LIST OF WORKSHOP PARTICIPANTS

Appendix A

David Applegate, U.S. Geological Survey, Reston, Virginia

Kira Brooks, Michael Baker Jr., Inc., Alexandria, Virginia

Michael Buckley, Federal Emergency Management Agency, Washington, D.C.

Stephen A. Cauffman, National Institute of Standards and Technology, Gaithersburg, Maryland

David Chadwick, First American RE Services, Arlington, Virginia

Nell C. Codner, National Oceanic and Atmospheric Administration, Silver Spring, Maryland

Daniel Cotter, Department of Homeland Security, Disaster Readiness Caucus, Washington, D.C.

Michael P. Gaus, PhD, Professor Emeritus, Williamsburg, Virginia

David A. Harris, FAIA, National Institute of Building Sciences, Washington, D.C.

John R. Hayes, Jr., PhD, PE, National Institute of Standards and Technology, Gaithersburg, Maryland

Claret M. Heider, National Institute of Building Sciences, Washington, D.C.

Thomas L. Holzer, U.S. Geological Survey, Menlo Park, California

Douglas G. Honegger, D.G. Honegger Consulting and ALA Team Leader, Arroyo Grande, California

Christopher Hudson, PE, Federal Emergency Management Agency, Washington, D.C.

Kathy Jones, U.S. Army Corps of Engineers, Hanover, New Hampshire
Angela R. Kamrath, NEES Cyberinfrastructure Center, San Diego Supercomputing Center, La Jolla, California

Brian King, FM Global, Norwood, Massachusetts

Charles Kircher, PE, Charles Kircher and Associates Consulting Engineers, Palo Alto, California

Edward M. Laatsch, PE, Federal Emergency Management Agency, Washington, D.C.

Jon Lea, NEES, Inc., Davis, California

Christopher W. Letchford, BE, Dphil, MIEAust, Texas Tech University, Lubbock

Alan R. Lulloff, PE, CFM, Association of State Floodplain Managers, Madison, Wisconsin

Scott McAfee, Federal Emergency Management Agency, Washington, D.C.

Thomas McLane, Applied Technology Council, Arlington, Virginia

David Mendonca, New Jersey Institute of Technology, Newark

Bernard F. Murphy, PE, National Institute of Building Sciences, Washington, D.C.

James K. Murphy, Michael Baker, Jr., Inc., and ALA Project Team member, Alexandria, Virginia

Stuart Nishenko, PhD, Pacific Gas and Electric Company and ALA Project Team member, San Francisco, California

Joy M. Pauschke, PhD, PE, National Science Foundation, Arlington, Virginia

Timothy A. Reinhold, PhD, PE, Institute for Business and Home Safety, Tampa, Florida

Claire Lee Reiss, JD, ARM, CPCU, Public Entity Risk Institute, Fairfax, Virginia

Clifford J. Roblee, PhD, PE, NEES, Inc., Davis, California

Linda R. Rowan, American Geological Institute, Alexandria, Virginia

William U. Savage, PhD, U.S. Geological Survey and ALA Team member, Menlo Park, California

Philip J. Schneider, AIA, National Institute of Building Sciences, Washington, D.C.

Alan Springett, Federal Emergency Management Agency, Washington, D.C.

Susan K. Tubbesing, Earthquake Engineering Research Institute, Oakland, California

Loren L. Turner, PE, Caltrans, Sacramento, California

Stuart D. Werner, Seismic Systems and Engineering Consultants, Oakland, California

Brent H. Woodworth, IBM Crisis Response Team, Woodland Hills, California

T. Leslie Youd, Brigham Young University, Provo, Utah

WORKSHOP AGENDA

Appendix B

AMERICAN LIFELINES ALLIANCE (ALA) WORKSHOP ON UNIFIED DATA COLLECTION
October 11-12, 2006
American Institute of Architects Headquarters Board Room
Washington, D.C.

October 11, 2006 (Wednesday)

8:00 - 8:30 am	Continental Breakfast
8:30 - 8:50 am	Welcome -- Brent Woodworth, IBM Crisis Management Team and MMC Chair, and Mike Buckley, FEMA)
8:50 - 9:15 am	Introduction and Overview of Workshop -- Doug Honegger, ALA Project Team Chair
9:15 - 10:00 am	Keynote Speakers on Recent Data Collection Experiences Steve Cauffman, NIST, and Alan Springett, FEMA
10:00 - 10:30 am	Keynote Speaker on Perspectives from the Insurance Industry -- Tim Reinhold, IBHS
10:30 - 10:45 am	Break
10:45 - 11:15 am	Keynote Speaker on Recommendations from USGS Circular 1242 -- Tom Holzer, USGS
11:15 - 11:45 am	Keynote Speaker on Recent Database Efforts and Needs Anke Kamrath, SDSC
11:45 am -12:10 pm	Discussion and identification of working group topics
12:10 - 12:45 pm	Lunch
12:45 - 1:00 pm	Assign working groups
1:00 - 4:00 pm	Working group meetings
4:00 - 5:00 pm	Summary of working group meetings/discussion

October 12, 2006 (Thursday)

8:00 - 8:30 am	Continental Breakfast
8:30 - 9:30 am	Overview from working group summary
9:30 - 10:30 am	Identify needs
10:30 - 10:45 am	Break
10:45 - 11:15 am	Identify barriers
11:15 am - 12:00 pm	Identify approaches to overcome barriers
12:00 - 12:45 pm	Lunch
12:45 - 2:00 pm	Plan for action
2:00 - 2:15 pm	Closing remarks

WORKING GROUP BACKGROUD INFORMATION

Appendix C

Working Group 1

Improving Mechanisms and Procedures for Post-Disaster Investigations

Working Group 1 Lead: Doug Honegger

Working Group 1 Participants:
Andrew Bruzewicz, Stephen Cauffman, Nell C. Codner, Thomas L. Holzer, Christopher W. Letchford, William U. Savage (secretary), Alan Springett, Susan K. Tubbesing, T. Leslie Youd

- What shortcomings in present approaches need to be addressed?
- Distinguishing between perishable and non-perishable data.
- Is there too much emphasis on short-term data collection efforts (e.g., a primary goal is to publish a reconnaissance report)?
- Unrealistically short periods to conduct investigations given broad data collection needs, access to facilities, and availability of key facility personnel.
- How can the need for uniform data collection guidelines be addressed without sacrificing the flexibility to capture modes of damage that may not have been previously identified?
- Are we maximizing the use of current technology to provide the accurate location and description of damage?
- How to best accommodate collection of both perishable and non-perishable data?
- Multiphase data collection process that begins with the capture of perishable data and ends with the addition of supporting data that may be made available weeks or months after the collection of perishable data.
- Prioritization of damage data collection efforts to address known deficiencies in knowledge.
- Segregation of data collection efforts to avoid duplication of efforts.
- What organizational structure characteristics/changes would improve timely post-event deployment of field investigators?
- Flexible funding mechanisms.

- A pre-identified pool of individuals and/or organizations from which to populate field reconnaissance teams.
- The capability to provide the level of training necessary to ensure consistent, efficient, and complete data collection.
- Resources that can be devoted to post-event analysis of damage data and the formulation of recommendations to improve future performance.

Working Group 1 Reporting:

- Vision for improving mechanisms and procedures for post-disaster investigation
- What can we realistically expect to achieve and how over both the short term and the long term

Working Group 2

Improving Cooperation Among Public and Private Organizations

Working Group 2 Lead: Ed Laatsch

Working Group 2 Participants:
David Chadwick, Michael P. Gauss, Claret Heider (secretary), Kathy Jones, Brian King, Charles Kircher, Alan R. Lulloff, Thomas McLane, Timothy A. Reinhold, Brent H. Woodworth

- Characteristics necessary to assure new approaches are viewed as mutually beneficial as measured by perceived value of access to much broader data sets compared to the costs associated with collection of data being donated to the system.
- Removing data “embargos” by academic investigators who wish to hold data as leverage for soliciting future research funds or publishing research findings.
- Emphasize comprehensive data collection in addition to a focus on very narrow topics. For example, efforts focused on collecting wind-blown debris damage may miss other opportunities to collect other important performance information related to the adequacy of roof tie-down systems, anchorage of roof-mounted equipment, and damage to non-building structures.
- To what degree does private sector ownership of unique information on performance create a potential for a competitive advantage and reduce the incentive to share data?
- What types of cooperative agreements for post-event investigations may be needed?

- How can coordination among other federal agencies, federally funded initiatives (e.g., WindHRP), and private organizations currently involved in post-event damage data collection (e.g., professional organizations, industry groups) be improved? What cooperative frameworks are possible (from a legal and/or practical view) among various federal agencies and between federal agencies and the private sector?

- To what degree can federal agencies "direct" the use of uniform guidelines for post-disaster earthquake investigations activities that they fund?

Working Group 2 Reporting:

- Vision for improving cooperation among public and private organizations

- Obstacles to achieving that vision

- What can we realistically expect to achieve and how over both the short term and the long term

Defining an IT Framework for Data Archiving and Exchange

Working Group 3

Working Group 3 Lead: Anke Kamrath

Working Group 3 Participants:
Kira Brooks, John Lea, Scott McAfee, David Mendonca, Philip Schneider, Loren Turner, Stuart D. Werner (secretary)

- Should database protocols be established first or should they evolve to accommodate the types of data?

