123,820

Figure 6

Existing Statewide License Program Pricing and Savings

The existing site license program allows for unlimited licenses of the core and most of their extensions of the three vendors. The agreement allows for free online training. ESRI even includes free registration for the yearly user conference in San Diego for up to 20 faculty/staff/students per year. The unique agreements have been offered at a tremendous savings over the product value and also a significant savings over individual campus-wide licenses. It is also beneficial to the vendors to have the structure of a statewide program for administration - one contract for the state with each vendor and 5 major points of contact including the 4 MRC coordinators and the site license administrator.

Figure 7 shows savings using the existing statewide license program over the campus-wide pricing. The chart shows total system-wide savings is **\$190,633**.

TOTAL Savings for Using IHL Site License

<u>Campus</u>	<u>Ind. Costs</u>	<u>80/20</u>	<u>Savings</u>
UM	\$78,625	\$37,626.00	\$40,999
MSU	\$105,400	\$37,626.00	\$67,774
USM	\$48,500	\$37,626.00	\$10,874
JSU	\$44,000	\$37,626.00	\$6,374
ASU	\$15,000	\$9,406.40	\$5,594
DSU	\$28,725	\$9,406.40	\$19,319
UMMC	\$26,045	\$9,406.40	\$16,639
MVSU	\$17,000	\$9,406.40	\$7,594
MUW	\$10,000	\$9,406.40	\$594
C/JC	\$52,500	\$37,626.00	\$14,874
	<hr/>	<hr/>	<hr/>
	\$425,795	\$235,162.00	\$190,633

Figure 7

V - Training

Along with the tremendous savings in cost of the software to the IHL system, there is an additional benefit to faculty, staff and students from the training available through the site license.

I - ESRI www.esri.com has a Virtual Campus that allows the hub coordinators to set up a wide variety of short courses that can be taken by the student over the web. Under the current site license agreement, the hubs can set up unlimited classes at no extra costs to IHL. There are currently 71 self-study classes. Once a class is initiated, any person on Campus can take the class online at their convenience. Each learning module takes an average of three hours to complete.

Usage statistics from ESRI report that between February 22 and November 3, 2011 approximately **265** classes were set up at the various MS IHL campuses for a value of **\$23,072**. Some of the most popular online courses among MS IHL students are:

Learning ArcGIS Desktop 10, Customizing ArcGIS Desktop 9, Creating and Editing Topology with ArcGIS Desktop, Cartographic Design Using ArcGIS 9, and Understanding Map Projections and Coordinate Systems and Turning Data into Information Using ArcGIS 9.

Also, several faculty members are ESRI certified instructors. This allows them to offer classes at off-campus sites that are more accessible to the general public. As an example, Dr Scott Samson through the GeoResources Institute at Mississippi State has developed a curriculum of classes available via a portable classroom at little or no costs to local and state government employees in Mississippi.

II - ERDAS www.erdas.com provides a 30% discount on all onsite and online classes.

Courses include: *Fundamentals of Erdas Imagine I and II, Multispectral Classification, Spatial Modeling, and Developer's Toolkit*. There are also free web seminars throughout the year available to all students on a wide variety of ERDAS modules.

III - ITT www.itvis.com/training provides classes at various sites across the country.

They will also customize classes to be taught at an IHL university or MARIS at a reduced price. ITT also has both live and recorded web seminars on ENVI and IDL specific uses of each. Also, all new versions of ENVI and IDL are completely downloadable via the internet. Announcements are sent to the Hub coordinators and the site license administrator when updates are available.

Courses Available at IHL Sites

Once faculty and staff are trained in various software modules, classes are offered as part of the curriculum for many departments of many of the IHL sites. The following is a summary of the courses available at the IHL sites this year. Most universities offer at least introductory classes in remote sensing and/or geographic information systems. Some universities offer extensive courses in the technology at the undergraduate and graduate level. These courses help prepare students to enter the work-force able to meet the demands of the GIS/RS field or aid in advancing the careers of employees by expanding their knowledge/skill base.

The following is a summary of courses available at the universities and community colleges:

Universities

Alcorn State University

9 on-campus courses

Delta State University

18 on-campus and online courses

Course Title	Mode Offered	2009-2010 AY Enrollment
Computerized Mapping and Cartography	On Campus	26
Computerized Mapping and Cartography	Online	16
Introduction to Geospatial Science and Technology	On Campus	123
Introduction to Geospatial Science and Technology	Online	46
Digital Image Processing	Online	9
Aerial Photographic Interpretation	Online	7
Advanced Geographic Information Systems	On Campus	11
Advanced Geographic Information Systems	Online	5
Spatial Solutions to Natural Resource Issues	On Campus	9
Business Geographics	Online	12
Geospatial Data Synthesis and Modeling	Online	5
Community Growth	Online	2
GIS Capstone	On Campus	35
Remote Sensing	Online	16
Applications of Remote Sensing to Ecological Modeling	Online	1
Agricultural Applications for Remote Sensing	Online	1
Remote Sensing of Water	Online	2
Forestry Monitoring and Management	Online	1
Total On Campus Enrollment		204
Total Online Enrollment		123
Total Enrollment		327

Jackson State University

4 on-campus courses, 5 workshops

- Introduction to Remote Sensing for Environmental Science (BIO617/ENV717; every Spring)
- Application of Remote Sensing in Environmental Science (BIO618/ENV718; every Fall)
- Earth System Science and Global Climate Change (SCI 228)
- Image Processing (CSC 800)
- Basics of Earth System Science using GIS and GPS. Jun 14-17, 2010, e-Center, JSU, Jackson, MS
- Learning Remote Sensing using ENVI. Dec 10-12, 2009. e-Center, JSU, Jackson, MS
- Learning Remote Sensing using ENVI. Dec 11-12, 2008. e-Center, JSU, Jackson, MS
- Learning Remote Sensing using ERDAS Imagine 9.2, May 8-10, 2008. e-Center, JSU, Jackson, MS.
- Remote Sensing and Geospatial Science Workshop, Dec 14th, 2007. e-Center, JSU, Jackson, MS.

Mississippi State University

31 on-campus and online courses

Main campus courses:

GPS/GIS

- Ag and Bio Engineering (ABE) GPS/GIS
- Forestry (FO) GIS Natural Resource Management
- Geosciences (GR) Geospatial Applications
- GR Intro to Geodatabases
- GR Principles of GIS
- GR Advanced GIS
- GR GIS Programming
- Landscape Arch. (LA) GIS Application in LA
- Plant and Soil Science (PSS) Geospatial Technologies in Agronomic Applications

Remote Sensing

- ECE, PSS, FO, ABE Intro to Remote Sensing (This is one course that can be used for credit in different departments)
- ECE, PSS, FO, AGE Remote Sensing Seminar (Same as above)
- FO, PSS, ECE, GR Remote Sensing (Same as above)
- FO Remote Sensing Lab
- FO Remote Sensing Applications
- GR Maps in Remote Sensing
- GR Remote Sensing of the Physical Environment

Online Courses:

- GR Principles of GIS
- GR Advanced GIS
- GR Remote Sensing of the Physical Environment

MS Valley State University

1 on-campus course

University of Mississippi

15 on-campus and online courses

University of Mississippi Med Center

4 on-campus courses

University of Southern Mississippi

23 on-campus courses

MARIS

3 classes scheduled for spring 2012

Community / Junior Colleges

Hinds

8 on-campus courses

Itawamba

1 on-campus course

MS Delta

15 on-campus courses

Northwest

4 on-campus courses, 14 workforce classes – 110 students

Pearl River

3 on-campus courses, 9 workforce classes

Jones Junior

4 on-campus courses – 64 students

VI - Applications

Along with the tremendous savings in cost of the software to the IHL system, there is great benefit to faculty, staff and students from the use of the software. GIS/Remote sensing has become part of daily life at most of the campuses. The software is being used as part of curriculums and used in research applications by faculty and staff as well as in thesis work by both undergraduate and graduate students. Also, grants have been awarded to universities based on availability of the software and knowledge base of faculty and students.

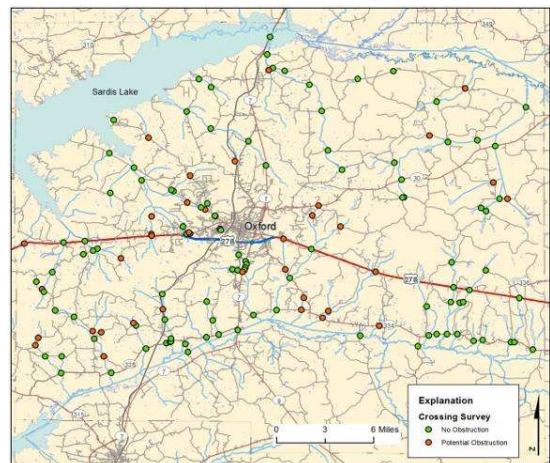
The descriptions below are just a sample of the various uses of this software and are by no means a complete listing.

I. University of Mississippi

Yazoo Darter Road Crossing Project:

The University of Mississippi as part of a US Fish and Wildlife Service (USFWS) project is mapping and classifying road / stream crossing in the upper drainage basins for the Little Tallahatchie and Yocona Rivers. The project is a multi-phase effort to identify barriers to fish passage up stream. The ultimate goal is to identify crossing that can be remediated to recover the upstream channel as potential habitat area for the Yazoo Darter. The small fish is considered a "species of interest" and hopes are to keep it off of the threatened or endangered species listing by recovering habitat now and expanding the genetic diversity of the breeding population. ESRI licenses are being used for this project.

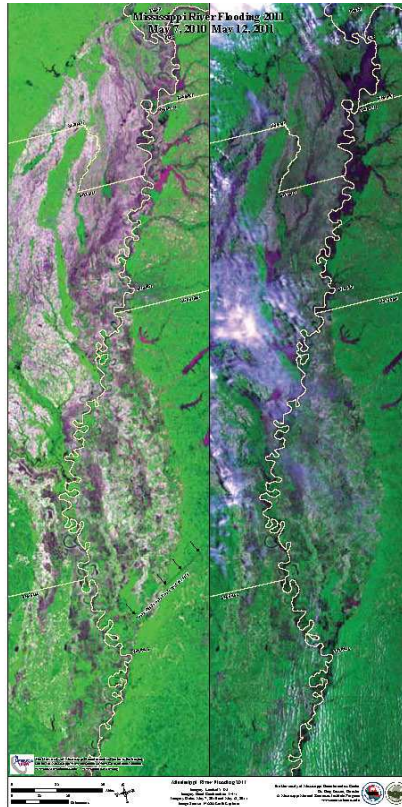
Example Obstruction: Concrete Box Culvert – created a 8-12" drop that makes upstream passage impossible for small fish.



