

= Hurricane Nadine (2012) =

Hurricane Nadine was the fourth longest @-@ lived Atlantic hurricane on record . The fourteenth tropical cyclone and named storm of the 2012 Atlantic hurricane season , Nadine developed from a tropical wave west of Cape Verde on September 10 . By the following day , it had strengthened into Tropical Storm Nadine . After initially tracking northwestward , Nadine turned northward , well away from any landmass . Early on September 15 , Nadine reached hurricane status as it was curving eastward . Thereafter , an increase in vertical wind shear weakened Nadine back to a tropical storm by September 16 . On the following day , the storm began moving northeastward and threatened the Azores ; by late on September 19 , however , Nadine veered east @-@ southeastward before reaching the islands . Nonetheless , the storm produced tropical storm force winds on a few islands . On September 21 , the storm curved south @-@ southeastward while located south of the Azores . Later that day , Nadine transitioned into a non @-@ tropical low pressure area .

Due to favorable conditions , the remnants of Nadine regenerated into a tropical cyclone on September 24 . After re @-@ developing , the storm executed a cyclonic loop and meandered slowly across the eastern Atlantic . Eventually , Nadine turned south @-@ southwestward , at which time it became nearly stationary . By September 28 , the storm curved northwestward and re @-@ strengthened into a hurricane . The tenacious cyclone intensified further and peaked with winds of 90 mph (150 km / h) on September 30 . By the following day , however , Nadine weakened back to a 65 mph (105 km / h) tropical storm , as conditions became increasingly unfavorable . Strong wind shear and decreasing sea surface temperatures significantly weakened the storm . Nadine transitioned into an extratropical cyclone on October 3 , shortly before merging with an approaching cold front northeast of the Azores . The remnants of Nadine passed through the Azores on October 4 and again brought relatively strong winds to the islands .

= = Meteorological history = =

= = = Origins = = =

A large tropical wave emerged into the Atlantic Ocean from the west coast of Africa on September 7 . The system passed south of Cape Verde on September 8 , with disorganized showers and thunderstorms . Around that time , the National Hurricane Center gave the system a medium chance of tropical cyclogenesis within 48 hours . A low pressure area developed along the axis of the tropical wave on September 9 , which caused convective activity to increase further . The system was assessed with a high chance for tropical cyclone formation on September 10 . Based on satellite intensity estimates , the National Hurricane Center declared the disturbance as Tropical Depression Fourteen at 1200 UTC on September 10 , while located about 885 miles (1 @, @ 425 km) west of Cape Verde .

Although thunderstorm activity was initially minimal around the center of circulation , convective band associated with the depression was becoming more organized . Late on September 10 , convection began to increase slightly near the center , though because Dvorak intensity T @-@ numbers were between 2 @.@ 0 and 2 @.@ 5 , the depression was not upgraded to a tropical storm . However , dry air briefly caused showers and thunderstorms to decrease later that day . Initially , it headed just north of due west around the southern periphery of a large subtropical ridge . However , by September 11 , the depression re @-@ curved northwestward . Later that day , the depression began to regain deep convection . Geostationary satellite imagery and scatterometer data indicated that the depression strengthened into Tropical Storm Nadine at 0000 UTC on September 12 .

= = = Strengthening and initial peak intensity = = =

By September 12 , a central dense overcast developed and due to favorable conditions , the

National Hurricane Center noted the possibility of rapid deepening . Intensification continued at a quicker albeit less than rapid rate on September 12 . Later that day , sustained winds reached 65 mph (105 km / h) . By early on September 13 , convective banding wrapped almost completely around the center and cloud tops reached temperatures as low as ? 112 ° F (? 80 ° C) . However , because microwave satellite data could not determine if an eye had developed , Nadine 's intensity was held at 70 mph (110 km / h) ? just below the threshold of hurricane status . The National Hurricane Center noted that " the window for Nadine to strengthen may be closing " , citing computer model consensus of an increase in wind shear and little change in structure . The storm then began experiencing moderate southwesterly wind shear on September 13 , generated by a mid- to upper @-@ level trough and a shear axis located a few hundred miles to the west of Nadine . As a result , the storm struggled to develop an eye and the center became more difficult to locate .