- Access and preservation of data:

- User access to be as open as possible via internet.

- Virtual system with transparent access to multiple data housing sites.

- Centralized storage of all data to assure preservation and migration of data to new data storage technologies.

- Types of data to be managed
  - Digital images.
  - GIS databases.
  - Text and spreadsheet files.
  - PDF files.
  - Digital audio.
  - Digital video.

- Should provisions be made to store supplemental data from detailed research investigations conducted in a time frame of 1 to 5 years after an event?
- Identification of current frameworks that could be adapted (e.g., NEESit, Library of Congress, other).

- What research is needed to develop procedures, software, and hardware to facilitate the collection and dissemination of field data?

- What security requirements are necessary to control access to potentially sensitive data?

Working Group 3 Reporting:

- Vision for defining an IT framework for data archiving and exchange

- Obstacles to achieving that vision

- What can we realistically expect to achieve and how over both the short term and the long term

Working Group 4

Long-Term Administration of the Data Archive

Working Group 4 Lead: Jim Murphy

Working Group 4 Participants:
David Applegate, Michael Buckley, Daniel Cotter, David Harris, John Hayes, Stuart Nishenko (secretary), Joy Pauschke, Claire Lee Reiss, Clifford Roblee, Linda Rowan

- Efforts to collect, disseminate, and evaluate data for the purposes of improving the resiliency of the built environment need to be maintained over a period of time that can be considered “indefinite” relative to typical federal initiatives (e.g., 50 to 150 years).

- To what degree should administration plan be based upon the assumption that that existing federally supported centers and institutions will continue to function over the long term as they are now?

- Can one federal agency serve as the lead for administration, setting research objectives, and reporting to Congress on the data collection program? If not, is there a need for a new entity or new cooperative structure among agencies?

- Is an alternate model that relies on achieving a self-sustaining funding mechanism (e.g., annual personal and organizational subscriptions, fees

for service) possible and/or practical? What restrictions or limitations could exist with respect to taking data largely derived from federal funding?

Working Group 4 Reporting:

- Vision for long-term administration of a data archive
- Obstacles to achieving that vision
- What can we realistically expect to achieve and how over both the short term and the long term

SPEAKER PRESENTATIONS

Stephen Cauffman, NIST

Appendix D

Collection of Perishable Data Following Hurricane Katrina and Hurricane Rita

ALA Natural Disaster Data Collection Workshop
October 11, 2006

Stephen A. Cauffman
Leader, Structures Group
Building and Fire Research Laboratory, NIST
stephen.cauffman@nist.gov

NIST

Overall Approach

- Multi-organizational reconnaissance of the performance and damage to physical structures.
  - 26 experts drawn from 16 private sector, academic, and government organizations.
- NIST-led reconnaissance was a cooperative effort from its very launch.
  - Data and information openly shared between NIST, other federal agencies, and private sector participants.
  - While findings and recommendations are those of NIST, the report and its recommendations have been reviewed by the participating organizations.
  - Interagency cooperation is continuing as agencies plan and carry-out follow up actions in response to recommendations.
- Complements other completed and ongoing studies of the performance of structures in the Gulf region.
- Only study to take a broad look at damage to physical structures (major buildings, infrastructure, and residential structures) and its implications for the Gulf Coast and other hurricane-prone regions.

NIST

Why Reconnaissance?

- Catastrophic events provide an unfortunate but important learning opportunity to improve standards, codes, and practices that will reduce losses in future events.
- **NIST undertook a broad-based reconnaissance rather than a detailed investigation since much has already been learned from past hurricanes.**
- **The reconnaissance was intended to identify new technical issues for:**
  - **Repair and reconstruction in the devastated regions.**
  - **Improving building codes, standards, and practices.**
  - **Further study of specific structures or research and development.**
- The 26 experts were deployed in 3 sub-teams to conduct reconnaissance in:
  - Mississippi Gulf Coast (Hurricane Katrina) – Oct. 17-21, 2005
  - New Orleans (Hurricane Katrina) – Oct. 17-21, 2005
  - Southeast Texas (Hurricane Rita) – Oct. 10-14, 2005
- Each of the three teams was further subdivided to focus on major buildings, infrastructure, residential structures.

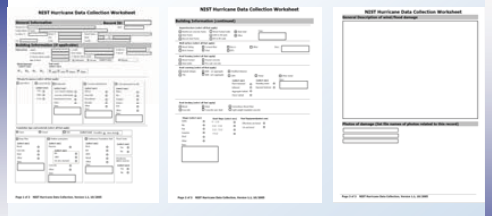
NIST

Scope of Reconnaissance

- Collect and analyze:
  - Perishable field data (e.g., first-hand observations, photographic data) on performance of physical structures.
  - Environmental data on wind speed, storm surge, and flooding, and relate environmental data to observed structural damage.
- Review and analyze relevant data collected by other sources (e.g., government agencies, academic and research organizations, industry groups).
- Document field observations, environmental conditions, and data gathered from other sources, and make recommendations for:
  - Repair and reconstruction in the devastated regions.
  - Improving building codes, standards, and practices.
  - Further study of specific structures or research and development.

NIST

Data Collection Approach



- Patterned after ATC-23; modified based on NIST past experience
- Attempted to standardize data collection
- Established a database and data entry form
- Forms could be completed on computer or by hand.
- Limited to buildings; not suited for other types of structures

NIST

Data Collection Approach (2)

- Identified key data
  - Description of structure (e.g., structure type and use, construction type, materials used, approximate age)
  - Location (latitude and longitude)
  - Written observations (type and extent of damage, measurements)
  - Photographs
- Data collected in handwritten form, matched with photographs at a later time.
- This approach was most efficient in the field since equipment (GPS, still cameras, camcorders, computers, communication equipment) was not integrated.

NIST

ALA Workshop on Unified Data Collection

Issues

- No easy system existed to compile data, so
  - We spent hours copying, pasting, transcribing, etc.
  - Few photos have precise geolocation attached.
  - Photos not always linked with written observations.
- No place to store data not used in the report, so
  - 100s of photos and notes were never centrally stored
  - These images, locations, descriptions, etc. were not bound together.
- Individuals on team used different methods for storing and compiling data
  - Additional work required to integrate data from different sources into final report.

NIST

Other Considerations

- Objective was to document findings in a final report and develop recommendations for improvements.
- As the key technical issues became clear, observations that illustrated those issues were selected for report and centrally stored.
- Photographs were matched with written observations during drafting of the report. Draft sections centrally stored; other data stored locally by team members.

NIST

Where is the Data Now?

- NIST Technical Note 1476 (selected data)
- Additionally, some data stored centrally and accessible by the NIST Reconnaissance Team via the internet
- Large amount of data and photographs are stored locally by the NIST Reconnaissance Team members.

NIST

Doing it better: efficient reconnaissance

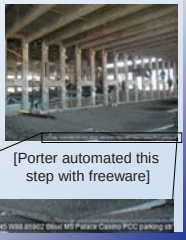
Snap photos with Smartphone & dictate observations. Bluetooth GPS provides lat/lon, software embeds it in jpg metadata

[L: Treo 700p w/5 MPix camera, text & voice caption capability
R: Garmin GPS 10 12-channel receiver]

Email to recon organizer; staff transcribe voice caption, add to metadata, & forward to NEED, which serves it securely to organizer, team (and posterity)

[Google Earth w/Porter's Katrina KML database of GPS track and photos]

Key metadata automatically watermarked onto images for later reference



[Porter automated this step with freeware]

NIST

How Does This Experience Compare to Earlier Events?

- Hurricane Andrew (1992)
  - Film camera
  - Paper maps
  - Handwritten observations
  - Manual data compilation
- Jarrell, TX Tornado (1997)
  - Digital camera
  - First generation GPS-based computer maps
  - Handwritten observations
  - Manual data compilation
- Hurricane Katrina
  - Vastly improved digital cameras
  - Enhanced GPS-based computer maps
  - Handwritten observations
  - Partially automated data compilation and storage

NIST

Thank you

NIST

ALA Workshop on Unified Data Collection

Thomas Holzer, USGS

"The Plan to Coordinate NEHRP Post-earthquake Investigations"

The Plan

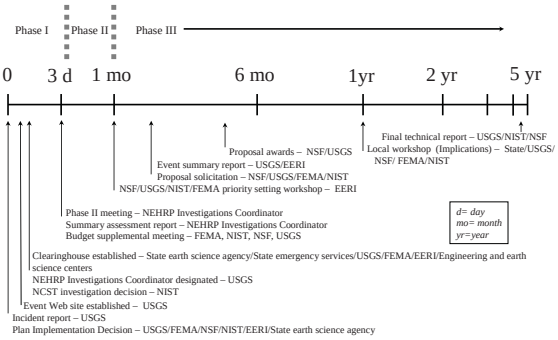
Coordinate and schedule formal and *ad hoc* post-earthquake activities

TLH1

Who were we trying to coordinate?

