

GIS AND HOMELAND SECURITY: RESOURCES FOR EDUCATORS

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BACKGROUND

- Since 2004, the Emergency Management Mapping Application (EMMA) has served as the Web-based emergency mapping system for Maryland State and local government agencies
- Until recently, no such system existed for use by Maryland residents in the event of an emergency
- Lack of public information was responsible for many of the problems and widespread confusion associated with the evacuation of New Orleans prior to the landfall of Hurricane Katrina, as well the confusion that ensued following the passage of the hurricane
- Analysis of the Hurricane Katrina disaster suggests that
 - Federal, state, and local governments have put too much emphasis on disaster response and have neglected efforts to minimize a disaster's impact in advance
 - Most Americans have not taken steps to prepare for a natural disaster, terrorist attack, or other emergency

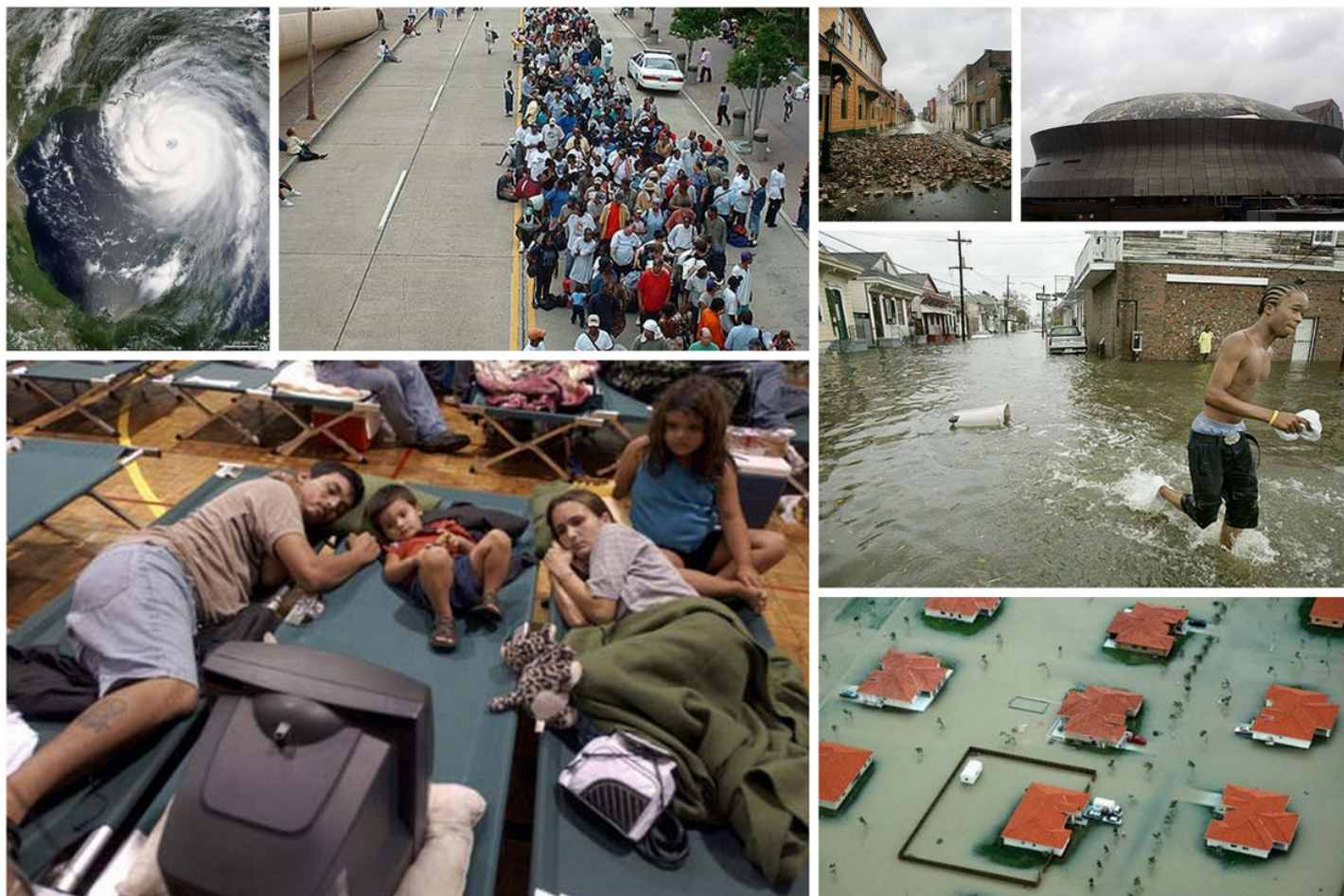
HURRICANE KATRINA FACTS

- Formed – August 23, 2005
- Dissipated – August 30, 2005
- Highest winds (one-minute sustained) – 175 mph (280 km/h)
- Lowest pressure – 902 mb (26.64 mHg)
- Fatalities – 1,836 confirmed
- 80% of New Orleans was flooded
- Largest mass migration in U.S. history
- Damage - \$81.2 billion in 2005 U.S. dollars (costliest hurricane in U.S. history)



