The Florida Senate

COMMITTEE MEETING EXPANDED AGENDA

APPROPRIATIONS SUBCOMMITTEE ON GENERAL GOVERNMENT
Senator Hays, Chair
Senator Thompson, Vice Chair

MEETING DATE: Wednesday, February 12, 2014
TIME: 2:00 —4:00 p.m.
PLACE: *Toni Jennings Committee Room,* 110 Senate Office Building

MEMBERS: Senator Hays, Chair; Senator Thompson, Vice Chair; Senators Bradley, Braynon, Bullard, Dean, Detert, Joyner, Latvala, Legg, Simpson, Soto, and Stargel

TAB	BILL NO. and INTRODUCER	BILL DESCRIPTION and SENATE COMMITTEE ACTIONS	COMMITTEE ACTION
1	Presentation on People First Assessment and Business Case by the Department of Management Services		Presented
2	Presentation on Florida Public Hurricane Loss Model Status of Enhancements		Presented
	Other Related Meeting Documents		

KPMG

cutting through complexity

Florida DMS People First Assessment & Business Case

Business Case Presentation

February 12, 2014

People First

STATE OF FLORIDA HR

Agenda

- Scope of Work
- Technology Evaluation and Recommendation
- Operating Model Evaluation and Recommendation
- Cost Benefit Analysis
- Risk Analysis
- Options Assessment Summary
- Projected Implementation Timeline
- Next Step - Projected Procurement Timeline

Scope of Work

The State of Florida, Department of Management Services, engaged KPMG LLP (KPMG) to provide consulting services for the development of a People First business case. This business case includes the following components:

- Technology Assessment – What application platform provides the most value for the State of Florida?
- Options Available – Based on the application platform recommendation, what are the operating model options available.
- Recommended Operating Model - Which of the operating models provides the best value for the State of Florida?

Statutory requirements (section 287.0571(4), Florida Statutes) were satisfied in this Business Case, including sections on performance improvements, performance standards, procurement timelines, contingency plans, and transition plans.

An analysis of current contract cost savings was also conducted.

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NDPPS 179221

Technology Evaluation and Recommendation

The options identified for continued human resources application support included:

- Utilize a homegrown application – This option would require a homegrown application be developed and installed to replace the current SAP application (**Not Recommended**).

- Utilize an ERP application that services large organizations - This option would align an ERP solution with an application that typically supports complex, large business processes across multiple locations and that can be customized to address state requirements (**Recommended**).

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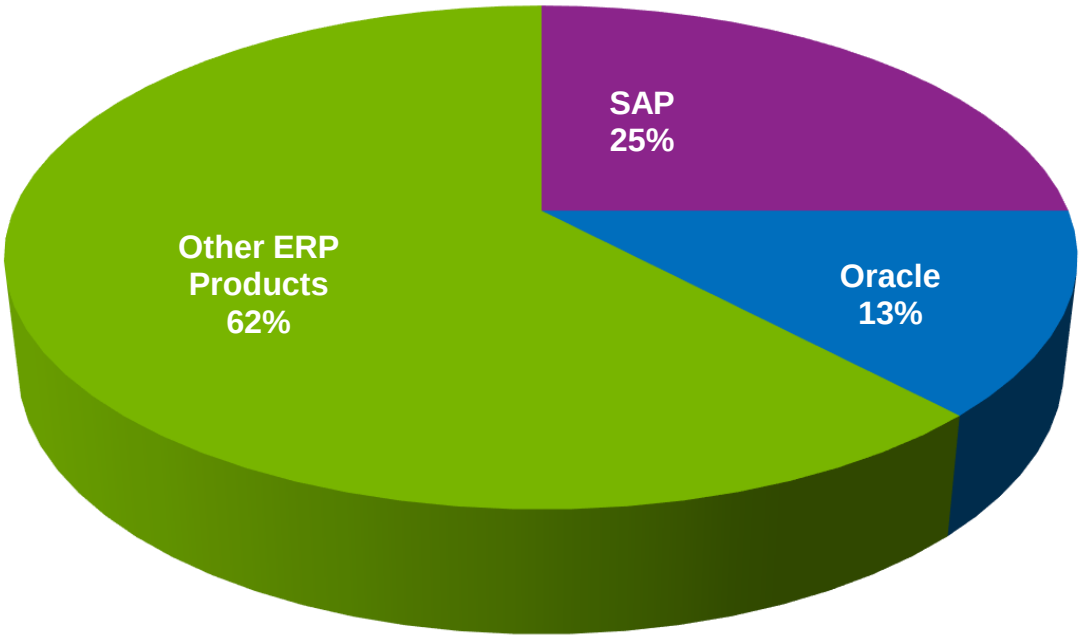
Technology Evaluation and Recommendation

Based on the size of the state, number of state locations, and business process requirements, this ERP technology assessment was focused on three ERP applications:

- SAP
- Oracle
- Workday



The first two ERP applications (SAP, Oracle) were selected for consideration due to their size and profile. SAP is the current application supporting the People First initiative. These software applications are typically geared towards multibillion dollar complex organizations like the state. Another vendor (Workday) was included due to a rapidly increasing market share.

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Technology Evaluation and Recommendation

Evaluation Criteria	
In this analysis some key areas were established as criteria so that each alternative could be weighed against these criteria. SAP scored higher in the majority of these key criteria areas.	
Best long-term position	SAP scored higher
Best functional capability	
Best organizational acceptance	SAP scored higher
Cost of technology alternatives	SAP scored higher
Lowest risk	SAP scored higher
Best technical architecture	
Least staffing impact	SAP scored higher

It is recommended that the state HR functionality remain on the SAP application based on the analysis in these key criteria areas.

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Operating Model Evaluation and Recommendation

Option 1 - Comprehensive Outsourcing

Option 2 - Insourcing Infrastructure and Application Support Only

Option 3 - Insourcing Service Centers Only

Option 4 - Comprehensive Insourcing

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Operating Model Evaluation and Recommendation

It is **recommended** that the state approve Option 1 for human resources services utilizing the SAP platform based on the assessment of key areas listed below. Option 1 is the comprehensive outsourcing operating model.

The evaluation elements use to determine the recommended option were:

- Cost Benefit Analysis
- Risk Assessment
- Scalability
- Customer Satisfaction
- Ease of Implementation
- Stability

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Cost Benefit Analysis

The options were ranked based on the most benefits provided to the State of Florida over a five year contract period. These rankings would have been identical had the Schedule IV-B or the ten year cost benefit analysis models been used.

Score	Cost Savings ($K)	Option Description
12	$41,916.2	Option 1 - Comprehensive Outsourcing
9	$24,131.6	Option 3 - Insourcing Service Centers Only
6	$2,115.4	Option 2 - Insourcing Infrastructure & Application Support Only
3	($8,889.2)	Option 4 - Comprehensive Insourcing

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Risk Analysis

A common risk assessment methodology was used for all four options that focused on the areas of strategy, technology, organizational change management, communication, fiscal, project organization, project management and project complexity.

Risk Assessment Area	Risk Exposure			
	Option 1	Option 2	Option 3	Option 4
Strategic Assessment	Low	High	High	High
Technology Exposure Assessment	Low	High	High	High
Organizational Change Management Assessment	Low	Medium	High	High
Communication Assessment	Low	Low	Medium	Medium
Fiscal Assessment	Medium	High	High	High
Project Organization Assessment	Low	Medium	Medium	Medium
Project Management Assessment	Low	Medium	Medium	Medium
Project Complexity Assessment	High	High	High	High
Overall Project Risk	Medium	High	High	High

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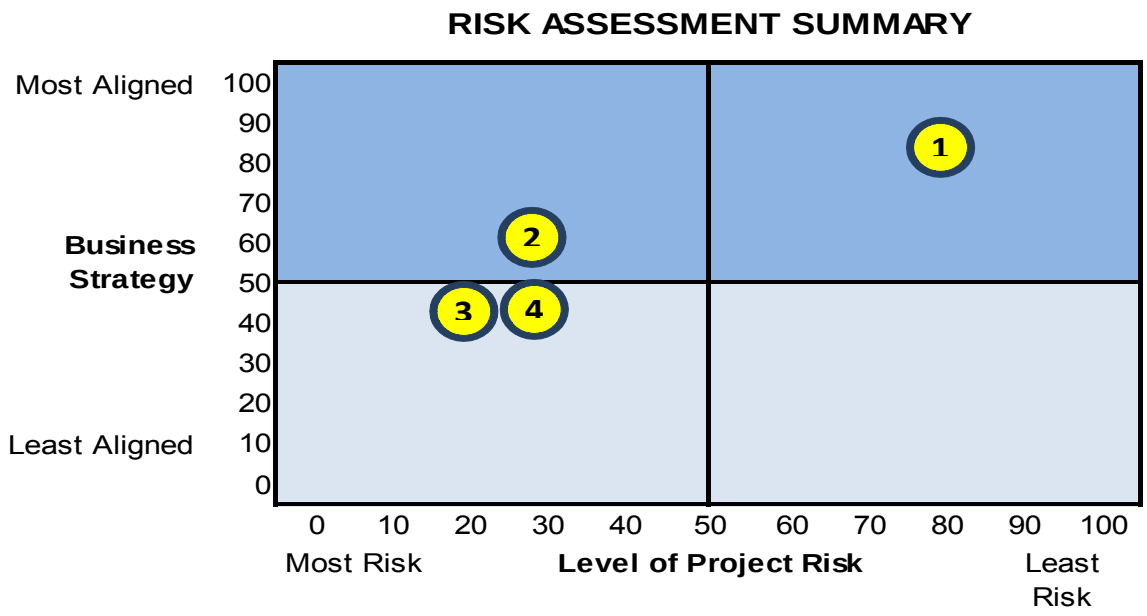
Risk Analysis

The risk assessment also included a review of how well each option aligned to the People First business strategy, and how risky each of the options might be as compared to the other options.



QUANTIFYING THE RISK ASSESSMENT RESULTS

Factors	Option 1	Option 2	Option 3	Option 4
Business Strategy Alignment	80	60	45	45
Level of Project Risk	80	30	20	30
Total Score	**160**	**90**	**65**	**75**

Score	Risk Score	Option Description
12	160	Option 1 - Comprehensive Outsourcing
9	90	Option 2 - Insourcing Infrastructure & Application Support Only
6	75	Option 4 - Comprehensive InSourcing
3	65	Option 3 - Insourcing Service Centers Only

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Options Assessment Summary

Assessment Component	Option 1 - Comprehensive Outsourcing	Option 2 - Insourcing Infrastructure and Application Support Only	Option 3 - Insourcing Service Centers Only	Option 4 - Comprehensive Insourcing
Cost Analysis	12	6	9	3
Risk Assessment	12	9	3	6
Scalability	12	6	9	3
Customer Satisfaction	9	3	6	12
Ease of Implementation	12	9	6	3
Stability	12	9	6	3
TOTAL SCORE	69	42	39	30

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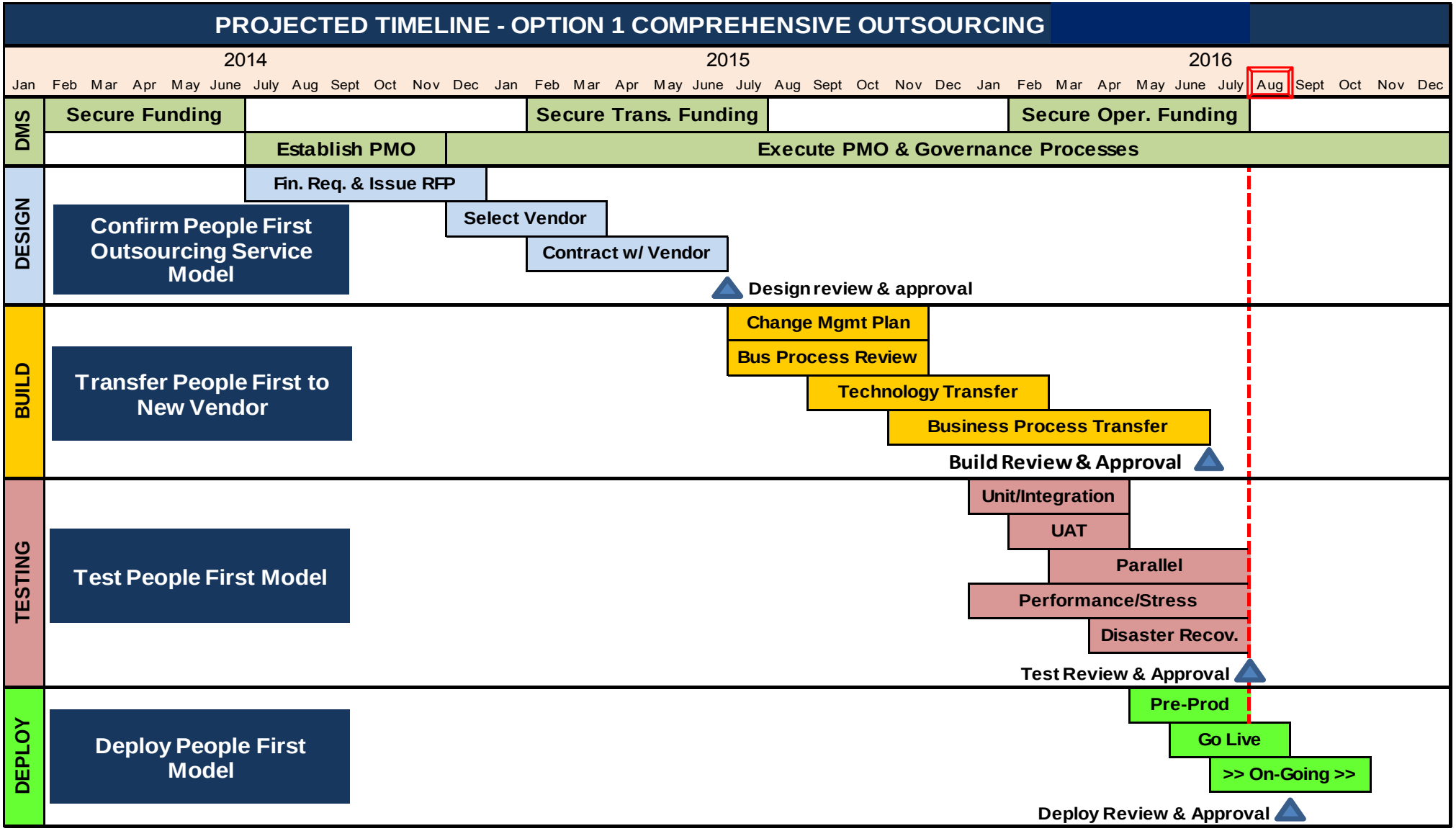
Projected Implementation Timeline



NOTE: The projected implementation timeline for Options 2-4 demonstrate that the new operating model would not be in place within the current contract termination period due to the design and testing of new business processes

