



# LOOK INTO THE EYE

FIU researchers are building a resilient world





# CONFRONTING THE UNTAMED WIND

Climate change has increased the ferocity of hurricanes at a time when threatened coastal populations continue to grow. FIU researchers are on the forefront of tackling these serious concerns.

They are leading the research, testing and planning needed to empower communities to prepare for, mitigate and recover from the worst of what lies ahead. In collaboration with local, state, national and international partners, FIU’s hurricane-focused research advances the science behind storms, presents solutions to reduce damage to the natural and built environments and suggests pragmatic strategies to protect human life.

\$52.5M

hurricane-related research funding  
over the past 10 years

242

hurricane-related articles, proceedings,  
journal articles, books over the past 10 years



MISSION





# SAVING LIVES

Keeping all people safe is priority No. 1 for FIU disaster researchers.

That includes finding ways to address the risk of hurricanes and other natural disasters as well as the needs and safety of the most vulnerable. Often invisible until disaster strikes, marginalized communities worldwide suffer from a lack of attention in risk reduction and disaster planning.

For decades, FIU researchers have been committed to enhancing the hurricane resilience of underserved, neglected populations.



FIU volunteers traveled to the Florida Keys to support relief efforts after Hurricane Irma.

\$4.63M

Andrew Mellon Foundation grant to address the disproportion of hurricane impacts on low-income communities in South Florida

45

percentage of U.S. population that lives in hurricane-threatened states

The United States Agency for International Development (USAID) has awarded the university **more than \$7.5 million dollars** to address hurricane risks as well as develop resilience approaches in Latin America and the Caribbean. Funded programs seek to advance the region’s ability to mitigate hurricanes by focusing on land use management, building codes and preparedness.



PROTECTION





## 20/20 FORESIGHT

FIU researchers are harnessing data science to understand how hurricanes behave to make proactive decisions possible.

Their work informs forecasting by the National Hurricane Center and the Navy's Joint Typhoon Warning Center, and they have helped develop a storm surge database for Haiti and the Dominican Republic to support decision-making on evacuations.

A grant to FIU from the National Oceanic and Atmospheric Administration (NOAA) is funding efforts to map and forecast flooding in hurricane-vulnerable regions throughout the Caribbean. The collaborative project improves storm surge monitoring and warning for island-nations and Central American coastal areas.

**THE FLORIDA PUBLIC HURRICANE LOSS MODEL** was developed by university experts in meteorology, wind and structural engineering, computer science, GIS, statistics, finance and actuarial science. It is used to assess the state's hurricane risk to regulate windstorm insurance rates and determine fair pricing in a state that saw 16 insurers fail after 1992's catastrophic Hurricane Andrew.

Operated by FIU and funded by the Florida legislature, the model also evaluates the solubility of individual insurance companies and quantifies the economic benefits of mitigation efforts.

10,000

estimated annual number of hurricane/tropical storm-related deaths worldwide

\$78.5B

total U.S. damage from hurricanes/tropical storms in 2021

\$23M

for the Florida Public Hurricane Loss Model since 2001

“With the NOAA National Hurricane Center located on the Florida International University campus, FIU’s scientists are able to collaborate directly with scientists at NHC. Given this partnership and close proximity, storm surge modeling and forecasting techniques as well as windstorm damage findings directly contribute to NOAA’s vision for a Weather-Ready Nation.”

— Jamie Rhome  
Director, NOAA National Hurricane Center



PREDICTION





# LESSONS LEARNED, LESSONS SHARED

**Preparing tomorrow’s professionals, building public awareness and getting the word out to leaders make FIU’s hurricane work a dynamic endeavor.**

**FIU is teaching** engineers, geologists, meteorologists, computer scientists, statisticians, social scientists and others to serve on the forefront of an increasingly challenging landscape. FIU students work with experienced professionals in specialized labs as well as in the field to learn firsthand what will be required to keep people safe in the new reality.

**Training the community** to be ready for hurricanes includes FIU’s outreach to schools and mounting of an annual exhibit at a local science museum. Such activities set the foundation for informed communities that respect the inherent dangers of windstorms and recognize their responsibility to prepare through practical steps and appropriate technologies.