Hurricane Katrina: 5 Years Later
<http://projects.usatoday.com/news/katrina/>

HURRICANE KATRINA, AUGUST 29, 2005



Source of photographs: *National Geographic News*

HURRICANE KATRINA, AUGUST 29, 2005

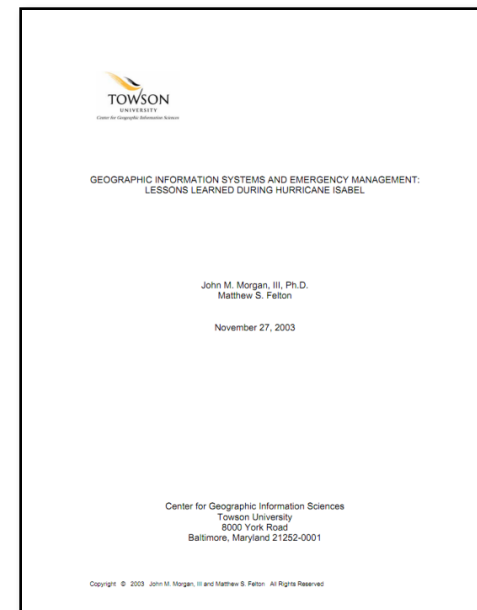
- More than one million people fled the Gulf Coast in advance of Hurricane Katrina!



Source of photograph: *National Geographic News*

GIS AND EMERGENCY MANAGEMENT WHITE PAPER

- “GIS and Emergency Management: Lessons Learned During Hurricane Isabel” by Jay Morgan and Matt Felton, November, 2003
 - 44-page report
 - Documents the 24/7 volunteer GIS support provided by the Towson University Center for GIS to the State EOC during the Hurricane Isabel emergency in September, 2003
 - Includes an atlas of maps prepared during the emergency



The white paper is available for download at ...
http://pages.towson.edu/morgan/files/Hurricane_Isabel.pdf

