"Landspout" Tornadoes Strike Cape Coral and Fort Myers Beach

Event

A rapidly intensifying thunderstorm, developing from just south of Fort Myers Beach northward into Cape Coral, spawned two tornadoes in southwest Lee County, during the evening of Sunday, September 16, 2007. The first tornado began as a waterspout southwest of Fort Myers Beach at 613 PM EDT, inching slowly northeast before making landfall on the beach at approximately 6:25 PM, stirring up a large amount of sand. As the waterspout churned ashore, it caused roof damage to a Florida Keys-style resort hotel, and blew down a light metal awning of a nearby restaurant, before dissipating at 6:28 PM.

Minutes later, at approximately 6:33 PM, a second tornado touched down in south Cape Coral, then skipped northward for four and one-half miles along and near Skyline Boulevard and Southwest 8th Place, before lifting back into a funnel cloud. This twister produced substantial property damage, generally between El Dorado Parkway and SW 37th Terrace along Skyline Drive. Initial property damage assessments were estimated at $4 million, not including vehicles, boats, fences, sheds, and utility infrastructure. Based on interviews with persons in the area, the Cape Coral tornado continued until 6:58 PM, including periods where it lifted. In total, waterspout, funnel cloud, and tornadoes were seen for nearly an hour – from 6:13 PM until 7:04 PM.

The Public Information Statement shows a summary of the tornado statistics. Damage details, and locations, are provided on this map (link to Lee County EM map) and log (link to Lee County EM log). A summary of power outages as the tornado sliced through south Cape Coral is provided here (link to LCEC outage log).

Meteorology

This event becomes the third substantial rainy season tornado/waterspout to occur near the coast of Charlotte or Lee County, not associated with a tropical cyclone, since 2005. While the prior two tornadoes, one rated as high as F2 in Port Charlotte on June 21, 2006, and another brief landfall of a large waterspout near the mouth of the Peace River on July 15th, 2005 , occurred a bit farther north, the pre-cursor conditions were generally the same: multiple low level boundaries from different directions collided, increasing both the updraft growth and the low level vorticity, or “spin”, necessary to produce tornadoes.

On September 16th, intense thunderstorms developed along the extreme southwest Florida coast generally between Everglades City and Naples, and strong southerly outflow winds propagated northward, prompting Special Marine Warnings across the Gulf of Mexico within 20 nm offshore of Collier and Lee Counties. As the outflow raced northward, it encountered a southwesterly sea breeze which had reached St. James City, at the southern end of Pine Island. Lastly, northeasterly winds, perhaps enhanced by persisting southwest-moving storm cells out of Desoto and northern Charlotte County, provided a final source of potential rotation. Figure 1 (satellite photo with overlays) shows the precursor conditions at around 600 PM.

An Hour’s Worth of Funnels?

A typical summertime waterspout tends to last 15 minutes or less, with duration often sustained by lack of surface friction. Land-reported small tornadoes or funnel clouds are normally very short lived; anecdotal data suggests most last no more than 10 minutes. On September 16th, the evolving thunderstorm produced a near continuous stream of funnel activity for nearly an hour.

The loop of radar composite reflectivity offers some clues. The initial thunderstorm, which was part of a broken line but appeared to become a separate entity just prior to initial intensification, becomes linear in its own right, with the heart of the line stretching across Cape Coral and eventually northward into extreme southern Charlotte County. This suggests that inflow from the initially strong cells along the southwest Florida coast predominated, maintaining an updraft core while allowing for a continual generation of vorticity from the Gulf sea breeze and southwest-moving outflow from the Desoto/northern Charlotte County cluster. This sustained, rotating updraft likely explains the nearly hour-long duration of funnel cloud, waterspout, and tornado reports as the storm moved northward.

At about the time of the final funnel cloud report, the Lee County and Charlotte/Desoto cells merged, producing additional strong winds, hail, and excessive lightning – but no reported funnels or tornadoes, as of this writing.

A Florida Landspout

This event generally meets the definition of a landspout, which, according to the American Society’s Glossary of

Meteorology (2002), is defined as a “tornado occurring during the growth stage of the parent thunderstorm with its vorticity originating in the boundary layer”. Also known as a “non-supercellular tornado”, landspouts rarely have a pre-existing mid level mesocyclone.

Sure enough, on September 16th, the initial funnel cloud and waterspout reports were received as the cell underwent rapid intensification; eventually, rotation estimated to be near 60 knots of gate-to-gate shear (44 knots inbound, in green, against 16 knots outbound, in red), was briefly observed on radar, at around 7000 feet altitude, at 6:24 PM; however, this was more than 10 minutes after the first funnel cloud and waterspout was observed.

