

= Tropical Storm Keith (1988) =

Tropical Storm Keith was the eleventh Atlantic tropical cyclone of the 1988 Atlantic hurricane season . It struck the Continental United States later in the calendar year than any since the 1925 Atlantic hurricane season . Keith developed out of a tropical wave in the Caribbean Sea on November 17 . It tracked northwestward , and under generally favorable conditions , it reached a peak intensity of 70 mph (110 km / h) shortly before striking the northeastern tip of the Yucatán Peninsula . It turned northeastward in the Gulf of Mexico , and made landfall near Sarasota , Florida , on November 23 . Keith accelerated its forward motion under the influence of a cold front , and became extratropical near Bermuda on November 24 . The extratropical remnant persisted for two more days .

Early in its duration , Keith produced moderate to heavy rainfall in Honduras , Jamaica , and Cuba . Minimal damage was reported in Mexico , which was still recovering from the effects of Hurricane Gilbert two months prior . Keith , the last of four named tropical cyclones to hit the United States during the season , produced moderate rainfall , rough storm surge , and gusty winds across central Florida . Overall damage was fairly minor but widespread , totaling \$ 7 @. @ 3 million (1988 USD ; \$ 14 @. @ 6 million 2016 USD) . Near the coast of Florida , damage occurred mainly from storm surge and beach erosion . Further inland there were floods , downed trees and power lines . No fatalities were reported .

= = Meteorological history = =

A tropical wave moved off the coast of Africa on November 5 . It tracked steadily west across the tropical Atlantic Ocean . Its forward motion slowed after it passed the Lesser Antilles on November 12 . A large well @-@ defined anticyclone persisted across much of the Caribbean Sea , providing a favorable environment for the system . A low @-@ level circulation gradually became evident on satellite imagery within the disturbance . Based on ship observations , the National Hurricane Center estimated that the system organized into a tropical depression on November 17 , about 280 miles (450 km) south of the western tip of Haiti .

Initially , the depression was disorganized as it continued west ; on November 18 the center became exposed from the area of deep convection . However , the upper @-@ level environment gradually became more favorable for further development , and deep convection , or thunderstorm activity , developed closer to the center . An eastward @-@ moving upper @-@ level trough in the Gulf of Mexico turned the depression northwest . The next day , the depression intensified into a tropical storm while a short distance north of Honduras , receiving the name Keith . It quickly intensified , and on November 21 the storm reached its peak strength of 985 mbar (29 @. @ 09 inHg) with winds of 70 mph (110 km / h) . The trough , which turned Keith northwestward , rapidly accelerated northeastward ; as a result , the storm moved slowly northwest until making landfall on the northeast tip of the Yucatán Peninsula at 0800 UTC on November 21 , at an intensity slightly below hurricane status .

After briefly moving over land , Keith turned north under the influence of a trailing frontal trough . The storm became disorganized while recurving northeast because of increased vertical wind shear and the presence of cool dry air from its north . On November 23 , Keith made landfall near Sarasota , Florida , with winds of 65 mph (100 km / h) , while most of its convection was well to the north of the center . Its landfall was the second latest on record for the Continental United States , only behind a hurricane in the 1925 season . The storm quickly weakened as it crossed Florida , and within hours the winds dropped to 40 mph (65 km / h) . Reaching the Atlantic Ocean eight hours after moving ashore , Keith began to gradually re @-@ intensify , and under the influence of a very large upper @-@ level low pressure area over Newfoundland , the storm accelerated northeast . On November 24 , the storm again reached its peak intensity of 70 mph (110 km / h) , shortly before becoming an extratropical cyclone near Bermuda . Keith restrengthened and deepened into a powerful extratropical cyclone , attaining hurricane @-@ force winds and a minimum pressure of 945 mbar (27 @. @ 92 inHg) . The extratropical storm turned westward and was last observed on

November 26 northeast of Newfoundland .