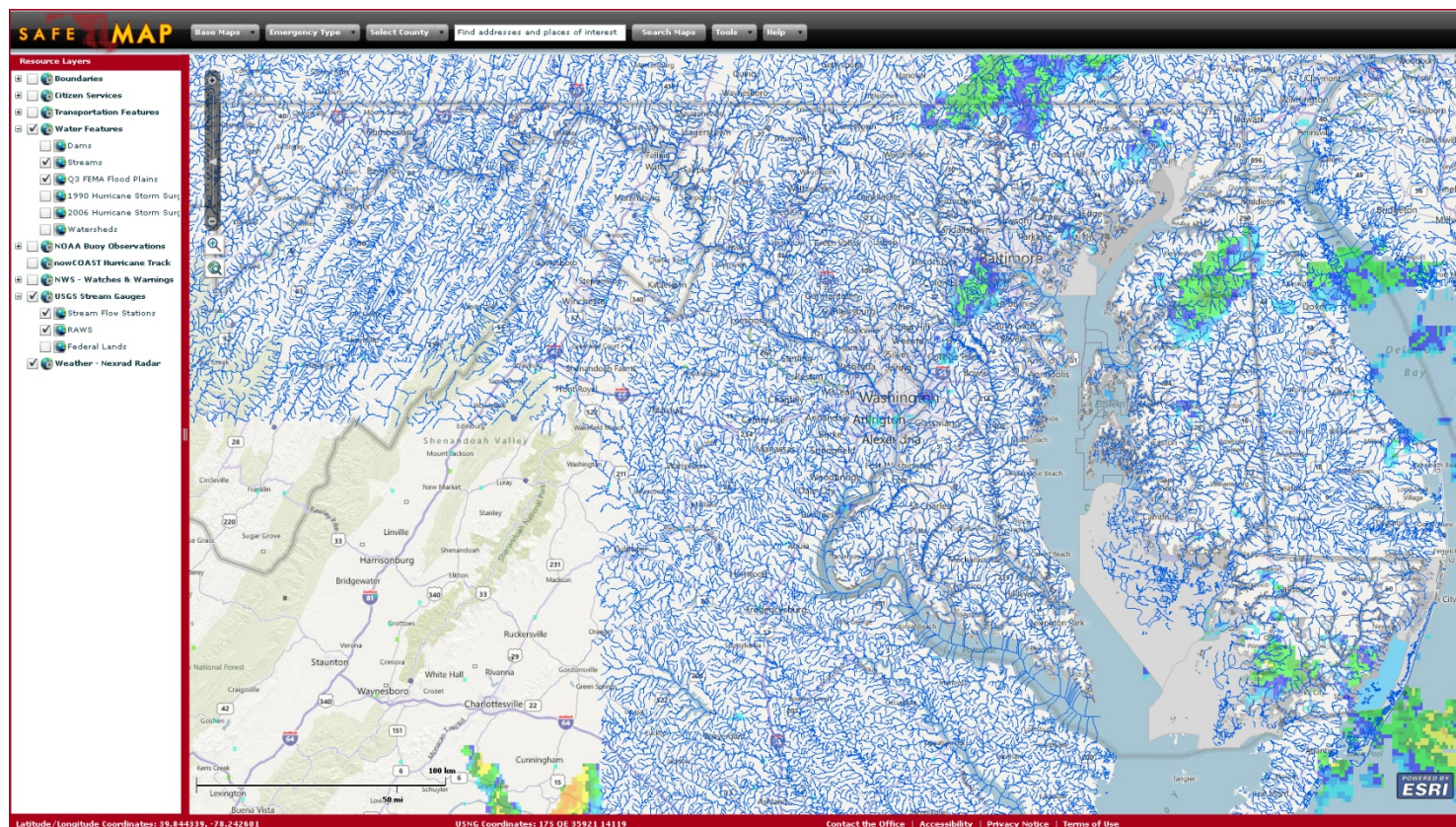
MARYLAND safeMAP

- Web mapping application designed to provide the public with geospatial information in the event of an emergency
- Funded via an Elkins Professorship grant (University System of Maryland)
- safeMAP resource layers include
 - Boundaries
 - Citizen Services
 - Transportation Features
 - Water Features
 - NOAA Buoy Observations
 - nowCOAST Hurricane Track
 - NWS - Watches & Warnings
 - USGS Stream Gauges
 - Weather – Nexrad Radar



SAFE MAP

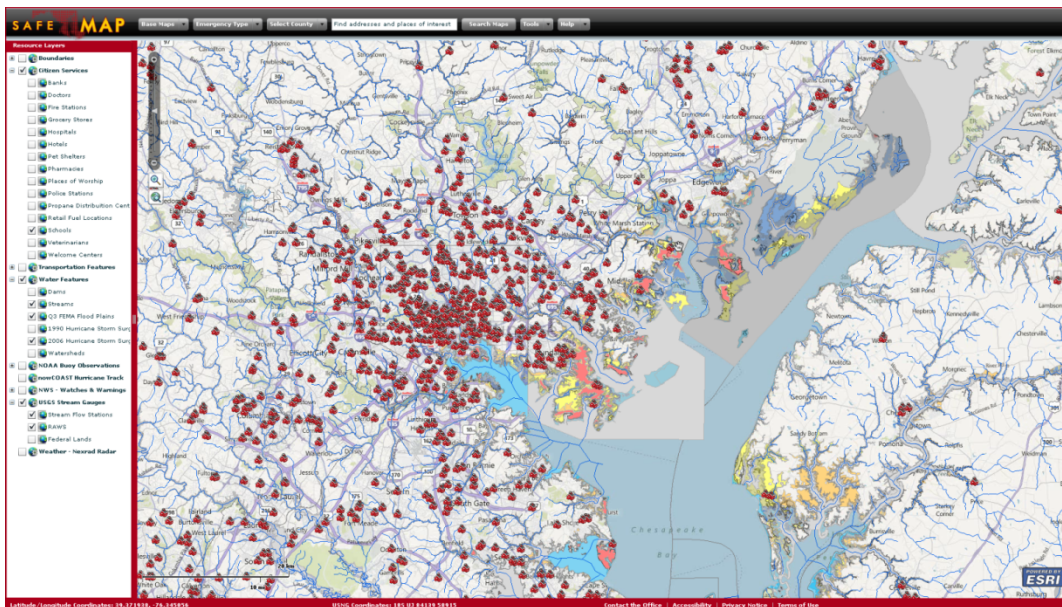
MARYLAND safeMAP



Maryland safeMAP is accessible at ... <http://gis1.towson.edu/mdsafemap/mdsafemap.html>

MARYLAND safeMAP

- User guide is available
- Tutorials for safeMAP are currently being developed
 - Are any schools located in flood prone or storm surge inundation areas?