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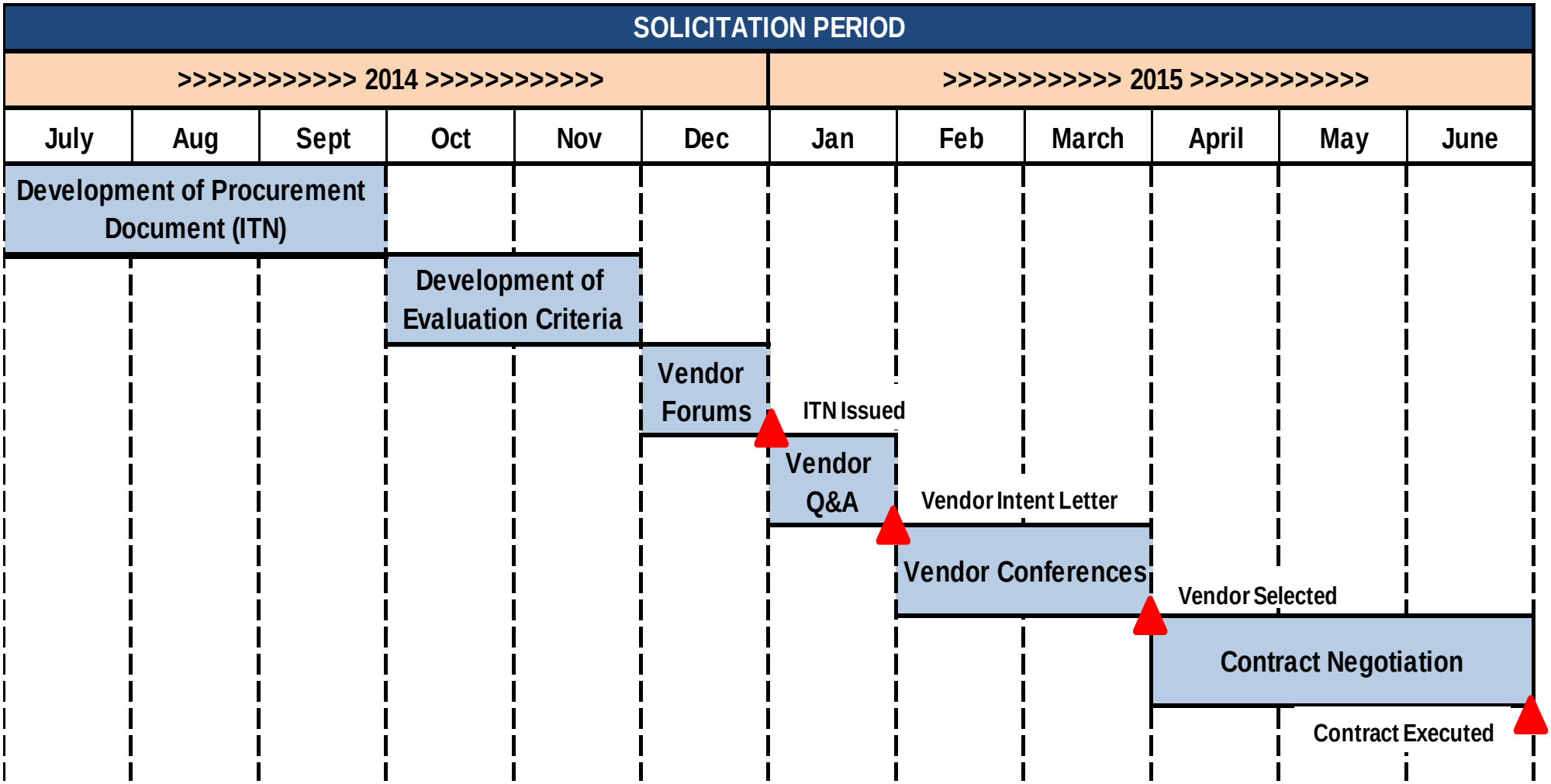
Next Step – Projected Procurement Timeline



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Thank You

THE FLORIDA SENATE

APPEARANCE RECORD

(Deliver BOTH copies of this form to the Senator or Senate Professional Staff conducting the meeting)

2/12/14
Meeting Date

TAB 1

Topic: People First Business Case

Bill Number: _____ *(if applicable)*

Name: Sec. Craig J. Nichols

Amendment Barcode: _____ *(if applicable)*

Job Title: Agency Secretary

Address: 4050 Esplanade Way
Street

Tallahassee, FL 32399
City *State* *Zip*

Phone: 488-6285

E-mail: craig.nichols@dms.myflorida.com

Speaking: [ ] For [ ] Against [X] Information

Representing: Dept. of Management Services

Appearing at request of Chair: [ ] Yes [ ] No

Lobbyist registered with Legislature: [✓] Yes [ ] No

While it is a Senate tradition to encourage public testimony, time may not permit all persons wishing to speak to be heard at this meeting. Those who do speak may be asked to limit their remarks so that as many persons as possible can be heard.

This form is part of the public record for this meeting.

S-001 (10/20/11)

THE FLORIDA SENATE

APPEARANCE RECORD

(Deliver BOTH copies of this form to the Senator or Senate Professional Staff conducting the meeting)

TAB 1

2/12/14
Meeting Date

Topic: DMS PEOPLE FIRST

Bill Number: _____ (if applicable)

Name: DAVID DENNIS

Amendment Barcode: _____ (if applicable)

Job Title: PARTNER

Address: 111 N. ORANGE AVE
Street

ORLANDO, FL 32801
City State Zip

Phone: _____

E-mail: _____

Speaking: ☐ For ☐ Against ☑ Information

Representing: _____

Appearing at request of Chair: ☐ Yes ☐ No

Lobbyist registered with Legislature: ☐ Yes ☐ No

While it is a Senate tradition to encourage public testimony, time may not permit all persons wishing to speak to be heard at this meeting. Those who do speak may be asked to limit their remarks so that as many persons as possible can be heard.

This form is part of the public record for this meeting.

S-001 (10/20/11)

The Florida Public Hurricane Loss Model
Storm Surge Enhancement Project

Shahid S. Hamid, Ph.D., CFA
PI, Hurricane Loss Projection Model
Professor of Finance, College of Business, and
Director, Laboratory for Insurance, Economic and Financial Research
International Hurricane Research Center
Florida International University

FIU | FLORIDA INTERNATIONAL UNIVERSITY

- Florida ranks #1 in total insured property value exposed to hurricane wind and #1 in coastal property exposed to storm surge.
- Florida has $3.6 trillion in insured properties of which about $2 trillion are residential, and all are exposed to hurricane risk.
  - About 79% is coastal property which is particularly vulnerable to hurricane risk.
  - Of this $400 billion in properties may be particularly vulnerable to storm surge.
  - About 35% of the flood policies and 30% of the flood premium originate in Florida

- In 2001 The Florida Office of Insurance Regulation funded Florida International University to independently develop a public hurricane loss model to assess hurricane wind risk and predict insured losses for these residential properties.
- First activated in March 2006. Latest version activated last September.
- Model is a useful tool for the state of Florida. It has been used over 550 times by the state.
- Also been used by firms in the insurance industry.
- The wind model went through an extremely rigorous review process
  - Dozens of papers published in peer reviewed scientific journals and conference proceedings
  - Model is certified by the Florida Commission on Hurricane Loss Projection Methodology----the gold standard for such models

- In 2013 the state funded FIU to enhance the FPHLM by adding both a storm surge and rain water flooding component.
- The SSFC enhancement project will take three years and cost at least $4.5 million.
- FIU received about $1.54 million for the first year 2013-14. It needs about $1.54 million each for 2014-15, and 2015-16.
- There are about 110 proposed deliverables (tasks) that will have to be completed. These have been listed in the Plan of Action submitted in June 2013.
- There are 38 deliverables (tasks) to be finished or ongoing for 2013-14.
- On track for these tasks. November progress report available. Others will be submitted in February, April, and end of June.

Participating Institutions

- Florida International University/ IHRC (lead institution)
- Florida State University
- Florida Institute of Technology
- Hurricane Research Division, NOAA
- University of Florida
- University of Miami
- Notre Dame University
- About 2 dozen professors and experts and over 2 dozen graduate and undergraduate students have been involved in the development and operation of the model.
- Some are leading experts in their field
- All the model operation work and model run is done at FIU
- About half the development and updating work is done at other institutions

The current key team members for SSFC

- Dr. Shahid Hamid Dept of Finance and IHRC, Florida International University
- Dr. Shu-Ching Chen School of Computing and Information Sciences, FIU
- Dr. Keqi Zhang International Hurricane Research Center, FIU
- Dr. Jean Paul Pinelli Dept of Civil Engineering, Florida Institute of Technology
- Dr. Steven Cocke Dept of Meteorology, Florida State University
- Dr. Kurtis Gurley Dept of Civil and Coastal Engineering, Univ of Florida
- Dr. Mark Powell Hurricane Research Division, NOAA
- Dr. Omar Abdul-Aziz Dept of Civil Engineering, Florida International University
- Dr. Andrew Kennedy Dept of Civil Engineering, University of Notre Dame
- Bachir Annane CIMAS, University of Miami
- Dr. Mei-Ling Shyu Dept of Electrical and Comp Engineering, Univ of Miami
- Gail Flannery FCAS Actuary, Vice- President AMI Risk Consultants
- Dr. Huiqing Liu International Hurricane Research Center, FIU
- Dr. Yongzhi Liu Dept of Civil Engineering, Florida International University
- Dr. Sneh Gulati Dept. of Statistics, FIU, statistical expert
- Dr. B. G. Kibria Department of Statistics, FIU, statistical expert
- Carolyn Robertson Associate director, IHRC, Florida International University

What is the wind model?

- The model is a very complex, state of the art, set of computer programs.
- The programs simulate and predict how, where and when hurricanes form, their wind speed and intensity and size etc, their track, how they are affected by the terrain along the track after landfall, how the winds interact with different types of structures, how much they can damage house roofs, windows, doors, interior, contents etc, how much it will cost to rebuild the damaged parts, and how much of the loss will be paid by insurers
- Its development required experts in meteorology, wind and structural engineering, statistics, actuarial sciences, finance, GIS, and computer science.

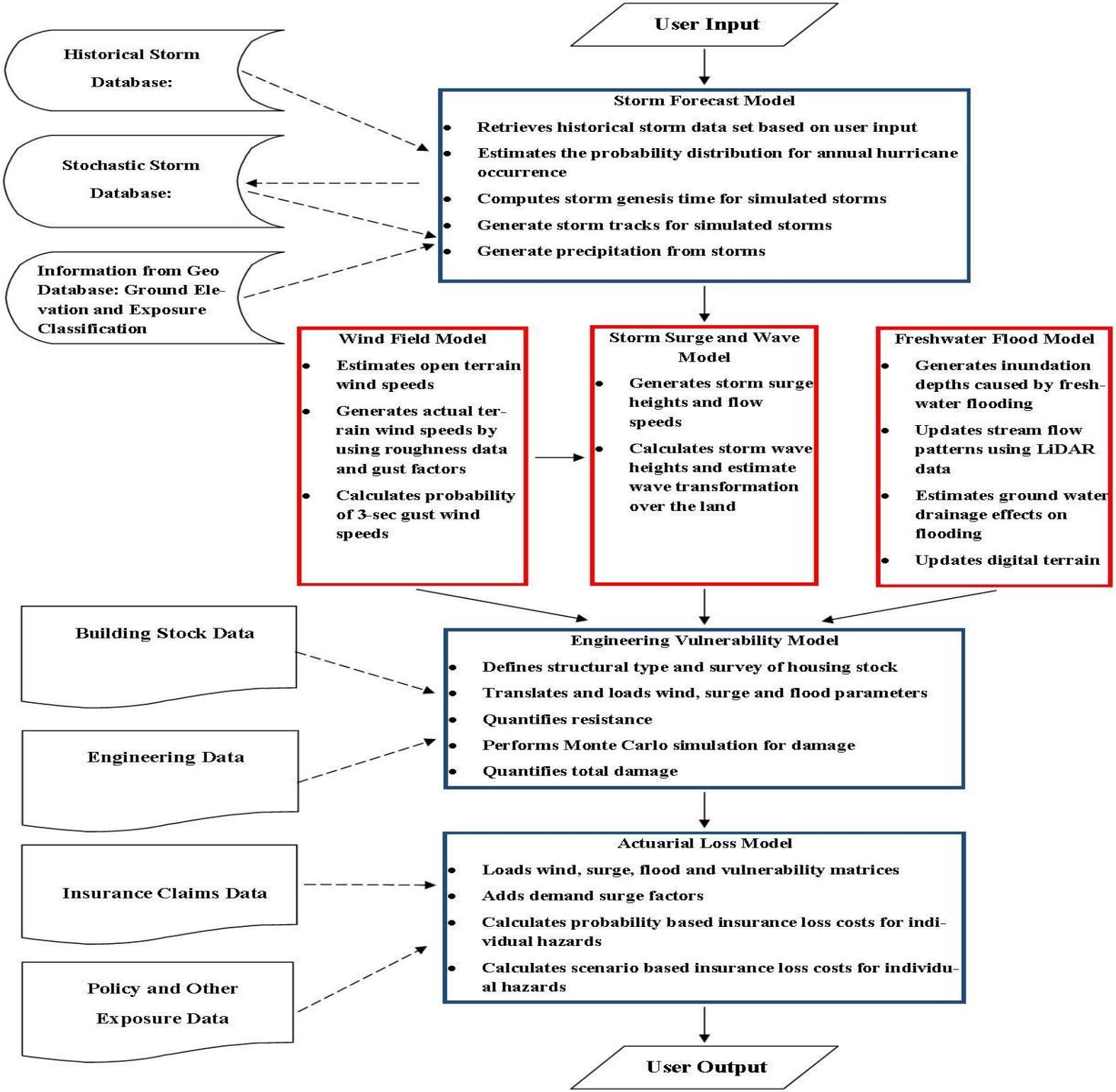
What can the wind model produce?

- The model can generate for a given policy or portfolio of residential policies, the annual average losses and the probable maximum losses
  - Loss estimates are produced for building structures, contents, and additional living expense coverage
  - These are typically used by insurance companies as input in the rate making process and are used by state regulators to help evaluate rate filings
- Model can do scenario analysis. Once we have ascertained a land falling hurricane's, track, size and wind speed, we can predict the losses they are likely to inflict down to the street level.
- The model has capability to estimate the loss reduction from certain mitigation efforts.

FIU FLORIDA INTERNATIONAL UNIVERSITY

What will the storm surge enhancement do?