- Federal (NEHRP)
  - USGS
  - NSF (Engineering and Geosciences Directorates)
    - EERI LFE program
    - SGER
    - Earthquake Centers, NEES
    - Individual investigators redirection
    - GEER
  - NIST (NCST)
  - FEMA (MAT)
- State (Earth science agencies)
- Others (Professional organizations, government agencies, private sector…)

Plan Timeline



Process

- Prepared under aegis of Applied Technology Council
- Formal preparation
  - Seven-member *multidisciplinary* committee appointed to write plan
  - Nineteen member *multi-institutional* oversight committee appointed to review plan
- Invitational workshop with EERI to solicit community input (March 2001)

Major Issues Identified at Workshop

- Structural and nonstructural damage data are not systematically collected
- Social science aspects are not addressed
- Earth-science investigations have been done relatively well

ALA Workshop on Unified Data Collection

TLH2

Who were we trying to coordinate?

- Federal (NEHRP)
  - USGS
  - NSF (Engineering and Geosciences Directorates)
    - EERI LFE program
    - SGER
    - Earthquake Centers, NEES
    - Individual investigators redirection
    - GEER
  - NIST (NCST)
  - FEMA (MAT)
- State (Earth science agencies)
- Others (Professional organizations, government agencies, private sector…)

The Plan's Recommendations for further action

1. Broaden coverage and comprehensiveness of earthquake impacts
   a. Built environment
   b. Socioeconomic environment
2. Encourage use of information technology
3. Formalize data management and archiving (NEED-National Earthquake Experience Database)

Strategy involves a series of actions to achieve a goal

Aspirations are not a strategy

NEHRP Goals

1. Broaden coverage and comprehensiveness of earthquake impacts
   a. Built environment
   b. Socioeconomic environment
2. Encourage use of information technology
3. Formalize data management and archiving (NEED-National Earthquake Experience Database)

Strategy involves a series of actions to achieve a goal

Elements of a strategy:

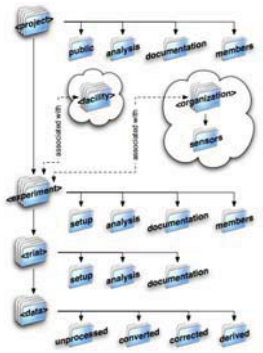
- What is going to be done?
- By whom?
- When?
- How?

Status Report

- NEESit & NEEScentral
- Google Earth
- Virtual technical clearinghouse
- SEAOC
  - Ad hoc post-disaster performance observation committee
- ALA effort

ALA Workshop on Unified Data Collection

NEEScentral



Data repository for managing, sharing, storing, and publishing data

http://it.nees.org

Google Earth

GIS platform and Google Earth

Under Development by USGS
NEHRP Virtual Technical Clearinghouse

- Data repository
- Damage descriptions
- Investigation teams
- Collaboration opportunities
- Research recommendations

SEAOC

Post-earthquake observations of performance by practicing structural engineers

Bottom Line

- NEHRP needs to create and assume responsibility for NEED
- NEHRP needs to provide leadership for coordinating grass roots efforts

Strategy involves a series of actions to achieve a goal

Elements of a strategy:

- What is going to be done?
- By whom?
- When?
- How?

ALA Workshop on Unified Data Collection

Angela Kamrath, UCSD

Data and Disasters – Predicting, Analyzing, and Responding to Catastrophe

Presentation at American Lifelines Alliance Workshop; Oct 11-12, 2006

Anke Kamrath

Division Director, San Diego Supercomputer Center

Strategic Advisor, NEES Cyberinfrastructure Center

Cyberinfrastructure and SDSC

Enabling science and engineering discovery through Cyberinfrastructure

More capable and/or higher capacity **computational resources**

Access to community and reference **data collections**

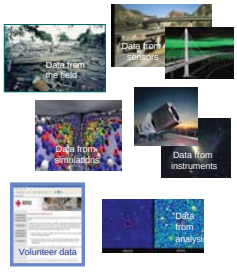
Professional-level Multi-disciplinary **expertise**

Cyberinfrastructure = **resources** (computers, data storage, networks, scientific instruments, experts, etc.) + **"glue"** (integrating software, systems, and organizations).

Community codes, middleware, software **tools** and **toolkits**

Data is a key driver for SDSC's Cyberinfrastructure

- **Data comes from everywhere**
  - Field Data
  - "Volunteer" data
  - Scientific instruments
  - Experiments
  - Sensors and sensornets
  - Computer simulations
  - New devices (personal digital devices, computer-enabled clothing, cars, …)
- **Data-oriented science and engineering involves an unprecedented level of IT integration, interoperability, scale, and use**
- ***Deluge of Data….***
  Turning the deluge of data into usable information for the research and education community requires an unprecedented level of integration, globalization, scale, and access



Data Cyberinfrastructure for Two Recent Events

- **Sumatran Tsunami**
  - Collect and manage data from NSF-funded Recon Teams
- **Katrina Hurricane**
  - Disaster Response – Supporting Red Cross with Data Management

NEES Tsunami Reconnaissance Data Repository

- **Partnership:**
  - UCSD:
    - SDSC (San Diego Supercomputer Center)
    - NEESit
  - Oregon State University
    - Harry Yeh, Ben Steinberg, Cherri Pancake
- **Project includes three primary elements**
  - Focus on the 2004 Great Sumatra Tsunami Event
    - Coordination with NSF SGER Recon Teams & EERI Recon Teams
      - Work with teams to upload data
  - Creating Data Upload Environment
    - Metadata structure
    - File hierarchy for upload
  - Query/Browsing Environment
    - Google Maps (maps.google.com) as catalog browser (all data geo-referenced)
- **Based on NEESit Data Repository (it.nees.org)**

Repository Features

- **Upload Environment**
  - Flexible, easy-to-use secure area for data entry and management
  - Flexible file hierarchy and file type support
- **Download Environment**
  - Search by keyword, location
- **Infrastructure**
  - Redundant Data
  - Data preservation (multiple copies, relying on longevity of NEES and SDSC)
- **Beta-version:**
  - http://tsunamirepository.nacse.org
  - Guest Login:
    - Login: harry
    - Password: harry123

Challenges

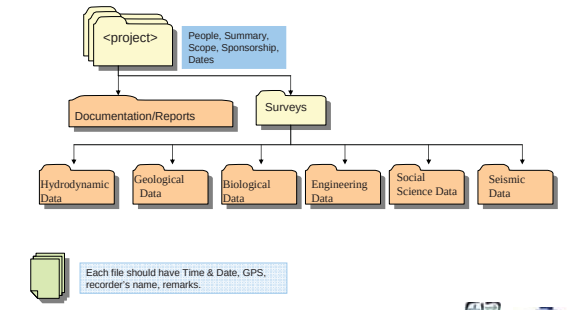
- **Broadly multidisciplinary (and interdisciplinary) data**
  - Seismic Data
  - Hydrodynamic data
  - Engineering data
  - Geological data
  - Biological data
  - Social science data
- **Data Formats and Preservation Concerns**
  - Multi-media and variety data formats
    - Tables (DB)
    - Photos/videos
    - Audio
    - Documents
    - Maps/illustrations
  - Preservation Issues (file conversion)
  - Who's going to manage the data 50 years from now?
- **Acquiring adequate metadata**
  - No prior data/metadata standards & data quality disparity
  - Field teams reluctant to spend time and effort
  - Not experienced in using tools, systems, metadata standards
  - Labor Intensive -- $$$ needed to make data useful to others (e.g. annotation, translation, structuring)
  - Many survey teams without prior experience
  - International survey efforts: India, Indonesia, Thailand, Sri Lanka, Japan, Korea, Australia, New Zealand, England, Greece, Russia, Turkey, and the US
- **Intellectual property and data piracy issues**
  - Proper credit is given to the original data owner, e.g. copyright/citation information being inserted into the data.
  - Human Subjects issues
  - Competitiveness (e.g., timeline for publications)
- **Increasing Value for Long-term Research via the Data**
  - Need to add other tools and resources to increase overall research value.
  - Need other related data resources (e.g., international)

SDSC SAN DIEGO SUPERCOMPUTER CENTER

Anke Kamrath

Tsunami Repository Prototype File Hierarchy

*Orange folders include subfolders as needed



Each file should have Time & Date, GPS, recorder's name, remarks.

