

= 1998 ? 99 South @-@ West Indian Ocean cyclone season =

The 1998 ? 99 South @-@ West Indian Ocean cyclone season was a quiet season that had the fourth @-@ lowest number of days with tropical storm or tropical cyclone activity . Most of the storms formed either in the Mozambique Channel or in the far eastern portion of the basin , with five storms crossing from the adjacent Australian basin east of 90 ° E. As a result , few storms impacted Madagascar , and none made landfall on the African continent . Throughout most of the season , there was below @-@ normal sea surface temperatures in the Indian Ocean east of Madagascar . In February , typically the peak in activity , Réunion island recorded its highest average monthly pressure since 1953 . Due to generally unfavorable conditions , there were only six tropical storms tracked by the Météo @-@ France office (MFR) on Réunion . There were only two tropical cyclones ? a storm with winds of at least 120 km / h (75 mph) .

Activity began late , with the first tropical storm ? Alda ? forming on January 16 , the third latest ever recorded at the time . Alda formed in the Mozambique Channel , which was one of few favorable areas for tropical cyclogenesis in the season . It brought rainfall to southwestern Madagascar that alleviated previously dry conditions . The next five tropical storms either originated or crossed into the adjacent Australian basin , where storms were monitored by the Bureau of Meteorology (BoM) . Both Tropical Storm Chikita and Tropical Cyclone Davina brought beneficial rainfall to the Mascarene Islands . The latter storm caused two drowning deaths on Réunion and caused some crop damage . The strongest storm ? Evrina ? peaked as a strong cyclone in the Australian but weakened upon crossing 90 ° E , with 10 @-@ minute maximum sustained winds of 175 km / h (110 mph) in the basin . The final storm was unnamed , crossing from the Australian basin on April 21 as a minimal tropical storm before quickly dissipating . There were also several tropical disturbances or depressions , many short @-@ lived . The first of these formed on September 3 in the northeastern portion of the basin , and there was a tropical depression in February in the Mozambique Channel that approached tropical storm status .

= = Season summary = =

The Météo @-@ France office (MFR) on Réunion island issued warnings in tropical cyclones within the basin during the season . The agency estimated intensity through the Dvorak technique , and warned on tropical cyclones in the region from the coast of Africa to 90 ° E , south of the equator . The Joint Typhoon Warning Center ? a joint United States Navy ? United States Air Force task force ? also issued tropical cyclone warnings for the region . Wind estimates from Météo @-@ France and most other basins throughout the world are sustained over 10 minutes , while estimates from the United States @-@ based Joint Typhoon Warning Center are sustained over 1 minute . 10 minute winds are about 1 @-@ 14 times the amount of 1 minute winds . Most storms formed and dissipated within the tropics , with the exception of Severe Tropical Storm Alda .

During the season , atmospheric conditions shifted from El Niño to La Niña , but despite the shift , the season was similarly inactive as its predecessor . In general , sea surface temperatures were below normal , and atmospheric pressures were above normal , both unfavorable for tropical cyclogenesis . In the month of February , on average the peak time for activity , there was a general lack of convection , or thunderstorms , east of Madagascar . The average monthly pressure on Réunion was the highest since reliable records began in 1953 . The low number of storms occurred despite an otherwise active cyclone year in the southern hemisphere . In its summary of the season , the MFR described the lack of activity as " rare and remarkable " , possibly related to a Walker circulation . The agency monitored 14 tropical disturbances , of which only eight were tropical depressions for at least 24 hours . Six of these intensified into tropical storms , three less than the average of nine , of which only two attained tropical cyclone status , or half the average . There were 28 days in which there was storm or tropical cyclone activity , less than the average of 42 and at the time the fourth lowest since reliable record @-@ keeping began in 1967 with the advent of satellite imagery . The only seasons with a lower number of storm days were 1982 ? 83 , 1986 ? 87 , and 1997 ? 98 .