Phase 1: Crossing Map

2011 Flood Imagery:

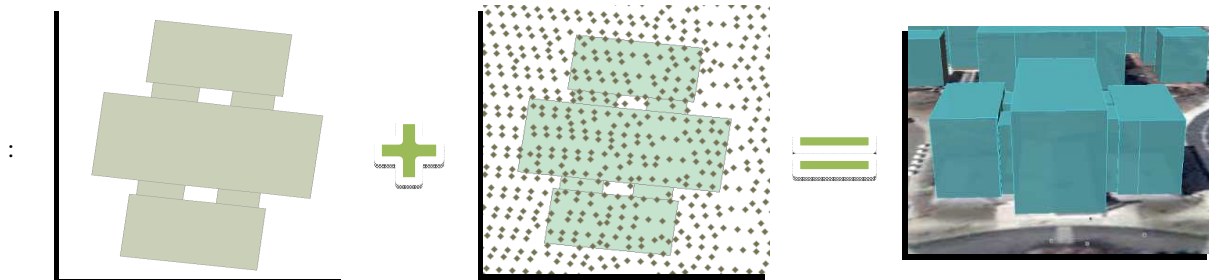
As part of a student project – a large poster was produced showing the annual flooding occurring along the Mississippi River comparing 2010 to the record flooding in 2011. The poster uses LandSAT data from May of both years. The poster has been printed and made available to local schools. ERDAS and ESRI licenses were used to complete this project. Small Version of Poster (130mb pdf available upon request):

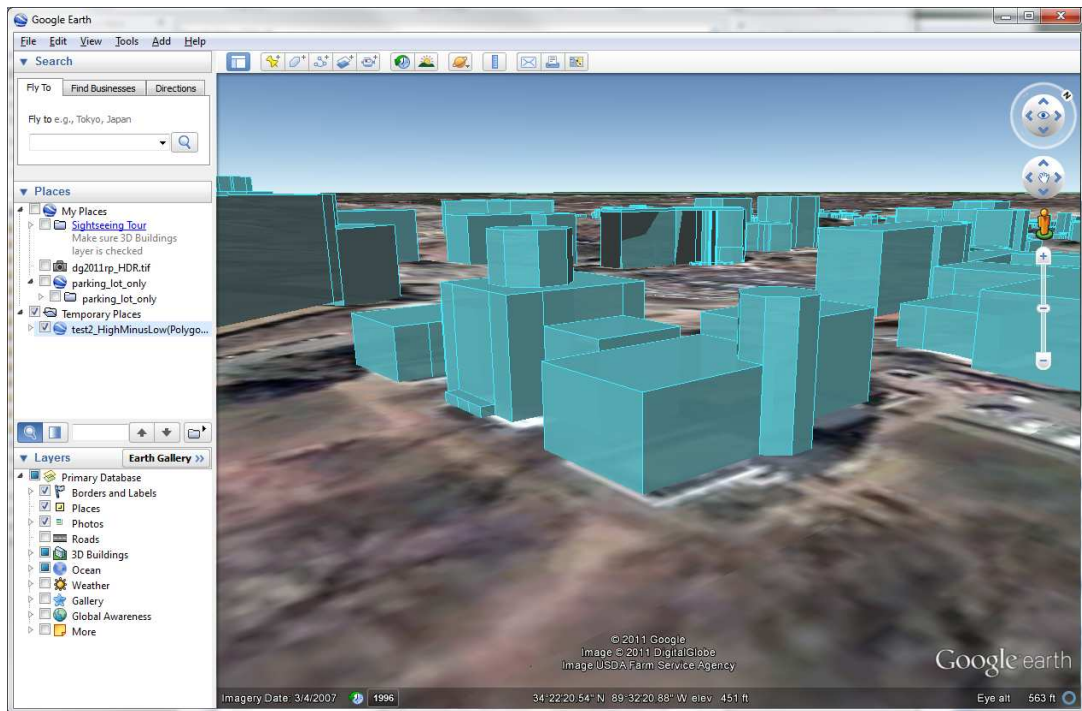


LiDAR Building Height Extraction:

As part of a student project in the computer sciences department, LiDAR data from Oxford, MS was processed and evaluated to generate and assign building heights to existing building footprints. The focus area was on the campus of the University of Mississippi and surrounding area and involved several thousand buildings. Over 2 million LiDAR points were processed for the study area. The unique aspect of the process involved the mathematical sampling of the data to reduce the handling time and processing to less than 5 seconds for the dataset. ESRI licenses were used to complete this project.

Process:





3D Representation of Multi-height Building Footprint

GIS Investigation of Regional Geologic Controls on Mercury Deposits in Arkansas:

As part of a graduate Master’s Thesis, a student analyzed elevation data and imagery to investigate geological controls on the deposition of mercury deposits in Arkansas. The goal of this Master’s thesis project is to use Geographic Information Systems (GIS) to determine which mode of deposition (structural features or lithologic changes) better explains the linear depositional pattern of mercuric minerals within the Arkansas mercury district by examining which potential control mechanism is closer to the deposit locations. Presumably, the closer a controlling mechanism is to the site of deposition, the more influence it will have on the deposit location. ERDAS, ESRI and ENVI licenses were used to complete this project.

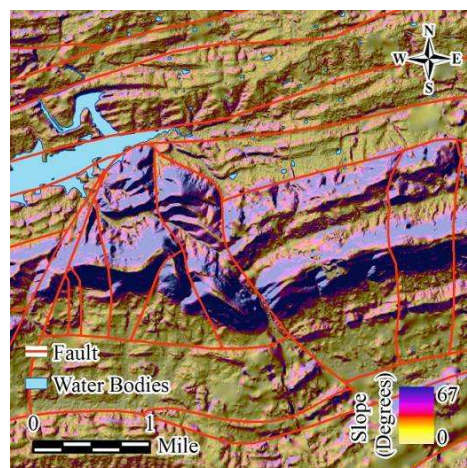
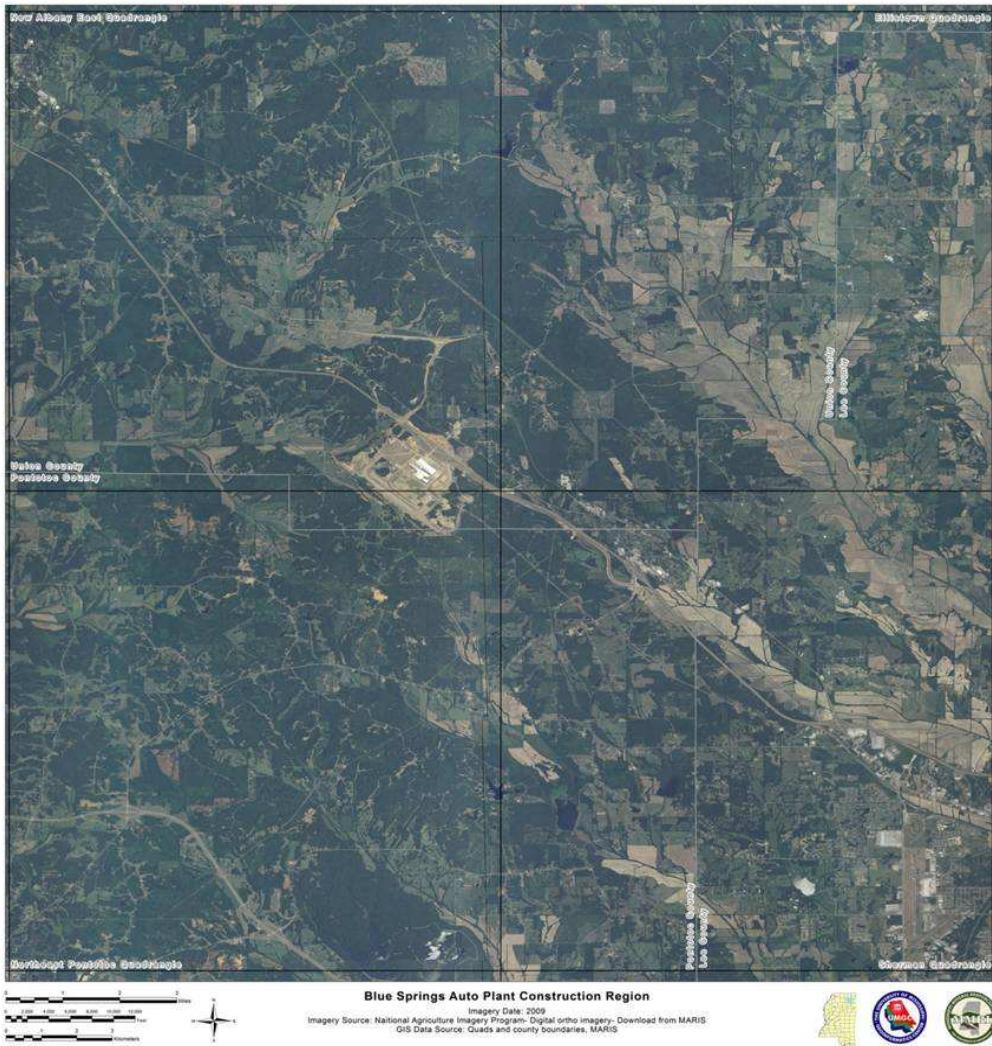


Figure: Relationship between Slope and Faulting – Higher sloped area are sandstone while lower sloped areas are typically shale with thin bedded sands.

Geologic Mapping and Engineering Hazard Assessment – Blue Springs, MS:

The construction of the Toyota vehicle manufacturing plant in Blue Springs, Mississippi, will likely initiate rapid economic growth in the Lee, Union, and Pontotoc area. Sighting a manufacturing plant in a rural setting presents the opportunity to develop information that can be used for well-planned economic development that recognizes constraints of the natural environment as well as the constraints / advantages of the local infrastructure. With appropriate information, economic development could be focused in geographic areas that will minimize geological / environmental concerns and maximize the long-term well-being of the development. The Mississippi Mineral Resources Institute at the University of Mississippi is conducting research to develop and compile a series of GIS data sets that will be readily available use in further economic development. This includes new geologic mapping efforts and engineering hazard maps for the area. ERDAS and ESRI licenses are being used to complete this project.



