

Partner Spotlight – Daniel Smith Ph.D.

Daniel is a post-doc research fellow with the Cyclone Testing Station at James Cook University. His research experience covers a wide range of wind engineering disciplines including: insurance claims analysis for severe wind events, field-deployed anemometry for cyclones, vulnerability and fragility modelling, wind-borne debris trajectory modelling, post-event damage assessment, wind resistance of roofing systems, structural retrofitting for wind and water ingress, wind tunnel testing, behavioral aspects of community cyclone preparedness.

Q: What is your background or education and how did you get interested in disaster safety?

A: My educational experience is in structural engineering, emphasizing wind-related building failures. After completing doctoral research at University of Florida I began working with the Cyclone Testing Station (CTS) at James Cook University in Queensland, Australia. Similar to Florida, Queensland is the most at-risk state in Australia with respect to tropical cyclone events. Between the U.S. and Australia over the last decade I have been involved in damage assessments and/or deployed mobile weather stations for seven tropical cyclones and many non-synoptic events (e.g., tornado, thunderstorm). Although I work with the CTS, I am based in Charleston, SC and have current projects with FLASH, University of Florida (UF), Insurance Institute for Business and Home Safety (IBHS) and the National Science Foundation (NSF).

Q: How did you get interested in disaster safety?

A: As a Florida native, tropical cyclones and the associated damage have always been a part of life. The interest in doing something about it (i.e. disaster safety) began during my time at UF. When I started as an engineering undergraduate, I wasn't aware of the research being conducted within the department. That changed when a faculty member (Forrest Masters) approached me with the opportunity to manage one of his research projects, which involved using a wind-borne debris simulator (i.e. research-grade potato gun) to investigate the vulnerability of metal storm shutters to impact from wind-borne roofing tile fragments (this particular damage mode was observed frequently after 2004 Hurricane Charley). I was hooked immediately. I enjoyed the research, the team environment and most importantly the contribution to protecting Florida (and other) communities from tropical cyclone impacts. David Prevatt and Kurt Gurley were also very involved as mentors that shaped the way I approach disaster research today.

Q: Can you tell us about specific projects or programs you are working on or are passionate about in the resilience field?

A: Ironically, one of the most important projects started with FLASH over five years ago. In 2013, myself and a group of fellow UF students (including Dr. David Roueche now at Auburn University) won a FLASH shark-tank style contest that challenged student teams to develop novel ideas for improving the resilience of Florida housing. Our idea was to put disaster research into the hands of homeowners via a smartphone app that allowed users to self-asses their wind risk and communicate with their insurer, community preparedness organizations and university researchers. Since then, the project has grown dramatically in scope and interest. There are now several parallel streams of research and development being conducted both in the U.S. (led by David Prevatt) and Australia by students and faculty from behavioral science, computer science and civil engineering disciplines. The work is supported by Florida Department of Emergency Management (FDEM), Florida SeaGrant, Queensland Government and Suncorp Insurance (largest in Queensland). There is still plenty of work to be done but one of the key learnings so far is that the obstacles to tropical cyclone mitigation are not specific to the Southeast U.S. They are faced by communities across the globe where, in some cases, novel solutions have been (or are being) developed. It's important that we work collaboratively and not duplicate efforts.

Q: What do you think are the driving forces that are advancing the cause of resilience today, especially after last year's hurricanes?

A: In my opinion, there are no singular driving forces for increasing resilience. To make a widespread impact and gain critical mass, the effort must come from ALL key stakeholders, especially in the aftermath of recent events when awareness is higher. This includes academic research to understand building failures and innovative (cost-effective) solutions to retrofit the 40-80% of housing stock in the Southeast U.S. and Australia that were constructed before modern wind-resistant building codes. It also includes community education and outreach from organizations like FLASH, higher resolution risk-reflective pricing and incentives by insurers, building code development and compliance and an increase in resilience ownership by homeowners themselves. There are many other important driving forces as well and all are critical to success.

Q: What do you see in the future of resilient building?

A: Smart sensors. From a research perspective, we are now in (or approaching) an era where buildings in wind-prone communities can be fitted with smart devices that record hazard information (e.g., wind speed, pressure, water ingress, etc.) and the corresponding structural reactions (e.g., the actual amount of wind-generated uplift force in a roof to wall connection). In other words, instead of primarily testing buildings in the lab, the world itself will become the lab. There will always be a need for component and full-scale testing in a laboratory setting but we are already starting to

see major improvements in data collection and analysis for real disaster events at a resolution, accuracy and scale not previously possible. As more (and better) data are collected and analyzed, our understanding of how to build cost-effective resilient buildings will improve rapidly.

Q: How can the FLASH Partnership support your efforts?

A: Keep up the great work! FLASH does a fantastic job of bringing together a wide range of stakeholders in disaster resilience. Let's work to expand the circle of influence and engagement beyond the U.S.