= = Storms = =

= = = Severe Tropical Storm Alda = = =

After a subtropical depression exited the Mozambique Channel , another area of convection formed in the region on January 8 , which fluctuated in intensity for several days . A passing cold front increased convection further on January 12 , which split off a cutoff low @-@ pressure area . Two days later , a subtropical disturbance formed offshore Beira , Mozambique , classified due to the extratropical origins and lack of centralized convection . The system remained nearly stationary , with the convection extending well to the east . On January 16 , the MFR reclassified the system as a tropical depression after the thunderstorms increased near the center , the increasing organization due to moderate but decreasing wind shear . By that time , the depression had begun an eastward movement , but soon turned to the south in the weakness between two high @-@ pressure areas . Late on January 16 , the depression intensified into Tropical Storm Alda after the convection organized into a central dense overcast . Also that day , the JTWC began tracking the system as Tropical Cyclone 12S . This marked an unusually late start for the first named storm , at the time the third @-@ latest on record .

Neither the MFR nor the JTWC anticipated much strengthening after Alda attained tropical storm status . Around the time of its upgrade , Alda passed about 20 km (12 mi) west of Europa Island in the Mozambique Channel , where sustained winds reached 72 km / h (45 mph) and gusts were as strong as 90 km / h (56 mph) . A building ridge southeast of Madagascar turned the storm to the southwest . After an increase in wind shear diminished the convection , the JTWC discontinued advisories on January 17 , although the thunderstorms redeveloped following an unexpected decrease in wind shear . Alda turned to the southeast ahead of an approaching trough , and developed a ragged eye feature on January 18 . That day , the MFR estimated peak 10 @-@ minute winds of 95 km / h (60 mph) , and the JTWC estimated one @-@ minute winds of 120 km / h (75 mph) , equivalent to a minimal hurricane . The latter agency also reissued one advisory when the storm was at its peak . Alda accelerated to the southeast and gradually lost tropical characteristics , becoming extratropical on January 19 before being absorbed by the approaching cold front .

Following rainfall from an earlier subtropical depression , Alda dropped 198 mm (7 @.@ 8 in) of rainfall in Morombe in southwestern Madagascar . The rainfall caused flooding that affected thousands of people . The rainfall was beneficial in alleviating previously dry conditions that had prevented crops to be planted . The passage of the storm also caused temperatures to decrease in Mozambique and Madagascar .

= = = Moderate Tropical Storm Damien @-@ Birenda = = =

On January 21 , a tropical disturbance formed in the Australian region about 500 kilometres (310 mi) south of the Indonesian island of Java . Moving west @-@ southwestward , the system intensified into Tropical Storm Damien on January 23 , and attained tropical cyclone status two days later while passing 400 km (250 mi) south of the Cocos Islands . Subsequently , an increase in wind shear induced steady weakening , causing the circulation to be briefly exposed from the convection on January 26 . Damien maintained an area of convection nearby the circulation , and exited into the south @-@ west Indian Ocean on January 28 as a minimal tropical storm ; at that time , the Mauritius Meteorological Services renamed the storm as Birenda . The storm turned more to the west and west @-@ northwest due to a building ridge to the south . Increasing wind shear weakened Birenda to tropical depression status on January 29 and into a tropical disturbance the next day . Although convection was intermittent , the circulation dissipated on February 3 .

= = = Moderate Tropical Storm Chikita = = =

Soon after Damien @-@ Birenda exited the Australian region , another tropical disturbance formed north of the Cocos on January 29 , which was initially weak but gradually organized . The disturbance tracked quickly west @-@ westward due to a powerful ridge to the south , remaining in tandem with Tropical Storm Birenda about 1 @, @ 300 km (810 mi) to the east . On January 31 , the system crossed into the south @-@ west Indian Ocean . The fast forward motion caused the effects of wind shear to diminish as well as increase the circulation 's strength , and the depression intensified into Tropical Storm Chikita on January 31 . At that time , the storm attained its peak intensity of 65 km / h (40 mph) . Almost immediately thereafter , the convection began weakening due to lukewarm water temperatures , and Chikita weakened to tropical depression status on February 1 . Continuing rapidly to the west , the circulation became exposed from the convection on February 3 due to increased wind shear . Around that time , Chikita passed about 75 km (47 mi) north of Rodrigues island , and shortly thereafter weakened into a tropical disturbance . On the next day , the circulation passed north of both Mauritius and Réunion , presenting an asymmetric structure with the strongest winds to the south . Chikita dissipated on February 5 off the southeast coast of Madagascar .