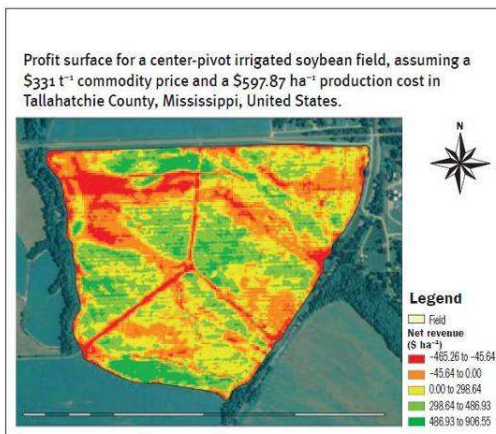
Aerial Imagery of Study Area

II. Mississippi State University

For the 2011 Fall and Spring semesters, 12 geospatial classroom courses are offered. There are 448 seats available and for the two semesters actual attendance for the 12 courses is 343 students. This results in a class attendance of approximately 77%. The number of courses available and the percentage of students taking the courses clearly show the emphasis Mississippi State University puts on geospatial education.

Semester	Department	Course	Code	Seats	Actual Attendance
Fall	Electrical and Computer	Intro to Remote Sensing	ECE 4423/6423	30	15
	Foestry	Remote Sensing	FO 4411/6411	20	21
	Forestry	Spatial Tech Natural Resource Mgt	FO 4313/6313	60	24
	Geography	Principles of GIS	GR 4303/6303	100	91
	Geography	Remote Sensing of the Environment	GR 4333/6333	30	30
	Plant and Soil Sciences	Geospatial Agronomic Mgt	PSS 4373/6373	20	20
		Remote Sensing Seminar		20	11
Spring	Forestry	Remote Sensing Applications	FO 4452/6452	20	23
	Forestry	GIS Natural Resource Mgt	FO 4451/6451	20	11
	Geography	Principles of GIS	GR 4303/6403	60	49
	Geography	Advanced GIS	GR 4313/6413	25	21
	Geography	GIS Programming	GR 4363/6363	25	9
	Wildlife and Fisheries	GIS & GPS in Wildlife Mgt	WF 4253/6453	18	18
			Totals =	448	343

Student Success Stories

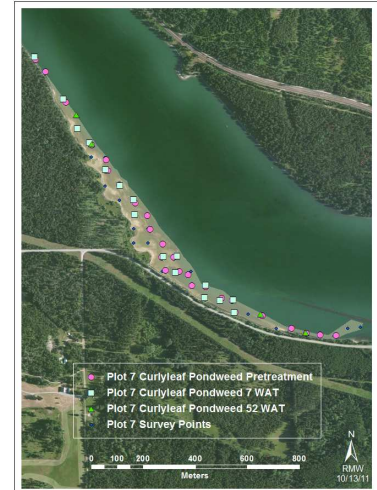


Mark McConnell was a M.S. student in the Department of Wildlife, Fisheries, and Aquaculture. Graduated in Spring 2010. His research was focused on spatially-explicit optimization of conservation and row crop production in agricultural systems. As part of his research he developed an ArcInfo Script that operates as a plug-in on the tool bar. This tool does 2 things. First it uses eligibility criteria based on spatial relationships to define conservation buffer practices enrollment opportunities for croplands under the Conservation Reserve Program. Secondly, it uses

spatially explicit yield data from GPS-guided combines,

coupled with crop production budgets to produce spatially explicit yield surfaces, and then illustrates currently cropped regions that would be more profitable to enroll in a conservation program. Mark's work is published in the November/December 2011 Journal of Soil and Water Conservation. The tool Mark developed can be found on the Geosystems Research Institute website www.gri.msstate.edu

Ryan Wersal, Research Associate, with the Geosystems Research Institute was awarded the Outstanding Graduate Student Award at the Aquatic Plant Management Society's 50th annual meeting. Mr. Wersal becomes the first recipient of the award. Some of Mr. Wersal's recent research has included Aquatic Plant Management Methods in the U.S. and Geographic Information Systems (GIS) for Aquatic Plant Management. The annual meeting was held July 11-14, 2011 in Bonita Springs, FL.



Community Service

Are you interested in having detailed information about the status of your community at your fingertips? Want to compare your county's graduation rates, test scores, and early care and education options to other areas of the state? Now you can download individualized KIDS COUNT fact sheets for all 82 Mississippi counties. Easily printable, these colorful fact sheets may be used at economic and community development workshops, in welcome packets for newcomers in your community to read or as useful information when preparing grant proposals.

<http://www.ssrc.msstate.edu/mskidscount/>

Below are testimonials from developers of MS KIDS Count and other social information about Mississippi.

“While I do not know about how to use GIS software, I can attest that the visualization of data is important to all our research projects. The production of the MS KIDS COUNT Databook would not be possible, without this technology.” – Linda

“We used the software to create maps showing state-level distracted driving policies (i.e., laws restricting cell phone use, texting, etc.)” -- Ginger

“Yes, I use GIS software for every project I work on essentially. RWJ, KIDS COUNT, Sex-education Implementation survey, Distracted Driving Report, Grant proposals and Briefs. Let me know if you would like examples of the ways we have used the program.” – Colleen

“We use the ESRI software to map all traffic citations issued through the Mississippi eCite System. Supervisors of the Mississippi Highway Patrol have access to a web-based “dashboard” which allows

them to map the citations issued in their region, district or by an individual trooper for the time frame they choose. None of these features were available before eCite, much less ESRI software. Currently, we are adding more agencies other than MHP, as well as taking crash data and mapping that data set.”
– Lee

“Our entire "Healthy and Unhealthy Places" research initiative (about 11 years in the making) is based on spatial analysis, including Arc GIS and GeoDa. We have about a dozen publications on the topic. Also, the annual MS KIDS COUNT data book (Colleen) makes extensive use of ArcGIS maps. So, we (the SSRC) are a very heavy user of ArcGIS and related spatial analysis software.” -- Ronald

Grant/research projects resulting from the software

Weather Research and Forecasting Modeling System

This research includes assimilation of NEXRAD radial winds in a regional mesoscale model and the use of Lagrangian models to estimate the transport and dispersion of gasses/particles over the Southeastern United States. It is our plan to provide daily plume (smoke) forecast information, as well as atmospheric wind and other conditions over the Gulf coast. Therefore, the information can be used to assess how the smoke due to burning oil over the Gulf of Mexico propagates in time.

Spatial Detection of Agri-terrorism

This GRI project develops and deploys an automated target recognition system that utilizes hyperspectral imagery to detect biological or chemical contamination of vegetation. The Automated Target Recognition - ATR - system is applied to the problem of BioSecurity, i.e. the detection of crop contamination via biological or chemical agents.

Site Specific Technologies

GRI's New Satellite and Computer-Based Technology for Agriculture (NSCTA) project is to investigate site-specific technologies as they pertain to natural resource management, precision farming, agribusiness, and decision making in agriculture. The project develops research activities in an effort to produce new knowledge concerning applications of these technologies in Mississippi and the nation.

Levee Evaluation through Remote Sensing

GRI researchers are developing a means to use remote sensing to determine the strength of river levees through the utilization of airborne synthetic aperture radar for levee condition assessment and develop classification software. The team has set out to develop new methods and software to improve knowledge of levee conditions and help levee managers prioritize their efforts to inspect, test and repair levees.

Integrated Pest Management Systems and Resistance Management Using Geospatial Technologies

This research has evaluated the use of remote sensing technologies to detect and predict

spatial distribution of weed populations for the purpose of designing site-specific herbicide prescriptions and monitoring the spread of herbicide resistant weed species. Associated spatial technologies have been used to generate guidelines for creation of site-specific harvest-aid, plant growth regulator, and insecticide prescriptions. A unique contribution of this research has been the development of novel statistical models that more fully characterize geographic, topographic, hydrological, edaphic, and producer-induced sources of variation in yield than previously understood. The research also highlights the immense complexity of spatial data collection, management, geoprocessing, and integration for decision support in site-specific agriculture. Outcomes of this study may increase efficiency and profitability, reduce the threat of off-target movement of residual herbicides in runoff to surface and groundwater, and reduce herbicide usage through precision applications.

GIS for Aquatic Plant Management

Geographic Information Systems (GIS) have become the new tool for information management, planning and presentation for invasive aquatic plant management programs and is critical in every component of the program.

Enhanced Soils Mapping For Productive Capacity Assessments

This research uses geospatial technologies to create methodology used in defining soil management zones that address soil variability in distinct areas and identify the soil properties that limit crop production while increasing soil conservation. Determining appropriate soil management zones can lead to an increased profit by either increasing yield in areas of fields that are being underutilized or decreasing fertilization in areas of fields where maximum economic yield has already been attained. Moreover, robust and repeatable methodology for construction of management zones will provide an empirical basis for developing variable rate fertilizer prescriptions that optimize profitability and minimize off-site nutrient transport, thereby benefiting the producer, the public, and the environment.



III. University of Southern Mississippi

Departments including Anthropology, Biology, Computer Science, Geography, Geology, History Information Technology, Library Science, Coastal Science, and Marine Sciences are using the software.

USM has offered the following courses: Introduction to GIS, Spatial Analysis and Modeling, Internet Mapping, Python Scripting, Cartography and two remote sensing courses that are completely dependent on the IHL licensing this year at USM.

Success stories include:

A GIS-Based Football Stadium Evacuation Model: This is a manuscript in press in *Southeastern Geographer*. This was a thesis project of one of our Master's student in which a GIS-Based evacuation model was developed using linear programming/ArcGIS Network Analyst/Spatial Analyst to determine evacuation time and evacuation roads in case of a Haman-made hazard in the M. M. Roberts Stadium at USM. The time computed by the model was compared with other evacuation models, such as EXODUS, OREMS to determine its usability as a training and pre-game preparation tool by local emergency personnel with access to IHL licensed GIS software. The model works great in comparison to above-mentioned complex models.

An Integrated Approach to Storm Surge Risk Management and Mitigation in South Mississippi: This is a USM funded Project in which Bandana Kar is using ArcGIS/ArcServer to model the impact of storm surge on Mississippi Coastal Counties. The results of the Project will be published soon.

