

Public Hurricane Loss Projection Model

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Project Funding and Timeline

- The project is currently funded for \$2.55 million by the Florida Department of Insurance.
- Project started in Summer of 2001 and is expected to be completed by May 2004. However, the model will need to be maintained, updated and extended and will require annual funding in the future

Goal of the Project

- The goal of the project is to develop and maintain a computer model to assess hurricane risk, and to project annual expected insured residential losses for specific sites, zip codes, counties and regions in Florida.
- These losses can be estimated for both individual property and for entire portfolios of residential properties.
- The proposed model shall also project insured losses for user defined scenarios and historical events.

The proposed model can be used to:

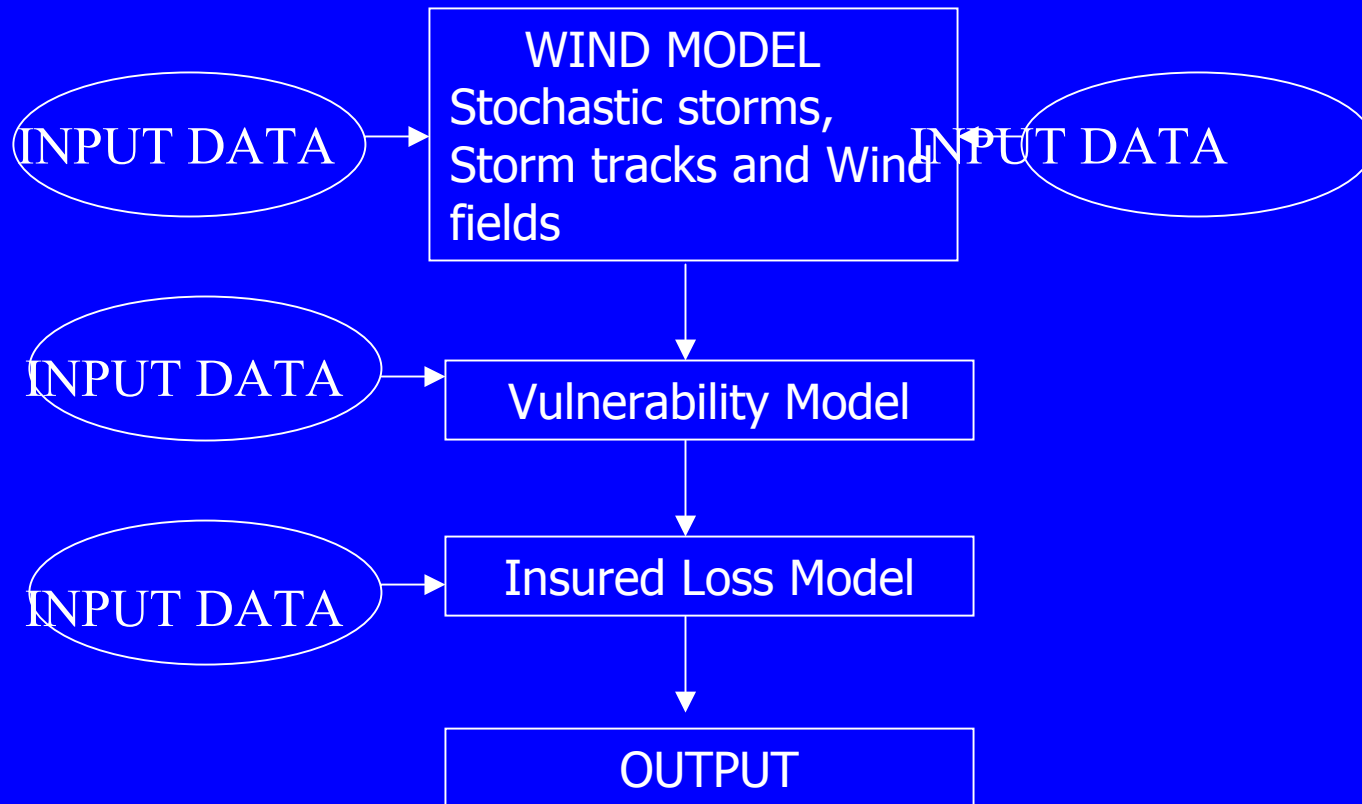
- provide assistance to the Florida Department of Insurance and the insurance industry in the rate making process
- provide a state of the art transparent wind hazard, vulnerability and insured loss models for public use
- provide a check on the assumptions, analysis and results generated by the proprietary models
- help evaluate reinsurance risk for, e.g., the Florida CAT Fund
- assess the efficacy of disaster mitigation strategies

General Comments

- While the project is funded by the state of Florida and sponsored by the Florida Department of Insurance, it is being developed predominantly by academic experts at the International Hurricane Center at FIU, and in the various universities, in accordance with the best available methodologies, techniques, theories and scientific principles.

- The model is being developed without bias and will be transparent.
- It is expected the model and its components will be available to the insurance and reinsurance industry.
- It will be subject to external review and will comply with the standards set by the Florida Commission on Hurricane Loss Projection Methodology (FCHLPM).

Project Design Flow Chat



Project Design

- The model consists of three major components: wind, vulnerability (damage), and insured loss.
- The components shall be developed and validated independently before being integrated.
- The computer platform is designed to accommodate future hookups of additional sub-components or enhancements.