**Informing legislators** about new findings and developments remains a critical function of FIU’s International Hurricane Research Center, which prepares reports on special issues and sends personnel to meet with state lawmakers and even testify before Congress.

**Measuring public support** for disaster risk reduction policies and their effective enforcement is the goal of an NSF-funded program that collects opinions in the United States and Latin America, data FIU will share with policymakers, stakeholders and the public at large.

## THE WALL OF WIND CHALLENGE

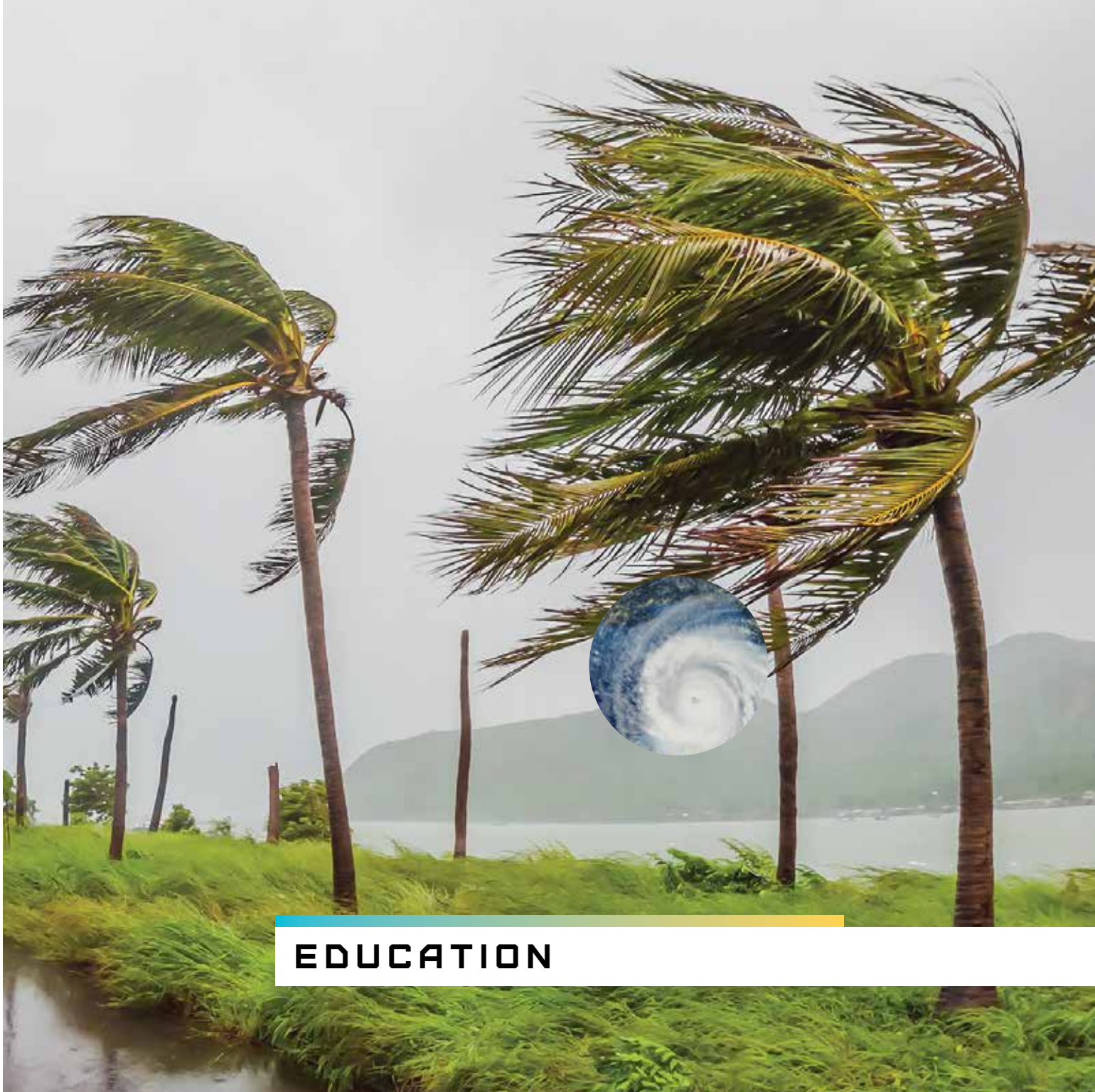
How do you get high school students interested in hurricane mitigation? You run an annual competition that has them collaborating around their best ideas – and then pit those ideas against the power of the largest hurricane simulator on a university campus.