Mapping Non-Point Source Pollution Using Remote Sensing Data with a Web Service: This is a class project for Internet Mapping class, which is also part of a student's Master's Thesis. The student is using ERDAS to process the images and then Map Server (Open Source System) to publish the images as a web-service.

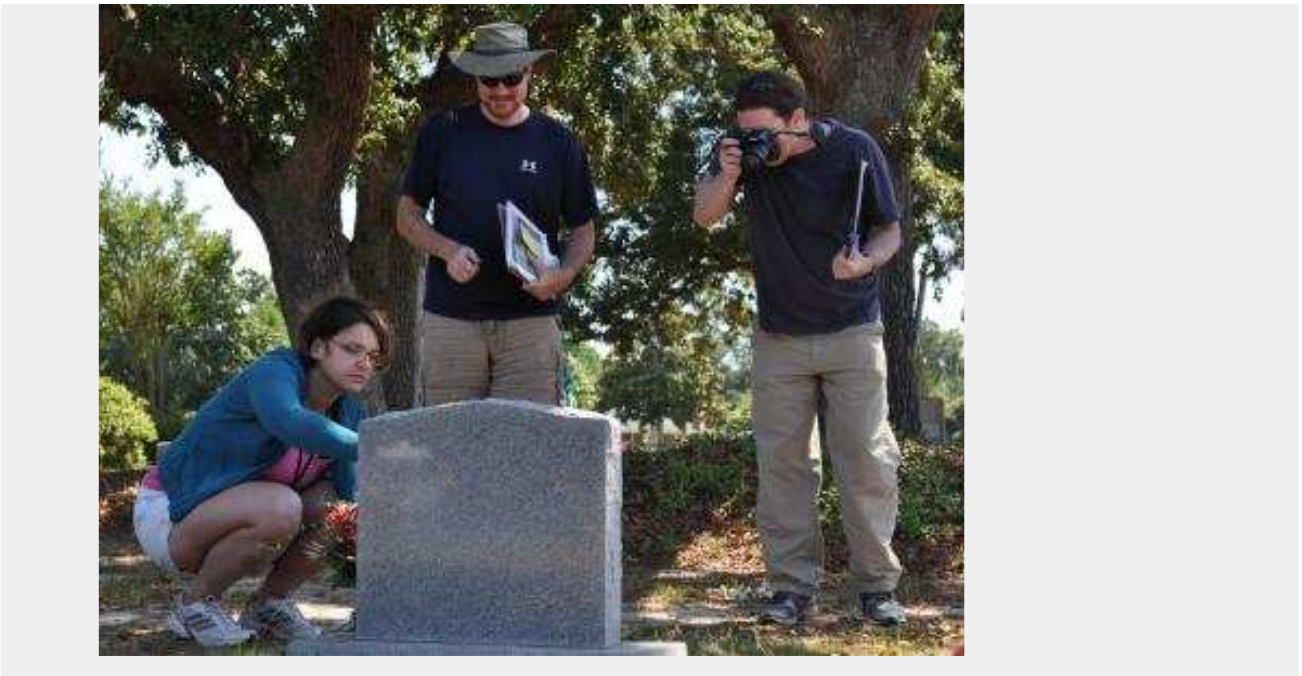
Students from Biology Department who are enrolled in our GIS classes are using ArcGIS to model spatial data related to Marine Mammal (Dolphin) habitats and their distribution in the Gulf Coast.

Dr. Greg Carter, Associate Professor of Geography and Chief Scientist of the USM Gulf Coast Geospatial Center, served this year as Guest Editor for the Dec. 2011 special issue of *Geocarto International* entitled 'Remote Sensing of Coastal System Dynamics'. In this issue, he is lead author of a paper entitled 'Historical changes in seagrass coverage on the Mississippi barrier islands, northern Gulf of Mexico, determined from vertical aerial imagery (1940-2007)'. The paper is co-authored by Kelly Lucas, Patrick Biber, Alan Criss and Gabe Blossom, and represents the culmination of a multi-year, multi-agency-funded effort. The paper also provides a link through which seagrass maps developed in the project may be downloaded in GIS format (shapefiles) from the USM Gulf Coast Geospatial Center web site. The use of USM state-licensed ESRI software was a cornerstone in the production of the seagrass maps and journal article.

Also in 2011, Carter and Dr. Kelly Lucas, Gulf Coast Geospatial Center, completed a field survey of ecological habitats on the Mississippi-Alabama barrier islands. More than 400 randomly-located GPS positions were surveyed and classified by dominant vegetation type in a NASA-funded effort to determine post-Katrina ecosystem recovery on the islands. Carter and Lucas are working with USM Geography doctoral student Nathan Hopper to develop updated habitat-type maps of the islands and provide them to the scientific community and general public via web access.

State-licensed ENVI software was used extensively in teaching remote sensing and digital image processing to undergraduate and graduate students on the USM Gulf Park campus in Long Beach.

Geography Students, Professor Restore Cemetery's Lost Data



From left to right, University of Southern Mississippi Gulf Coast student Meagan Leigh Moran of Diamondhead holds a sign indicating the geographic location of a cemetery plot while Dr. David Holt, assistant professor of geography, and graduate student Tim Sutherlin of Gulfport document the plot's information. (Office of University Communications photo by Charmaine Schmermund)

In an effort to restore valuable information the City of Long Beach lost when Hurricane Katrina struck in 2005, University of Southern Mississippi Gulf Coast students and assistant professor of geography, Dr. David Holt have spent the past six months piecing together research and data for the city's cemetery.

The project, funded by a \$7,250 grant from the Learn and Serve America program, involved Holt and more than 50 geography students working diligently on mapping, photographing and researching each plot within the 100-year-old cemetery.

"Projects like these are invaluable to the education of the modern student," said Holt, who teaches students in both the geography bachelor's and master's degree programs. "This gets our students out into the communities and shows them how to generate and maintain real-world data, all the while benefiting the community in which they work."

The cemetery's records, stored in City Hall when the hurricane made landfall, were lost after the building received damage from the storm. Long Beach Mayor Billy Skellie said he finds the research and data extraordinarily helpful. Following Holt's presentation to the mayor and city clerk, Skellie said that he "appreciates the academic service learning program, the grant sources and Southern Miss Gulf Coast for providing such diligent students and faculty."

"It's great to have this work done by such a capable group of people," he said. "Now the City of Long Beach has this comprehensive information to work with and we can continue to pass on this invaluable information for years to come."

Holt and his students used a variety of methods to investigate and document the cemetery's occupied and unoccupied graves. In addition to an aerial image of the cemetery, the researchers used a map, photography and a newly developed coding system to document each plot's location within the cemetery. Information from remaining city records and the cemetery's headstones were also documented for the researchers' data.

"Geographic information system (GIS) is a problem solving discipline," said Holt. "Once the students go into the field, they quickly realize the issues with generating the simplest of datasets and must use problem-solving skills to generate useful data."

With the research completed, city officials will now be able to access the cemetery's data using an interactive map and spreadsheet. With this information, city officials can conduct various searches on either the map or spreadsheet all within the computer program.

JinJoo McClendon, program director for the Learn and Serve America program, was thoroughly impressed with the project during Holt's presentation to the mayor.

"This is one of the top projects we have," said McClendon. "There are a lot of projects in the learning service program that involve the classroom, but this is unique in what students were learning outside the classroom."

While the project with the city's cemetery is complete, Holt hopes to continue assisting the city of Long Beach with other projects. If Holt can secure a two-year funded grant, his next project would be completing all the addresses in Long Beach for 911 services. Additionally, with a two-year grant, they would be able to extend this project to Pass Christian and mark the high water elevations of Long Beach's infrastructure.

For more information about Southern Miss Gulf Coast, visit www.usm.edu/gulfcoast.

USM Gulf Coast has offered 6 courses (3 GIS, 1 Cartography, and 2 RS) that are completely dependent on the IHL licensing this year just on the coast.

IV. Jackson State University

This software is This software is used to get grants for departments and research labs from areas like Urban and Regional Planning, Marketing, Environmental Health, School of Education, Physics, Atmospheric Sciences and Geosciences, Political Science to Environmental Science and others. to get grants for departments and research labs from areas like Urban and Regional Planning, Marketing, Environmental Health, School of Education, Physics, Atmospheric Sciences and Geosciences, Political Science Science to Environmental Science and others.

Positive impact realized as a result of professional development workshop and other educational programs conducted for K-12 teachers by JSU/NASA Educator Resource Center in collaboration with department of Visualization and Remote Sensing. On June 27-30, 2011, Visualization and Remote Sensing Department conducted Basics of Earth System Science workshop with emphasis on learning Geographic Information System components and arc software. This workshop was held at the Remote Sensing Lab based at the campus of Jackson State University in Jackson, Mississippi. Over 25 teachers and students participated in this program. Feedback from participants indicated that they had acquired a wealth of information and resources that were effective in enhancing students' interest in learning Science and Technology. Over seventy percent indicated that the program was a valuable experience. The following are some of the comments excerpts that indicate positive results from the participant's point of view: "Got valuable knowledge in GIS/GPS and remote sensing. Looking forward for such workshop ahead. Really fortunate to get a chance to listen to excellent professors teaching these subjects. Remote sensing is an interesting subject to learn more about them will be my future interest." "This was excellent information today because the previous day's material was integrated in today's work in an excellent manner. It made the previous day's material more practical." "Very valuable information to use in the classroom and at home". Due to participants interest in the area of remote sensing, JSU/ NASA ERC has scheduled another professional development workshop with emphasis to remote sensing to be held on December 3, 2011 at Remote Sensing Lab located at Jackson State University. **Dr Pamela Heard JSU/NASA Educator's Resource Center (ERC).**



NATIONAL CENTER FOR BIO DEFENSE Communications - MISSING 14 YEAR OLD GIRL

A 14 year old girl was abducted from one of the high schools in Leake County. The Sheriff's Department called emergency responders to help trace the girl's location. Emergency responders contacted AT&T complaint center to ping the abducted girl's cell phone. The first ping response was received around 11:47 pm.

The locations of the pings are marked and mapped as shown in Figure 1. The cell phone was pinged subsequently two more times and the corresponding data for these pings were also marked, mapped and integrated into DISCOVER MS.