SAFE MAP

Towson University
Geospatial Research and Education Laboratory

How to Use Maryland safeMAP

Overview

Maryland **safeMAP** is a Web mapping application that provides useful and freely available geographic data to the public in the event of an emergency. **safeMAP** was developed by the Geospatial Research and Education Laboratory at Towson University. Funding for the project was provided by a Wilson H. Elkins Professorship grant from the University System of Maryland. **safeMAP** was built using ArcGIS API for Flex (Environmental Systems Research Institute).

Prior to a description of **safeMAP**'s various buttons, layer list, tools, and links, the following is a brief explanation of **safeMAP**'s Internet "real estate." **safeMAP** includes a top bar (A), a Resource Layers list (B), the map display (C), navigation buttons and zoom slider bar (D), and a bottom bar (E).

The top bar includes the following drop down buttons:

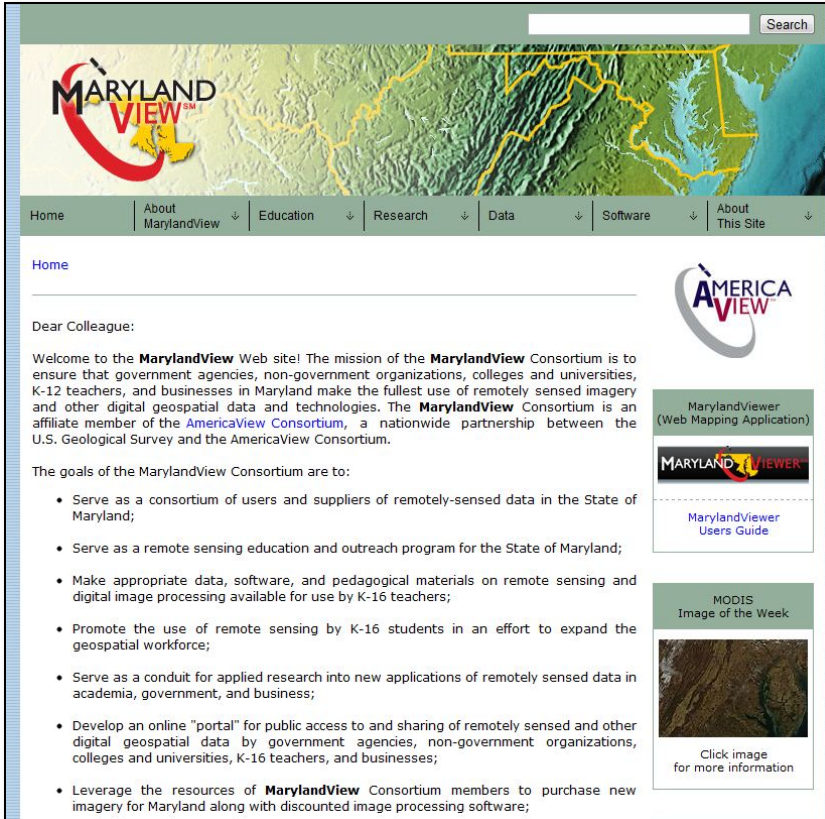
- Base Maps
- Emergency Type

The Maryland safeMAP user guide is accessible at ... <http://gis1.towson.edu/mdsafemap/help/MarylandsafeMAP.pdf>

MarylandView

- Part of a U.S. Geological Survey funded national program (<http://www.americaview.org>) to support applied remote sensing research, K-12 and higher STEM education, workforce development, and technology transfer

The MarylandView Web site is available at ...
<http://www.towson.edu/marylandview/>



Search

MARYLAND VIEW

Home | About MarylandView | Education | Research | Data | Software | About This Site

Home

Dear Colleague:

Welcome to the **MarylandView** Web site! The mission of the **MarylandView** Consortium is to ensure that government agencies, non-government organizations, colleges and universities, K-12 teachers, and businesses in Maryland make the fullest use of remotely sensed imagery and other digital geospatial data and technologies. The **MarylandView** Consortium is an affiliate member of the **AmericaView Consortium**, a nationwide partnership between the U.S. Geological Survey and the AmericaView Consortium.

