GeoResources Institute - Profile

Mission

• To understand Earth's natural and managed systems and provide comprehensive solutions for socioeconomic and environmental requirements, leading to an improved quality of life.

Vision

• To be a world leader in advancing the state-of-the-art in spatial technologies and resource management.
GeoResources Institute - Profile

- Total funding in FY 07 - $28M
- 74 active projects funded from NOAA, NASA, USGS, DoD, USDA, EPA, SBA/Census, USDOE, USFS, USDOT…
- Collaborations
  - External: over 20 universities nationally, internationally
  - Internal (MSU): faculty from 22 departments, 6 colleges/units
- Philosophy – Identify expertise needed and find it so as to best address agency/client needs
NASA

- **Rapid Prototyping Capacity** – technology infrastructure and experimentation process to evaluate NASA S&T in the context of end-user needs.
- Focuses on key components of potential solutions that must be validated before full experimentation.
- Tool for risk mitigation – decide which end-user decision tools can best utilize NASA S&T.
Project Profiles

NASA

- Rapid Prototyping Capacity
- Satellite Remote Sensing for Improved Mapping of Invasive Vegetation in National Parks
  - MSU ECE - Image Processing, Target Recognition, Hyperspectral Sensors
  - MSU PSS – Botany, Plant Physiology, Invasive Species Management
  - USGS & Colorado State University – Ecology, Botany, Field Studies
NASA – Small Satellite

- Need for new approach to satellite development, deployment
- Academic program – new Ph.D. in small satellite engineering
- Research program – aerospace, electrical, systems engineering, applications
- Economic development – new company development
- Other agencies now on board
Visualization – Multiple Agencies

• Demonstrate the value of using a spatially-immersive virtual environment to examine and analyze remotely sensed data

• Utilize CAVE to advance research data understanding, interpretation

• Capitalize on computational resources unique to Mississippi State University

• Port multiple data sets and types into CAVE
USGS

• Invasive Species - Develop integrated management programs that focus on advanced decision support systems
• Incorporate latest technologies with proven current practices
• Build prototype educational programs; execute through academic & extension outlets
• Work with USDA, USFS, DOI, NASA, non-profits, industry for holistic approach
Project Profiles

US DOT

- Lead consortium for R/S technology demonstration related to environmental impact of transportation infrastructure growth (Mississippi Gulf Coast I-10 corridor; US 49)
- Needs assessments and validation with US DOT
- Baseline data needs for US DOT and brokering data for other consortium members
- Education and training
  - Specialized training for US DOT
  - Annual workshop(s)
  - Congressional Technology Showcase
- Environmental compliance, citizen engagement
- Comprehensive planning (especially regarding evacuation planning)
NWS and FEMA

- Advanced hurricane modeling
- Coupling wave models and atmospheric models
- New wave growth algorithm valid for hurricane speed regimes.
- Analysis of hurricane boundary using Japanese buoy data, U. S. buoy data, and Australia atoll data.
- Development of a hurricane storm surge atlas using the Army Corps of Engineer's ADCIRC model. Replacement of USGS elevation data with IFSAR data.
- Publication of Second Edition of “Natural Disasters: Hurricanes” by Dr. Patrick Fitzpatrick of GRI.
**Project Profiles**

**DHS**

- Advance the state-of-the-art in remote sensing image analysis and target recognition
- Develop new target recognition algorithms for hyperspectral imagery
- Apply new methods to problem of bio-security
  - Agricultural food crops
  - Airborne chemicals
  - Biological pathogens, e.g. soybean rust
- System verification and validation via extensive field studies, greenhouse studies, experimental data collection and analysis

- Partners:
  - UIUC, USDA/ARS, DOE
Project Profiles

DHS

- Evaluation of GIS data and procedures from Hurricane Katrina
- Extensive use of GIS in response and recovery efforts
- “Lessons Learned” analysis of procedures, products, activities
- Products: national archive, improved preparedness
- Partners:
  - DOE, MEMA, NVisions
Community Resiliency Planning

Rebuilding the Gulf Coast
Conceptual Master Plan for the Gulf Coast of Mississippi
Design Week 2006
Department of Landscape Architecture
Mississippi State University

Sponsored by:
Design Workshop, Michael Hatcher and Associates,
The Chalet, Office of the President - Mississippi State University, The Landscape Studio,
Lanier's Landscape, Madison Planting and Design Group,
Brookshire's Grocery, Anjean Italian Restaurant, Coca-Cola of Biloxi

GeoResources Institute
Mississippi State University
Northern Gulf Institute
A NOAA Cooperative Institute

David Shaw, Director
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www.NorthernGulfInstitute.org
Concept
Northern Gulf Institute

