

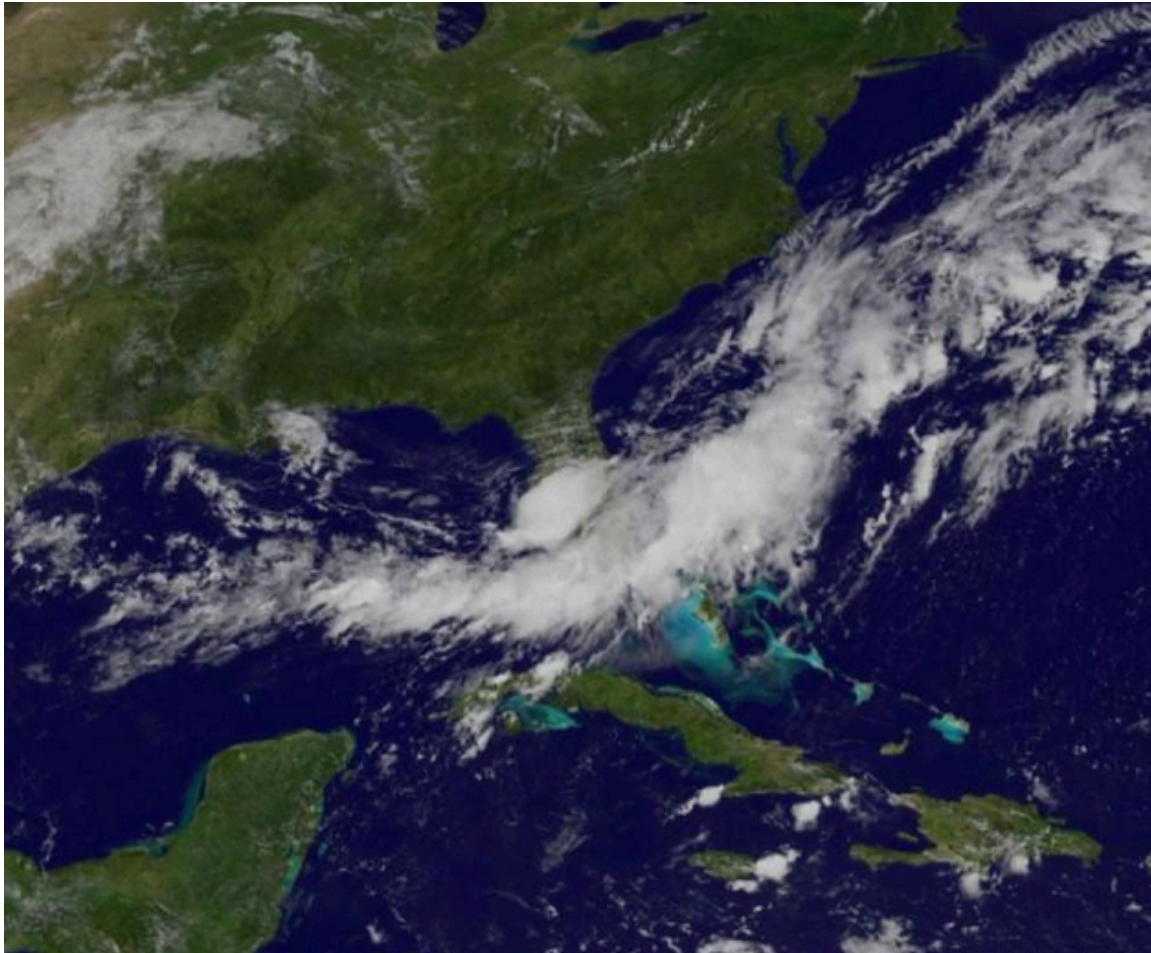
Tropical Storm Emily – A Fast-Developing, Ultimately Weak Tropical Cyclone

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GOES visible-satellite imagery of Tropical Storm Emily. Courtesy: National Oceanic and Atmospheric Administration

Introduction

At approximately 11:00 AM EDT on 31 July 2017, Tropical Storm Emily made landfall on Anna Maria Island, which is located near the entrance to the Tampa Bay, off shore from Bradenton in Manatee County. This landfall was the first one on Florida coastline in the 2017 Atlantic hurricane season, which officially commenced on 1 June.