The goals of the MarylandView Consortium are to:

- Serve as a consortium of users and suppliers of remotely-sensed data in the State of Maryland;
- Serve as a remote sensing education and outreach program for the State of Maryland;
- Make appropriate data, software, and pedagogical materials on remote sensing and digital image processing available for use by K-16 teachers;
- Promote the use of remote sensing by K-16 students in an effort to expand the geospatial workforce;
- Serve as a conduit for applied research into new applications of remotely sensed data in academia, government, and business;
- Develop an online "portal" for public access to and sharing of remotely sensed and other digital geospatial data by government agencies, non-government organizations, colleges and universities, K-16 teachers, and businesses;
- Leverage the resources of **MarylandView** Consortium members to purchase new imagery for Maryland along with discounted image processing software;

AMERICA VIEW

MarylandViewer (Web Mapping Application)

MARYLAND VIEWER

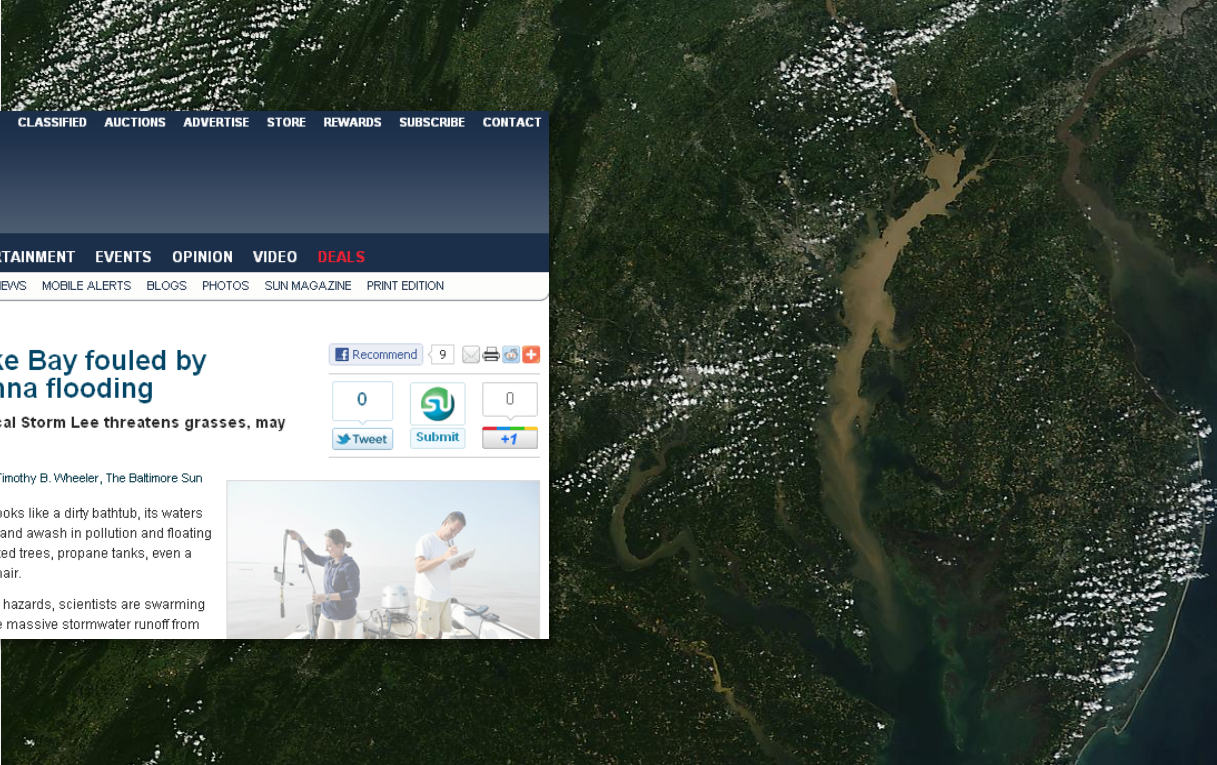
MarylandViewer Users Guide

MODIS Image of the Week

Click image for more information

MarylandView

- Daily MODIS imagery
- Example – September 13, 2011 (250 meter resolution Terra image)



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THE BALTIMORE SUN

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Ads By Google

Water Damage Repair

Mold Treatment-Dryout-Water Removal
800-563-4131 | FEMA# 514E Baltimore
www.FloodTechs.com/Baltimore

Chesapeake Bay fouled by Susquehanna flooding

Runoff from Tropical Storm Lee threatens grasses, may create dead zone

September 15, 2011 | By Timothy B. Wheeler, The Baltimore Sun

The Chesapeake Bay looks like a dirty bathtub, its waters turned brown with mud and awash in pollution and floating debris, including uprooted trees, propane tanks, even a battered dining-room chair.