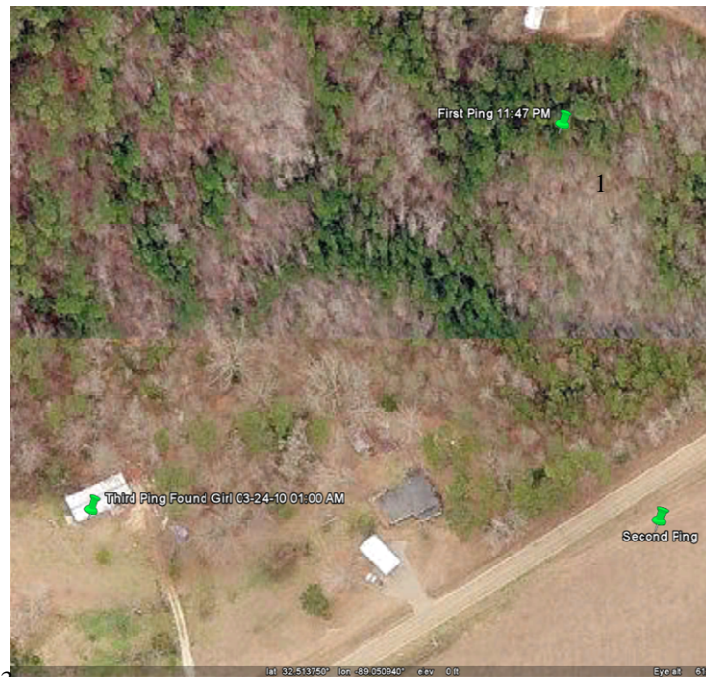


Image of ping locations for missing girl's cell phone.

The girl's cell phone position was finally identified in Newton County from the third ping around 1:00 am. The young girl from Leake County, Mississippi was traced and located in Newton County, Mississippi. DISCOVER MS was used to map the critical search and rescue information. It allowed first responders to make an accurate assessment of the possible rescue locations. Using DISCOVER MS, first responders were able to determine that the distance from first ping to second ping was approximately 397 feet and from the second ping to the third ping was 542 feet. The location of the response received from the first ping and the second was in non-residential areas and the response received from the third ping was in a residential area on Decatur Little Rock Road. The missing girl's position was pinpointed on Decatur Little Rock Road. Leake County and Newton County emergency responders and law enforcement officials went to the pinpointed location, and successfully found and secured the missing 14 year old girl from Leake County.

Bennetta Robinson completed a summer research at UNC-Chapel Hill. The DHS Center of Excellence DIEM summer research project has provided Bennetta the opportunity to assess how many areas, particularly coastal counties, are preparing for natural hazards and disaster occurrences. These events wreak havoc on the natural and built landscape, and the

brunt of the destruction is usually more disruptive to marginalized populations who lack the access to the resources most needed during hazard occurrences. Under these circumstances, the ability to prepare, respond, and recover is lessened in vulnerable populations. The DIEM summer project has allowed her to analyze, in great depth, underlying relationships between the quality of hazard mitigation plans and their strength in planning for, or acknowledging, those populations deemed socially vulnerable. The overarching goal of this research is to present not only the findings but also to offer practical recommendations that derive from an institutionalized framework in the realm of hazard mitigation and disaster management policy.

While this project examined coastal counties throughout the United States, this methodology is applicable to other administrative boundaries as well. Future plans for this project include using the outlined framework to derive a social vulnerability index for the 82 counties that comprise Mississippi while exploring the relationship between the index and hazard mitigation plan quality scores. This study will specifically highlight disaster prone areas such as the Mississippi Gulf Coast and Mississippi Delta regions. Such findings will guide resource allocation and technical assistance for those counties most in need.

Publications List

1. **Simulation of surface Ozone pollution in the Central Gulf Coastal region during summer synoptic condition using WRF/Chem air quality model**, Anjaneyulu Yerramilli, Venkata Srinivas Challa, Venkata Bhaskar Rao Dodla, LaToya Myles, William R. Pendergrass, Christoph A. Vogel, Srinivas Desamsetti, Francis Tuluri, Julius M. Baham, Robert Hughes, Chuck Patrick, John Young and Shelton J. Swanier. 2011. Atmospheric Pollution Research, DOI:10.5094/APR.2012.005
2. **An Integrated WRF/HYSPLIT Modeling Approach for the Assessment of PM2.5 Source Regions over Mississippi Gulf Coast Region**, Anjaneyulu Yerramilli, Venkata Bhaskar Rao Dodla, Venkata Srinivas Challa, LaToya Myles, William R. Pendergrass, Christoph A. Vogel, Hari Prasad Dasari, Francis Tuluri, Julius M. Baham, Robert Hughes, Chuck Patrick, John Young, and Shelton, 2011, Air Qual. Atmos. Health, Springer, DOI:10.1007/s11869-010-0132-1.
3. **Air Quality Modeling for Urban Jackson, Ms Region using High Resolution Wrf/Chem Model**, Anjaneyulu Yerramilli, Venkata Bhaskar Rao Dodla, Srinivas Desamsetti, Srinivas V. Challa, John H. Young, Chuck Patrick, Julius M. Baham, Robert L. Hughes, Sudha Y., Francis Tuluri, Mark G. Hardy and Shelton J. Swanier, 2011: Int. J. Environ. Res. Public Health, 8, 2470-2490; doi:10.3390/ijerph8062470.
4. **A Comparison of HWRF, ARW and NMM Models in Hurricane Katrina (2005) Simulation**, Venkata Bhaskar Rao Dodla, Srinivas Desamsetti, and Anjaneyulu Yerramilli, 2011: Int. J. Environ. Res. Public Health, 8, 2447-2469; doi:10.3390/ijerph8062447.
5. **Tropical cyclone prediction over Bay of Bengal: A Comparison of the performance of NCEP operational HWRF, NCAR ARW and MM5 models**, Bhaskar Rao, D.V. and Vijay Tallapragada, 2011: Natural Hazards:. DOI: 10.1007/s11069-011-9839-z.
6. **Numerical Prediction Of Atmospheric Mixed Layer Variations Over The Gulf Coast Region During NOAA/ARL JSU Meteorological Field Experiment Summer 2009 - Sensitivity To Vertical Resolution And Parameterization of Surface And Boundary Layer Processes**. William R. Pendergrass, LaToya Myles, Christoph A. Vogel, Venkata Bhaskar Rao Dodla, Anjaneyulu Yerramilli, Hari Prasad Dasari , C.V. Srinivas, Julius M Baham, Robert Hughes, Chuck Patrick, John Young, and Shelton J Swanier, 2010, Paper presented at presented at 90th Annual Meeting of American Meteorological Society Conference Held Atlanta, Ga –Jan 17-21, USA.

7. **Source-Receptor Modeling Using High Resolution WRF Meteorological Fields And The HYSPLIT Model To Assess Mercury Pollution Over The Mississippi Gulf Coast Region.** Anjaneyulu Yerramilli, Venkata Bhaskar Rao Dodla, Hari Prasad Dasari, Challa Venkata Srinivas, Francis Tuluri, Julius M. Baham, John H. Young, Robert Hughes, Chuck Patrick, Mark G. Hardy, Shelton J. Swanier, Mark.D.Cohen, Winston Luke, Paul Kelly and Richard Artz, 2010, Paper presented at presented at 90th Annual Meeting of American Meteorological Society Conference Held Atlanta, Ga – Jan 17-21, USA.
8. **Real Time Prediction Of Sidr Cyclone Over Bay Of Bengal Using High Resolution Mesoscale Models;** D.V. Bhaskar Rao, D. Srinivas and D. HariPrasad, Trent Lott Geospatial and Visualization Research Center, Jackson State University, Jackson, Department of Meteorology and Oceanography, Andhra University, Visakhapatnam, India Published in Book on Indian Ocean Tropical Cyclones and Climate Change. Charabi, Yassine (Ed.), 285 p. 164 illus., Springer, ISBN: 978-90-481-3108-2.

v. Delta State University

The Center for Interdisciplinary Geospatial Information Technologies at Delta State University provided instruction in geospatial technologies to 245 students during the 2010-2011 academic year resulting in the production of 735 credit hours. Approximately a 40% of these students received their instruction online.

In addition to formal instruction provided through credit-hour generating courses, the Center received significant support from sources such as the US Geological Survey, the Geospatial Information and Technology Association, the Federal Geographic Data Committee, the Army Geospatial Center, the National Audubon Society, Three Rivers Planning and Development District, and others to perform training and outreach activities. For example, the Center taught more than a dozen training courses about the United States National Grid (USNG) coordinate system, created and facilitated workshops about enabling community-based geospatial collaboration in Phoenix and Dallas, and provided 5 online workshops about standards-based mapping. In all, our outreach program of work touched more than 2,500 geospatial professionals and emergency responders and facilitated the creation and adoption of a standard generated here, in Mississippi, in by DHS and FEMA, established the basis for state-wide mapping initiatives in 11 states, and assisted with the development of a new geospatial company (MyMapBooks.com).

The Center continues to enjoy a near 100% placement rate for students completing a minimum of 18 semester hours in geospatial technologies. The average starting salary for these students rose from \$34,000 a year in 2010 to nearly \$37,500 in 2011 - many of our graduates are finding jobs in Mississippi. We are particularly pleased to see our successfully out-competing with graduates from "big name" geospatial programs such as those at Penn State and the University of California, Santa Barbara for high-paying technical jobs with consulting firms such as Booze-Allen-Hamilton, software companies like ESRI, and substantial agribusiness firms like Jimmy Sanders.

The Center was involved in the response to the Mississippi River flooding and April 2011 flooding (see details in Community Service section later). Unfortunately, these were not the only significant disasters to beset the US. Hurricane Irene caused significant inland flooding in the northeast. Through professional networks, the Center was repeatedly called up to create standardized map products for Vermont, New York, and New Jersey. Using technologies and methods created at the Center, standardized mapping products were created within 4 hours of request and posted into a web server at <http://greatriver.deltastate.edu/ireneusng/index.html>. This mode of distribution, which allows for seamless integration and distribution of paper and digital maps, was an instant hit with users.



Center Director Talbot Brooks (right) with FEMA Deputy Administrator Richard Serino (left) at the East Coast Public Safety GIS Summit.

Response agencies are now turning to the Center to provide similar products for search and rescue, large wildfires, and other emergencies. Further, prominent organizations such as FDNY and the City of Baltimore have requested training sessions about the methods and means of map production created at the Center.