SDSC SAN DIEGO SUPERCOMPUTER CENTER

Anke Kamrath

Metadata for survey categories

1) General Site Configuration
- Description
- Topography
- Bathymetry
- Maps, Sketches, and Other Visuals

***2) Social Science Data*:**
- Background Information
- Human Impact
- Communication
- Individual Response
- Community Response
- Organizational Response
- Damage & Loss

3) Hydrodynamic Data:
- Run-up Heights
- Extent of Inundation
- Tide-Gauge Data
- Flow
- Wave Structure
- Conditions at Time of Tsunami

4) Seismic Data
- Local Seismographs
- Macroscopic Intensity Assessment
- Post-Event Measurements

5) Geological Data:
- Surface Fault
- Tectonic Displacement
- Tsunami Deposits & Clast/Boulder Movement
- Geomorphological Changes
- Earthquake Induced Liquefaction
- Submarine & Subaerial Landslides
- Paleo-Tsunami Data

6) Engineering Data
- Event Data
- Structural Damage
- Lifeline Damage
- Geotechnical Damage
- Pre-event Hazards and Mitigation

7) Biological Data
- Flora
- Fauna
- Marine Biology

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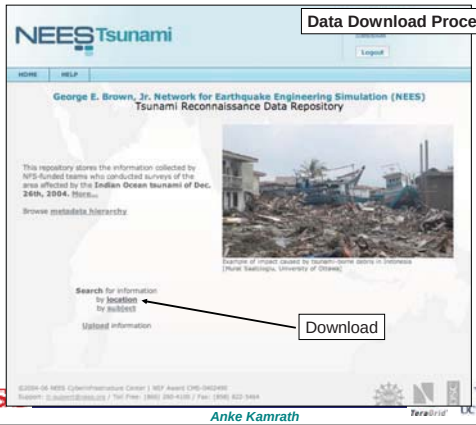
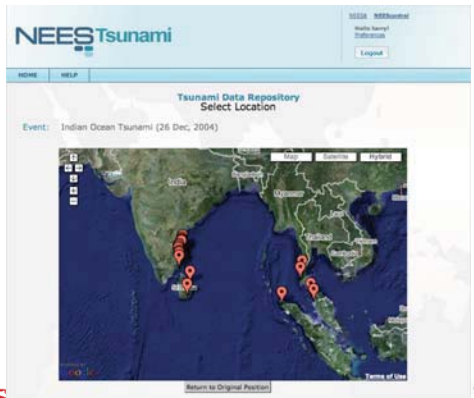
Anke Kamrath

Data Download Procedure



SDSC

Anke Kamrath

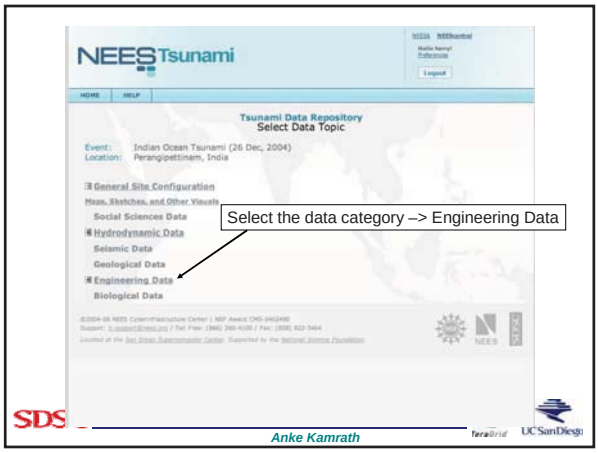


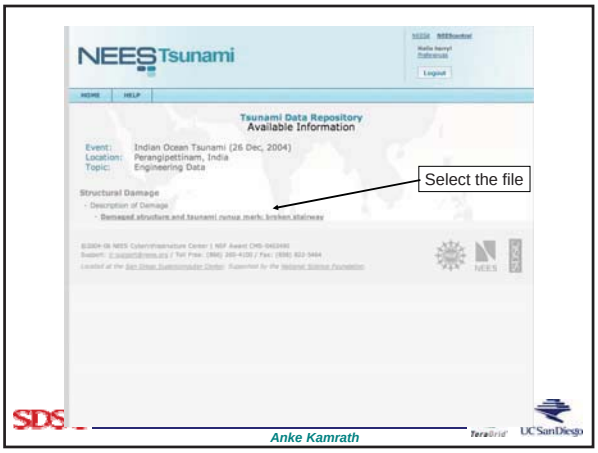
SDSC

Anke Kamrath

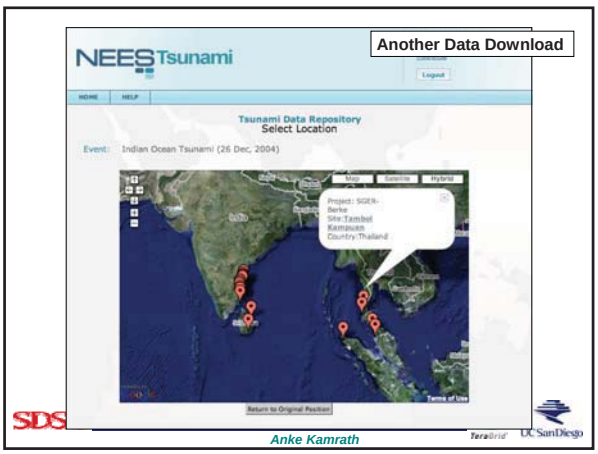
SDSC

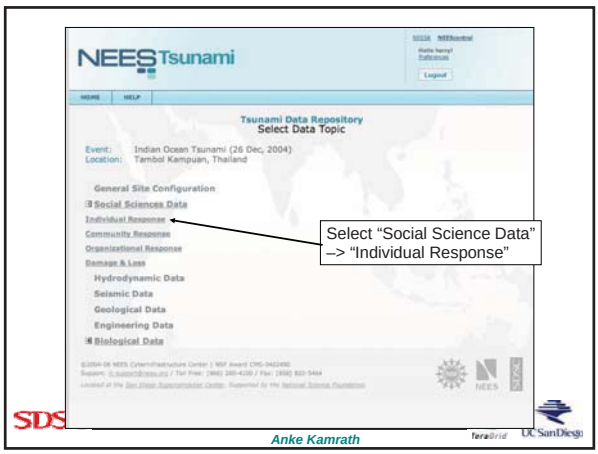
Anke Kamrath


NEES Tsunami
Tsunami Data Repository
Select Data Topic
Event: Indian Ocean Tsunami (26 Dec, 2004)
Location: Perangipettinam, India
General Site Configuration
Maps, Sketches, and Other Visuals
Social Sciences Data
Hydrodynamic Data
Seismic Data
Geological Data
Engineering Data
Biological Data
Select the data category –> Engineering Data
Anke Kamrath


NEES Tsunami
Tsunami Data Repository
Available Information
Event: Indian Ocean Tsunami (26 Dec, 2004)
Location: Perangipettinam, India
Topic: Engineering Data
Structural Damage
Select the file
Anke Kamrath


Tsunami Data Repository
Archive Photo
Credit, time, georeference, title, and short description are shown
Anke Kamrath


Another Data Download
NEES Tsunami
Tsunami Data Repository
Select Location
Event: Indian Ocean Tsunami (26 Dec, 2004)
Anke Kamrath


NEES Tsunami
Tsunami Data Repository
Select Data Topic
Event: Indian Ocean Tsunami (26 Dec, 2004)
Location: Tambol Kampuan, Thailand
General Site Configuration
Social Sciences Data
Individual Response
Community Response
Organizational Response
Damage & Loss
Hydrodynamic Data
Seismic Data
Geological Data
Engineering Data
Biological Data
Select "Social Science Data" –> "Individual Response"
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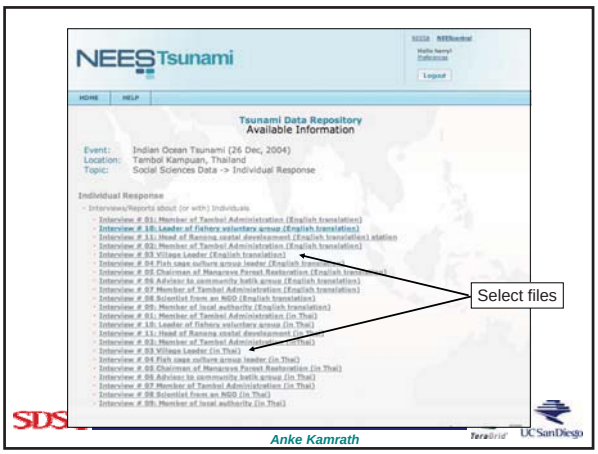
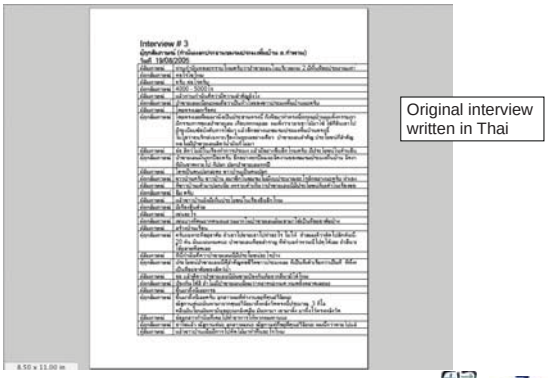
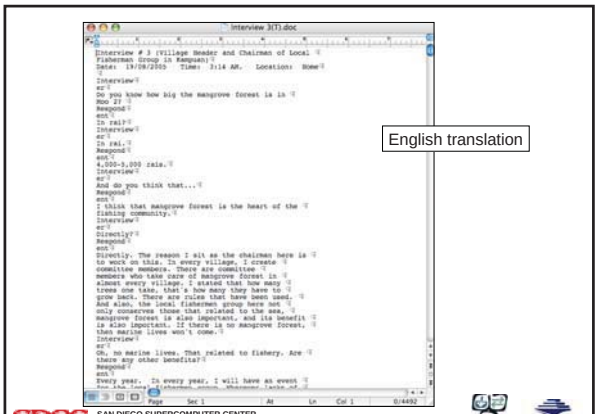