- The new components will assess storm surge and hurricane related rain flood risk and estimate both the insured and uninsured losses they may create.
- provide a state of the art innovative, transparent, combined model that can separate wind losses from flood losses and help resolve the issue of who should pay for damages
- provide a more refined and actuarially sound method of estimating insured losses and determining fair pricing for all hurricane risk
- conduct simulations and scenario analysis that can help state and local government with disaster planning and land use planning
- Help assess the cost-benefit of disaster mitigation strategies


User Input
Historical Storm Database:
Stochastic Storm Database:
Information from Geo Database: Ground Elevation and Exposure Classification
Storm Forecast Model
Retrieves historical storm data set based on user input
Estimates the probability distribution for annual hurricane occurrence
Computes storm genesis time for simulated storms
Generate storm tracks for simulated storms
Generate precipitation from storms
Wind Field Model
Estimates open terrain wind speeds
Generates actual terrain wind speeds by using roughness data and gust factors
Calculates probability of 3-sec gust wind speeds
Storm Surge and Wave Model
Generates storm surge heights and flow speeds
Calculates storm wave heights and estimate wave transformation over the land
Freshwater Flood Model
Generates inundation depths caused by freshwater flooding
Updates stream flow patterns using LiDAR data
Estimates ground water drainage effects on flooding
Updates digital terrain
Building Stock Data
Engineering Data
Insurance Claims Data
Policy and Other Exposure Data
Engineering Vulnerability Model
Defines structural type and survey of housing stock
Translates and loads wind, surge and flood parameters
Quantifies resistance
Performs Monte Carlo simulation for damage
Quantifies total damage
Actuarial Loss Model
Loads wind, surge, flood and vulnerability matrices
Adds demand surge factors
Calculates probability based insurance loss costs for individual hazards
Calculates scenario based insurance loss costs for individual hazards
User Output

Components of the existing model

- Hurricane threat area definition
- Storm genesis model
- Storm Track and Intensity Model
- Inland Storm Decay Model
- Wind Field Model
- Terrain Roughness Model
- Gust Factor Model
- Wind Probabilities Model
- GIS component
- Engineering damage simulation models
- Engineering vulnerability model
- Engineering Mitigation Model
- Demand Surge Model
- Probabilistic Loss Cost Actuarial Model
- Scenario based Loss Cost Actuarial Model
- Extensive survey was conducted of the building stock in Florida. Identified key structure types and combination of features

Future components of the Storm Surge and Flood Model

- Wind and storm surge temporal and spatial interpolation model
- Coastal basin size determination
- Storm surge inundation model
- Ocean wave model
- Near shore wave transformation model
- Freshwater hydrological flood model
- Drainage model for flood
- Engineering vulnerability simulation models for storm surge and wave
- Engineering vulnerability simulation models for inland flood
- Engineering damage models for surge and wave
- Engineering damage models for inland flood
- Probabilistic ground up and actuarial loss model for surge and flood
- Scenario based loss model for surge and flood
- Mitigation model for surge and flood
- GIS overlay model for surge and flood
- These components will be tested and validated
- Software will be developed and tested for these components

Tasks completed to date (2013-14)

- There are 38 tasks to be completed or ongoing in year1.
- 14 tasks completed to date. More than a dozen others ongoing.
- Determined coastal basin size for storm surge modeling.
- Determined optimal size of wind domain for storm surge modeling.
- Developed new wind interpolation code and the interface to perform spatial and temporal interpolation from the wind model grid to the grid required by the storm surge model.
- Collected and processed technical data from past hurricanes needed for current storm surge modeling and validation.
- Determined appropriate basin size for inland and coastal freshwater flood modeling for Florida (based on the USGS Hydrologic Unit Codes).

Tasks completed to date (continued)

- Explored the alternative steady-state, transected based overland wave models for computational efficiency.
- Collected and evaluated technical data needed for developing and validating freshwater flooding model (e.g., depth, rainfall intensity, high resolution land elevations, land use/cover, groundwater table, tide etc. data).
- Identified in the Florida Building Code requirements related to storm surge protection and flooding (including regional variations).
- Initiated the data call to carry on an exposure study to determine the existing Florida building stock characteristics on the coastline as they relate to storm surge risk.
- Initiated data call for insured exposure and claim data needed for development and validation of the engineering vulnerability model and the actuarial model.

Tasks completed to date (continued)

- Developed methods to identify and build databases of uninsured properties for both flood and wind peril.
- Gathered peer reviewed literature regarding the vulnerability of residential construction to surge and wave loads, including laboratory studies, field studies, and post-storm observations
- Conducted training sessions for staff and student assistants.
- Selected the computer architecture, operating system, programming languages, programming environment, software development tools, and software testing tools. The current system's architecture will be analyzed and modified accordingly to cover the expanded model

Tasks for year two (2014-2015)

- There are over 30 tasks (deliverables) in the scope of work for 2014-15 for the continuation of the FPHLM storm surge and flood enhancement project.
- Work will be done on
  - the integration of the storm surge and wind model components
  - the continuation of the development of the freshwater flood model
  - the integration of the wind and freshwater flood components
  - the development of the engineering vulnerability functions for both storm surge and flood hazards
  - the developments of methods for separating wind and surge loss
  - the databases for data on insured exposure and claims and uninsured exposure
  - the development of actuarial component
  - development, testing and validation of computer codes and software

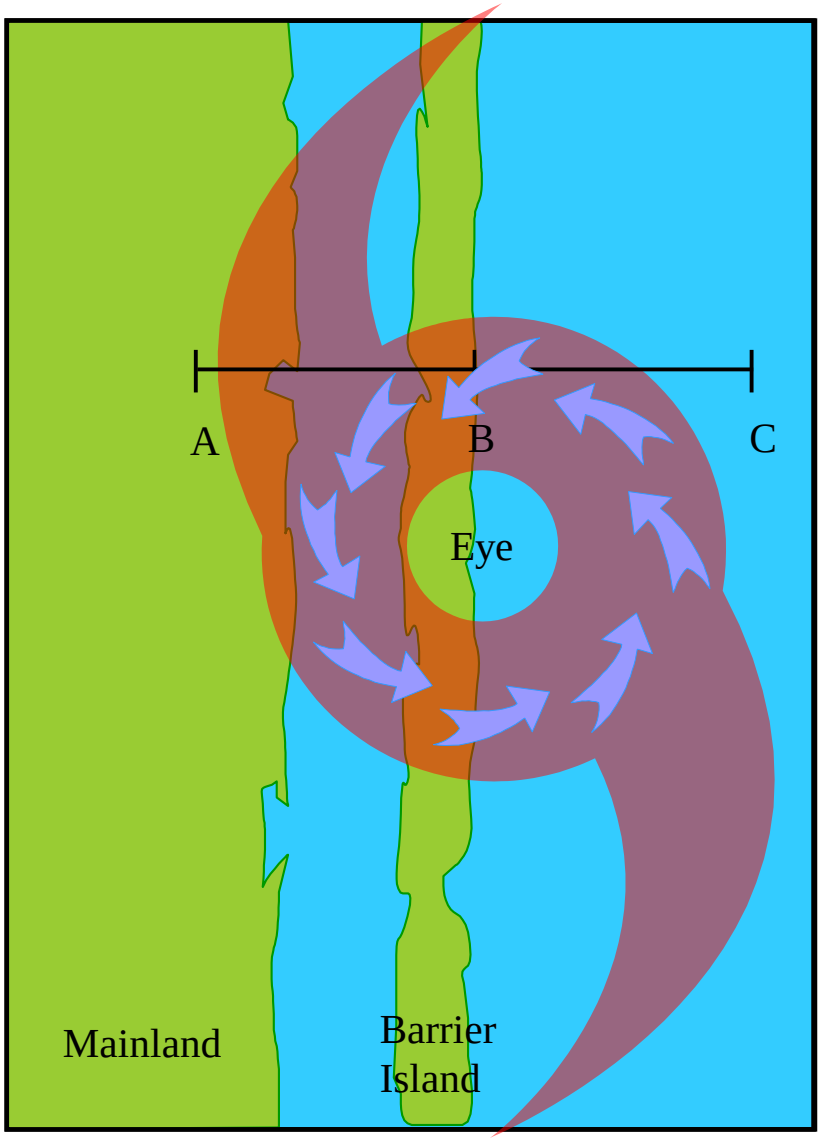
Coastal and Estuarine Storm Tide (CEST) Model

Keqi Zhang

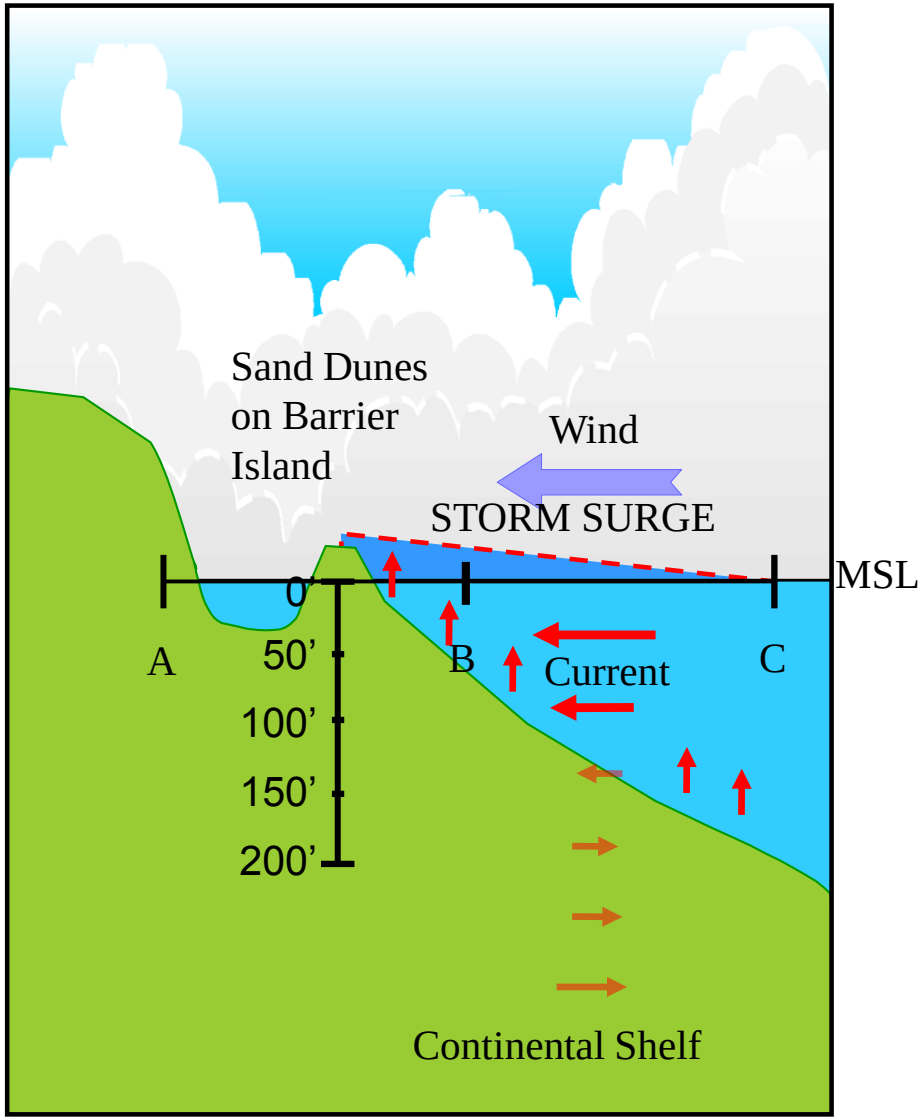
February 12, 2014

Storm Surge

a. Top View of Sea Surface and Land



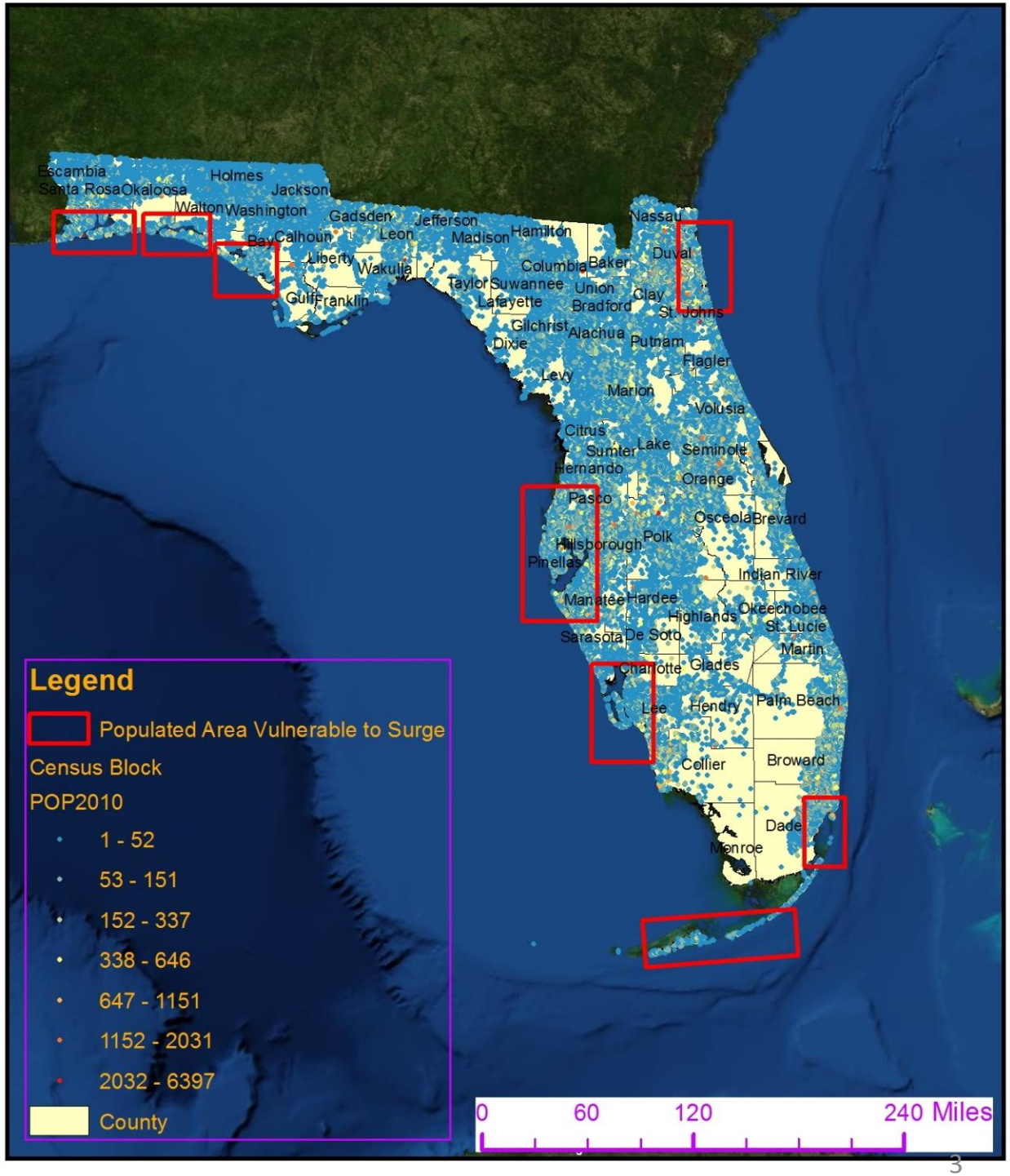
b. Side View of Cross Section "ABC"