While disaster and crisis response make for interesting reading, the Center is proud to report several other significant accomplishments made possible by the software site licensing program. These activities include:

1. The creation and rollout of a new Master's of Applied Science in Geospatial Information Technologies as an online program of study. Announced in July of this year, the program kicked off with 16 students this past August.
2. The Center was chosen by the National Audubon Society and the Lower Mississippi River Conservation Commission to create a spatially-based inventory of environmental types and resources in the Lower Mississippi Valley. The

objective of this program is to provide graphic (map-based) representation of resources that clearly show the region as unique and worthy of designation as a World Heritage Site by the United Nations.

3. The Center has partnered with the Army Geospatial Center to develop digital atlases that may be used with GPS-enabled devices or printed using inexpensive, letter-sized printers. Initial products are being battle-tested by soldiers in Afghanistan. The aim of this program is to shorten the timeline between spatial data collection and map production - the reduction thereof would improve situational awareness and potentially save lives.



DSU GIS student Bobby Lee Horne and Center graduate Chris Smith – now a geospatial analyst with Booz, Allen, and Hamilton in Washington DC, catch up at the Smithsonian Air and Space museum after attending a conference earlier in the day.

Of course, our students are that which we are most proud - they work alongside faculty and staff in every project mentioned above. Industry recognizes the value of such practical experience and our job placement rate remains near 100%.

VI. MS Valley State University

Mississippi Valley State University has ArcGIS installed on 22 computers. An Intro to GIS class is scheduled for Spring 2012 semester.

VII. Alcorn State University

Alcorn teaches the following courses using the ArcGIS and ERDAS software:

- IT181 Computer Cartography
- IT381 GIS Techniques, Utilities, and Production
- IT384 Advanced GIS
- IT119 Remote Sensing Process and Applications
- IT386 Introduction to Remote Sensing Techniques
- IT392 Remote Sensing Applications to Resource Management
- IT407 Remote Sensing at Microwaves
- IT477 Remote Sensing of the Environment
- IT480 Advanced Remote Sensing

Dr. Sam Nwaneri from Department of Advanced Technology had a poster presentation on GIS with his student JatrI Heard:

RELEVANCE OF ENVIROMENTAL PREPAREDNESS FOR DEVELOPING NATIONS IN AFRICA (A NIGERIAN MODEL OF ENVIRONMENTAL INFORMATION SYSTEM - NEIS), IGARSS, July 24-29, Vancouver, Canada

VIII. University of Mississippi Medical Center

Identified as one of the first academic health science campuses in the nation to have a GIS program, UMMC has taken a leadership role in promoting GIS and Remote Sensing in the health science applications. From the very beginning, the suit of software available through the state site license has been critical for teaching, research and service for this program.

Academic Settings

From class project to abstract and poster, and then journal manuscript

Two doctoral students, Ms. Dorothy Young and Ms. Mechelle Keeton, used ArcGIS for their CHS 759 class project which led them to develop a research protocol studying the Effect of Referring Provider Proximity on Cardiovascular Disease State for University Heart Invasive Procedures at UMMC. They have presented this study at several forums. Now they are preparing a manuscript for journal publication.

Base Pair High School students

UMMC has a biomedical research mentorship program, known as Base Pair, that pairs faculty from the UMMC with public high school students and educators (<http://basepair.library.umc.edu/faq/faq.htm>). Currently, Dr. Roy Duhe and Dr. Fazlay Faruque are co-mentoring two Base Pair students, Ms. Denae Bradley and Ms. Elizabeth Nichols, from Murrah High School in applying GIS for studying cancer care disparities in Mississippi. They have also received hands on ArcGIS training which hopefully will help them to conduct research in their future studies.



Picture: Elizabeth (left) and Denae (right) are receiving 2-day ArcGIS training certificates from Dr. Warren Jones, the Executive Director of the MIGMH and the DRI.

Training

In 2011, more than a dozen students and researchers received training in GIS, with special emphasis on analyzing health disparities. The Mississippi Institute for Improvement of Geographic Minority Health's (MIGMH) Delta Regional Institute (DRI) at UMMC houses a GIS training facility with state license GIS software.

CURRENT GIS COURSES

Course Number	Course Name	Course Description
CHS 759	GIS in Healthcare and Epidemiology	This course combines an overview of the general principles of GIS and analytical use of spatial information technology applicable for healthcare professionals. (3 credit hours, Fall semester, Dr. Fazlay Faruque, Course Coordinator)
ID 701	Introduction to GIS	Introduces students to fundamental concepts and applications of GIS. Requires completing a health GIS project. (4 credit hrs, Spring semester, Dr. Fazlay Faruque, course coordinator)
ID 625	Environmental Health	This course examines the interaction between living and work activities of people and the environment and the resulting effect on health and diseases. (3 credit hours, Fall semester, Dr. Fazlay Faruque, Course Coordinator)

GRANT/RESEARCH

Currently, UMMC is working on several funded projects with high-level national interest. Without the state site license it would have been difficult to obtain grants and conduct research. For a recently funded project from the National Institute of Health titled, "A New Approach to Compute PM2.5 for Health Impact Analysis", UMMC is using ArcGIS and ERDAS for data preparation and analysis.

Studying health disparities is a major focus for DRI and MIGMH at UMMC. State site license is being critical for both training and research for these studies. A major project involves identifying the gaps in available healthcare resources in three southern states, Mississippi, Alabama and Louisiana, as it

relates with the population needs and access. Below, Figure 1 shows the areas outside the 30-minute driving distance, which is threshold for many health issues requiring immediate medical care.

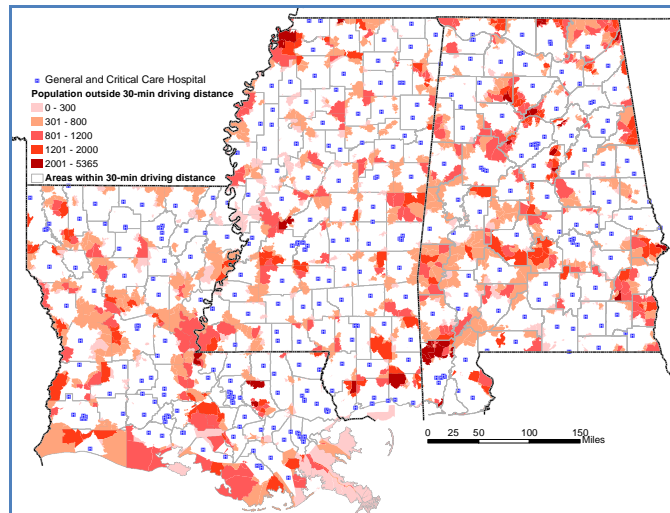
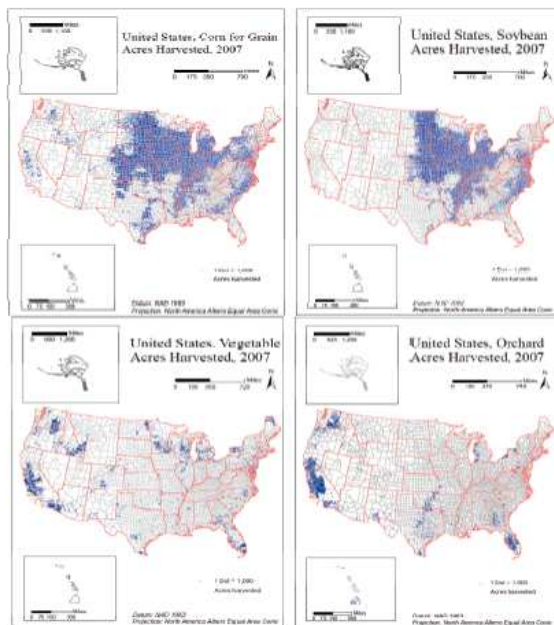


Figure 1: Population without access to a hospital within 30 minutes (total calculated population = 927,042).

Community service projects

Every year UMMC prepares maps for the Mississippi Poison Control Center, to identify the number of calls per county. Also, our GIS program extends assistance to other government and private sectors for health and GIS related services.



Source: United States Department of Agriculture, National Agriculture Statistics Service, 2009. Maps prepared by the GIS and Remote Sensing Program at the University of Mississippi Medical Center, 2010.

Recently, UMMC assisted the Center for Mississippi Health Policy with maps for their report entitled, *From Field to Fitness: Aligning Farm Policy with Health Policy to Improve Nutrition & Health*. Please follow the link for additional information (http://www.mshealthpolicy.com/documents/FarmBillReportSept2010_002.pdf)

Figure 2: United States Acres Harvested of Corn, Soybeans, Vegetables, and Fruits in 2007
 Source: United States Department of Agriculture, National Agriculture Statistics Service, 2009.
 Maps prepared by the GIS and Remote Sensing Program at the University of Mississippi Medical Center.

GeoMedStat

GeoMedStat is a GIS-based surveillance system designed to track daily pollutants (fine particles and ozone) and hospital patient encounters. GeoMedStat is the flagship project of UMMC which uses site license software for viewing the daily distribution of patients and air pollution on a near real-time basis.

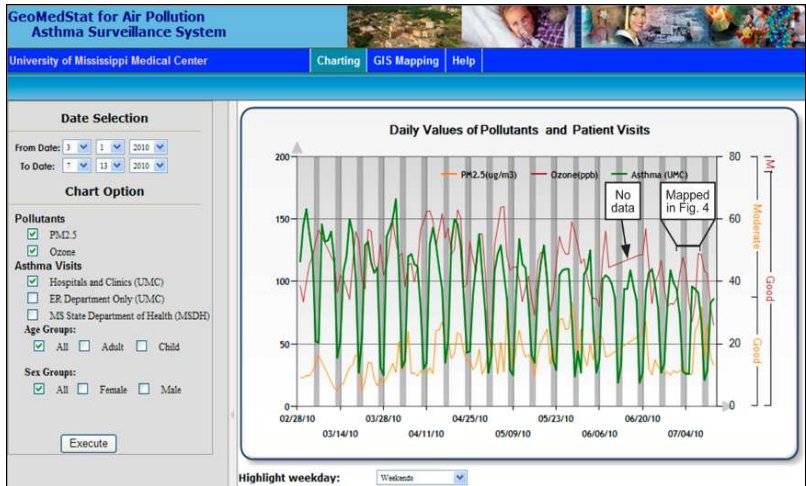


Figure 3: Chart showing the temporal trend of PM_{2.5}, ozone, and hospital visit data for a period of five-and-a-half months. The left Y-axis shows the raw count of hospital visits per grid. The right Y-axis shows PM_{2.5} in micrograms per cubic meter and ozone in parts per billion.