Braving boat-damaging hazards, scientists are swarming over the bay to see if the massive stormwater runoff from

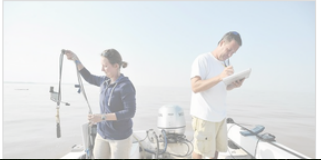
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MarylandView

- Balloon aerial photography

Balloon Aerial Photography


Dr. John M. Morgan, III, Phillip L. Reese, and Dr. Martin C. Roberge,
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 Department of Geography and Environmental Planning
 Towson University, Towson, Maryland 21252-0001, USA
<http://grelab.towson.edu/>

The Geospatial Research and Education (GRE) Laboratory recently undertook its first balloon aerial photography mission. The project selected for the first mission was to develop a composite image of the University's new \$123-million, LEED Gold-certified College of Liberal Arts Building. GRE Laboratory staff followed the recommendations of Grassroots Mapping (<http://www.grassrootsmapping.org/>), a part of the Public Laboratory for Open Technology and Science, and developed a balloon payload that consisted of: 1) a **Bosch** Simplex manually-aimed camera frame and **ProStar** suspension system; 2) a **Canon PowerShot SD3000 IS** (3000) 12.1 megapixel digital camera with 4X wide-angle optical image stabilized zoom and 2.7-inch LCD; and 3) a **Togo360** Mini GPS tracking system and data logging device. The balloon payload was carried aloft by a 5.5-foot weather balloon filled with 80 cubic feet of helium. The balloon was attached (tethered) to 500 feet of 200-pound Dacron line. A B&S-C robot taken from the Canon Hack Development Kit was modified to automatically trigger the camera every 15 seconds. The total cost of the equipment used for this project was approximately \$750 (including the cost of helium).

The mission was flown on Friday, August 26, 2011. The day was selected because the sky had less than 10 percent cloud cover, and winds were less than 5 miles per hour. The tethered balloon reached an altitude of approximately 300 feet above ground level. The balloon was "walked" around the College of Liberal Arts Building. Stops were made every 50 feet so that the camera had time to take several pictures at 15-second intervals. A total of 107 aerial photographs were captured over the period of an hour. The aerial photographs were mosaicked using **Microsoft Image Composite Editor**. The photographs were also input to **Microsoft Photosynth**, an online site of tools for capturing and viewing the world in three dimensions.




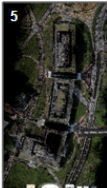
The cost to plan the mission and design the payload was underwritten by a grant from the **AmericaView Consortium** (<http://www.americaview.org/>). The GRE Laboratory hosts the **MarylandView Consortium** (<http://marylandview.towson.edu/>), the state-based consortium in Maryland that supports applied remote sensing research, K-12 and higher STEM education, workforce development, and technology transfer. The cost of the equipment for the project was underwritten by a grant from the **Maryland Chapter of the American Planning Association** (<http://www.marylandapa.org/>). Based on the success of the first mission, the GRE Laboratory plans to modify and improve the balloon payload to include gyro stabilization of the camera platform, to capture infrared photographs, to capture composite images, and to undertake small balloon aerial photography missions for government agencies and businesses. The results of this project demonstrate that balloon aerial photography can be used to quickly and cost-effectively collect high resolution aerial photographs and create composite images for a variety of uses.


All photographs by Dr. Jay Morgan and Phillip Reese.




Above 1: Final composite image of the College of Liberal Arts Building. This image was created using **Image Composite Editor (ICE)** from **Microsoft Research**. **Info:** research.microsoft.com/en-us/um/homestead/ice and the 3D photographs depicting the mission.

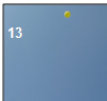
Below: From left to right: 2: An example of the quality of the captured aerial photographs (photograph taken of the area between the CLA Building, University Hall, and the Psychology Building); 3: The same photo, combined with the rest of the 107 photographs, then selected and 3D "walked" around the building (created with **Microsoft Photosynth** (<http://photosynth.net/>)); 4, 6: The same scene as a 3D photo, which can be used to create a three-dimensional rendering of the building. This photograph has been uploaded to **Blog Maps** and is publicly accessible (<http://maps.blog.com/>).