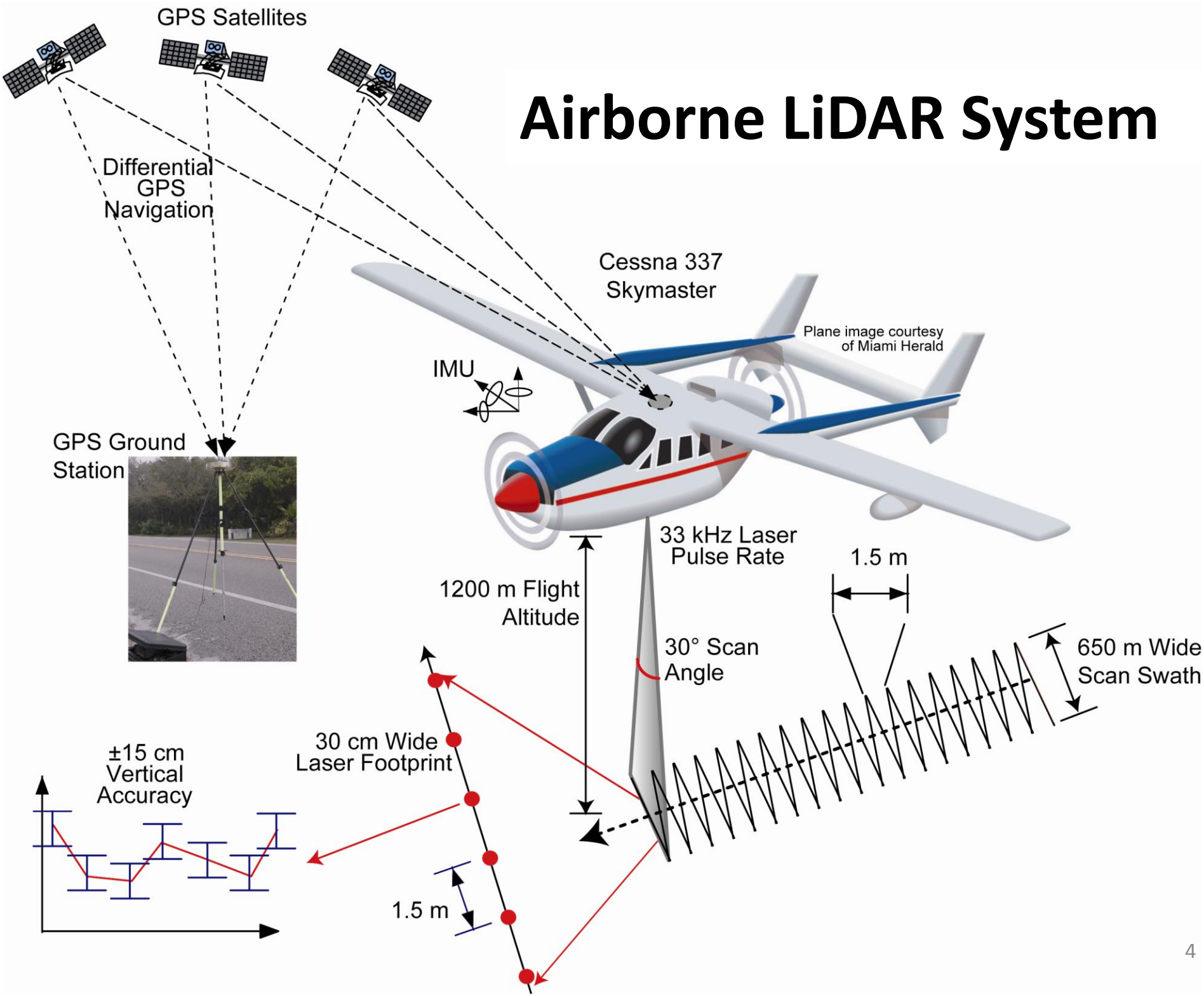
Courtesy of NHC

Florida State:

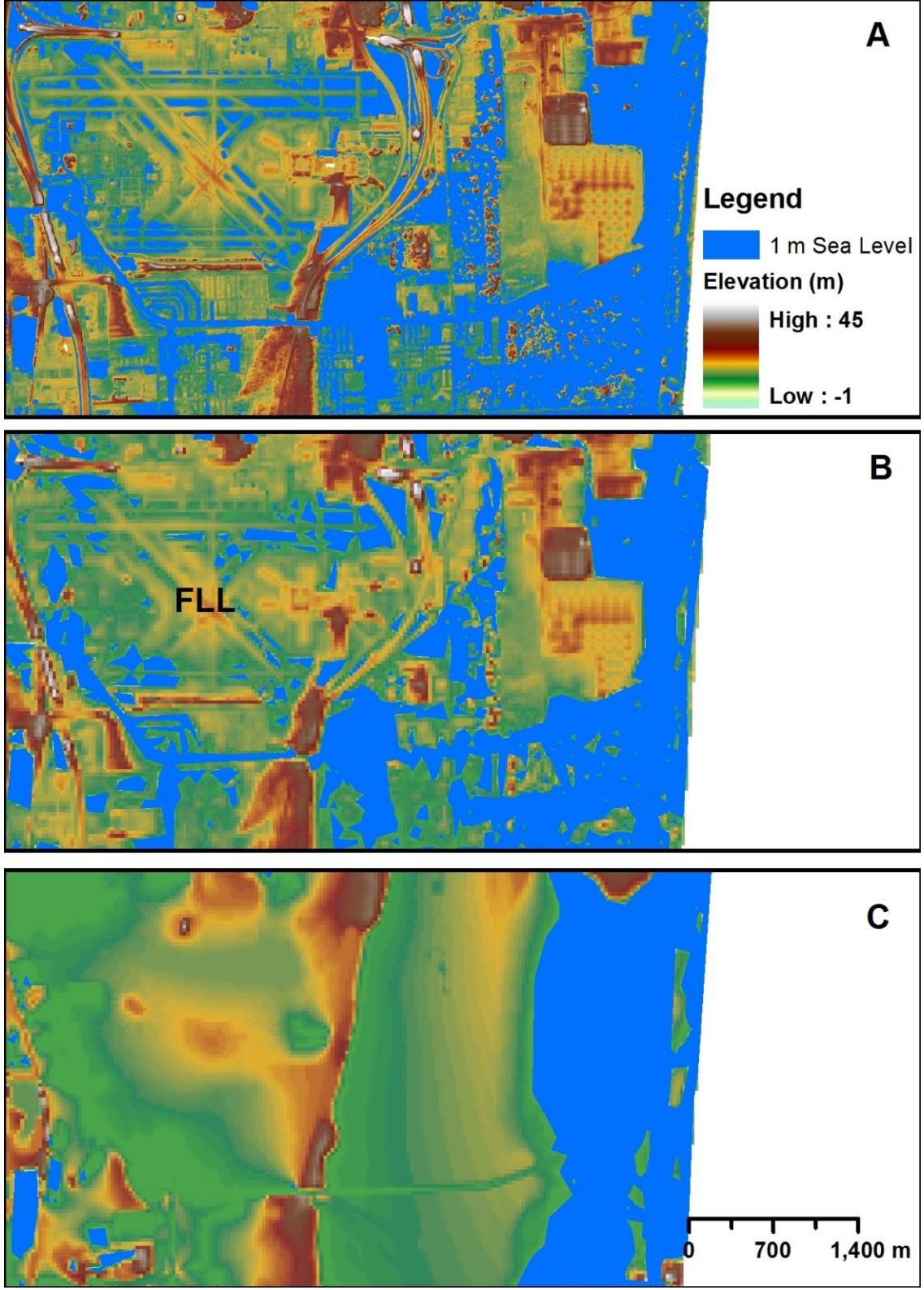
- Longest Coastline
- Populated Low-lying Areas



Airborne LiDAR System



The Effects of DEMs on Inundation

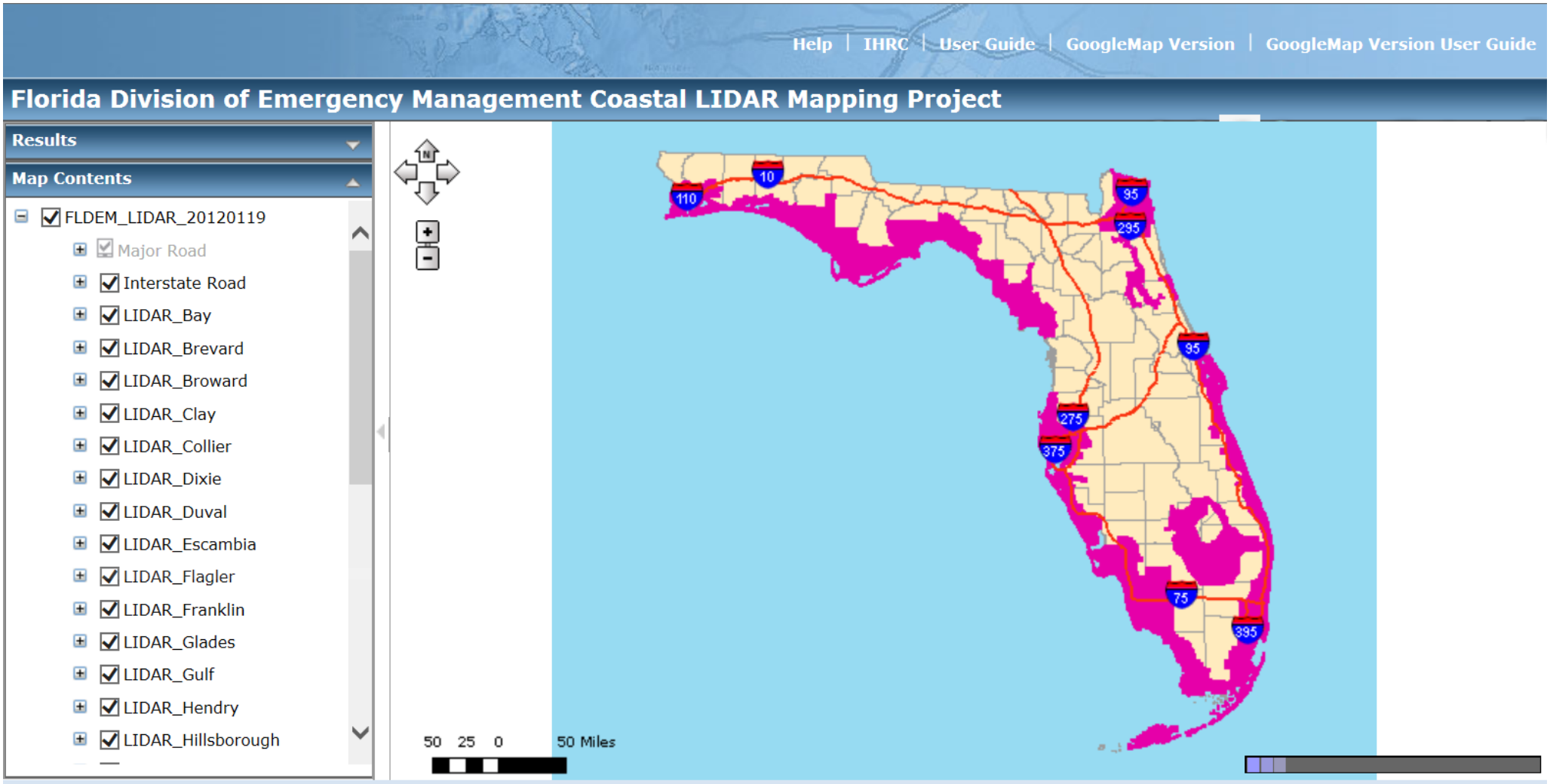


5 m LiDAR

30 m LiDAR

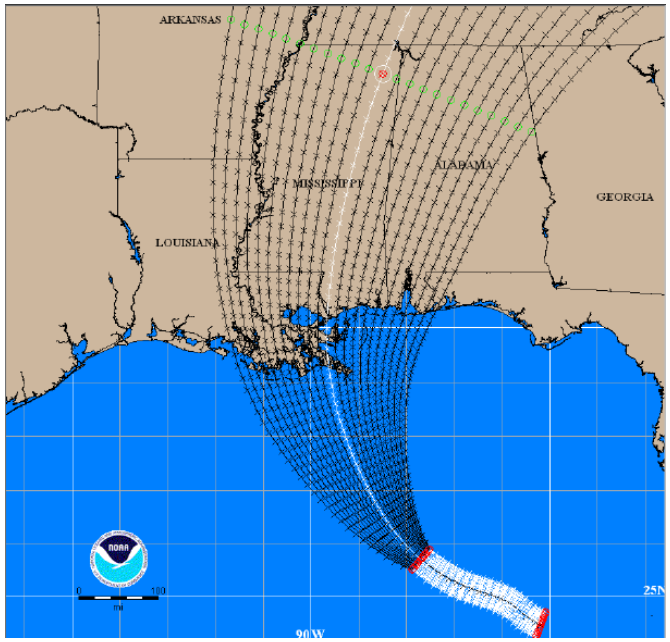
30 m USGS

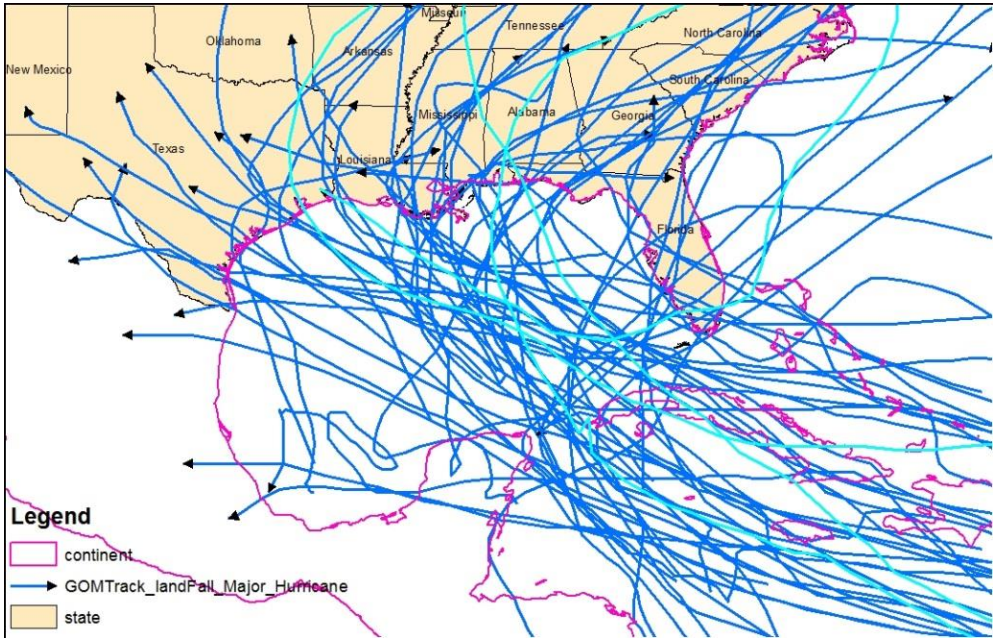
LiDAR Data from FDEM



Challenges of Forecast and Insurance Rate Estimation

- Uncertainty in hurricane track and intensity forecast
- Forecast is updated every 6 hours and 2-3 hours when a hurricane approaches landfall
- 40,000 Stochastic storm cases

