Progressive or cascading failures of roofing connections were simulated using a computer model based on wind tunnel data, dynamic connection tests and damage surveys observations. Results identify the most vulnerable parts of the roof and how damage can spread during a storm, which is essential for developing retrofitting measures for older houses.

**Fig1.** Batten to rafter failure caused by Tropical Cyclone Marcia

**Fig2.** Wind tunnel model and recorded load fluctuations

1) Wind tunnel tests are used to record wind pressures on the roof surface

2) Connection samples are tested under fluctuating loads from wind tunnel data

3) Testing data are used to create simulated connections in a structural analysis model

4) Time history analysis is performed using wind tunnel data (A virtual storm!)

5) Model outputs include load sharing and progressive failure information

**Fig3.** Connection testing apparatus and connection response

**Fig4.** Non-linear structural analysis model of roof structure

**Fig5.** Connection loads and failure during the simulation