Emily is noted for its fast development during nighttime off shore a heavily populated region. (The Tampa Bay region is Florida's second-most-populous metropolitan area.) Had Emily ultimately been a stronger storm, this scenario could have proven very dangerous and underscores the need for preparation. As Emily lacked a high level of organization, its main impacts were a minimal

storm surge along a portion of the western coast of the peninsula, moderately strong winds and some minor damage, a soaking rainfall that brought widespread but mostly minor urban flooding, and one weak tornado.

Development and Evolution

Around 29 July, a cold front stalled over the northern Gulf of Mexico and southeastern United States. Only infrequently do cold fronts advance so far south during summer. A center of cold-core low pressure formed along the front just south of the Florida panhandle on the 30th, and it drifted southeastward parallel to the front, settling just west of the Tampa Bay.

The low-pressure center organized rapidly during the night of the 30th into a warm-core entity. By 5:00 AM EDT on the 31st, having a defined circulation, the entity was christened by forecasters at the National Hurricane Center (NHC) as Tropical Depression No. 6. Within just another two hours, at 7:00 AM EDT, forecasters at the NHC christened the tropical cyclone as Tropical Storm Emily. At this time, it boasted maximum strength, with sustained winds of 45 miles per hour and a minimum pressure of 29.70 in Hg (1005 mb). At 11:00 AM EDT, Emily made landfall on Anna Maria Island, Manatee County, at the mouth of the Tampa Bay just off shore of the mainland city of Bradenton. After landfall, the center of the cyclone moved in a generally eastward and later northeastward direction across the peninsula. Effective with the 5:00 PM EDT NHC Public Advisory later that day, the cyclone was downgraded in strength to tropical depression. At this time, the center of the cyclone was near the west-to-east mid-point of the peninsula, in the vicinity of Polk County. In the pre-dawn hours of 1 August, the center of the cyclone moved off the eastern shore of the peninsula in Brevard County.

Impacts

Mainland impacts from Emily were generally minor, commensurate with its strength. As a means of organizing response efforts, Governor Rick Scott declared a State of Emergency in 31 counties.

A small storm surge was observed along the central and south western coast. The amount of beach erosion is unknown but was likely minimal. The following table lists storm-surge and maximum tide heights for select gauges.

Gauge Location	County	Storm Surge Height (feet)	Maximum Tide (feet)
Clearwater Beach	Pinellas	1.22	1.61
Saint Petersburg	Pinellas	1.14	1.68
Port Manatee	Manatee	1.12	1.41
McKay Bay Entrance	Hillsborough	1.45	1.83
Fort Myers	Lee	1.41	1.55

Wind gusts reached the tropical-storm threshold (39 miles per hour) at several locations, especially in west-central and southwest Florida and in the

vicinity of Miami. These gusts were largely limited to coastal and near-coastal locales. At the height of the storm, 18,000 customers had no electric service. Several reports of minor damage to vulnerable structures, mainly from Tampa southward to Fort Myers and Naples, were logged. Following is a table listing wind gusts by station that exceeded the 39-miles-per-hour threshold.

Location	County	Network	Wind Gust (miles per hour)
5 ESE Ft. DeSoto Park, Skyway Fishing Pier	Pinellas	Wxflow Mesonet, station XSKY	57
Sarasota- Bradenton Int'l Airport	Sarasota	ASOS	43
Marco Island, Marriott Beach Resort	Collier	WeatherBug Mesonet, station MRCSL	48
8 SSE Key Biscayne, Fowey Rocks	Miami-Dade	C-MAN, station FWYF1	45 (near surface); 64 (144-ft. elevation)
Winter Haven Airport	Polk	ASOS	44
1 S Marco Island, Charter Club of Marco Beach	Collier	WeatherBug Mesonet, station MRCSC	44
1 S Virginia Key, University of Florida RSMAS campus	Miami-Dade	WeatherStem Mesonet	43
6 E Buckhead Ridge	Glades	South Fla. Water Mgmt. Dist. Mesonet, station L001	42
1 SSE Cedar Key	Levy	Mesonet station CKYF1	41
2 ESE Fla. Int'l Univ., Miami-Dade	Miami-Dade	WeatherBug Mesonet, station	40