Although the storm was disorganized , a scatterometer pass indicated tropical storm force winds extended outward up to 230 miles (370 km) . The satellite appearance of Nadine became more ragged by September 14 . Despite this , the storm remained just below hurricane status , and the National Hurricane Center noted the possibility of intensification if wind shear were to decrease within the next few days . Nadine turned northward on September 14 as it tracked along the periphery of a subtropical ridge . Shortly thereafter , a Tropical Rainfall Measuring Mission (TRMM) pass indicated that core convection began re @-@ organizing . However , because wind shear displaced the mid @-@ level circulation to the north of the low @-@ level circulation , Nadine was not upgraded to a hurricane . Because Nadine would approach colder sea surface temperatures , significant strengthening was considered unlikely . Due to an increase in satellite intensity estimates and re @-@ organization , Nadine was upgraded to a hurricane at 1800 UTC on September 14 . Six hours later , Nadine reached an initial peak intensity with winds of 80 mph (130 km / h) . Satellite imagery indicated that a ragged eye feature was attempting to develop late on September 15 .

= = = Weakening and initial post @-@ tropical transition = = =

Late on September 15 , National Hurricane Center forecaster Robbie Berg noted that Nadine began " to look a little more ragged " , as microwave data observations noted shearing of deep convection to the northeast of the center . Late on September 16 , the eye became tilted and disappeared , convective bands began disorganizing , and the overall shower and thunderstorms activity waned since early that day . Nadine weakened back to a tropical storm on September 17 . Additionally , a trough in the area caused Nadine to acquire a less tropical satellite appearance on September 17 .

Dry air began impacting Nadine on September 17 , though outflow from the storm prevented significant weakening . Despite a large flare of deep convection over the northern semicircle , Nadine weakened slightly later that day . Further weakening occurred on the following day , after the burst in deep convection on September 17 deteriorated . Later on September 18 , most of the deep convection dissipated , with the strongest of the remaining shower and thunderstorm activity being located within a band located west and northwest of the center .

Nadine threatened the Azores while moving northeastward and then northward between September 18 and September 19 , though a blocking ridge prevented the storm from approaching further toward the islands . Its closest approach to the Azores was about 150 miles (240 km) south @-@ southwest of Flores Island on September 19 . The storm then re @-@ curved east @-@ southeastward on September 20 , after the ridge weakened and the mid- to upper @-@ level trough deepened . By late on September 21 , much of the remaining deep convection was composed of only a ragged convective band with warming cloud tops . Operationally , the National Hurricane Center re @-@ classified Nadine as a subtropical storm at 2100 UTC on September 21 , mainly because it had a larger than average and asymmetrical wind field , as well as the development of an upper @-@ level low pressure area near the center . However , post @-@ season analysis concluded that Nadine degenerated into a non @-@ tropical low pressure area three hours earlier .

= = = Regeneration , peak intensity , and demise = = =

Early on September 22 , the National Hurricane Center noted that regeneration into a tropical cyclone was a distinct possibility . The remnant low pressure area soon moved over warmer seas and a low @-@ shear environment , causing deep convection to re @-@ develop . Thus , Nadine regenerated back into a tropical storm at 0000 UTC on September 23 . Another blocking ridge over the Azores forced Nadine to move west @-@ northwestward on September 24 , causing it to execute a small cyclonic loop . Although winds increased to 60 mph (95 km / h) , the storm weakened again and decreased to a 45 mph (72 km / h) tropical storm on September 25 . Despite this , satellite imagery indicated that Nadine developed an eye @-@ like feature . However , the National Hurricane Center later noted that it was a cloud @-@ free region near the center of the storm . By September 26 , Nadine curved south @-@ southwestward to southwestward around the southeastern portion of a mid- to upper @-@ level ridge located over the western Atlantic .