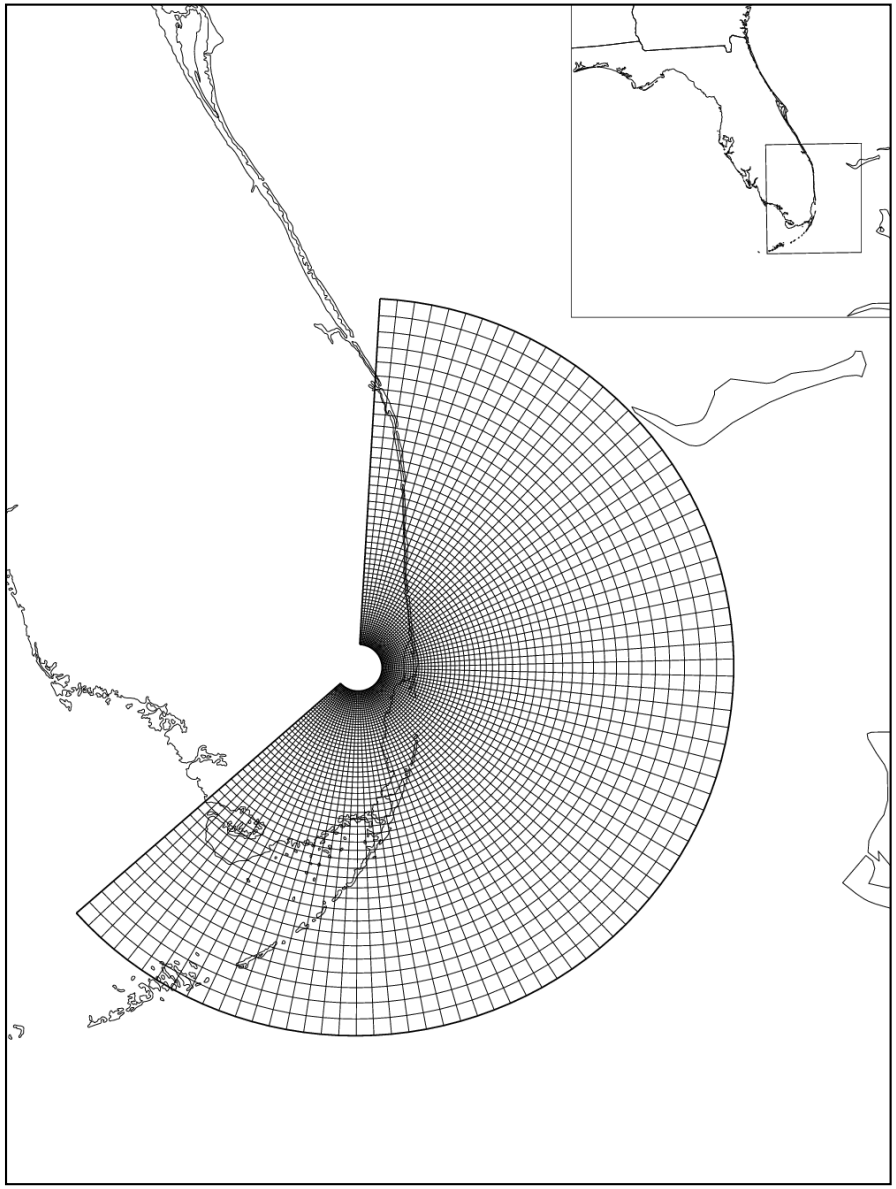




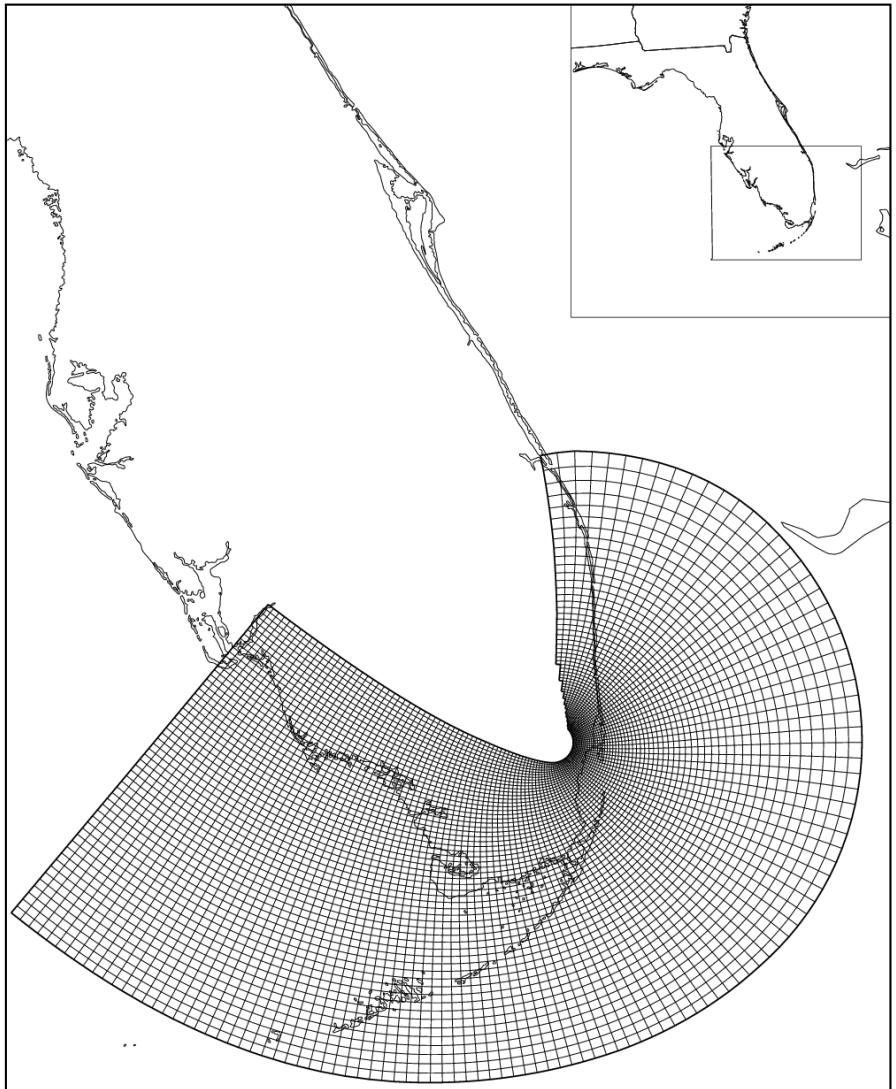
NOAA SLOSH	FIU CEST
Finite Difference	*Finite Difference*
Conformal Grid	***Curvilinear Grid***
Subgrid Features	*Subgrid Features*
Explicit Scheme	***Semi-implicit Scheme***
Coarse Resolution	***Fine Resolution***
Overland Flooding	*Overland Flooding*
No land cover effect on friction	***Land cover effect on friction***
No Tide	***With Tide***
No Wave Set up	***With Wave Setup***
No Upstream	*No Upstream*
Fast Computation	*0.5-2 times*
Real –Time Forecast	*Real –Time Forecast*