Fire Stn. No. 21		MDFR4	
Treasure Coast Int'l Airport	St. Lucie	ASOS	40
10 ESE Fort Drum	St. Lucie	Mesonet site	40
1 WSW Naples, Bay View Dental Arts	Collier	WeatherBug Mesonet	40
St. Petersburg Whitted Airport	Pinellas	ASOS	39
3 WNW Cape Canaveral	Brevard	USAF tower	39
3 SW Key Biscayne	Miami-Dade	Wxflow Mesonet, station XKBS	39
1 W Pelican Beach, Naples Grande Beach Resort	Collier	Mesonet, station NPLSR	39

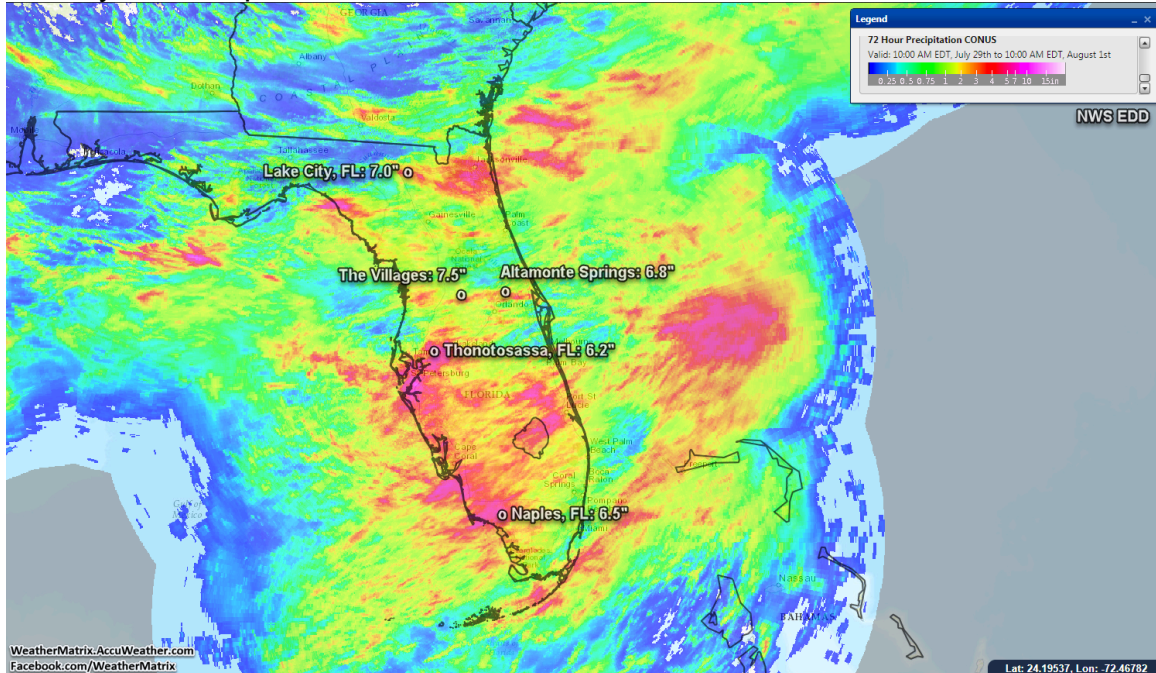
Rainfall totals were mostly moderate, with isolated to scattered higher totals. Urban flooding was widespread during the height of the storm on 31 July, forcing numerous road closures. The following table lists storm rainfall totals (spanning 48 hours, from approximately 7:00 AM EDT on 30 July to approximately 7:00 AM EDT on 1 August) exceeding 4.00 inches, limited to central and south Florida. It is noted that a zone of high rainfall totals existed in northeast Florida during this same period, but not all that rainfall is necessarily directly attributable to Emily. During the daytime hours on 1 August, high rainfall totals were registered in the Miami area, causing flooding. Moisture attributable to Emily's outer circulation likely contributed to those high totals, but, again, not all that rainfall is necessarily attributable to Emily.