On Rodrigues , Chikita produced wind gusts of 92 km / h (57 mph) and a rainfall total of 113 mm (4 @. @ 4 in) , the rainfall proving beneficial due to previously dry conditions . Despite only being a tropical disturbance , Chikita produced wind gusts of 89 kilometres per hour (55 mph) on Mauritius and 104 km / h (65 mph) in the mountainous peaks of Réunion . The rainfall rates in both islands varied greatly ; the peak total on Mauritius was 160 mm (6 @. @ 3 in) compared to the peak of 560 mm (22 in) in Bébouurg in the heights of Réunion . Also on the latter island , there was a six @-@ hour rainfall total of 132 mm (5 @. @ 2 in) at Piton de la Fournaise . Wet weather persisted after Chikita dissipated , resulting in four @-@ day totals of 953 mm (37 @. @ 5 in) in Bébouurg on Réunion , and easing drought conditions on Mauritius .

= = = Intense Tropical Cyclone Davina = = =

After an extended period with no activity across much of the Indian Ocean , the intertropical convergence zone (ITCZ) rebuilt toward the end of February , and spawned an area of convection on March 1 in the extreme eastern portion of the basin . The next day , a circulation was noted on satellite imagery to the northeast of the convection , which indicated that a tropical disturbance had developed . The influence of the monsoon trough steered the disturbance to the southeast into the Australian basin , where moderate wind shear prevented quick development . A building ridge to the south turned the system to the southwest , bringing it back into the south @-@ west Indian on March 3 as a tropical depression . With decreasing wind shear , the depression slowly intensified as convection increased , becoming Tropical Storm Davina on March 4 . An eye developed the next day , signaling Davina had intensified into a tropical cyclone , or reaching 10 @-@ minute winds of at least 120 km / h (75 mph) . On March 7 , Davina became an intense tropical cyclone , with sustained 10 @-@ minute winds of 165 km / h (105 mph) . At around the same time , the JTWC estimated peak 1 @-@ minute winds of 205 km / h (125 mph) .

Continuing quickly to the west @-@ southwest , Davina moved over an area of cooler waters and began weakening . On March 8 , the system passed about 140 km (87 mi) northwest of Rodrigues as a minimal tropical cyclone . The next day , Davina re @-@ intensified slightly to winds of 130 km / h (85 mph) , and while near that intensity its eyewall crossed over Mauritius . After passing the island , the eye increased to a diameter of 50 km (31 mi) before deteriorating . On March 10 , Davina passed about 35 km (22 mi) southeast of Réunion as a severe tropical storm . The next day , the storm slowed its forward motion and rapidly weakened due to increasing wind shear , becoming a tropical depression on March 12 . The circulation turned to the northeast and later to the west in the trade winds . Davina looped off the east coast of Madagascar , eventually dissipating on March 19 .

Cyclone Davina affected Rodrigues as a weakening storm , which limited wind gusts to 137 km / h (85 mph) and rainfall to only 40 mm (1 @. @ 6 in) . After moving toward Mauritius for several days ,

the cyclone produced a peak wave height of 7 @. @ 73 m (25 @. @ 4 ft) . On the island , the airport at Plaisance recorded a peak gust of 169 km / h (105 mph) , strong enough to cause crop damage and injure 60 people . Rainfall peaked at 227 mm (8 @. @ 9 in) , which failed to break the island 's worst drought since 1904 . On Réunion , wind gusts also peaked at 169 km / h (105 mph) at Piton Sainte @- @ Rose . Davina produced wave heights of 8 @. @ 84 m (29 @. @ 0 ft) at Saint @- @ Pierre . Rainfall on Réunion was highest in the southern portion of the island , mainly through the process of orographic lift ; over a three @- @ hour period , 180 mm (7 @. @ 1 in) of precipitation was recorded at Piton de la Fournaise , and the highest total was 1 @, @ 200 mm (47 in) in the island 's center . Due to the storm 's slow movement , Davina produced scattered rainfall over Réunion for several days . Two people drowned in the Rivière des Galets , but otherwise the rainfall proved beneficial in alleviating dry conditions . The gusty winds damaged the sugar cane and banana crops , but overall damage was minor .