NEES Tsunami
Tsunami Data Repository
Available Information
Event: Indian Ocean Tsunami (26 Dec, 2004)
Location: Tambol Kampuan, Thailand
Topic: Social Sciences Data -> Individual Response
Individual Response
Select files
Anke Kamrath





Next Steps

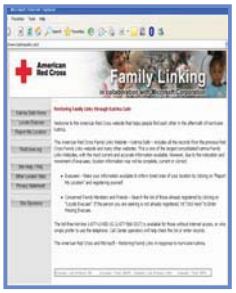
- **Drivers for Success**
  - Motivate data providers to upload his/her data (e.g., Minimize time and effort for upload)
  - Weed out unnecessary data by requiring proper metadata in the upload process
  - Value Added -- Effective and efficient queries and data utilization
- **General Comments**
  - Provides framework of field data repository for other natural and manmade hazards, e.g. earthquakes and hurricanes.
  - Support for long-term repository is essential to preserve data
- **Where next:**
  - Repository could readily be extended for international research community in a variety of disciplines.
  - For real research value needs be expanded to accommodate other tsunami survey data collected by both national and international survey team

Hurricane Katrina:
Data Cyberinfrastructure and Disaster Response

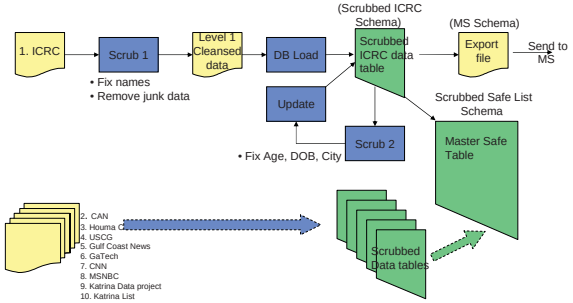
- **The Problem: integrate information about survivors and missing people across the Web**
- **Many Web sites developed "virally"**
  - Need to create a single, consolidated, definitive list of names to support searching for missing people and determine status of individuals
  - Example: Katrina.com was private site – owner converted to a website to support community need.
- **Challenges:**
  - data entered/collected rapidly in the field
  - Data had to be cleaned and merged on a daily basis ("in real time")

SDSC Katrina Project

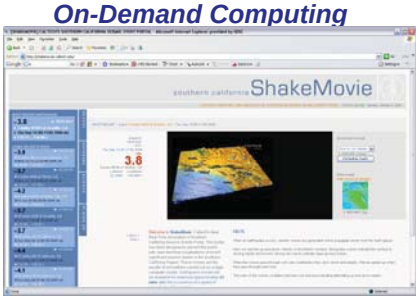
- **Background**
  - Were approached by National Institute for Urban Search and Rescue (NIUSR) to help create consolidated list of names
  - Partnered with Red Cross to create such a list for survivor names and "looking for" names
- **How:**
  - Collected data from some websites, by "scraping" websites
    - CNN, MSNBC, Times Picayune, Gulf Coast News, Katrinalist, Katrina.com, Katrina Data Project
  - Received data from Red Cross
    - ICRC
    - Data from shelters (e.g. Houma Civic Center)
    - Red Cross Coordinated Assistance Network (CAN)
    - US Coast Guard
  - Did data cleaning
  - De-dup
    - Acquired commercial software packages



SDSC Katrina Safe List Data Flow



Supporting Disaster Prediction: On-Demand Computing



- **Sample On-Demand Applications**
  - SoCal Earthquake Analysis (Jerom Tromp, Caltech)
  - Tsunami Path Prediction (Jerom Tromp, Caltech)\
  - Real-time storm path prediction (Droegemeier, U. Oklahoma)
  - Bio Terriorism (Charturvedi, Purdue)

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SDSC Data Central

- **First program of its kind to support research and community data collections and databases**
- **Comprehensive resources**
  - ***Disk:*** 400 TB accessible via HPC systems, Web, SRB, GridFTP
  - ***Databases:*** DB2, Oracle, MySQL
  - ***SRB:*** Collection management
  - ***Tape:*** 6 PB, accessible via file system, HPSS, Web, SRB, GridFTP
- **Data collection and database hosting**
  - Batch oriented access
  - Collection management services
  - **Collaboration opportunities:**
    - Long-term preservation
    - Data technologies and tools

New Allocated Data Collections

- Bee Behavior (Behavioral Science)
- C5 Landscape DB (Art)
- Molecular Recognition Database (Pharmaceutical Sciences)
- LIDAR (Geoscience)
- LUScID (Astronomy)
- NEXRAD-IOWA (Earth Science)
- AMANDA (Physics)
- SIO_Explorer (Oceanography)
- Tsunami and Landsat Data (Earthquake Engineering)
- UC Merced Library Japanese Art Collection (Art)
- NEES Data Repository (Earthquake Engineering)
- Terabridge (Structural Engineering)

Interested in a data allocation? Contact datacentral-allocations@sdsc.edu

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Anke Kamrath

Thank You

Contact Info:

- **Anke Kamrath** kamratha@sdsc.edu
- **SDSC Computational or Data Allocations** Consult@sdsc.edu

Thanks to:

- Tsunami Repository
  - **Oregon State (Harry Yeh, Ben Steinberg, Cherri Pancake)**
  - **NEESit/SDSC (Lelli Van Den Einde)**
  - **NSF-funded Recon Teams**
  - **EERI (Susan Tubbessing, Majorie Greene)**
  - **NSF (Joy Pauschke, ENG; Kevin Thompson, OCI)**
- Katrina Safe List
  - **SDSC (Jerry Rowley, Chaitan Baru and many others),**
  - **Red Cross**
  - **Microsoft**

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Tim Reinhold, IBHS

Insurance Industry Perspectives? Attempts to Become Data Driven

Tim Reinhold
Director of Engineering & VP

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Some Insurance Perspectives

- Privacy Issues
- Largest companies feel they can do it all themselves – reluctant to release data
- Competitive Advantage
- Everybody wants the lowest risk portfolio
- Historical lack of information about what they are insuring – need for inspections
- Case History - Hail

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Understanding the Event

- Before the event – setup monitoring systems
- During the event – on line data reporting
- After the event
  - Analysis of event strength at various locations
  - Damage investigations
  - Damage assessments

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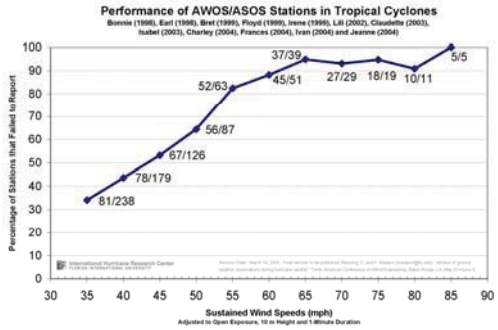
Performance of ASOS Stations – FIU Study



Portable Weather Stations

- Stiff 10-m Steel Lattice Tower
- Remain stable under dead weight in hurricane winds (200 mph)
- Self-powered for the duration of storm approach and landfall
- Meets DOT requirements for transport as a conventional trailer
- Quick setup to hasten retreat from approaching storm

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Instrumentation Deployment in Storms

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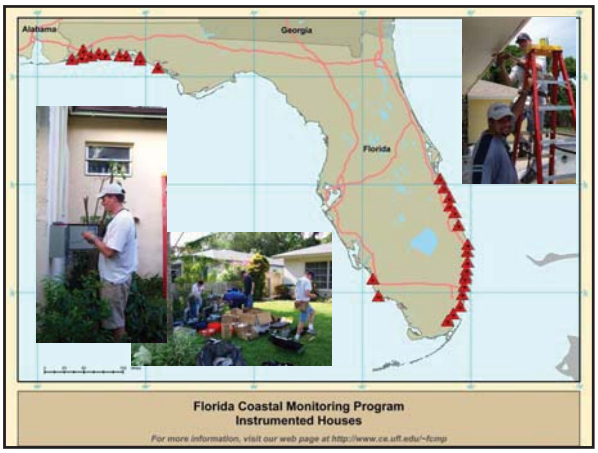
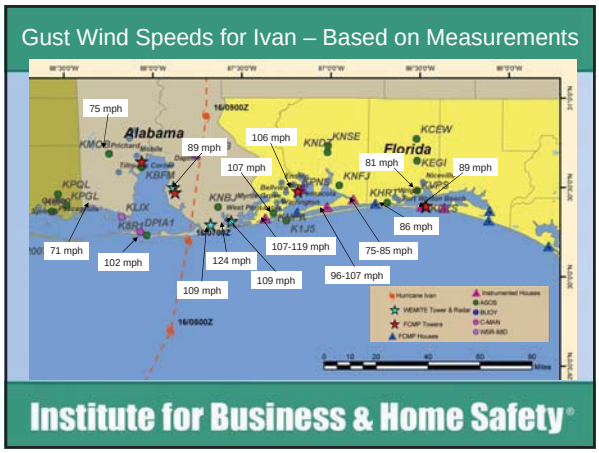
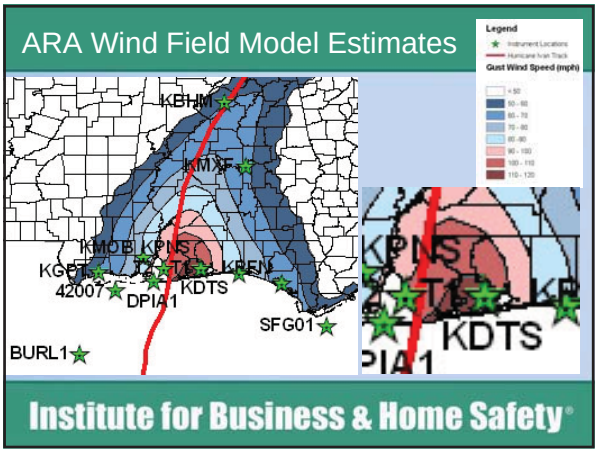