Landspouts have also been called “dust-tube” tornadoes, as their legacy of study in the Great Plains has included evidence of surface dust that is not always accompanied by a visible condensation funnel. Photographs received by news affiliates across southwest Florida show a similar effect, with a combination of surface debris and sand sometimes unlinked with the condensation funnel.

For more information on landspouts, see Caruso and Davies, 2005, as well as Bluestein, 1985.

References:

Bluestein, H. B., 1985: The formation of a “landspout” in a “broken-line” squall line in Oklahoma. Preprints, 14th Conf. on Severe Local Storms, Indianapolis, IN, Amer. Meteor. Soc., 267-270.

Caruso, J.M, and J.M Davies, 2005: Tornadoes in non-mesocyclonic environments with pre-existing vertical vorticity along convergence boundaries, National Weather Association Electronic Journal of Operational Meteorology, June, 2005

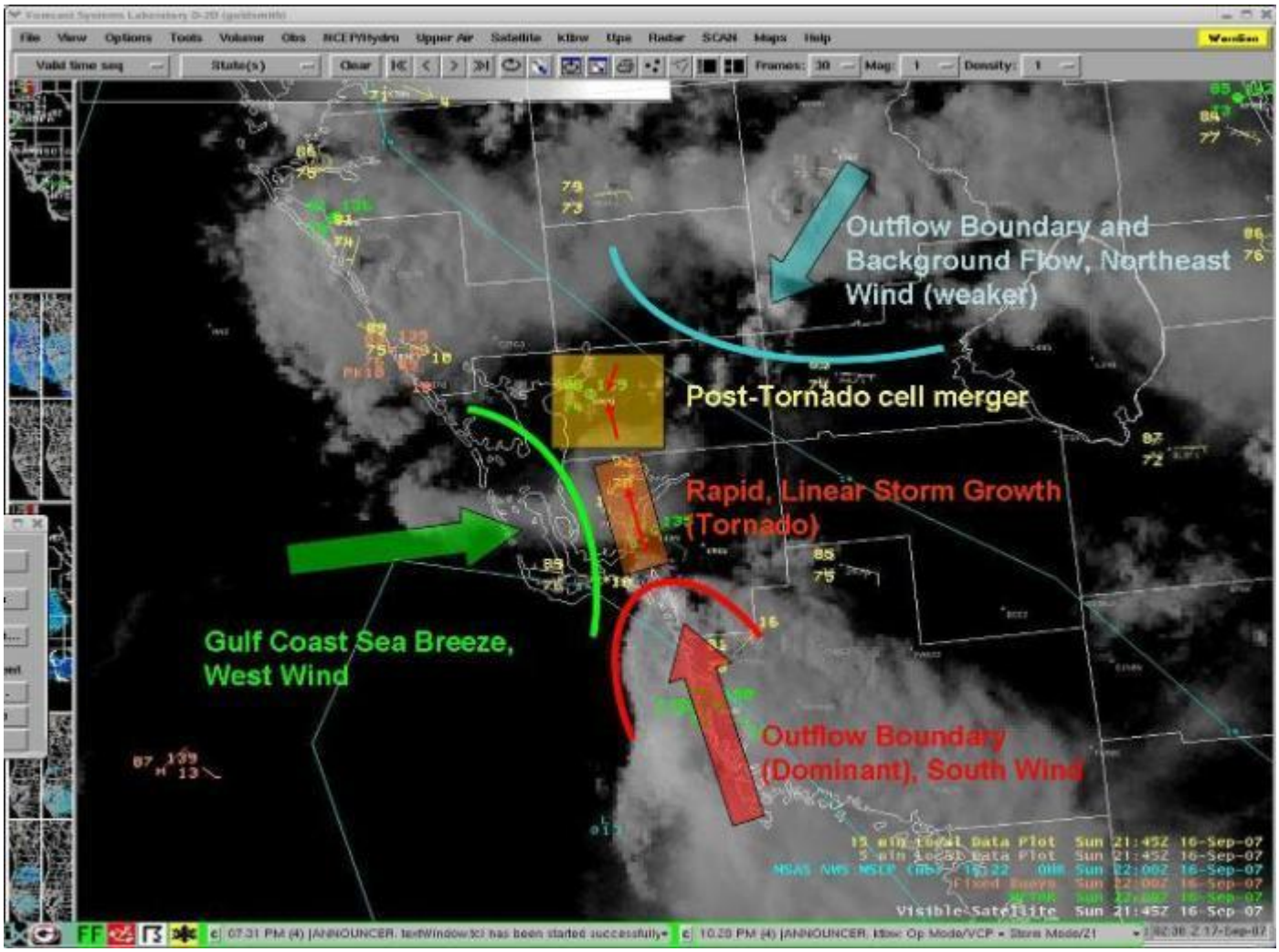

Figure #1: Satellite Image

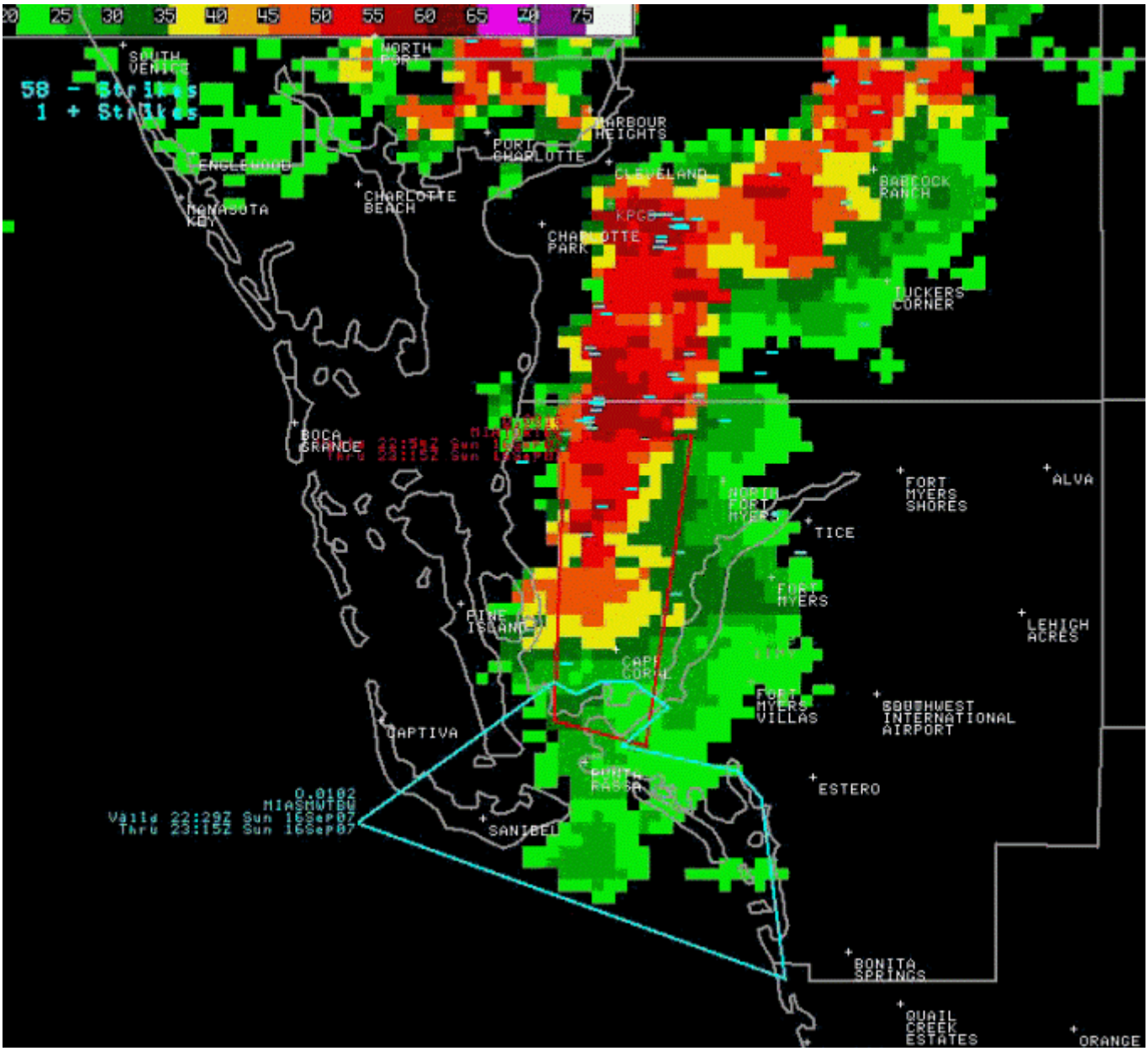

Figure #2: Composite Reflectivity Radar Loop.