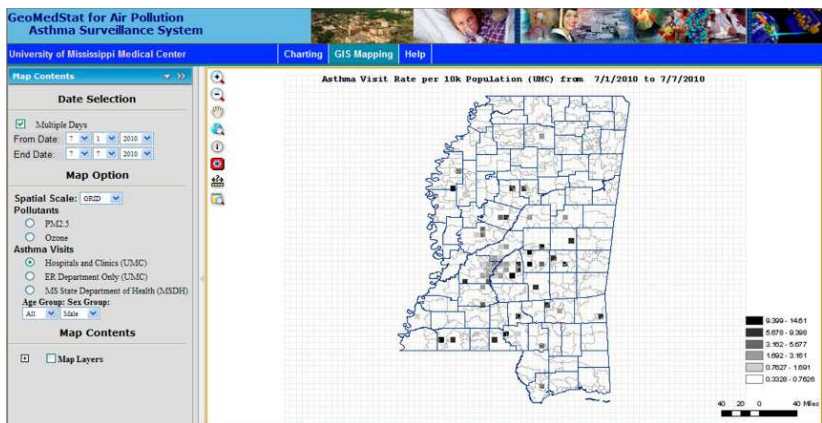


Figure 4: Example of mapping capability showing asthma patients/100 thousand population at 10 km x 10 km grid level

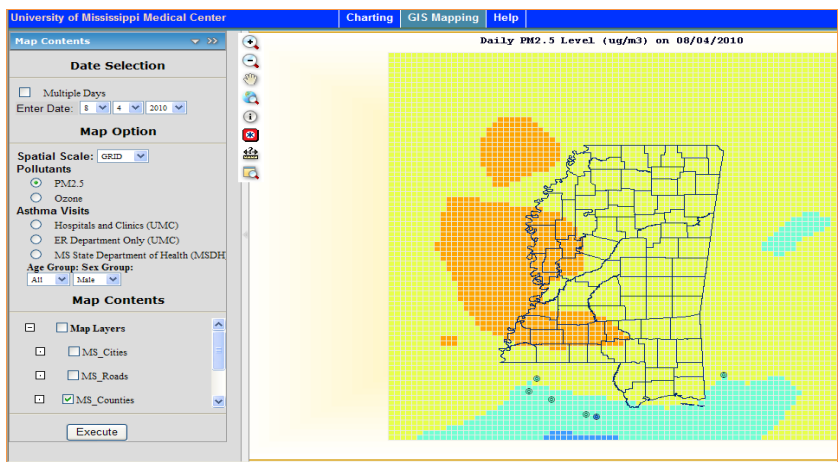


Figure 5: Distribution of particulate matter with a diameter of 2.5 micrometers or less (PM_{2.5}) on a specific day in and around Mississippi. Among air pollutants, PM_{2.5} is one of the most serious health concerns because these tiny particles can

Estimating the Distribution of Mold Spore Levels over Space and Time in Association with Weather and Diseases

Exposure to mold spore aeroallergens can trigger numerous allergic reactions ranging from mild to severe. Persons vulnerable to mold spore exposure can benefit from timely warnings of increased spore levels, and health care professionals can use this information to develop strategies to prevent some adverse outcomes.

Six sites were strategically selected to install volumetric Burkard® Spore Traps covering both urban and rural areas of central Mississippi. Seven clinically relevant molds were found: *Cladosporium cladosporioides*, *Cladosporium herbarum*, *Alternaria alternata*, *Epicoccum nigrum*, *Helminthosporium*, *Aspergillus*, and *Penicillium*. *Cladosporium* and *Alternaria* are two of the most frequently found spores, and their size allows them to be easily inhaled.

Analysis showed that the number and type of mold spores vary drastically with the seasons. Response time to meteorological conditions on mold spore levels varies with the seasons. Preliminary analysis indicates that the best predicting variables include temperature, precipitation, and solar radiation. In the cold season, the most significant predictor is temperature, and then followed by rainfall. In the warm season, the most significant predictor is solar radiation.

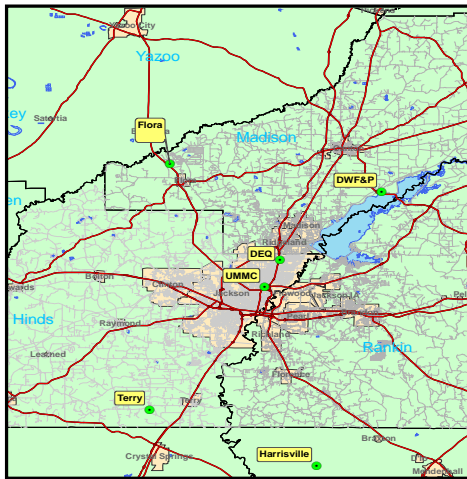


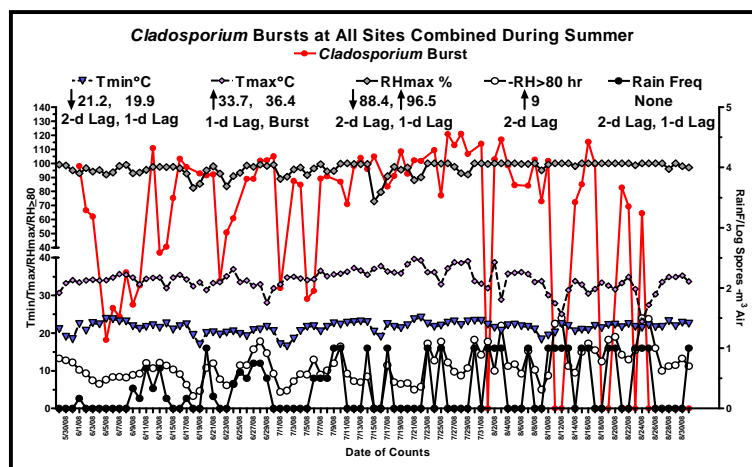
Figure 6: Location of specimen and data collection/monitoring stations



Figure 7: Mold spore, pollen and meteorological data collection station



Figure 8: *Alternaria* (from UMMC monitoring site)- one of the main fungal causes of allergy



IX Jones County Junior College

Geospatial Technology course offerings and enrollment statistics for Jones.

Spring 2011

GIT 2124 – Fundamentals of Geographic Information Systems (GIS)

- 14 students
 - Majors
 - Drafting / Surveying
 - Civil Engineering Technology
 - Geography

Summer 2011

GIT 2263 – Advanced Geographical Information Systems (GIS)

- 2 students
 - Majors
 - Geography
 - Drafting / Surveying

Fall 2011

FOT 2214 – Advanced GIS / GPS Applications in Forestry

- 19 students
 - Majors
 - Forestry Technology

Spring 2012

FOT 2214 – Advanced GIS / GPS Applications in Forestry

GIT 2124 – Fundamentals of Geographic Information Systems (GIS)

Forestry Technology students take FOT 2214 in the Fall semester of their second year at Jones. Upon completion of the Forestry Technology program students typically, 40% pursue a bachelor's degree at Mississippi State University (MSU) typically in either Forestry or Wildlife Management; 40% enter the workforce; and 10% pursue a bachelor's degree at The University of Southern Mississippi (USM) typically in Geography or Geospatial Technology.

Drafting and Design Technology students take GIT 2124 in the Spring semester of their first year at Jones. Upon completion of either the Drafting and Design Technology or Civil Engineering Technology program students typically, 20% pursue a bachelor's degree at MSU typically in either Architecture or Surveying; 60% enter the workforce; and 20% pursue a bachelor's degree at USM typically in Civil Engineering Technology, Geography, or Geospatial Technology.

VII - Community Services

Along with the direct benefits to the campuses; local, county, state, federal government and the private sector take advantage of a wide variety of services provided by their local educators. Training by campus staff and even guest IHL staff provide the community with formal software training, workshops, and presentations to inform the public of the benefits and applications of GIS, GPS, and remote sensing. Once interest is perked, some government agencies and private companies recognize the need for data development, system design, and implementation of customized applications for use by their facility. This provides staff and students with excellent opportunities to interact with "real world" situations that further their knowledge base and thus their marketability once they graduate. This also allows students to better qualify for jobs to help finance and further their education.

The software accessible through the state-wide licenses is still being used to determine losses of the timber industry, coastal shellfish industry, and helping the local emergency operations centers re-establish their systems from Katrina and plan for better response to future natural disasters. The entire state has seen the critical need for this technology. Access to the tools, the trained personnel at the IHL institutions, and the willingness of the users of the state-wide licenses gave the emergency responders in Mississippi the ability meet and exceed their responsibilities and serve the citizens of Mississippi during many natural disasters over the past 10 years.



Training by Nel Ruffin for ArcGIS I at Batesville Enterprise Center on September 17 and 18, 2009. The participants were from private industry, city government, fire departments, and forestry. This class was through Northwest Community College.

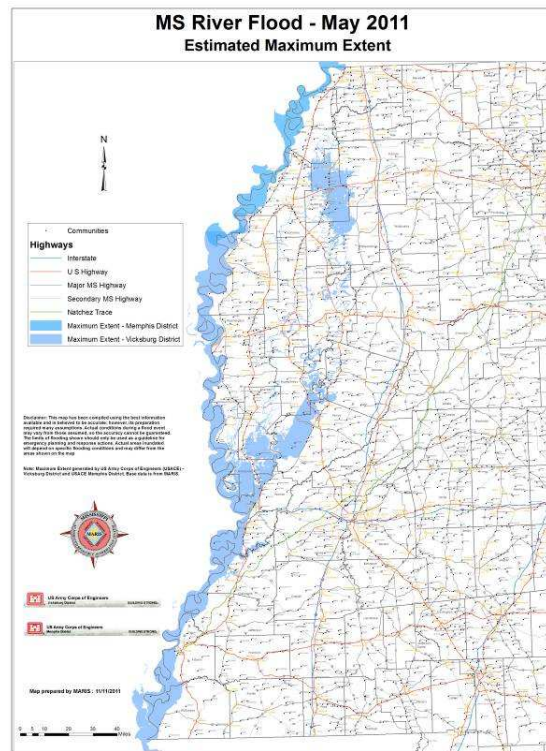
The following is a partial list of city, county and private entities that have benefited from services provided by their local campus including - training, presentations, workshops, simple and complex mapping requests, data development, system design, and implementation