Alabama
Georgia
Florida
Florida Coastal Monitoring Program
Instrumented Houses


Gust Wind Speeds for Ivan – Based on Measurements
75 mph
89 mph
106 mph
107 mph
81 mph
89 mph
86 mph
71 mph
102 mph
124 mph
107-119 mph
75-85 mph
109 mph
109 mph
96-107 mph
Alabama
Florida
Institute for Business & Home Safety


ARA Wind Field Model Estimates
KBHM
KMXF
KMOB
KPNS
KGPT
KDTS
42007
DPIA1
SFG01
BURL1
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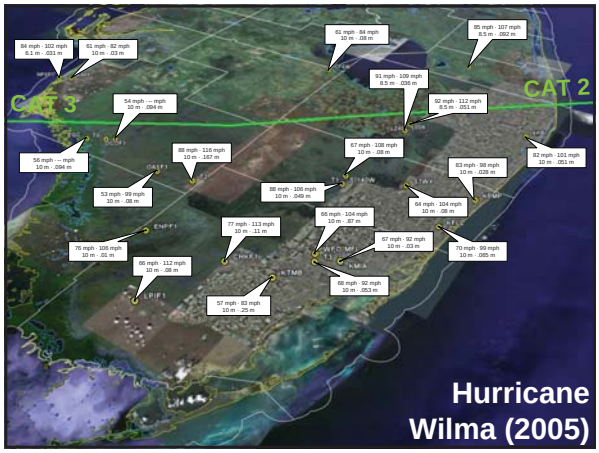
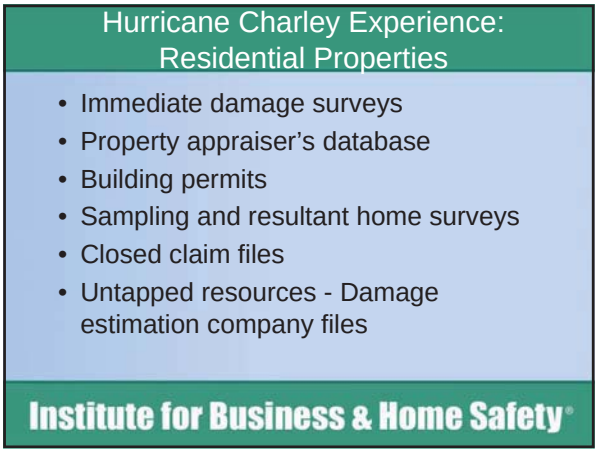

CAT 3
CAT 2
Hurricane
Wilma (2005)


Hurricane Charley Experience:
Residential Properties
• Immediate damage surveys
• Property appraiser's database
• Building permits
• Sampling and resultant home surveys
• Closed claim files
• Untapped resources - Damage estimation company files
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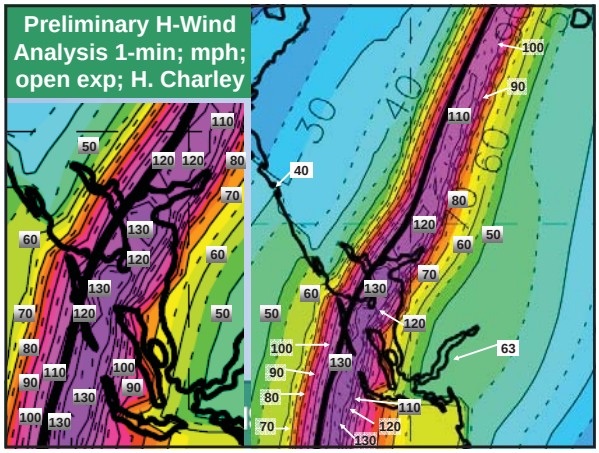
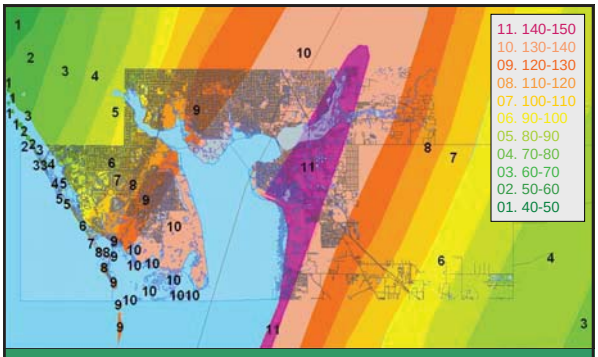

Preliminary H-Wind
Analysis 1-min; mph;
open exp; H. Charley



Applied Research Associates Wind Model:

11 separate swath categories **3-second gust metric**
140-150 MPH max. wind **10 MPH swaths**

Immediate Damage Surveys

- Tends to gravitate towards greatest damage areas
- Tends to be anecdotal
- Debris, debris sources and transport distances observations – require almost immediate access
- Failure modes – to the extent possible from general surveys
- Generally less complete information on event strength

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Property Appraiser's Database

- Depends on local jurisdiction
- No standards for capture of building characteristics (Charlotte County versus City of Punta Gorda)
- Age of property but no age of roof cover
- Does not handle complex situations very well
- Locating property and correlation with other databases

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82 Charlotte County Building Permits:

Tile
Shingle
Dimensional shingle
Garage door
Residential cage
Internal/external demolition and remodel

20 Punta Gorda Permits types:

Roof
Demolition
Remodel

Contractor Estimate Value

Estimate probably lower than normal
Data set at 8 months post event
Data lacks unpermitted replacements

Application Date

Building Permits

- No standards for capturing information
- Permit offices overloaded after an event
- Tend to enter a single permit when multiple failures exist
- $ estimates may be biased downward because fees are based on estimated costs
- Lots of types of damage are not captured in permits

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Aggregate Losses for Charlotte County and Punta Gorda

- All Permits: $1.8 Billion
- Residential Garage Doors: $2.6 Million
- Shingle Roofs: $114 Million
- Tile Roofs: $87 Million
- Residential Screen Enclosures: $16 Million

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Demolition Permits

- There were 130 demolition permits pulled in Charlotte County after Hurricane Charley struck
- None of those permits were for homes built after Hurricane Andrew struck South Florida in 1992

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IBHS Garage Door Permit Study

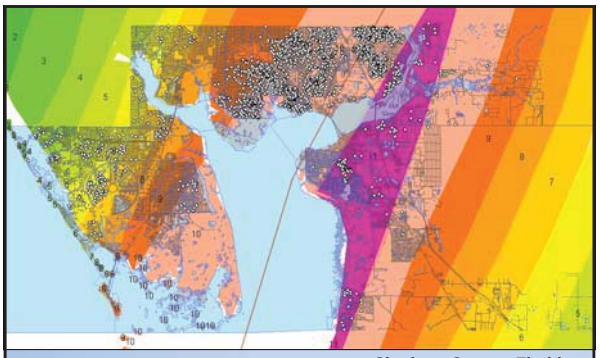
Population Studied:
57,308 Single Family Units

Post Charley Garage Door Permits Issued:
2,147

Aggregate Average Replacement Ratio:
3.75%

Aggregate Average Replacement Estimate:
$1,240.82

Aggregate Garage Door Replacement Estimate:
$2,628,051.27



Post Event Garage Door Permits — Charlotte County, Florida

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Garage Door Failures

- Failed primarily due to lack of reinforcement and track bracing for design pressures
- Some were also damaged by windborne debris

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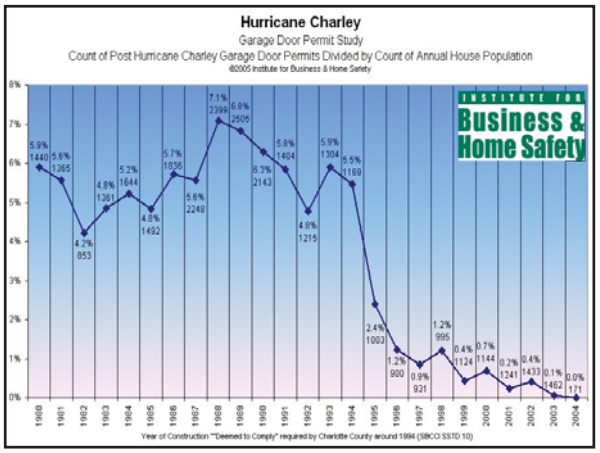