After minimal change in strength for several days , Nadine finally began to intensify on September 27 , due to sea surface temperatures warmer than 79 ° F (26 ° C) . At 1200 UTC on September 28 , Nadine re @-@ strengthened into a Category 1 hurricane on the Saffir ? Simpson hurricane wind scale . Around the time , satellite imagery indicated that the storm re @-@ developed an eye feature . After becoming disorganized , the National Hurricane Center erroneously downgraded Nadine to a tropical storm on September 29 , before upgrading it to a hurricane again six hours later . Nadine had actually remained a hurricane and was intensifying further . Winds increased to 85 mph (140 km / h) on September 30 , after the eye became more distinct . At 1200 UTC , the storm attained its peak intensity with maximum sustained winds of 90 mph (150 km / h) and a minimum barometric pressure of 978 mbar (28 @. @ 9 inHg) .

After peak intensity , Nadine began weakening once again and deteriorated to a tropical storm at 1200 UTC , on October 1 . Northwesterly winds began to increase on October 3 , after an upper @-@ level trough that was causing low wind shear moved eastward . A few hours later , the low @-@ level center became partially exposed , before becoming fully separated from the convection by 1500 UTC . Due to strong wind shear and cold sea surface temperatures , showers and thunderstorms rapidly diminished , and by late on October 3 , Nadine became devoid of any deep convection . At 0000 UTC on October 4 , Nadine transitioned into an extratropical low @-@ pressure area , while located about 195 miles (315 km) southwest of the central Azores . The low rapidly moved northeastward , degenerated into a trough of low pressure , and was absorbed by a cold front later that day .

= = Impact and records = =

Tropical cyclone warnings and watches were issued on two separate occasions as Nadine approached the Azores . At 1000 UTC on September 18 , a tropical storm watch was issued for the islands of Flores and Corvo . Although the tropical storm watch was discontinued at 2100 UTC , a tropical storm warning was implemented at that time for the islands of Corvo , Faial , Flores , Graciosa , Pico , São Jorge , and Terceira . At 1500 UTC on September 19 , a tropical storm warning was also issued for São Miguel and Santa Maria . All watches and warnings were discontinued by late on September 21 . After re @-@ generating , Nadine posed a threat to the Azores again , and thus , a tropical storm watch was issued for the entire archipelago at 1500 UTC on October 1 . Nine hours later , 0000 UTC on the following day , the watch was upgraded to a tropical storm warning . After Nadine became extratropical , the warning was discontinued . On the storm 's second approach toward the Azores , schools were closed and flight were cancelled .

Late on September 20 , Flores reported a wind gust of 46 mph (74 km / h) . A sustained wind speed of 62 mph (100 km / h) and a gust up to 81 mph (130 km / h) were reported at Horta on the island of Faial , as Nadine passed to the south on September 21 . During the second Azores impact on October 4 , the highest sustained wind speed reported was 38 mph (61 km / h) on São Miguel , while the strongest gust was 87 mph (140 km / h) at the Wind Power Plant on Santa Maria . On Pico Island , the pavement of the sports hall of the primary and secondary school in Lajes do Pico was destroyed . The remnants of Nadine produced a plume of moisture that dropped heavy rainfall over the United Kingdom , particularly in England and Wales , reaching 5 @. @ 12 in (130 mm) at

Ravensworth in the former . The rains flooded houses and disrupted roads and rails .

Nadine lasted a total of 24 days as a tropical , subtropical and post @-@ tropical cyclone , including 22 @.@ 25 days as a tropical system . This makes it the fourth longest @-@ lasting Atlantic tropical cyclone on record , only behind the 1899 San Ciriaco hurricane at 28 days , Hurricane Ginger in 1971 at 27 @.@ 25 days , and Hurricane Inga in 1969 at 24 @.@ 75 days . When only counting time spent as a tropical storm or hurricane ? 20 @.@ 75 days ? Nadine is the third longest @-@ lasting , behind only Hurricane Ginger in 1971 and the 1899 San Ciriaco hurricane . When Nadine was upgraded to a hurricane at 1800 UTC on September 14 , it marked the third @-@ earliest forming eighth hurricane , behind only an unnamed system in 1893 and Ophelia in 2005 .