• Critical needs in northern Gulf; currently underserved by NOAA
• Opportunity for pilot effort to closely link divisions across NOAA
• Integrated research, outreach, education programs
• Strong affiliation with other federal agencies
Concept
Northern Gulf Institute

- Anchored at Stennis Space Center, but regional in scope
- Collaborative with other CIs and NOAA labs
- Strong linkages with state, local partner agencies
- Needs-based research, education and transitional outreach as goals

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Complementary Academic Strengths

Member Institutions

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Ecosystem Level Focus

White water to brown water to blue water

31 State Watershed of the Northern Gulf

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Northern Gulf Institute Themes

Optimize/link watershed, ocean, & atmospheric models

Apply spatial technology in coastal assessment and management

Coordinate spatial data and data mining

Develop watershed mgt, understand impacts of Best Mgt Practices on coastal/marine water quality and ecology

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Developing Collaborations

- Across Disciplines (e.g., high performance computing, visualization, ocean & atmospheric modeling, geospatial technology applications, estuarine biology)
- Across Institutions (e.g., Jackson State University, University of North Carolina/Chapel Hill)
- With NOAA Partners (e.g., OAR, NOS, NCDDC, NESDIS, NDBC, NMFS, NWS)
- With Other Federal Agencies (e.g., NOAA, USGS, USCOE, NASA, NAVY)
- With State Agencies (e.g., MS Dept of Marine Resources, Alabama Dept of Environmental Management)
- With NGOs (e.g., The Nature Conservancy, Coastal States Organization)
# NGI Advisory Council

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
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<tbody>
<tr>
<td>Glade Woods, Chair</td>
<td>Northern Gulf Institute, MSU</td>
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<tr>
<td>Kacky Andrews</td>
<td>Coastal States Organization</td>
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<tr>
<td>Russ Beard</td>
<td>NOAA National Coastal Data Dev Center</td>
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<tr>
<td>Robert Bendick</td>
<td>The Nature Conservancy</td>
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<tr>
<td>Todd Davison</td>
<td>NOAA Gulf Coast Services Center</td>
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<td>Mark Glorioso</td>
<td>NASA Stennis Applied Sciences</td>
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<td>Bryon Griffith</td>
<td>EPA Gulf of Mexico Program</td>
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<tr>
<td>Dawn Lavoie</td>
<td>USGS Gulf Coast &amp; LMV</td>
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<td>Jeff Lillycrop</td>
<td>US Army Corps of Engineers</td>
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<td>Paul Moersdorf</td>
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<td>Scott Nichols</td>
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<td>David Reed</td>
<td>NOAA National Weather Service LMRFC</td>
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<td>Matt Romkens</td>
<td>USDA National Sedimentation Lab</td>
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<tr>
<td>David Ruple</td>
<td>Grand Bay National Estuarine Research Reserve</td>
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<tr>
<td>Martha Seguna</td>
<td>National Park Service Gulf Coast Network</td>
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<tr>
<td>LaDon Swann</td>
<td>MS/AL Sea Grant Consortium</td>
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<tr>
<td>Bill Walker</td>
<td>MS Department of Marine Resources</td>
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Regional Issues & Concerns

- Coastal Storms Forecasts & Storm Models
- Climate & Sea Level Changes
- Coastal Wetlands – Protection Competing with Development
- Marine Habitat Protection
- Complex Environmental Systems (Air – Sea – Land Interactions)
- Ecosystems Models - Large & Small
- Marine Fisheries Sustainable Yield
- Recreational & Commercial Fisheries Competing
- Coastal Wetland Protection & Recovery
- Agricultural, Industry, Transportation Watershed Impacts
- Hypoxia and Invasive Species
- Environmental Education
- Data Management Systems
- Observing and Geo-Spatial Data & High Performance Computers Systems
- Energy Exploration & Production Impacts
- Awareness & Integration of Multi-Research Projects
NGI Transitions Results

- Focus on Research-to-Operations as a guiding principle for project development and execution
- Embed a strong element of outreach in all funded activities to build Northern Gulf Stewardship
- Link directly to the regional community through advisory and collaborative activities
Northern Gulf Institute

Broadening the Impact

- Facilitated discussions between NOAA and USDA, resulting in joint press conference on hypoxia; Farm Bill language now under consideration.

- Hosted Gulf stakeholder workshop for Unmanned Aerial Systems; coordinating development of priorities list; assisting in replicating efforts in other regions.

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GRI/NGI STRENGTHS

- Systems approach
  - Basic research to Extension
  - Portfolio of projects
- Requirements driven
  - Connection to practitioners
- Integrated teams
  - Engineer, application scientist, end user
- Technical and support depth
- Experienced collaboration
  - Federal, State, & Local government
  - Commercial
  - Academia
- Focused on operational solutions