= = Preparations = =

On November 20 , shortly before the tropical depression intensified into a tropical storm , the government of Honduras issued a tropical storm warning for the Swan Islands , along with a tropical storm watch for the northwestern Honduran coastline . The advisories were discontinued within 10 hours of Keith 's passage through the region . The government of Belize briefly declared a tropical storm watch for the whole coastline of the country , but when it became clear that Keith posed little threat , the watch was canceled . About 16 hours before the storm made landfall on the Yucatán Peninsula , the government of Mexico issued a tropical storm watch for much of the coastline of Quintana Roo . Six hours later , a tropical storm warning replaced the watch , and it was extended west to Progreso , Yucatán ; a hurricane watch was also posted . Cuban officials issued a bulletin on the night of November 20 , advising that tropical storm conditions would spread over the west part of Cuba . A subsequent bulletin indicated the possibility for hurricane conditions , but as the storm continued further to the northwest , the threat diminished .

Two days before the storm struck Florida , emergency management workers began working to prepare for its onslaught . The next day , the water levels in five lakes in Hillsborough County were decreased as a precaution . Residents prepared sandbags to prevent flooding along coastal areas , while boat owners worked to secure their boats . Some tourists near the southwest Florida coast left for areas further inland , though many stayed despite the storm . Red Cross officials opened six emergency shelters . Additionally , police departments in Clearwater , Indian Shores , and Largo expanded their workforce to handle storm @-@ related problems . The storm resulted in the closure of some private schools as well as the Hillsborough Community College . About 21 hours before Keith made its final landfall , the National Hurricane Center issued a tropical storm warning along the Florida west coast from Cape Sable to Cedar Key . The next day , a tropical storm warning was posted from Jupiter , Florida , north to Savannah , Georgia . A tropical storm warning was briefly issued for Bermuda , as well .

= = Impact = =

Keith dropped around 3 inches (75 mm) of rainfall along the northern coast of Honduras , and totals of around 10 inches (250 mm) were reported on offshore islands . As the storm was making landfall on Mexico , a ship just west of Cozumel reported wind gusts of 90 mph (149 km / h) , while a second ship in Puerto Morelos , Quintana Roo , recorded sustained winds of 70 mph (110 km / h) . Reports from Cozumel indicated torrential rainfall and a large number of lightning strikes during the period of highest winds . Rainfall peaked at 7 @.@ 69 inches (195 mm) just south of Cancún . Still recovering from the effects of Hurricane Gilbert two months prior , the Yucatán Peninsula received only minor damage as a result of Keith . The storm triggered flooding in western Cuba that severely damaged tobacco and vegetable crops . Officials forced 2 @,@ 500 residents to evacuate their homes due to the flooding . The storm also dropped nearly 4 inches (100 mm) of precipitation in Kingston , Jamaica .

Off the coast of Florida , a freighter and its crew of ten were stranded after the storm flooded its engine room . The cyclone produced a moderately strong storm surge in isolated locations along the southwest coast of Florida , peaking at 5 @.@ 94 feet (1 @.@ 81 m) at Bradenton and Fort Myers Beach . The combination of storm surge and waves severely eroded beaches along Charlotte Harbor and Estero Bay . In Naples , strong waves destroyed the western end of the Naples Pier where several boats were washed ashore . Heavy precipitation fell to the north of the center , peaking at 10 @.@ 27 inches (260 mm) in Saint Leo . Sustained winds peaked at 63 mph (101 km / h) at the MacDill Air Force Base , with stronger gusts . Inland from the immediate coastline , damage was mostly limited to isolated fresh @-@ water flooding , downed trees , and power outages ; overall damage was widespread but fairly light , and six structures were destroyed across the state . Before moving ashore , Keith spawned two tornadoes , one of which damaged

approximately 30 mobile homes in Clermont . In Lakeland , a washed out track derailed a 34 @-@ car train , which broke a natural gas line and forced 450 people to evacuate . In Lee County , damage totaled \$ 1 @.@ 5 million (1988 USD ; \$ 3 million 2016 USD) , and in Pinellas County the storm caused about \$ 5 @.@ 8 million in damage (1988 USD ; \$ 11 @.@ 6 million 2016 USD) .

A light storm surge of 1 to 2 feet (0 @.@ 3 to 0 @.@ 6 m) was reported along the northeast Florida coast into southeastern Georgia . The storm 's outer rainbands dropped light rainfall of around 1 inch (25 mm) across coastal Florida , northward to North Carolina . A station on Bermuda reported sustained winds of 47 mph (76 km / h) , with gusts to 78 mph (126 km / h) . Only light damage occurred on the island .