Teams of four get to work on solving a stated challenge (one year they investigated “the impact of wind scour” on flat roofs) and then write technical papers, make presentations to a judging panel and, finally, put their design models to the test. The latter go head-to-head inside the Wall of Wind, where 12 fans generate hurricane-speed forces that very quickly determine whose work might pose a viable solution.

**Best of all:** Students learn creative problem-solving and critical thinking while gaining inspiration to pursue STEM studies and careers in wind engineering. It’s an engaging learning opportunity that has the potential to benefit all of society.

## THE FIU APPROACH

Education and research go hand-in-hand as FIU brings together experts across the university, among them centers, institutes and faculty within the Green School of International & Public Affairs, College of Engineering & Computing, College of Arts, Sciences & Education and College of Business.



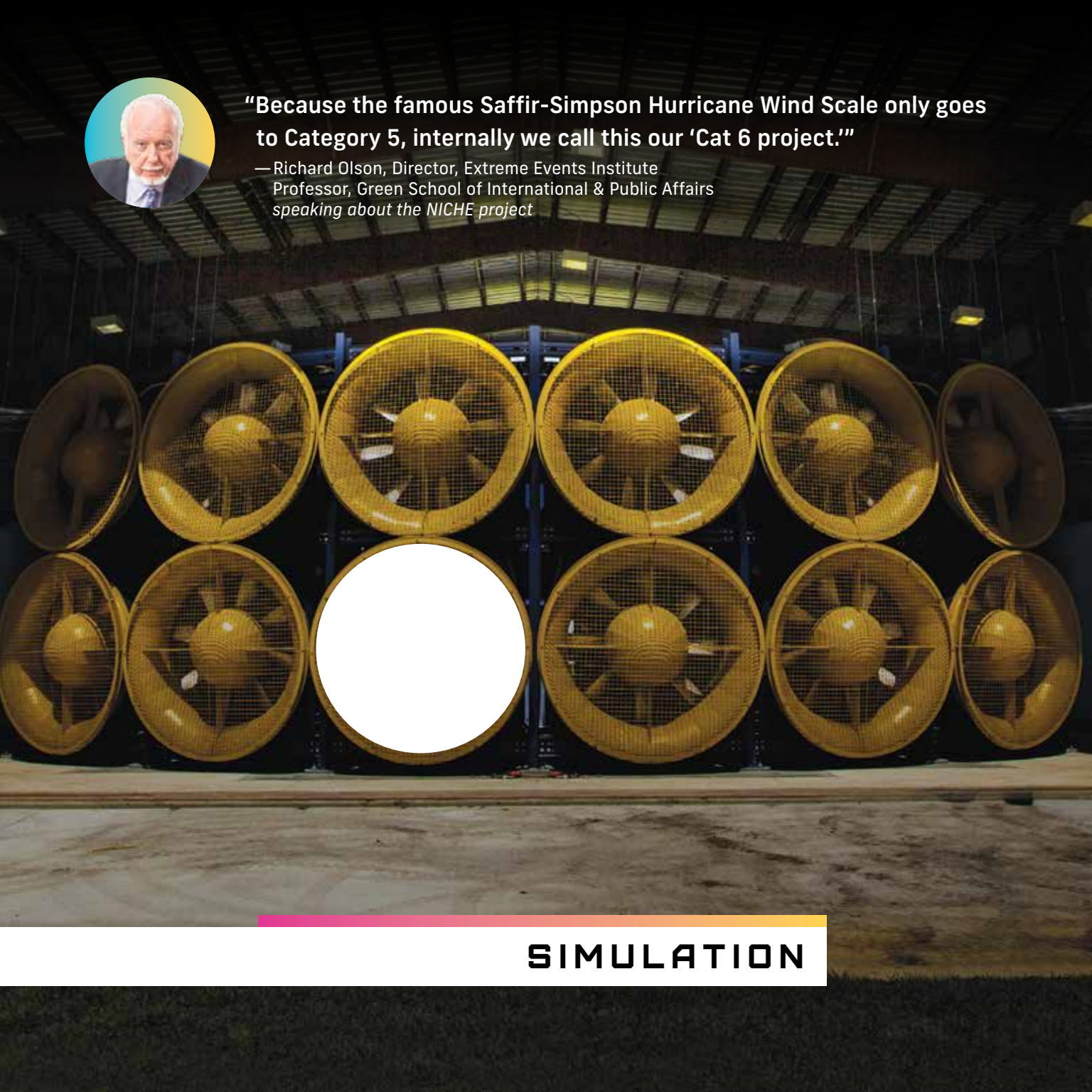
## EDUCATION





“Because the famous Saffir-Simpson Hurricane Wind Scale only goes to Category 5, internally we call this our ‘Cat 6 project.’”

— Richard Olson, Director, Extreme Events Institute  
Professor, Green School of International & Public Affairs  
speaking about the NICHE project



SIMULATION

## LAB-MADE STORMS FOR BUILDING BETTER

FIU researchers are generating controlled hurricane conditions to improve construction standards.

One of only eight National Science Foundation-supported experimental facilities in the country, FIU’s Wall of Wind (pictured) is the only university research lab capable of simulating Category 5 hurricane winds of up to 157 mph.

The **16,000-square-foot campus facility** has been used for more than a decade to test construction materials, fabricated components and entire structures in support of better performance-based design and stricter building codes.

**Among the more than two dozen organizations that have conducted testing at the Wall of Wind:**

Florida Division of Emergency Management  