Project Task Status

- There are over 65 major tasks and two hundred sub-tasks
- Currently 54 tasks are either completed or on going

Project Tasks- Continued

<i>Task</i>	<i>Status</i>
• A1 Historical meteorological data collection	Completed
• A2 Define landfall segment (Alternative method adopted)	Completed
• A3a Met Input database development	Completed
• A3b Met Output database development	On going
• A4 Meteorology literature survey	Completed
• A5a Modeling/fitting hurricane parameter distributions	On going
• A5b Wind fields development	On going
• ** Storm track modeling	On going
• ** Storm frequency and time of genesis modeling	Completed
• A6 Climate Cycle model development	Completed
• A7 Zip code centroid database	Completed
• A8 Terrain coefficient database development	Completed

- A9 Inland decay model development On going
- A11 Wind Speed Estimates On going
- A12 Treatment of uncertainties for wind model On going
- A13 Validation of the wind model On going
- A14 Wind field comparisons On going
- A15 Sensitivity analysis for wind model On going
- A16 Documentation of wind model On going
- B1 Vulnerability component data collection Completed
- ** Field data analysis Completed
- B2 Vulnerability (Engineering) literature survey Completed
- B3 Structural classification survey Completed
- B4 Vulnerability (damage) functions/matrix modeling for structures On going
- ** Engineering component Monte Carlo simulation model develop On going
- ** Engineering damage simulations for masonry home model Completed

- ** Engineering damage simulations for non-masonry home models On going
- B5 Vulnerability (damage) functions/matrix modeling for contents On going
- B6 Vulnerability (damage) functions/matrix modeling for ALE On going
- B8 Treatment of uncertainties for vulnerability model Ongoing
- ** Sensitivity analysis of the vulnerability models On going
- B12 Documentation of the model On going
- C1 Insurance premium file and claims database development On going
- C2 Insured loss modeling literature survey Completed
- C3 Insured Loss distribution modeling On going
- ** Modeling of deductibles On going
- ** Modeling of other policy modifications On going
- D1 Selection of computational architecture Completed
- D2 Hardware and software purchase and setup Completed
- D3 Computer Science graduate student training Completed
- D4 Integrated database development for all components On going

- D5 Wind model object oriented analysis (**) On going
- D8 Wind model software development (**) On going
- D6 Vulnerability model object oriented analysis (**) On going
- D9 Vulnerability model software development (**) On going
- D7 Insured loss model object oriented analysis (**) On going
- D10 Insured model software development (**) On going
- ** Requirement analysis and computer model design
of user case one Completed
- ** Requirement analysis and computer model design
– of user case two Completed
- ** Requirement analysis and computer model design
of user case seven Completed
- ** Requirement analysis and computer model design
of user case eight On going
- E1 External review of the wind model On going
- E2 External review of the vulnerability model On going
- E4 External review of the computer platform/ software design On going

- There are totally nine use cases in this project to run the model. Six are for meteorology computation, one for the engineering damage model and two for insured loss estimation. This system is prototyped as a Web-based system. All source data are stored in a database.

Participating Institutions

- Florida International University (lead institution)
- Florida State University
- Florida Institute of Technology
- Hurricane Research Division, NOAA
- University of Florida
- University of Miami
- National Institute of Science and Technology

List of current participants

(Excluding graduate students)

- Dr. Shahid Hamid * Dept of Finance and IHC, Florida International University
- Dr. Shu-Ching Chen * Dept of Computer Science, FIU
- Dr. Steven Cocke Dept of Meteorology, Florida State University
- Howard Eagelfeld Florida Department of Insurance
- Dr. Sneh Gulati * Dept. of Statistics, Florida International Univ
- Dr. Kurtis Gurley Dept of Civil Engineering, Univ of Florida
- Dr. T.N.Krishnamurti Dept of Meteorology, Florida State University
- Dr. Chris Landsea, Hurricane Research Division, NOAA
- Dr. Steve Leatherman Director, International Hurricane Center, FIU

* Team Leaders

- Nirva Morisseau Database expert, Hurricane Research Division, NOAA
- Dr. Ali Parhizgari Dept of Finance, Florida International Univ
- Dr. Jean Paul Pinelli * Dept of Civil Engineering, Florida Institute of Technology
- Dr. Mark Powell * Hurricane Research Division, NOAA
- Dr. George Soukop Hurricane Research Division, NOAA
- Dr. Emil Simiu National Institute of Standards & Tech and John Hopkins University
- Dr. George Soukup Applied physicist, AOML/NOAA
- Dr. Mei-Ling Shyu Dept. of Electrical and Computer Engineering, University of Miami
- Dr. Mani Subramaniam Dept of Mech Engineering, Florida Institute of Technology
- Dr. Walter Tang Dept of Civil Engineering, FIU

Insurance Data

- In February and March 2003, premium file and claims data were acquired for 1995-2002 from: Citizen's Group, Prudential and All State. Data from State Farm, Nationwide etc have not been made available.
- Data prior to 1995, including for hurricane Andrew, has not been made available.
- The delay in data acquisition means significant delay in project timeline.