Above 6: Tethering the balloon. 7: Release of balloon. 8: Release of balloon. 9: Release of balloon. 10: Release of balloon. 11: Release of balloon. 12: Release of balloon. 13: Release of balloon. 14: Release of balloon. 15: Release of balloon.







Resources and Programs Used

- Grassroots Mapping: <http://grassrootsmapping.org/>
- Canon Hack Development Kit: <http://www.canonhack.com/CHDK/>
- Ultra Mini-Domputer: **LEB&C** (<http://www.leb-c.com/>)
- Info: <http://www.leb-c.com/lebc-robot.html>
- Microsoft Image Composite Editor (ICE): <http://research.microsoft.com/en-us/um/homestead/ice/>
- Microsoft Photosynth: <http://photosynth.net/>
- Microsoft Blog Maps: <http://maps.blog.com/>


Parts List


- Canon PowerShot SD3000 IS (3000) 12.1 megapixel camera
- Bosch Simplex camera frame and ProStar suspension system
- Ultra Mini-Domputer (LEB&C)
- Bosch Simplex camera frame and ProStar suspension system
- Togo360 Mini GPS tracking system and data logging device
- 5.5-foot Dacron line
- King Line Release (with Log)
- B&S-C (robot) (Control) Balloon (<http://www.balloonhack.com/lebc-robot.html>) (with 80 cubic feet of helium)





American Planning Association
Maryland Chapter





Towson University • 8000 York Road • Towson, MD 21252

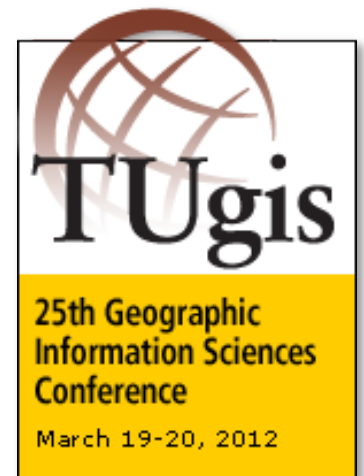
MarylandView



Balloon aerial photography information is available at ...
<http://pages.towson.edu/morgan/bap/>

TUgis

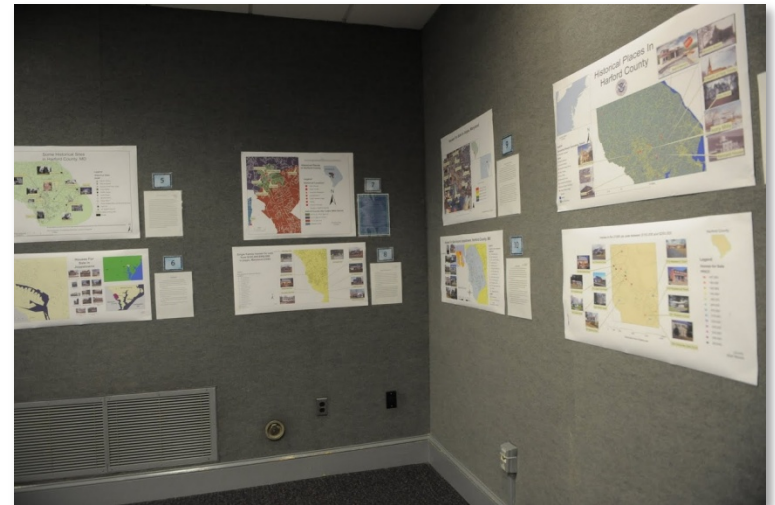
- Annual geographic information sciences conference
- Held at Towson University (University Union)
- 400-650 attendees from federal, state, and local government agencies, businesses, NGOs, and schools (high schools, community colleges, colleges and universities)
- Plenary sessions, presentations, and mini-workshops on a variety of GIS and related topics
- Exhibit area with 40+ exhibitors
- Map design competition (includes K-12 Category)
- Tugis 2012, March 19-20, 2012



Information about TUgis 2012 is available at ...
<http://www.towson.edu/tugis>

Tugis 2011

- 2011 Map Design Competition Winners (K-12 Category)
 - First Place
Andrea Rogers, Joppatowne High School
“Harford County Potential Flood Zone”
 - Second Place
Jeremy Clark, Joppatowne High School
“Recycling Center in Harford County”