Florida Department of Transportation  
Florida Power & Light  
GAF Materials Corporation  
Institute for Building Technology and Safety  
Tesla  
The Walt Disney Company

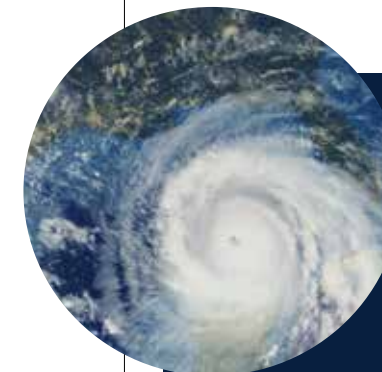
## MITIGATION

The **College of Engineering & Computing** houses the **Moss School of Construction, Infrastructure and Sustainability** and the **Institute for Resilient and Sustainable Coastal Infrastructure** both focused on developing innovative technologies to erect and retrofit buildings and other civil infrastructure to withstand the impacts of stronger hurricanes and more forceful storm surge associated with climate change.

**THE NATIONAL SCIENCE FOUNDATION AWARDED \$12.8 MILLION TO FIU TO DESIGN THE WORLD’S MOST POWERFUL WIND-WATER-WAVE TESTING FACILITY.**

The **National Full-Scale Testing Infrastructure for Community Hardening in Extreme Wind, Surge, and Wave Events**, or **NICHE**, recognizes the need to understand how increasingly stronger hurricanes are impacting coastal environments. It represents the best opportunity to evaluate current and evolving materials and techniques used in building construction by testing them against the strongest conditions possible in a controlled setting.

The research laboratory will be capable of generating wind speeds of up to 200 miles per hour combined with a water basin to simulate storm surge and wave action. FIU will lead a team of top scientists and engineers from eight other universities to develop the prototype.



### UNIVERSITY PARTNERS PARTICIPATING IN THE DESIGN OF THE NICHE PROJECT

Florida International University (lead)  
Stanford University  
University of Notre Dame  
University of Illinois at Urbana-Champaign  
Georgia Institute of Technology  
Colorado State University  
University of Florida  
Oregon State University  
Wayne State University



A UNIVERSITY OF DISTINCTION IN ENVIRONMENTAL RESILIENCE



Learn more about FIU's Real Impact