= = = Intense Tropical Cyclone Frederic ? Evrina = = =

On March 25 , an area of convection formed along the monsoon trough in the Australian basin , gradually organizing into a tropical storm while moving west @- @ southwestward and given the name Frederic . On March 29 , the storm attained tropical cyclone status , and continued to strengthen due to warm waters . At its peak on March 31 , Frederic developed a well @- @ defined 40 km (25 mi) eye within a circular central dense overcast . The MFR estimated peak 10 @- @ minute winds of 195 km / h (120 mph) , and the JTWC estimated maximum 1 @- @ minute winds of 260 km / h (160 mph) , equivalent to a Category 5 on the Saffir @- @ Simpson hurricane wind scale . Subsequently , Frederic encountered the combination of wind shear and cooler , dry air , which caused weakening . On April 1 , the cyclone crossed into the south @- @ west Indian Ocean with 10 @- @ minute winds of 175 km / h (110 mph) , at which time it was renamed Evrina .

Continuing to the west @- @ southwest upon entering the basin , Evrina gradually weakened as the eye gradually dissipated . It soon encountered the same cooler waters of the southern Indian that affected previous storms Chikita and Davina . By April 2 , Evrina had weakened below tropical cyclone status , just 30 hours after it was at peak intensity . Around that time , the circulation became exposed from the deepest convection , and the track shifted more to the west . On April 5 , Evrina weakened to tropical depression status . Two days later , the system turned toward the south , moving in a circular track around the island of Rodrigues while remaining far enough away not to cause any effects . On April 8 , the circulation turned to the east , dissipating two days later to the south of Rodrigues .

= = = Moderate Tropical Storm F1 (Hamish) = = =

On April 17 , an area of convection persisted near the border of the south @- @ west Indian and the Australian regions . The system moved eastward into the Australian basin , becoming a tropical disturbance on April 19 . Turning to the southeast , the system gradually organized as the convection persisted . On April 20 , the disturbance intensified into a tropical storm and was named Hamish . Shortly thereafter , the ridge to the south turned the storm to the southwest . After the BoM estimated peak winds of 100 km / h (65 mph) , Hamish began quickly weakening due to increasing wind shear . On April 21 , the storm crossed into the south @- @ west Indian basin , still maintaining 10 @- @ minute winds of 65 km / h (40 mph) . Although the Mauritius Meteorological Services should have classified the system as Tropical Storm Francine , the storm remained unnamed , referred as Tropical Storm F1 . However , the system weakened to tropical depression status within six hours of entering the basin , and dissipating on April 24 .

= = = Other storms in 1998 = = =

At the time , the MFR 's cyclone season began on August 1 , although the JTWC 's cyclone season for the southern hemisphere began on July 1 . The latter agency tracked a short @- @ lived tropical

storm toward the end of July , classifying it as Tropical Cyclone 01S . The MFR named it Tropical Depression H4 , estimating peak 10 @-@ minute winds of 55 km / h (35 km / h) .

The first system of the season proper originated out of an area of convection in early September in the northeast portion of the basin . On September 3 , the MFR initiated advisories on Tropical Disturbance A1 about 1435 km (890 mi) east of Diego Garcia . The system tracked westward , and the JTWC issued a Tropical Cyclone Formation Alert (TCFA) on September 4 . Failing to intensify beyond winds of 45 km / h (30 mph) , the disturbance dissipated on September 6 . Later in the month , Tropical Disturbance A2 formed in a similar region within the monsoon trough , with the MFR initiating advisories on September 29 . Also on that day , the JTWC began issuing advisories on Tropical Cyclone 02S . That day , the JTWC upgraded the system to tropical storm status , although strong wind shear prevented intensification . The MFR quickly discontinued advisories , but the JTWC continued tracking it , again upgrading the system to tropical storm status on October 1 . After the shear again increased , the storm weakened , dissipating on October 2 .