3-Tab Shingle Permit Study

Population Studied:
29,383 Single Family/Shingled Units

Population with Post Event Roof Permit:
9,741

Population Mean Replacement Cost:
$6,993.01

Population Replacement Value:
$68,118,951.32

Roof Covering and Soffits

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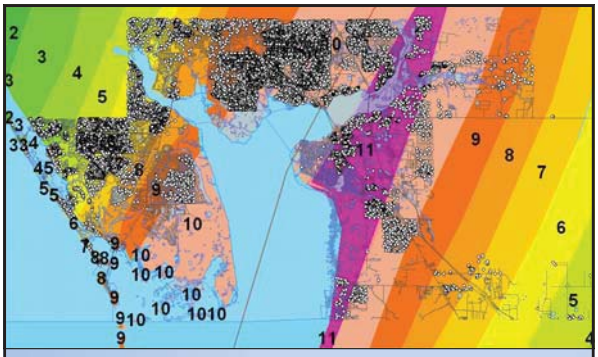

3-Tab Shingle Permit Study Total Population

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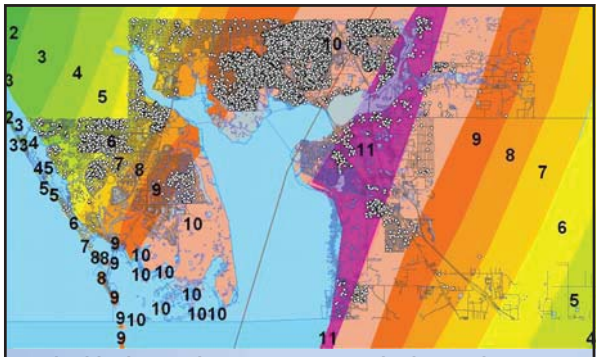

3-Tab Shingle Permit Survey Post Charley Replacement

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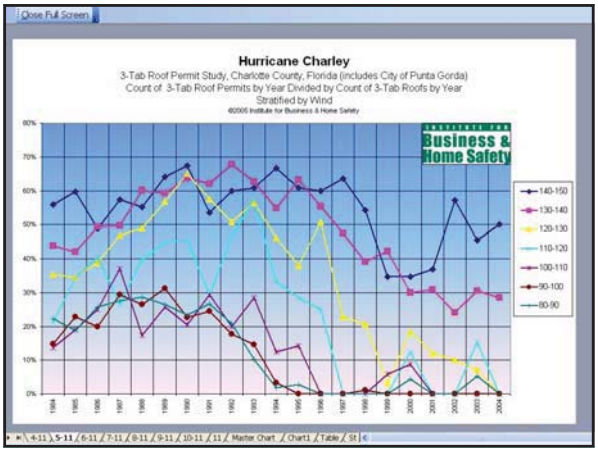

Sampling and Resultant Home Surveys

- Used property appraiser's database to stratify population by:
  - Age of home
  - Type of roof cover
  - Estimated maximum wind speed at location
- Random sample but required homeowner willingness to participate (~1:10 success rate) probably biased results

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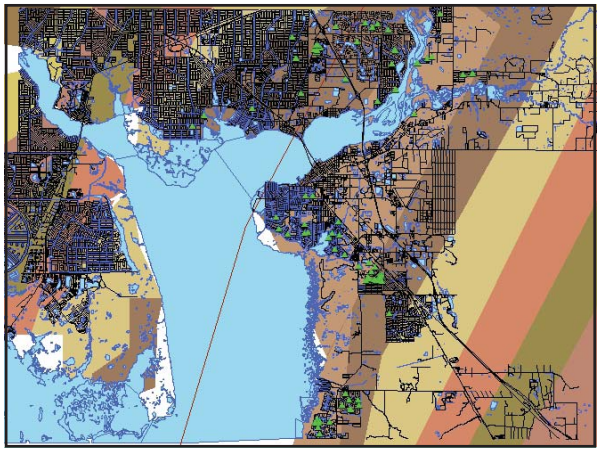
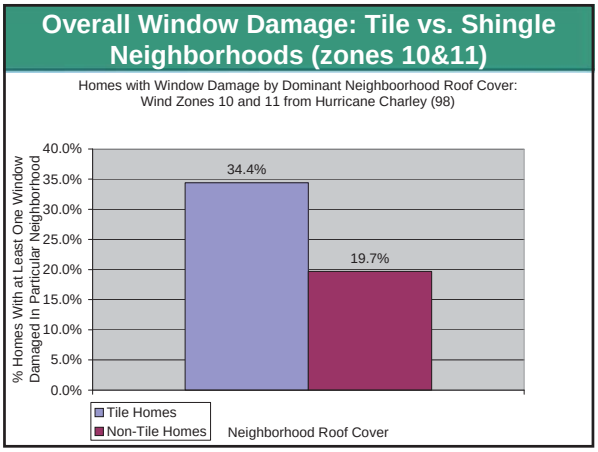
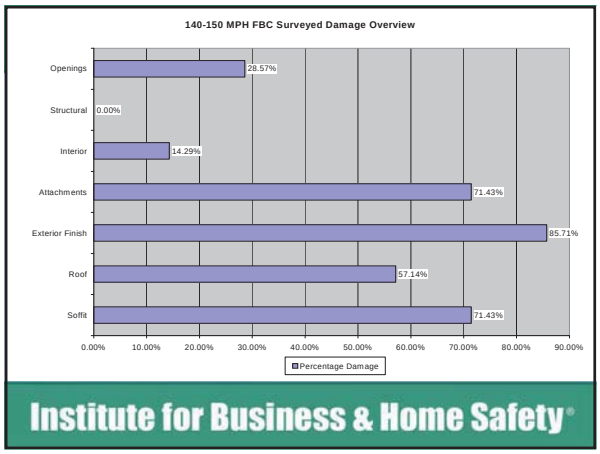
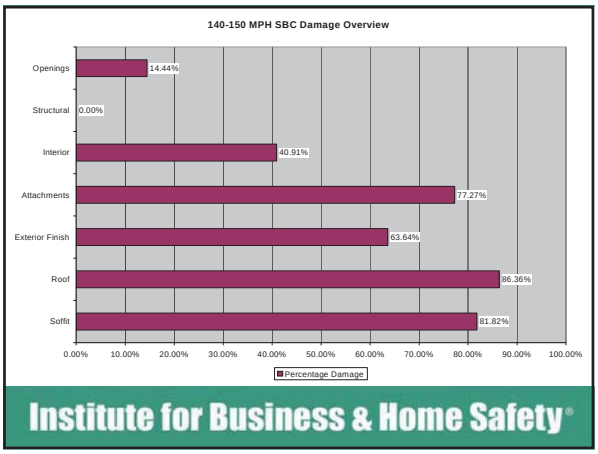
UF / IBHS DCA Survey Breakdown

Storm	Ivan	Frances / Jeanne	Charley		
# of samples	36	33	126		
Wind Speed	110-120	110-120	110-120	130-140	140-150
Zone	8	8	8	10	11
Old Code 1994–2002	20	17	10	45	24
New Code 2002-2004	16	16	12	12	23




Overall Window Damage: Tile vs. Shingle Neighborhoods (zones 10&11)
Homes with Window Damage by Dominant Neighboorhood Roof Cover:
Wind Zones 10 and 11 from Hurricane Charley (98)
% Homes With at Least One Window Damaged In Particular Neighborhood
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
34.4%
19.7%
Tile Homes
Non-Tile Homes
Neighborhood Roof Cover


140-150 MPH FBC Surveyed Damage Overview
Openings 28.57%
Structural 0.00%
Interior 14.29%
Attachments 71.43%
Exterior Finish 85.71%
Roof 57.14%
Soffit 71.43%
0.00% 10.00% 20.00% 30.00% 40.00% 50.00% 60.00% 70.00% 80.00% 90.00%
Percentage Damage
Institute for Business & Home Safety®


140-150 MPH SBC Damage Overview
Openings 14.44%
Structural 0.00%
Interior 40.91%
Attachments 77.27%
Exterior Finish 63.64%
Roof 86.36%
Soffit 81.82%
0.00% 10.00% 20.00% 30.00% 40.00% 50.00% 60.00% 70.00% 80.00% 90.00% 100.00%
Percentage Damage
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Interior
interior
100
90
80
70
60
50
40
30
20
10
0
Old
New
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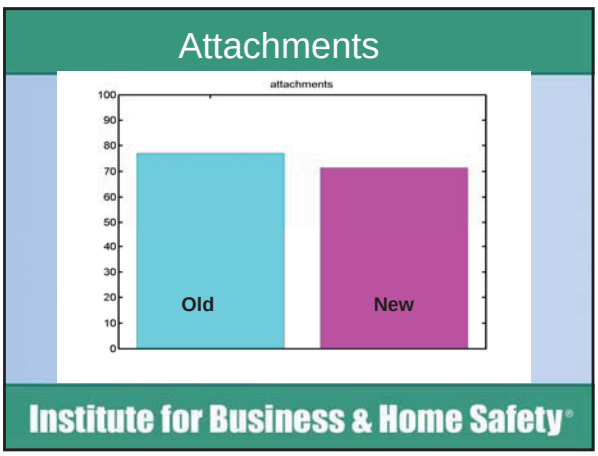
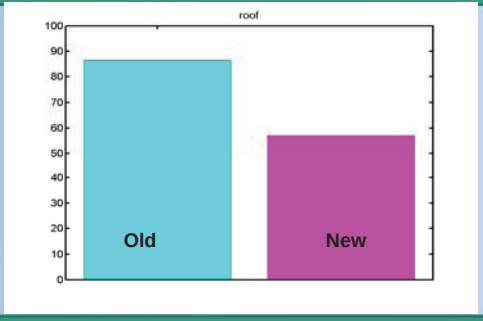