Station Location/Name	County	Storm-Total Rainfall (inches)	Observation Network
Naples 9.0 NE	Collier	7.19	CoCoRaHS
Valrico 2.2 SE	Hillsborough	6.79	CoCoRaHS
Palmetto 6.4 ENE	Manatee	6.6	CoCoRaHS
South Pasadena 0.6 E	Pinellas	6.18	CoCoRaHS
Lakeland 5.3 WNW	Polk	6.17	CoCoRaHS
Fort Myers International Airport	Lee	6.12	ASOS

Riverview 4.4 SSW	Hillsborough	6.01	CoCoRaHS
Gulfport 0.9 NNW	Pinellas	5.95	CoCoRaHS
Bradenton 3.5 WNW	Manatee	5.79	CoCoRaHS
Valrico 1.1 SE	Hillsborough	5.7	CoCoRaHS
Geneva 5 ESE	Seminole	5.55	USGS
South Pasadena 1.0 NE	Pinellas	5.46	CoCoRaHS
Riverview 4.8 SSW	Hillsborough	5.36	CoCoRaHS
Lakeland 8.7 SW	Polk	5.24	CoCoRaHS
St. Petersburg 3.2 NNW	Pinellas	5.12	CoCoRaHS
St. Petersburg 4.5 NW	Pinellas	5.08	CoCoRaHS
Marco Island	Collier	5.06	NWS COOP
St. Petersburg 1.6 WNW	Pinellas	5.01	CoCoRaHS
Lakeland 6.9 SW	Polk	5	CoCoRaHS
Port Charlotte 6.2 W	Charlotte	4.97	CoCoRaHS
Naples Park 3.7 ENE	Collier	4.94	CoCoRaHS
Naples 6.7 NE	Collier	4.75	CoCoRaHS
St. Petersburg Whitted Airport	Pinellas	4.72	ASOS
St. Petersburg 2.4 NW	Pinellas	4.71	CoCoRaHS
Ruskin 1.8 ESE	Hillsborough	4.65	CoCoRaHS
Sun City Center 1.0 NE	Hillsborough	4.64	CoCoRaHS
Okeechobee 18.0 NNW	Okeechobee	4.6	CoCoRaHS
Ruskin 1.6 ESE	Hillsborough	4.52	CoCoRaHS
Bradenton 10.8 SE	Manatee	4.46	CoCoRaHS
Sun City Center 0.4 S	Hillsborough	4.45	CoCoRaHS
Apopka 2.9 E	Orange	4.33	CoCoRaHS
Bonita Springs 3.1 NW	Lee	4.32	CoCoRaHS
Riverview 0.9 ENE	Hillsborough	4.3	CoCoRaHS
Tampa 5.0 NNE	Hillsborough	4.27	CoCoRaHS
Ellenton 6.6 E	Manatee	4.23	CoCoRaHS
Tampa 5.1 S	Hillsborough	4.21	CoCoRaHS
St. Petersburg 4.6 N	Pinellas	4.17	CoCoRaHS
Bradenton 11.0 E	Manatee	4.13	CoCoRaHS
Miles City	Collier	4.04	South Fla. Water Mgmt. Dist.
Sanford 1.9 WNW	Seminole	4.01	CoCoRaHS

The image below maps multi-sensor estimates of *approximate* storm-total rainfall from Emily. The highest totals occurred in the immediate Tampa Bay region,

northeast of Lake Okeechobee, and along and near the southwestern coast from Fort Myers to Naples.



Tropical Storm Emily was responsible for the occurrence of one tornado. It touched down around 10:55 AM, approximately two miles north-northeast of Cortez, a section of Bradenton, in Manatee County, near the landfall point. Its path was 1.3 miles long, and width of the path was 100 yards. Damages – including the destruction of two barns, multiple greenhouses, and an engineered wall -- were estimated at \$96,000. It was rated EF-0 on the Enhanced Fujita Scale.

Supplemental Links

The Tampa Bay National Weather Service Weather Forecast Office (WFO) published a post-storm summary:

<https://forecast.weather.gov/product.php?site=NWS&issuedby=TBW&product=P SH&glossary=1>

Weather Underground posted a gallery of photos of the storm on its Web site:

<https://www.wunderground.com/hurricane/atlantic/2017/tropical-storm-emily>

State Climatologist David Zierden discussed the potential dangers behind Emily's fast, surprise development at night near a heavily urbanized region:

<http://www.tampabay.com/news/weather/emilys-surprise-ingredients-were-there-for-quick-forming-tropical-storm/2332098>

Brian McNoldy of the Rosenstiel School of Marine and Atmospheric Science at the University of Miami has archived radar imagery of Emily on his Web site:

http://andrew.rsmas.miami.edu/bmcnoldy/tropics/emily17/Emily_31Jul17_TBW.gif