Model Domain (Basin) Comparison

NOAA SLOSH



FIU CEST

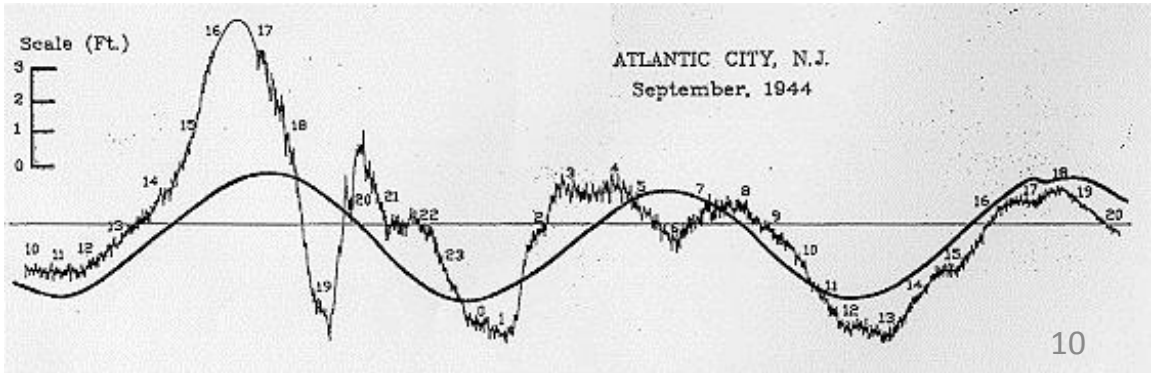


Actual resolution is four times higher

Debris Line

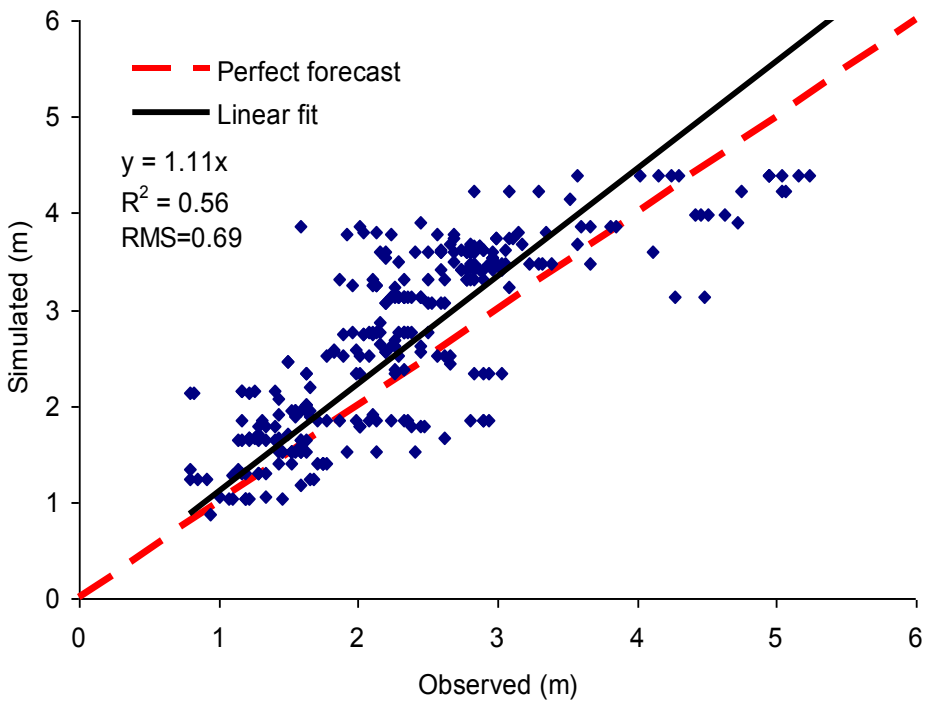
High water mark

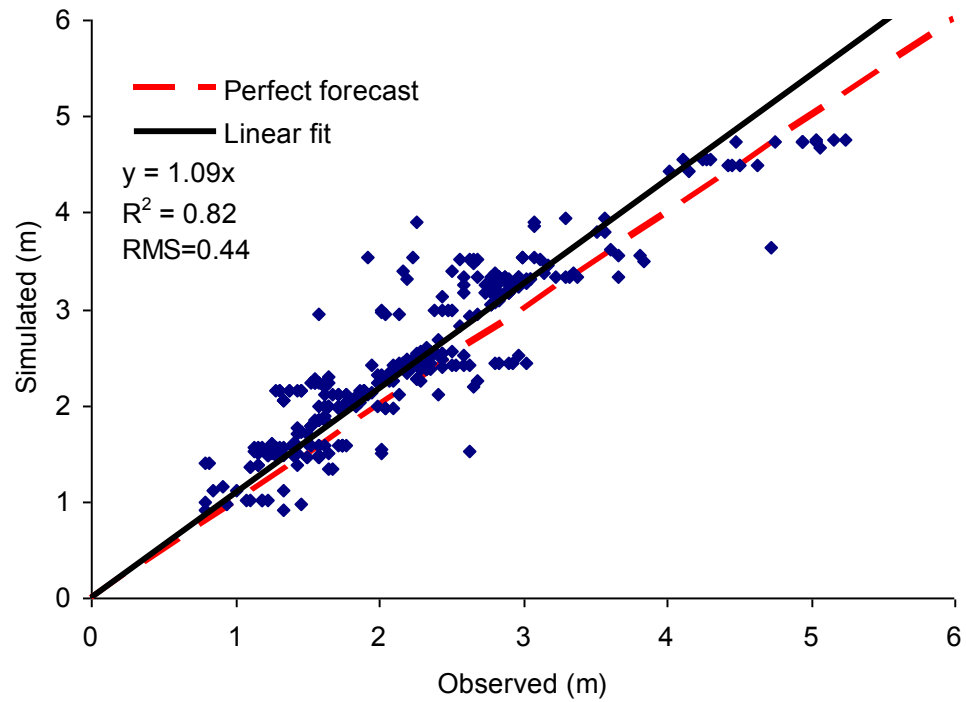
Tide gauge record



Andrew Simulation Comparison

High water mark





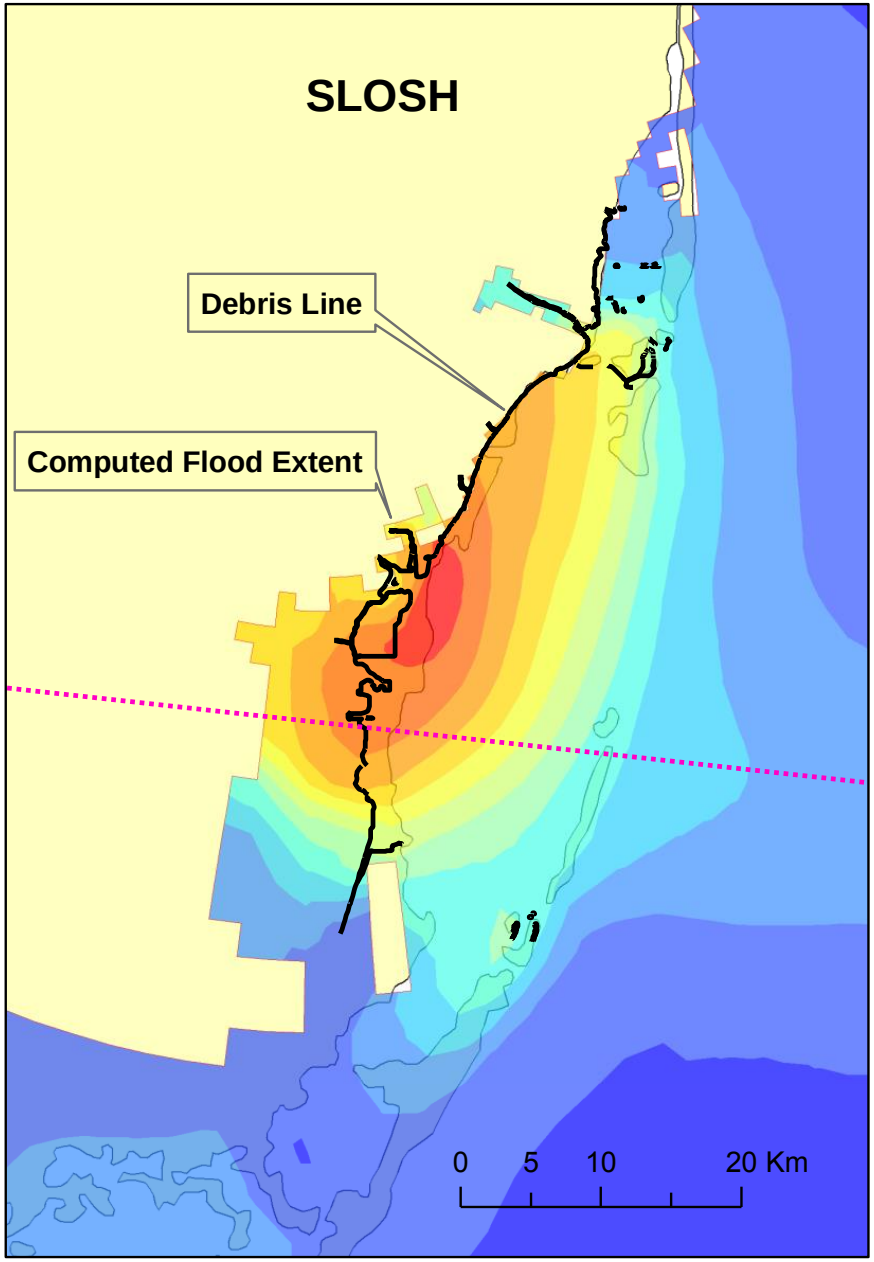
SLOSH

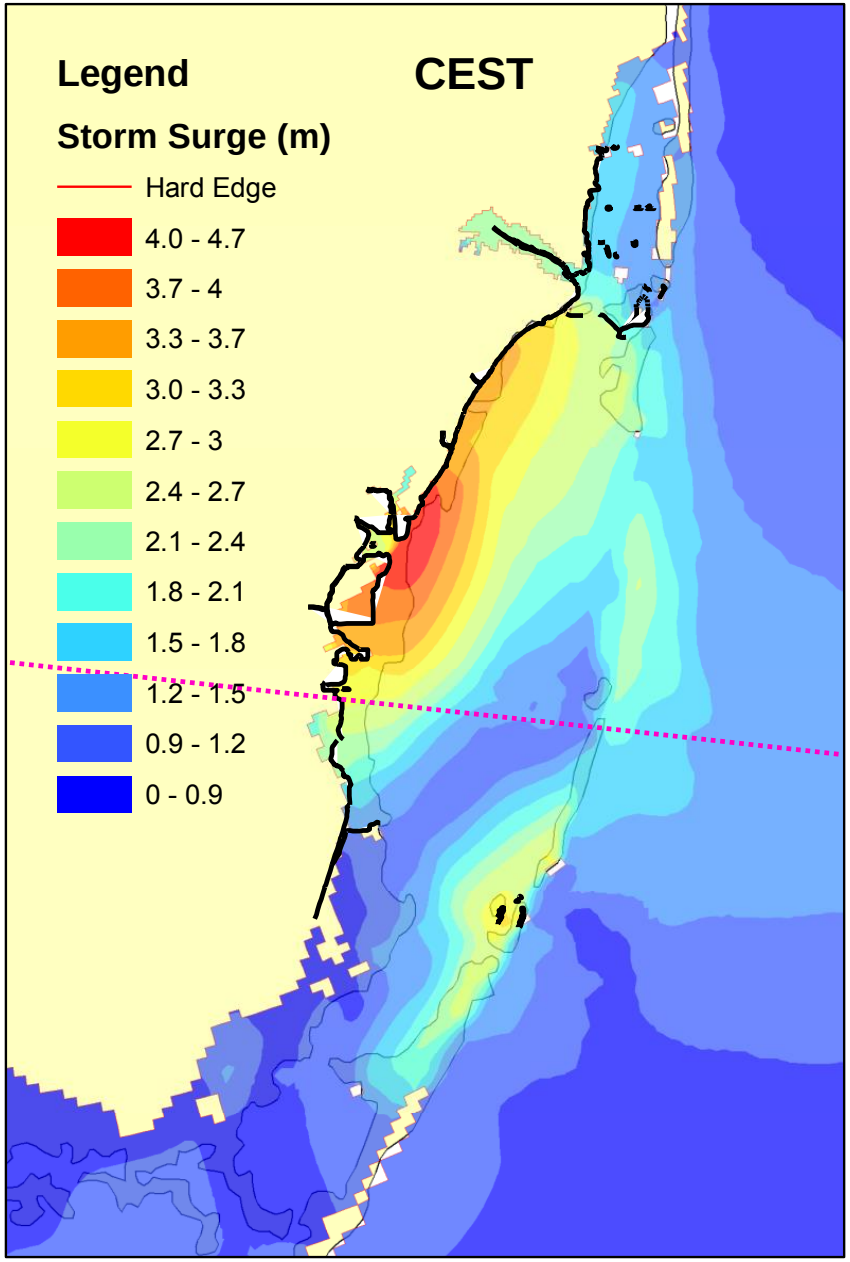
Elevation reference to NGVD 29 vertical datum

CEST

Measures: **R^2 and RMS**

Andrew Simulation Comparison





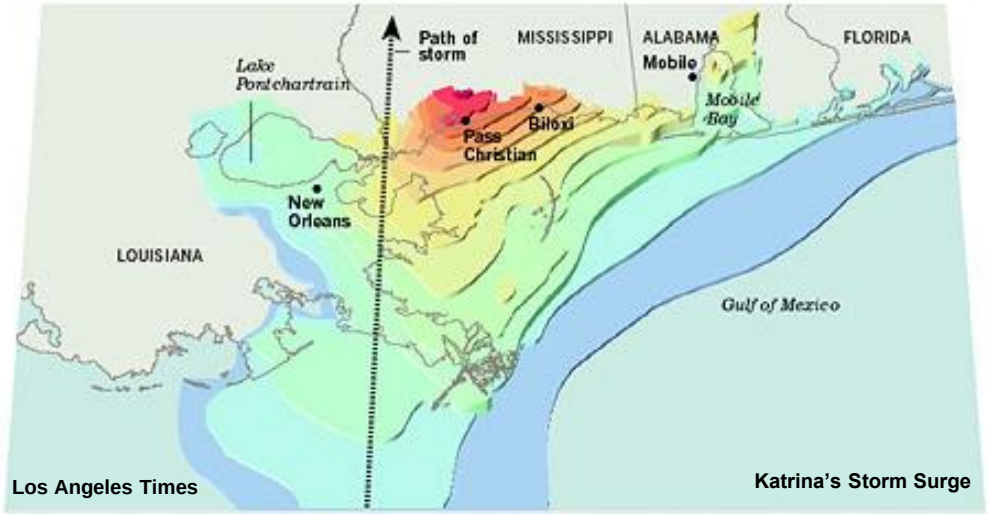
latimes.com. Los Angeles Times close window

Katrina's storm surge

President Bush got a close-up view Friday of the damage along the Gulf Coast caused by Hurricane Katrina, which pushed a surge of ocean water estimated to have been up to 200 miles wide and as high as 29 feet at landfall, according to a computer model.

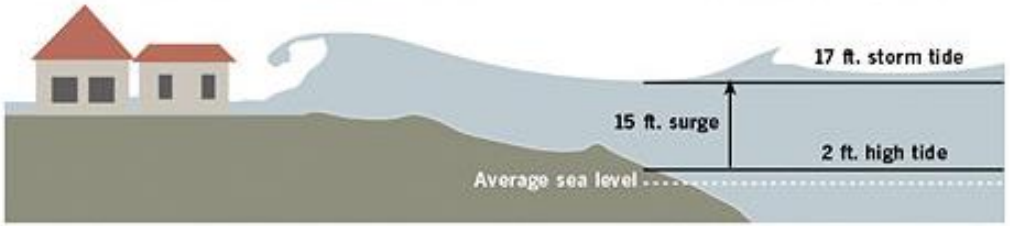
Maximum surge height

under 8 ft. | 8-16 ft. | 16-24 ft. | Over 24 ft.



Storm surges

A large dome of water may sweep across a coastline as a hurricane makes landfall. Surge height is the difference between the sea level in the storm and what it would have been had the storm not occurred.



- Most hurricane deaths are caused by storm surges.
- The worst surges occur in places like the Gulf Coast, where a very shallow shelf extends 120 miles from the beach.
- Local features such as bays and rivers can cause the surge height to double and increase in speed.

Sources: ESRI, TeleAtlas, Associated Press, International Hurricane Research Center, National Weather Service, Woods Hole Oceanographic Institute, "The Weather Book," Florida International University.

DOUG STEVENS AND MARK HAFER *Los Angeles Times*

Katrina's storm surge

September 3, 2005

Cited by:

New York Times

Los Angeles Times

Newsweek

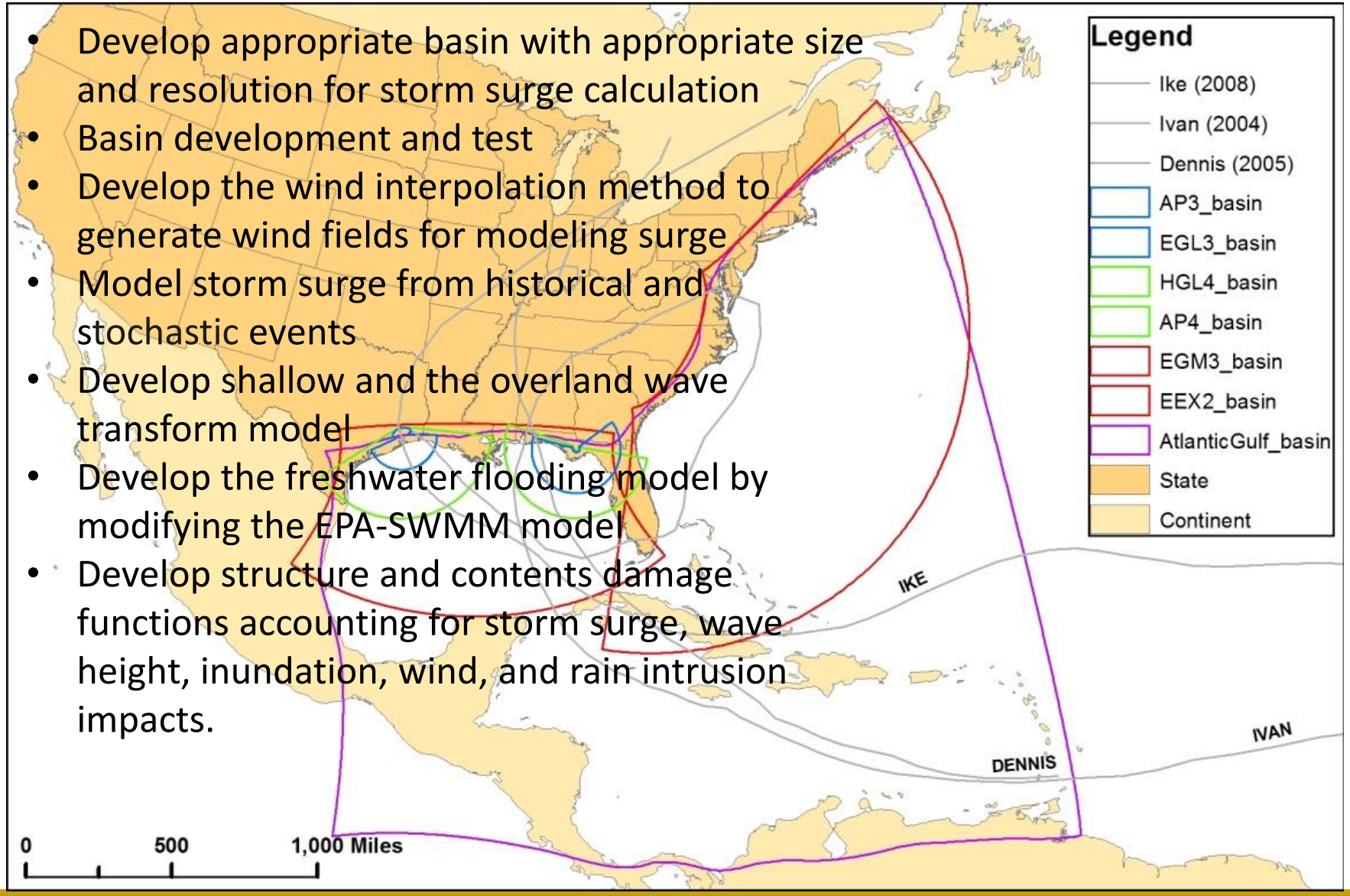
Time

National Geographic Society

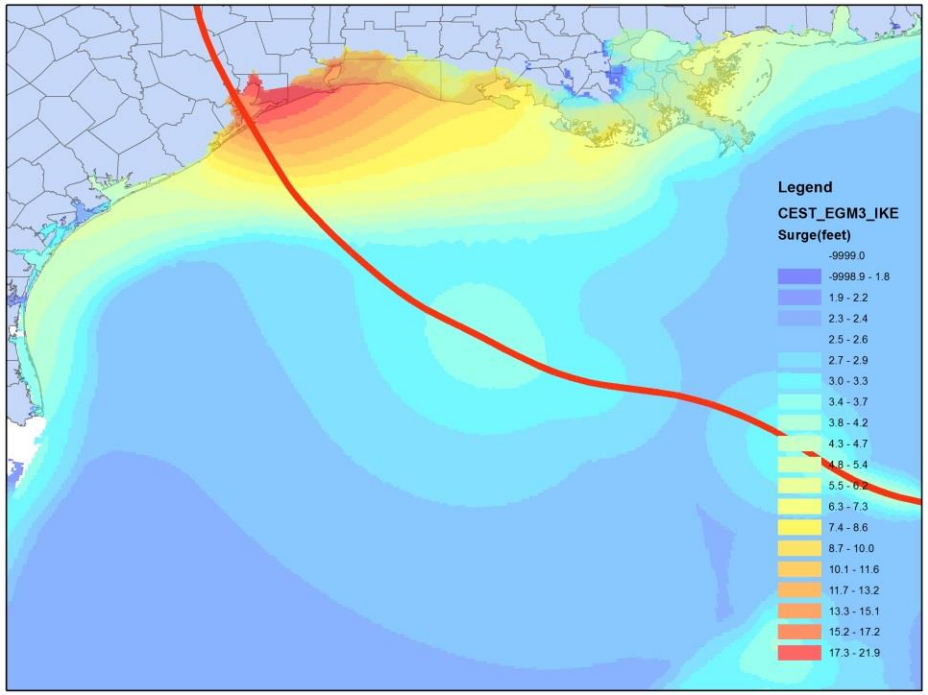
Associated Press

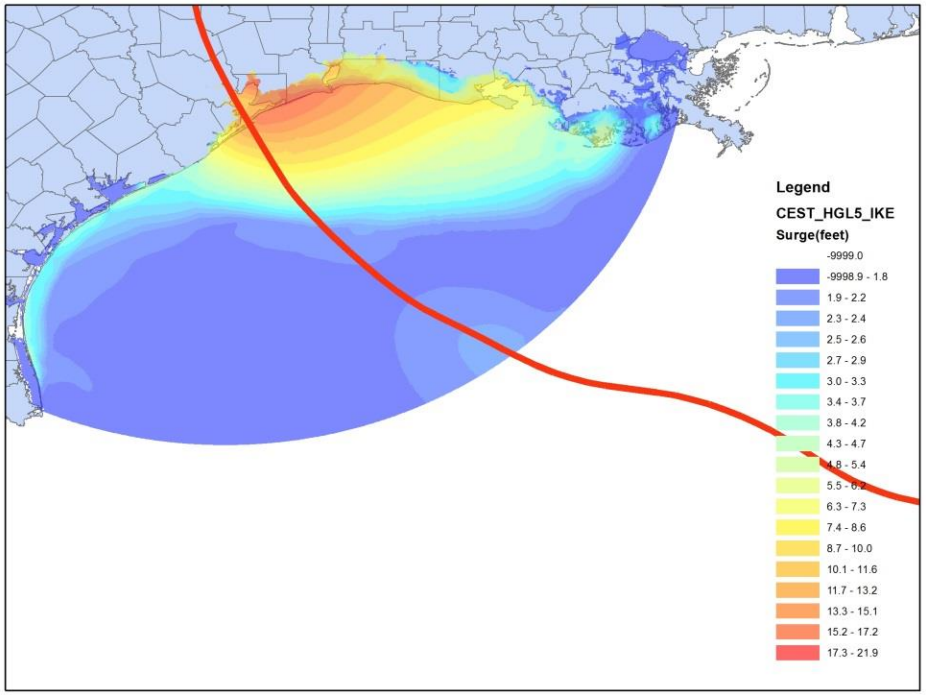
Storm Surge Component in EFPHL Model

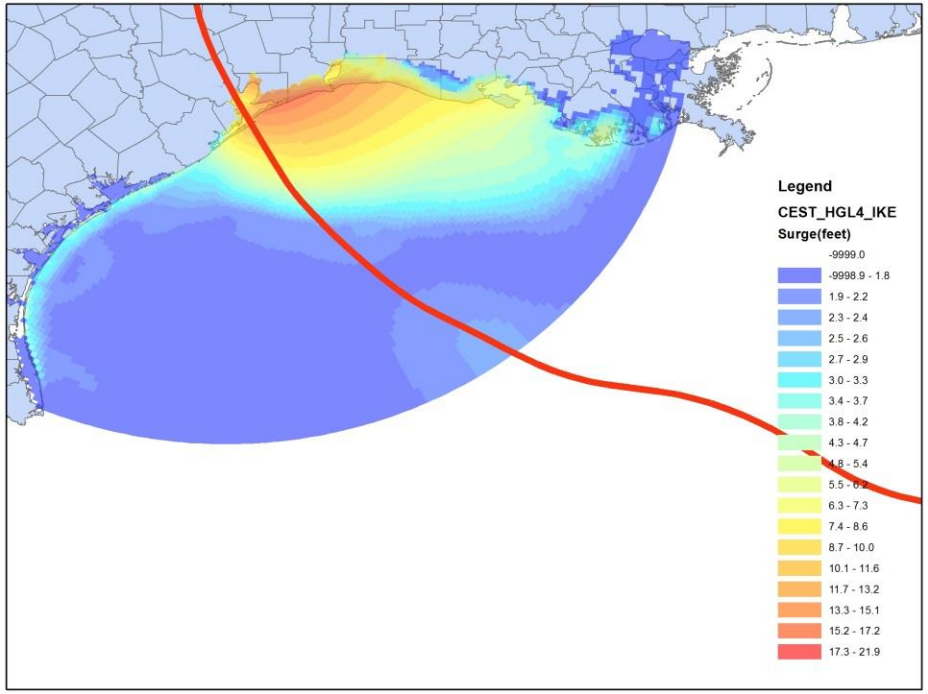
- Develop appropriate basin with appropriate size and resolution for storm surge calculation
- Basin development and test
- Develop the wind interpolation method to generate wind fields for modeling surge
- Model storm surge from historical and stochastic events
- Develop shallow and the overland wave transform model
- Develop the freshwater flooding model by modifying the EPA-SWMM model
- Develop structure and contents damage functions accounting for storm surge, wave height, inundation, wind, and rain intrusion impacts.