Attachments
attachments
100
90
80
70
60
50
40
30
20
10
0
Old
New
Institute for Business & Home Safety®

Roof



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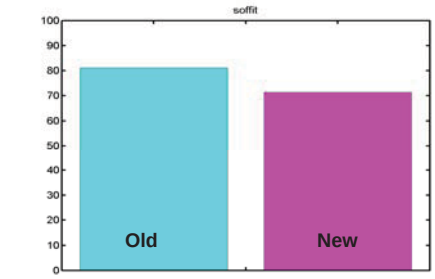
Soffit



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Closed Claim Files

- Probably the best source of data on extent of damage and types of damage
- No insight into failure modes
- Sample limited to properties with enough damage to create claim
- No data on age of roof cover
- No details on building components or construction
- Damage estimation programs

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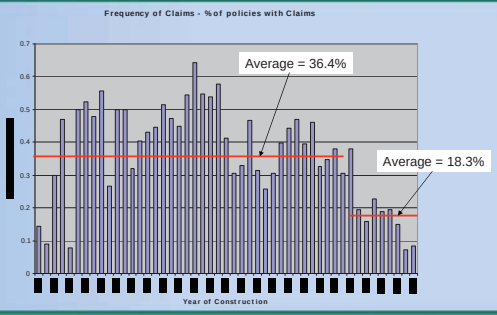
Claim Frequency by Age of Home



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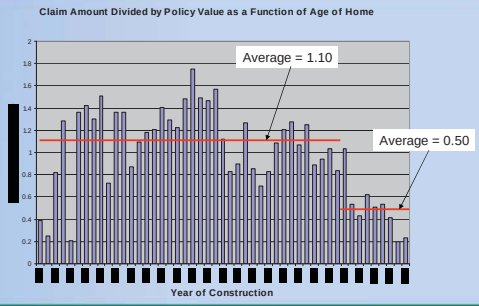
Relative Amount of Claim by Age of Home



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Effect of Building Codes on Claim Frequency and Severity

Pre 1996:
$24/sf

-42%

1996 - 2004:
$14/sf

Pre 1996:
41 claims/100 policies

-60%

1996 - 2004:
17 claims/100 policies

Pre 1996:
4453 Policies
1,843 Claims

1996 – 2004:
1151 Policies
192 Claims

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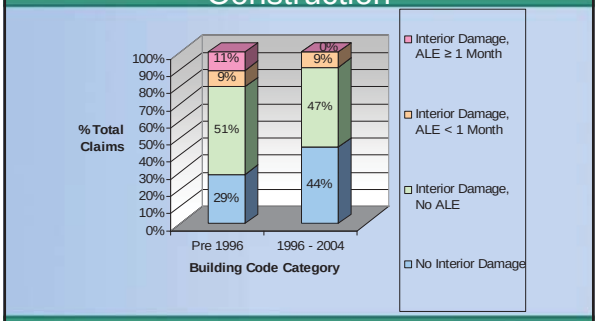
Interior Damage and ALE by Year of Construction



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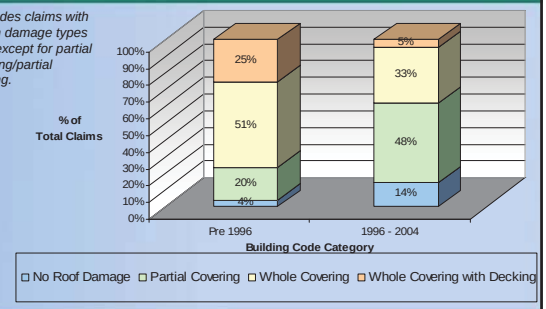
Amount of Roof Damage

** Includes claims with known damage types only, except for partial covering/partial decking.*



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Additional Issues

- Need to understand details of construction
  - Regional differences
  - Norms versus age of construction
  - Not as simple as "X year model with Y options"
- Understanding of code requirements
- Understanding the event
- Understanding underlying issues and national debates
- Consensus reports (pros and cons)

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Challenges

- Need to move beyond anecdotal
- Need statistics
  - What works
  - What doesn't work
- Need to capture data in a way that allows future correlation with new event data, analyses and modeling
- Experienced but open mind
- Develop cause and effect relationships

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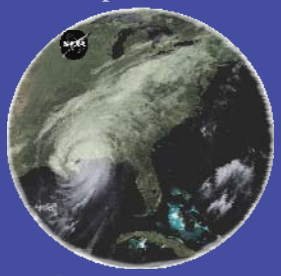
	event phase		
Changes in …	Before	During	After
Where you build	➢Land use planning ➢Protective barriers ➢Understanding risks ➢Laws & regulations ➢Incentives/disincentives	➢Event magnitude ➢Evacuation ➢Communication	➢Access to services ➢Access to property ➢Power availability ➢Community planning ➢Risk mitigation
How you build	➢Code adoption ➢Adequacy of code ➢Test standards & ratings ➢Code plus construction ➢Code enforcement ➢Education & certification ➢Public awareness ➢Incentives	➢Life safety ➢Shelter ➢Continued operation ➢Property damage	➢Recovery time ➢Extent of damage ➢Emergency repairs ➢Use of property ➢Rebuilding better ➢Code improvement ➢Community resiliency ➢Recovery costs
How well you maintain	➢Incentives/disincentives ➢Public awareness ➢Education	➢Extent of damage ➢Scale of damage ➢Loss of function	➢Recovery time ➢Recovery costs

Alan Springett, FEMA

Katrina & Rita
Data in Response to Disaster

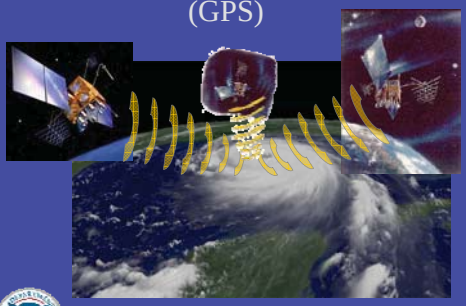


FEMA

Alan Springett, FEMA Headquarters October 2006

Imagery – A Foundation for Response

Geographic Positioning Systems
(GPS)



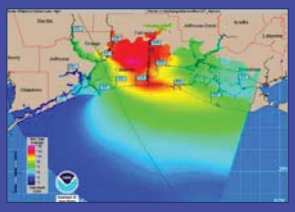
FEMA

Lidar Elevation Data

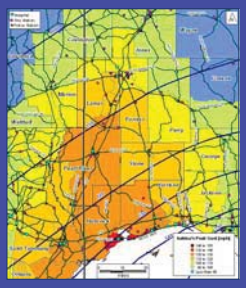
Lidar Courtesy of the USGS

FEMA

Data Gathered from Models



Storm Surge (Rita)



Wind Field (Katrina)

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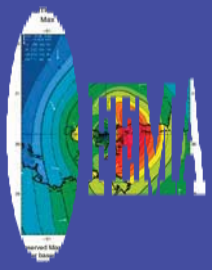
Data Gathered by Direct Observation

FEMA

Data Gathered by Direct Observation



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Wind Damage

The Long Beach Police Station was severely damaged by high winds

Wind damage to the New Orleans Fire Department 3rd District Headquarters

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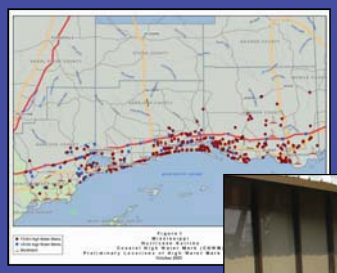
Data Collection – Katrina High Water Marks



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Mitigation Disaster Response

Wind/Water/Debris Line Determination

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Mitigation Disaster Response

Inland Wind Damage Studies

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Mitigation Disaster Response

Residential Substantial Damage Estimation

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Where is the Data Now?

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Where is the Data Now?

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Harrison Co., MS Coastal ABFE Map

- Pre-Disaster Imagery
- Katrina Inundation Limits
- Preliminary High Water Mark Elevations
- Wind/Water Line Information
- Estimated 1% Annual Surge Elevations

FEMA

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Elevation Worked in Pascagoula

Before Katrina

After Katrina

Where Do We Go From Here?

- Partnerships for Data Retention
- Common standards for data acquisition, sharing and retention

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Questions

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