GIS Community Services

<u>City Services</u>	<u>County</u>	<u>Private Companies</u>	<u>State/ PDDS</u>	<u>National</u>
Tupelo	Tippah County	Bickerstaff Brothers Construction Baptist Memorial Hospital	Three Rivers PDD MS Highway Patrol MS Forestry Commission MS Emergency Management Agency	USDA National Sedimentation Lab US Army Corps of Engineers National Geospatial Intelligence Agency
Batesville Job Corps	Quitman E911 Quitman Dep. Chancery Clerk	Yalobusha General Hospital		
Batesville Fire Department	Tallahatchie Fire Coordinator	Entergy , AR		
Charleston Fire Department	Panola County Road Department	Vicksburg Surveying Company	MS Department of Mental Health MS Oil and Gas Board Central MS PDD MS Dept. of Environmental Quality MS State Fire Commission	US Geological Survey Department of Homeland Security Environmental Protection Agency
Booneville Fire Department	Panola County Sheriff's Department Tallahatchie Emergency Mgmt	John Deere Agribusiness Services		
Water Valley Water Mngmt		International Paper		US Coast Guard
City of Cleveland	Tallahatchie Civil Defense	Georgia Pacific American Forest Management Forest Investment Associates Land Resource Management McCreless Forestry Consultants		
South Panola Schools	Panola County EMA			NOAA
North Panola Schools American Red Cross – Greenville	Panola County Coroner Tallahatchie Extension Service			US Forest Service US Census Bureau
Cleveland Lions Club	North Panola Schools Prentiss County Emergency Mgmt. Bolivar County Board of Supervisors	CAMI Forestry Contractors		
Cleveland Exchange Club Delta Law Enforcement Officers Assoc. Newton Rural Water Association Laurel Rural Water Association Ellisville Rural Water Association Meridian Rural Water Association Yazoo City Rural Water Association Hattiesburg Rural Water Association Jackson Rural Water Association Water Valley Water Mngmt Bay St. Louis Rural Water Association Ridgeland Rural Water Association Richland Rural Water Association McLain Rural Water Association Florence Rural Water Association	Tate County Schools Sunflower Board of Supervisors Delta K-9 Search & Rescue Bolivar County EOC Bolivar County VFD # 1 West Lamar Water Association Jones Rural Water Association Newton Rural Water Association Oktibbeha Rural Water Association Forrest Rural Water Association Greene Rural Water Association Jackson Rural Water Association	ECS Engineering Woodlands Specialists Wildlife Mississippi Timber Plus Johnson Controls Metsys Solutions Southgate Timber Company SCA Haglof Landmark Systems Cane Creek Environmental Gulf States		

May 2011 MS River Flood – IHL Geospatial Council Response

MARIS - In May 2011, due to extensive upstream rains, the MS River was scheduled to rise above flood stage in most areas south of St Louis. MARIS and other institutions were enacted by MS Emergency Management to assist in their efforts to save life and property. Several staff worked at the MEMA EOC in Pearl to help in mapping predicted crests and evaluate infrastructure and demographic considerations. MARIS was also able to help model the Wolf Lake area and IHL/MCBB property that could have been in danger. They worked with a myriad of local, state, and federal agencies in their response and also distributing critical data to companies having interests along the river.



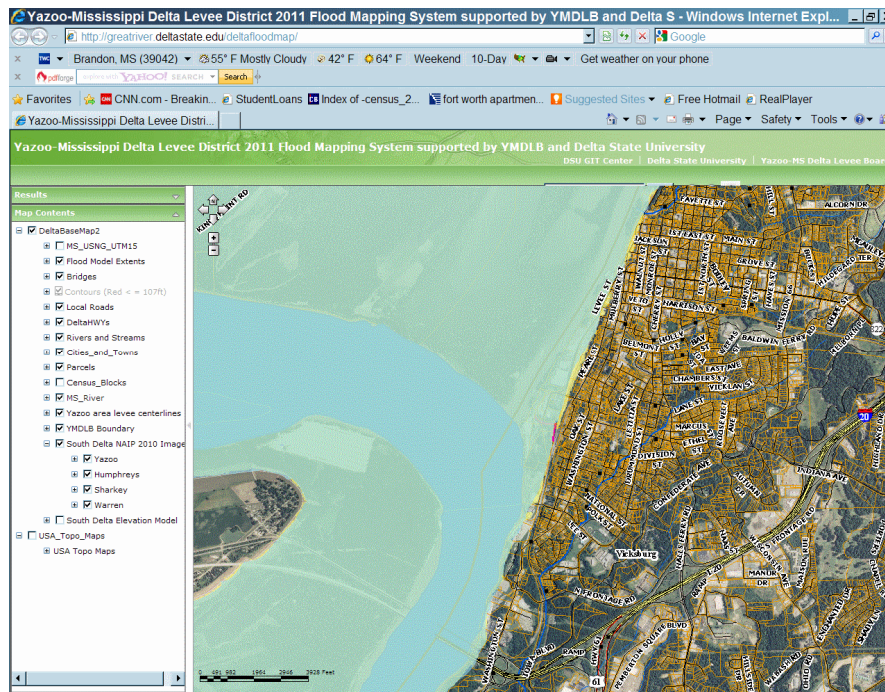
Map of Maximum extent of May 2011 MS River Flood – generated by MARIS

DSU - Delta State University's Center for Interdisciplinary Geospatial Information Technologies established a cooperative research and development program of work with the Yazoo-Mississippi Delta Levee District in 2005. YMLD is the private, non-profit organization responsible for the construction and maintenance of 98 miles of mainline MS River Levee from Memphis south.

They are also responsible for backwater protection levees along the Yazoo, Coldwater, and Tallahatchie Rivers in northwestern MS. The Center began working with YMLD in 2006 by conducting a needs assessment and drafting an implementation plan which included a training program and the rollout of ArcGIS, ArcGIS Server, several extensions, and products from ESRI business partners like TerraGo Technologies. Essentially they started with a room full of dusty maps - some dating back to 1898 - and have emerged with a Flex-based site (mirrored for public access at: <http://greatriver.deltastate.edu/leveeflex/index.html>), an organized atlas collection in GeoPDF format, a comprehensive data library which includes everything from LIDAR to parcels, and 5 staff who have completed an 18-semester hour GIS certificate program at DSU.

When the floodwaters began to rise, YMLD was armed for bear with GIS products and know-how. 3D Analyst was quickly used in combination with LIDAR data to find low spots on existing backwater levees in need of improvement, create evacuation-route elevation profiles, and create visualizations for local emergency managers and responders. Spatial Analyst was used to create 1' contour lines from LIDAR data - these were in turn used to "Select by location" homes and businesses in need of additional protective actions. ArcGIS was used to integrate data and services in near real time as they became available from a host of sources and then used as a decision tool for managing resources. It also provided the foundation toolset for creating specialized print products needed by field crews to respond to boils (essentially leaks) that were occurring along the levee. ArcGIS Server was used to disseminate internal YMLD data to other stakeholders and responders like FEMA, MEMA, USGS, local government, and more.

In short, YMLD fully embraced GIS and then used it effectively as a tool to fight what had once before been the greatest disaster in American history - the Great Flood of 1927 (in today's dollars that event makes Katrina and Ike look like chump change). Because they used GIS so effectively, a repeat of that disaster was averted. This accomplishment was recognized by Environmental Systems Research Institute when they awarded YMLD with a Special Achievement in GIS award in June of this year.



Web site of May 2011 MS River Flood – generated and maintained by Delta State University
<http://greatriver.deltastate.edu/deltafloodmap/>

VIII - Conclusion

It is apparent that GIS/remote sensing continues to grow at the Mississippi IHL universities and community/junior colleges. With more modules becoming part of the software site license, it shows commitment by the vendors to increase the functionality of their products. The academic realm is prime for developing new scientific methodologies with this software and the vendors recognize this. Many other states are now using Mississippi's software site license as a model to more efficiently administer their software throughout their university system. The increase in use by the various departments reflects a national trend in the growth of the field. The variety of applications and research found at the IHL sites points to the national diversity of uses for GIS/remote sensing.

The outreach to the surrounding community has established a tighter link between the campus and the government and private sector. This will in turn increase the need for more persons with expertise in the GIS and remote sensing fields. The impact of GIS/GPS and remote sensing during the Hurricane Katrina disaster brought to the forefront the need for trained personnel and the value of the site license as well as the IHL Geospatial Council. This exposure and success was very influential in the Legislature funding the site license expenses. In 2011, with the Smithville tornado and the MS River flood, the public became even more aware of the technology and critical affect it can have on disaster recovery.

As the public becomes more aware of the power and applications of this technology, there should in turn, be an increased number of students becoming interested in careers in the geospatial field. With the development of Google Earth and BING maps, the average person is now exposed to the concept of this field on a daily basis. National organizations such as Geospatial Information and Technology Association (GITA), the Federal Geographic Data Committee (FGDC), National States Geographic Information Council (NSGIC) continue to organize GIT and keep the need for standards, collaboration, and funding on the forefront of not only the US Legislature but State and Local governments as well.

The geospatial job market continues to be one of the fastest growing fields not only in Mississippi but in the entire country. High paying jobs and the wide variety of applications continues to attract new students and professional to this field.

The following economic impact figures are provided by the U.S. Department of Labor:

National Statistics

- According to the Department of Labor, the geospatial market worldwide, which is currently a \$5 billion market, will grow to \$30 billion
- Geospatial technology is among the top three fastest growing career fields in the U.S.
- A 15 percent growth rate in new jobs is projected over the next decade
- Geospatial technologies have a broad range of applications in many industry areas including homeland security, natural resources (agriculture, fisheries, forestry, wildlife,

- and water), urban planning, and emergency management
- The Department of Labor identified geographic information technology as “one of the three most important emerging and evolving fields, along with nanotechnology and biotechnology.

From federal, state, and local government agencies, engineering and surveying, foresters and farmers, increases in uses of the technology is requiring more and more people to be trained in this field. The availability of this software at a very low cost to the institutions is crucial to the growth of this technology - not only in the academic realm but also as a major boost to the economy of the state.

As trained students enter the job market equipped with GIS/remote sensing skills, they will help address the critical workforce needs of the geospatial industry and attract additional business through avenues such as the industry cluster. If Mississippi is to continue to develop as a high-technology home for GIS/remote sensing companies, the site license program must continue to be funded to satisfy the increased need for trained professionals to meet the increasing demand. With the job market in such disarray, students trained in high-tech fields remain more able to find good paying jobs.