

2.3 THE ROLE OF SMALL-SCALE VORTICES IN ENHANCING SURFACE WINDS AND DAMAGE IN HURRICANE HARVEY

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Small-scale structures have been observed in the landfalling hurricane / tropical cyclone boundary layer, including boundary layer rolls and streaks, and mesovortices. Roll structures have been linked to variations in the surface wind field observationally and through modeling. Damage mapping in Hurricane Andrew revealed small, coherent regions of enhanced damage.

To explore the relationship between small-scale wind field features and damage, Doppler On Wheels (DOW) mobile radars were deployed near the landfalls of hurricanes Harvey and Irma during the summer of 2017. Intense and complex mesovortices were observed from inside the eye of Harvey. In addition, much smaller, ~1 km tornado-scale, vortices were documented in the eyewall, as well as the ubiquitous boundary layer rolls. A DOW-mounted anemometer at 8 m AGL measured 1-second winds of 65 m/s during the eyewall passage. 300 m upstream, two vehicles were lofted and a building destroyed. Anemometer data illustrate the contributions of mesovortices and tornado-scale vortices to the surface wind field.

We will present an analysis of the evolution of the eyewall mesovortices and tornado-scale vortices and how these may relate to regions of documented enhanced damage.