INTEGRATED HOMELAND SECURITY M.S. PROGRAM

- 36 credit hour, exclusively online program
- Specialty areas include information assurance, health preparedness, and security policy
- Courses
 - IHSM 611 – Critical National Infrastructures
 - IHSM 612 – Planning, Prevention and Risk Management
 - IHSM 613 – Emergency Communication and Management
 - IHSM 614 – Team Building and Leadership Skills
 - IHSM 615 – Strategic and Tactical Planning
 - IHSM 620 – Introduction to Information Assurance
 - IHSM 621 – Information Systems Vulnerability and Risk Analysis
 - IHSM 622 – Application Software Security
 - IHSM 623 – Network Security
 - IHSM 630 – Health System Preparedness
 - IHSM 631 – Mental Health Emergency Preparedness and Response

INTEGRATED HOMELAND SECURITY M.S. PROGRAM

- IHSM 632 – Bioterror Public Health Preparedness
- IHSM 633 – Disaster Response and Community Health
- IHSM 640 – U.S. Homeland Security Policy
- IHSM 641 – Terrorism and Political Violence
- IHSM 642 – Intelligence and Homeland Security
- IHSM 643 – Homeland Security and Constitutional Rights
- IHSM 660 – GIS Applications – Homeland Security and Emergency Management
- IHSM 670 – Special Topics in Homeland Security
- IHSM 695 – Independent Study in Homeland Security
- IHSM 891 – Graduate Project

Information about the M.S. program is available at ... <http://grad.towson.edu/program/master/ihsm-ms/>

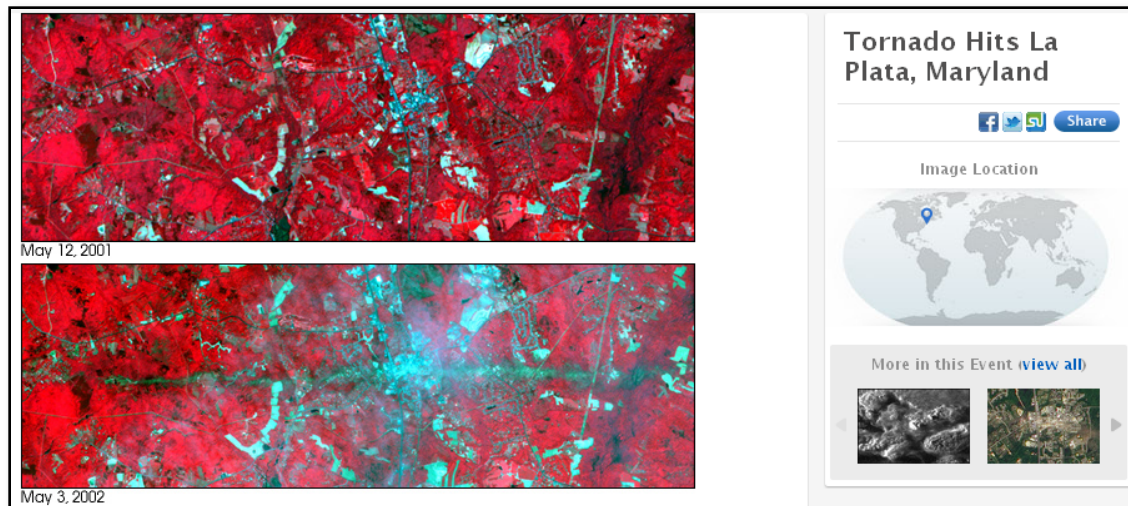
IHSM 660

- GIS Applications – Homeland Security and Emergency Management
- Course objectives
 - Apply important mapping concepts to the use of digital geospatial data
 - Perform selected GIS tasks using ArcGIS 10 (ESRI)
 - Employ Internet mapping applications for the retrieval and display of digital geospatial data
 - Find digital geospatial data for use with desktop and Web-based GIS applications using online metadata tools
 - Describe the analytical functionality and technical evolution of GIS
 - Understand how GIS and related geospatial technologies are used in support of homeland security and emergency management activities
- All students are required to develop a case study related to the use of GIS in homeland security or GIS in emergency management

The syllabus and schedule for IHSM 660 is available at ...
<http://pages.towson.edu/morgan/pages/students-ihsm-660.htm>

A FEW IDEAS?

- Engage high school students in local emergency management mapping projects
 - Create a K-12 “disaster charter” for Maryland similar to the International Charter Space & Major Disasters (<http://www.disastercharter.org/>)
 - Conduct workshops at Towson to familiarize teachers with the use of GIS for homeland security and emergency management
 - Have students update the citizen service layers for Maryland safeMAP



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