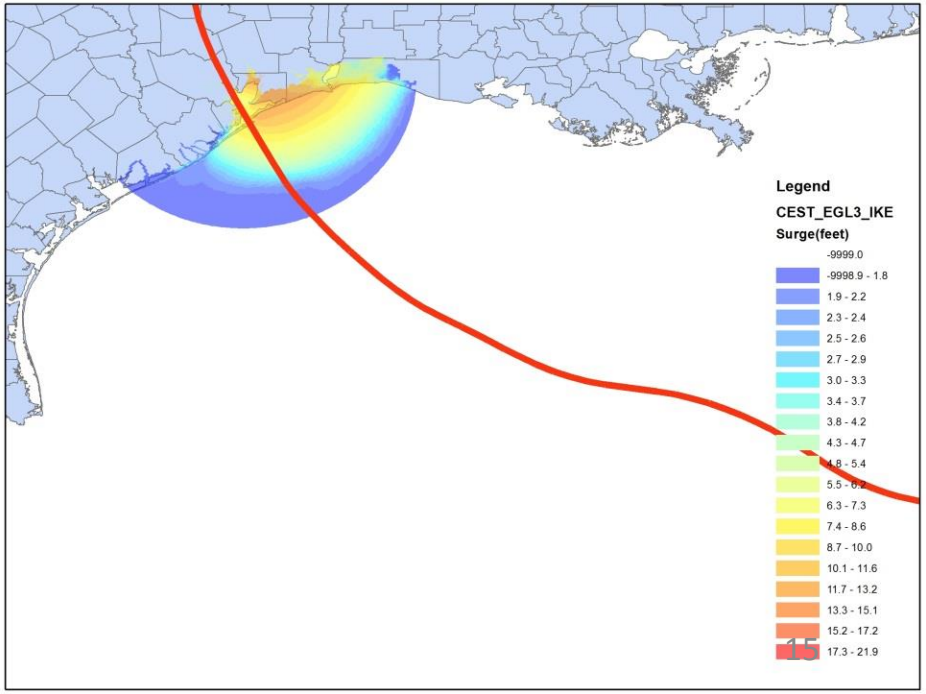


Hurricane Ike Peak Storm Surge Height

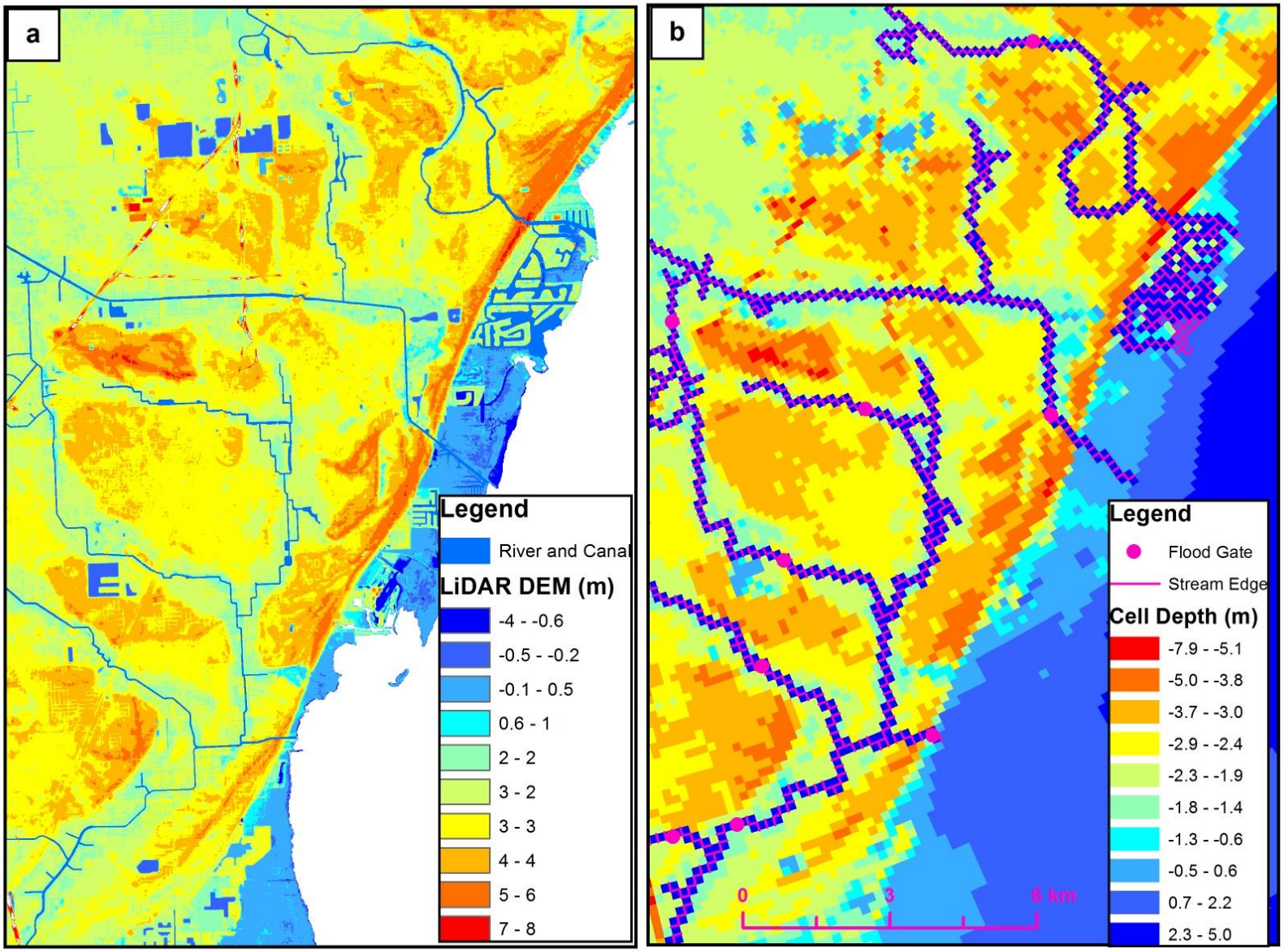








Basin Development



Publication List

Liu, H., K. Zhang, Y. Li, and L. Xie. 2013. Numerical Study of the Sensitivity of Mangroves in Reducing Storm Surge and Flooding to Hurricane Characteristics in Southern Florida, *Continental Shelf Research* 64:51–65.

Zhang, K., Y. Li, and H. Lui, J. Rhome, and C. Forbes. 2013. Transition of the Coastal and Estuarine Storm Tide Model to an operational forecast model: A case study of Florida, *Weather and Forecasting*, DOI:10.1175/WAF-D-12-00076.1.

Liu, H., B. Liu, L. Xie, and K. Zhang. 2012. Simulation of ocean response to an idealized landfalling tropical cyclone using a coupled atmosphere-wave-ocean model system. *Tropical Cyclone Research and Review*: DOI: 10.6057/2012TCRR03.01.

Pava, J., F. Fleites, S.C. Chen, and K. Zhang. 2012. Integrating Geographic and Meteorological Data for Storm Surge Planning. In *Recent Trends in Information Reuse and Integration*, edited by T. Ozyer, K. Kianmehr and M. Tan, Springer Verlag:273-292.

Zhang, K., Y. Li, H. Liu, H. Xu, J. Shen. 2012. Comparison of three methods to estimate the sea level rise effect on storm surge flooding. *Climatic Change* 118:487-500.

Zhang, K., H. Liu, Y. Li, H. Xu, J. Shen, J. Rhome, and T.J. Smith III. 2012. The role of mangroves in attenuating storm surges. *Estuarine, Coastal, and Shelf Science* 102-103:11-23.

Xu, H., K. Zhang, J. Shen, and Y. Li. 2010. Storm surge simulation along the US East and Gulf Coasts using a multi-scale numerical model approach. *Ocean Dynamics* 60:1597-1619.

Zhang, K., C. Xiao, and J. Shen. 2008. Comparison of the CEST and SLOSH models for storm surge flooding. *Journal of Coastal Research* 24:489-499.

Zhang, K., S.C. Chen, P. Singh, K. Saleem, and N. Zhao. 2006. A 3D visualization system for hurricane storm-surge flooding. *Computer Graphics and Applications, IEEE* 26:18-25.

FIU
International
Hurricane Research
Center
Research to Enhance Hurricane Resilience
Click to
OPEN

WALL OF WIND DEVELOPMENT

2-FAN WOW

RENRE 6-FAN WOW

12-FAN WOW

2005

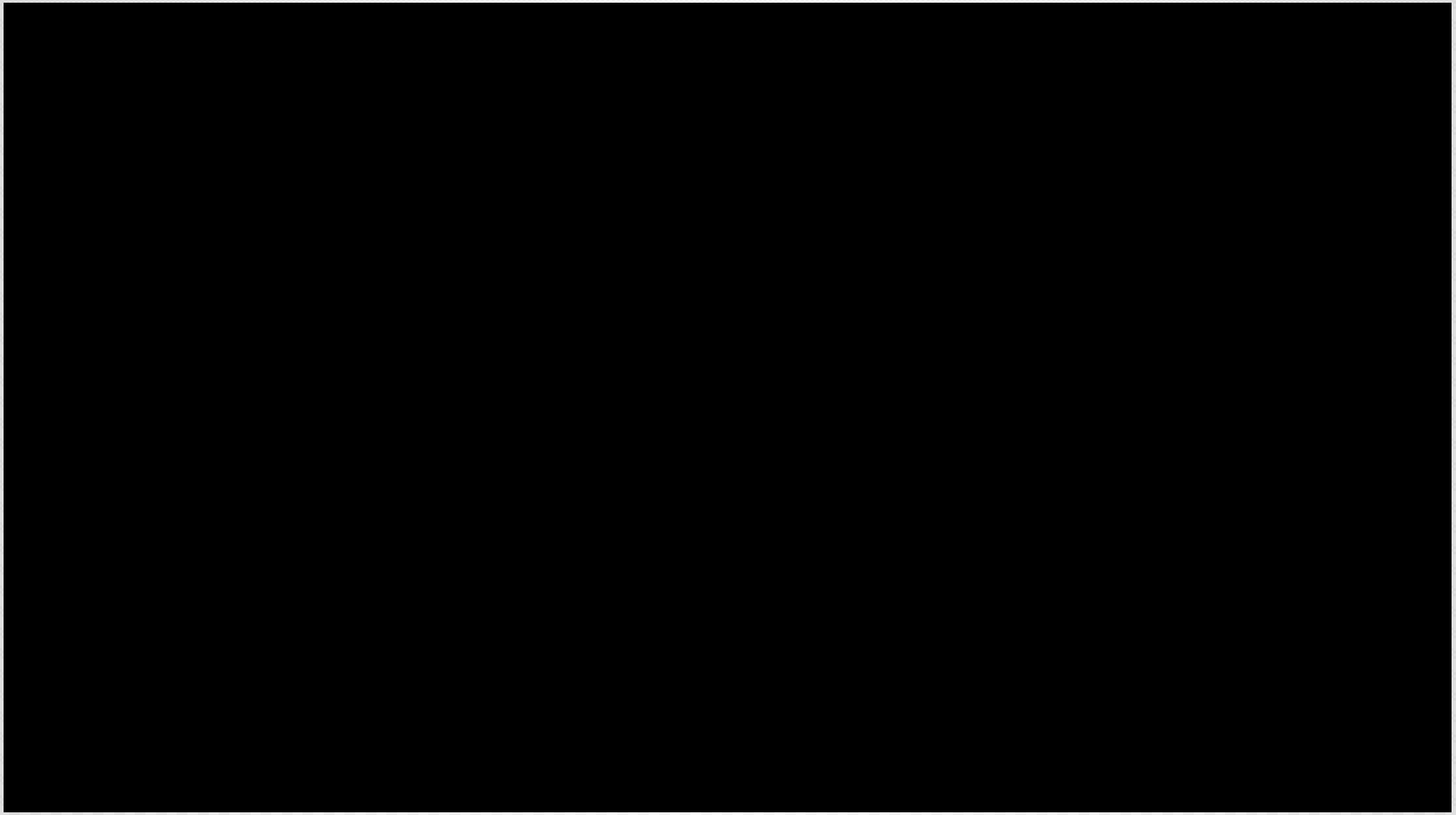
2007

2011

1996
IHRC is created

2012

12-FAN WOW INAUGURATION



WOW TESTING ON FRP CONNECTIONS

Roof-to-Wall Connection Study (NSF Funded)

New Fiber Reinforced Polymer (FRP) Roof-to-wall connections instrumented to measure aerodynamic load distribution

WOW AERODYNAMIC MITIGATION TESTING

Conventional flat roof

Flat roof with *AeroEdge (from WPC Inc.)*

Vortex Induced Scouring at Roof Corner

WOW AERODYNAMIC / DESTRUCTIVE TESTING

WOW Test-Based Recommendations were Published in the 2010 Florida Building Code

Roof Tile Prescriptive Attachments Testing for High Velocity Hurricane Zones Building Code

Wind Load Mitigation on Rooftop Equipment and Roof Tiles Tests

Porous screens around the equipment reduced wind loads on the equipment by up to 58%

12-FAN WOW RESEARCH PROJECTS

FIU 12-fan WOW: Largest, most powerful university research facility for simulating a Cat. 5 hurricane.