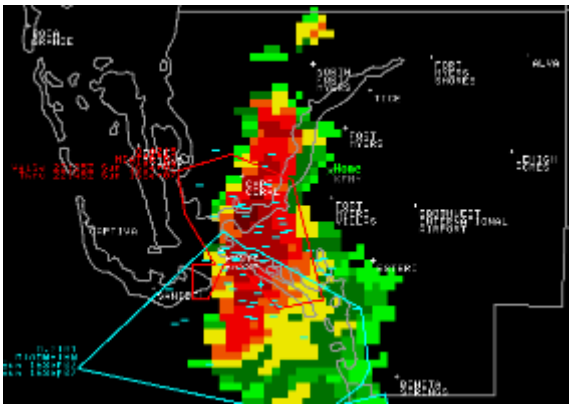

Figure #3: The radar Composite Reflectivity at 6:28 PM EDT showed rapid development northward along the sea breeze front into Cape Coral.

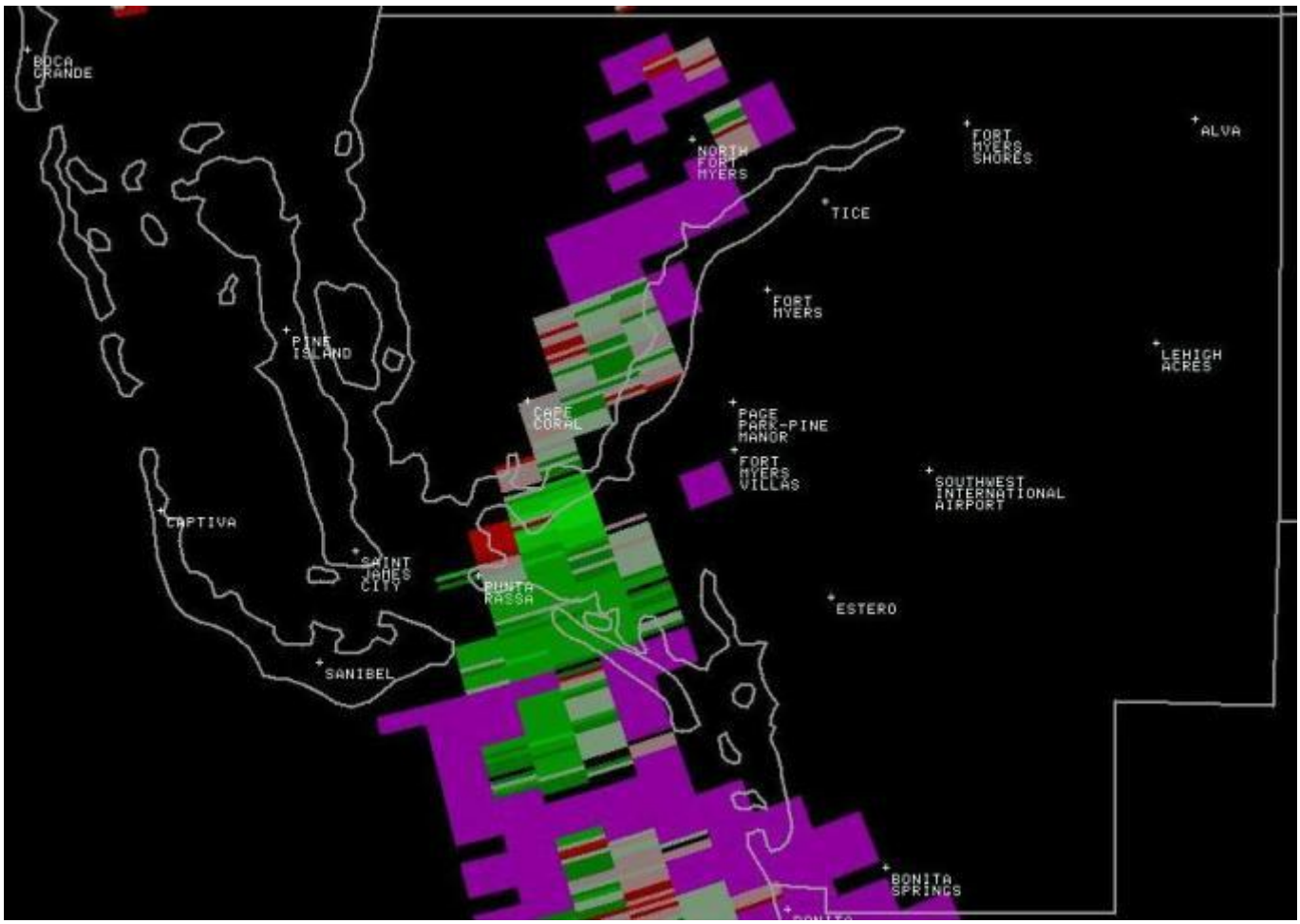

Figure #4: The Storm Relative Velocity at 6:23 PM EDT showed 44 knots of rotation around 7,000 feet just before touch down in southwest Cape Coral at 6:33 PM.

Cape Coral Tornado Damage