12-FAN WOW TEST OF TRANSITIONAL SHELTER

T-Shelter 1
Weak Construction
Start wind speed: 55 mph
Failed at 75 mph/90 deg

T-Shelter 3
Reinforced Construction / Reinforced base platform
Start wind speed: 85 mph

Transitional Shelter testing for USAID/OFDA, comparison between weak and reinforced construction

12-FAN WOW WIND DRIVEN RAIN INTRUSION

Exterior & Interior Damage

Interior & Content Damage

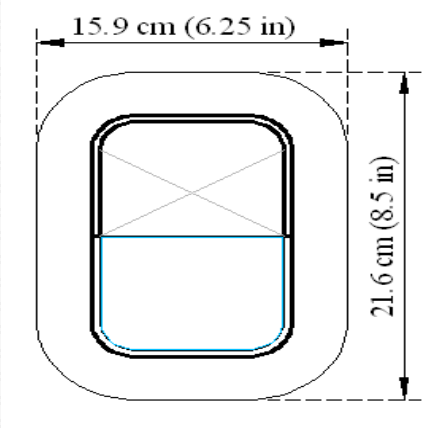
Interior damage vulnerability models are mostly based on engineering judgments

$$\begin{pmatrix} Interior \\ Damage \end{pmatrix} = x \cdot \begin{pmatrix} Exterior \\ Damage \end{pmatrix}$$

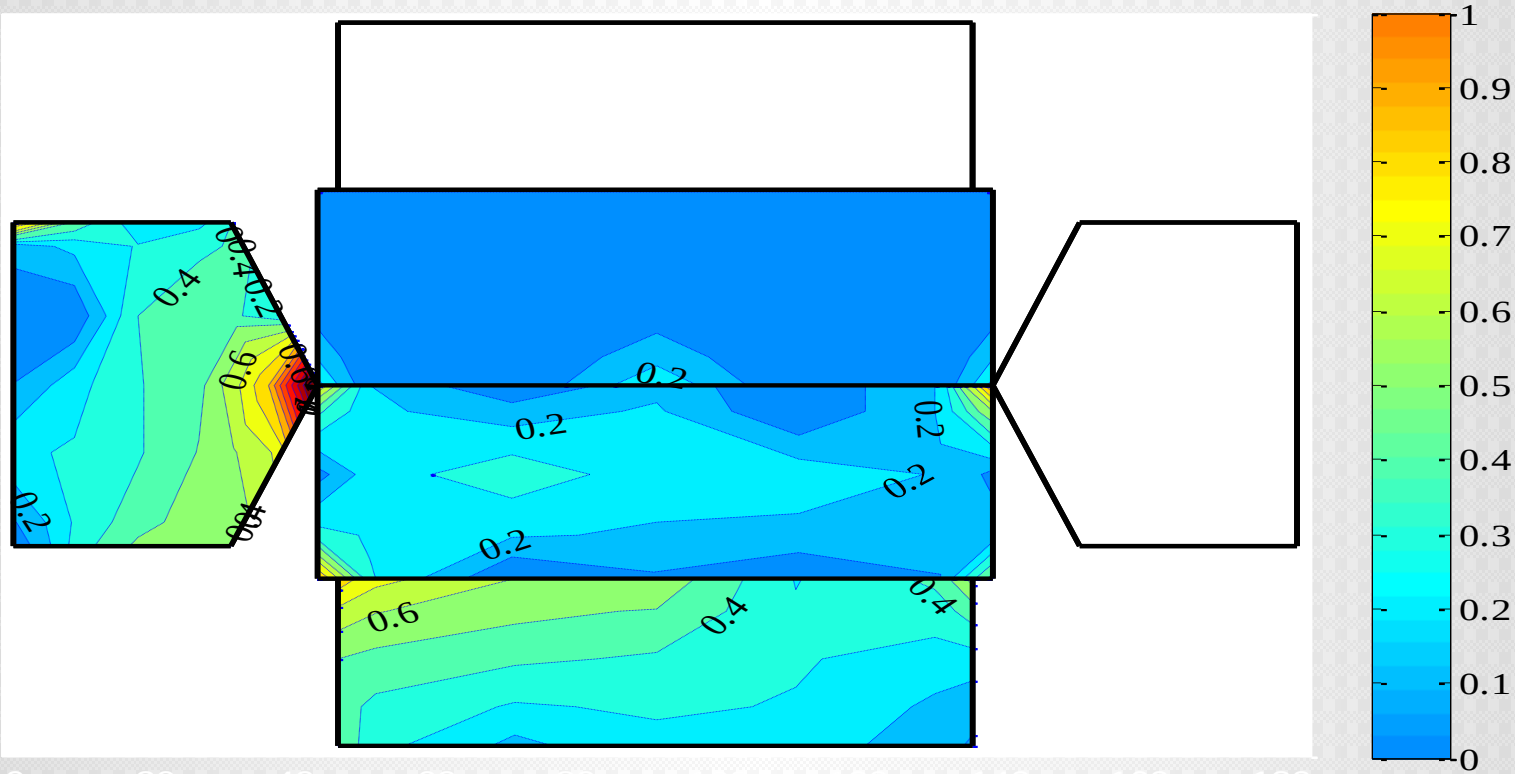
Goal: To develop test-based vulnerability model for total interior damage

12-FAN WOW TESTING OF WIND DRIVEN RAIN

Wind-Driven Rain Deposition Tests



12-FAN WOW RAIN ADMITTANCE FACTOR (RAF)



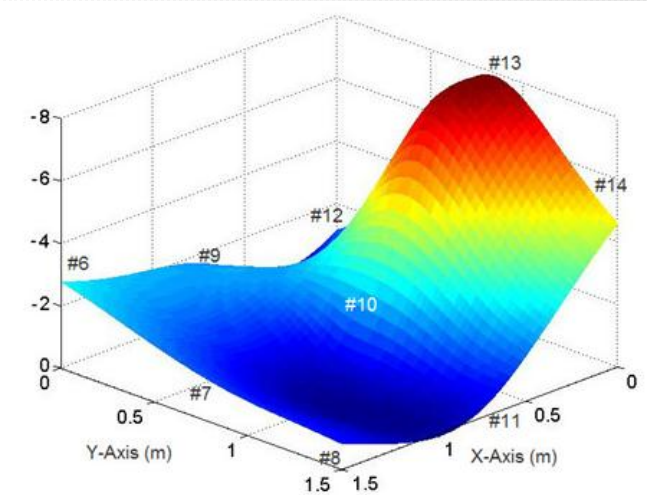
- Leading edges/corners and Gable-end exposed to higher raindrops deposition

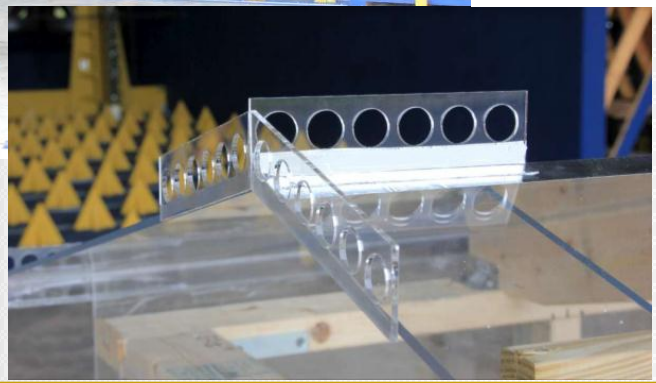
12-FAN WOW FULL-SCALE VALIDATION

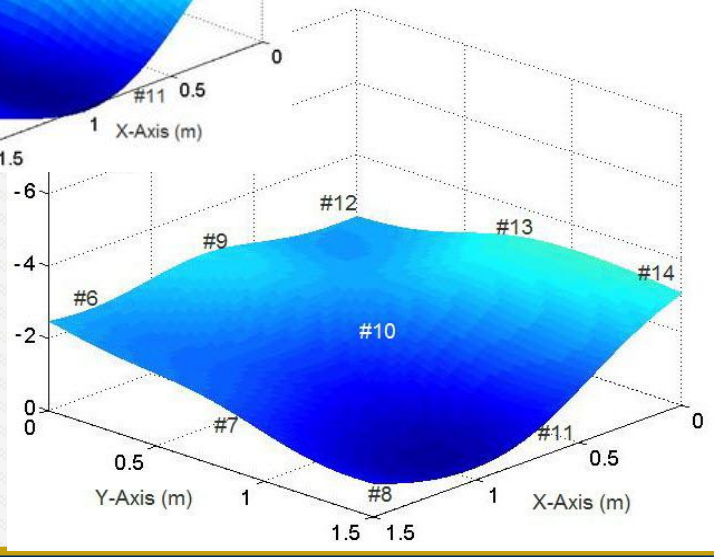
12-FAN WOW VARIABLE MESSAGE SIGN

- New drag coefficients to be incorporated in AASHTO to facilitate economic design
- Significant reduction in drag achieved by simple corner modifications (as much as 30% reduction in loading)

12-FAN WOW ROOF SUCTION MITIGATION







DAMAGE REDUCTION (%) -- MITIGATION

	Masonry	Frame
Roof strength		
BRACED GABLE ENDS	1%	1%
HIP ROOF	7%	10%
Roof Covering		
RATED SHINGLES (110 MPH)	1%	1%
8d NAILS	41%	41%
Wall-Floor Strength		
STRAPS	---	10%
Roof to Wall Strength		
CLIPS	13%	15%
STRAPS	15%	22%

The potential of damage reduction techniques and new mitigation strategies will be investigated through full-scale testing at the FIU WOW.

THE FLORIDA SENATE

APPEARANCE RECORD

(Deliver BOTH copies of this form to the Senator or Senate Professional Staff conducting the meeting)

2/12/2014
Meeting Date

TAB 2

Topic: Florida Public Hurricane Loss Model

Bill Number: _____ *(if applicable)*

Name: SHAHID HAMID

Amendment Barcode: _____ *(if applicable)*

Job Title: professor and director

Address: Dept of Finance, College of Business, FIU
Street

Miami, FL 33199
City *State* *Zip*

Phone: 305 348 2727

E-mail: hamids@fiu.edu

Speaking: [X] For [ ] Against [ ] Information

Representing: Florida International University

Appearing at request of Chair: [X] Yes [ ] No

Lobbyist registered with Legislature: [ ] Yes [X] No

While it is a Senate tradition to encourage public testimony, time may not permit all persons wishing to speak to be heard at this meeting. Those who do speak may be asked to limit their remarks so that as many persons as possible can be heard.

This form is part of the public record for this meeting.

S-001 (10/20/11)

THE FLORIDA SENATE

APPEARANCE RECORD

(Deliver BOTH copies of this form to the Senator or Senate Professional Staff conducting the meeting)

02/12/2014
Meeting Date

Topic: Public Loss Model

Bill Number: TAB 2 (if applicable)

Name: Kegi Zhang

Amendment Barcode: (if applicable)

Job Title: Professor

Address: 11200 SW 8th Street
Street

Miami, FL 33199
City State Zip

Phone: 305 348 8368

E-mail: zhangk@fiu.edu

Speaking: [X] For [ ] Against [ ] Information

Representing: Florida International University

Appearing at request of Chair: [X] Yes [ ] No

Lobbyist registered with Legislature: [ ] Yes [X] No

While it is a Senate tradition to encourage public testimony, time may not permit all persons wishing to speak to be heard at this meeting. Those who do speak may be asked to limit their remarks so that as many persons as possible can be heard.

This form is part of the public record for this meeting.

S-001 (10/20/11)

THE FLORIDA SENATE

APPEARANCE RECORD

(Deliver BOTH copies of this form to the Senator or Senate Professional Staff conducting the meeting)

02/12/14
Meeting Date

TAB 2

Topic: Wall of Wind

Bill Number: _____ *(if applicable)*

Name: Dr. Amndam Chowdhury

Amendment Barcode: _____ *(if applicable)*

Job Title: Assoc. Professor

Address: 10555 W Flagler St.
Street

Miami, FL 33174
City, State, Zip

Phone: 305-742-3586

E-mail: chowdhur@fiu.edu

Speaking: [✓] For [ ] Against [ ] Information

Representing: FIU

Appearing at request of Chair: [✓] Yes [ ] No

Lobbyist registered with Legislature: [ ] Yes [✓] No

While it is a Senate tradition to encourage public testimony, time may not permit all persons wishing to speak to be heard at this meeting. Those who do speak may be asked to limit their remarks so that as many persons as possible can be heard.

This form is part of the public record for this meeting.

S-001 (10/20/11)

CourtSmart Tag Report

Room: EL 110 **Case:** **Type:**
Caption: Senate Appropriations Subcommittee on General Government **Judge:**

Started: 2/12/2014 2:01:19 PM
Ends: 2/12/2014 3:29:01 PM **Length: 01:27:43**

2:02:19 PM	Chmn. Hays
2:03:14 PM	Sen. Bullard
2:03:35 PM	Chmn. Hays
2:04:30 PM	Sen. Dean
2:04:56 PM	Secretary Craig J. Nichols, Dept. of Management Services
2:05:02 PM	TAB 1 People First Assessment and Business Case
2:09:54 PM	Chmn. Hays
2:10:16 PM	Sec. Nichols
2:10:34 PM	David Desalvo, DMS
2:13:27 PM	Sec. Nichols
2:16:35 PM	David Dennis, KPMG
2:19:22 PM	Chmn. Hays
2:20:01 PM	David Dennis
2:24:24 PM	Chmn. Hays
2:25:03 PM	Mr. Dennis
2:25:18 PM	Sen. Soto
2:25:28 PM	Mr. Dennis
2:25:31 PM	Sen. Soto
2:25:35 PM	Mr. Dennis
2:27:14 PM	Sen. Soto
2:27:25 PM	Mr. Dennis
2:27:58 PM	Chmn. Hays
2:29:13 PM	Sen. Joyner
2:29:28 PM	Mr. Dennis
2:30:34 PM	Sen. Joyner
2:31:28 PM	Mr. Dennis
2:32:49 PM	Sen. Joyner
2:32:55 PM	Mr. Dennis
2:33:06 PM	Sen. Joyner
2:35:13 PM	Chmn. Hays
2:37:22 PM	Sec. Nichols
2:40:24 PM	Chmn. Hays
2:40:26 PM	Sen. Joyner
2:40:33 PM	Sen. Soto
2:40:36 PM	Mr. Dennis
2:41:45 PM	Chmn. Hays
2:42:00 PM	TAB 2 Public Hurricane Loss Model Status of Enhancements
2:42:18 PM	Dr. Shahid Hamid, Florida International University
2:44:15 PM	Chmn. Hays
2:44:29 PM	Dr. Hamid
2:47:51 PM	Sen. Detert
2:48:03 PM	Dr. Hamid
2:53:32 PM	Chmn. Hays
2:54:06 PM	Dr. Hamid
2:54:39 PM	Sen. Simpson
2:54:48 PM	Dr. Hamid
2:55:30 PM	Chmn. Hays
2:55:48 PM	Dr. Keqi Zhang, Florida International University
3:03:59 PM	Sen. Bullard
3:04:06 PM	Dr. Zhang
3:08:20 PM	Sen. Thompson
3:08:37 PM	Dr. Hamid

3:09:15 PM	Dr. Hamid
3:10:06 PM	Dr. Arindam Chowdhury, Florida International University
3:23:52 PM	Sen. Simpson
3:24:06 PM	Dr. Chowdhury
3:25:25 PM	Sen. Simpson
3:25:32 PM	Dr. Chowdhury
3:26:31 PM	Sen. Simpson
3:26:33 PM	Dr. Chowdhury
3:27:54 PM	Chmn. Hays
3:28:04 PM	Dr. Chowdhury
3:28:12 PM	Dr. Hamid
3:28:39 PM	Chmn. Hays
3:28:44 PM	Meeting adjourned