In November , rapidly weakening Tropical Cyclone Alison moved from the Australian basin and dissipated immediately upon entering the south @-@ west Indian Ocean on November 13 . On December 4 , short @-@ lived Tropical Disturbance A3 was classified by MFR , subsequently drifting into the Australian region . Possibly related to the previous system , Tropical Cyclone Cathy moved from the Australian basin into the basin on December 28 , quickly dissipating .

== Other storms in 1999 ==

On January 1 , an area of convection persisted in the Mozambique Channel , with an associated circulation located on land in Mozambique . The system drifted to the east and southeast over warmer waters , gradually organizing . On January 3 , the MFR classified the system as Tropical Disturbance A4 near the Mozambique coastline . The disturbance accelerated to the southeast , passing southwest of Madagascar with an asymmetric structure ; most of the convection was on the eastern periphery due to strong wind shear . Heavy rainfall occurred along the southwest Madagascar coast , peaking at 322 mm (12 @.@ 7 in) over a 48 ? hour period in Morombe . Wind gusts there reached 180 km / h (110 mph) , although the disturbance 's maximum sustained 10 @-@ minute winds were 55 km / h (35 mph) . The disturbance transitioned into a subtropical depression on January 5 , but soon after became extratropical while accelerating southeastward .

During an extended period of quiet conditions across much of the basin , an area of low pressure persisted along the eastern coast of Mozambique . Convection fluctuated daily but became more persistent on February 11 . That day , the thunderstorms organized into a circulation that had formed less than 200 km (120 mi) southeast of Beira , Mozambique , becoming Tropical Disturbance D1 . After forming , the system moved southward , developing a central dense overcast with northeasterly outflow . Based on the organization , the disturbance intensified into a tropical depression on February 13 . Although there were gale force winds in the southwest periphery , the circulation was located on the northern edge of the convection . The depression neared tropical storm intensity , but an increase in wind shear from a nearby trough prevented further intensification . The JTWC estimated peak 1 @-@ minute winds of 85 km / h (50 mph) , making the system a tropical storm by their assessment . A building ridge to the south turned the depression to the northeast , bringing the system near Europa Island . A station on the island recorded sustained winds of 65 km / h (40 mph) with gusts to 104 km / h (65 mph) about three hours before and after the closest approach ; the observations suggested that the depression could have become a tropical storm . Soon thereafter , the associated convection dissipated and the circulation turned westward . After crossing over its former path , the depression dissipated on February 17 very close to where it developed .

Similar to the previous depression and Tropical Storm Alda , Tropical Disturbance D2 developed in the Mozambique Channel , initially subtropical in nature . On February 20 , a cold front exited the African coast off Mozambique , spawning an area of convection . A weak low pressure area developed on February 23 , which proceeded to move southeastward . Due to unfavorable wind shear , the system failed to organize much , although initially it produced strong wind gusts . On

February 28 , much of the convection was removed from the circulation , which looped over southwestern Madagascar to turn back to the west . On March 4 , when Tropical Storm Davina was named , the disturbance was renamed E1 . The next day , the circulation executed a small loop , dissipating on March 6 over eastern Mozambique .

A long @-@ lived system developed on February 28 in the Australian region south of February 28 , and moved westward . On March 7 , the JTWC initiated advisories on the system as Tropical Cyclone 26S , briefly estimating peak 1 @-@ minute winds of 65 km / h (40 mph) the next day . Soon after , the system weakened into a tropical depression , crossing into the south @-@ west Indian Ocean late on March 8 . At that time , it was designated Tropical Disturbance E2 . Continuing westward along the northern edge of a strong ridge , the disturbance failed to intensify due to easterly wind shear . Although the MFR ceased issuing advisories , they noted that a distinct circulation persisted , reaching a location to the north of Mauritius by March 16 . That day , it turned back to the east with a sporadic area of convection , influenced by the larger Tropical Depression E3 . Two days later , the system organized enough for the MFR to reclassify it as a tropical disturbance . The system failed to reorganize much , and dissipated on March 20 . Another tropical disturbance , named E3 , formed on March 11 in the eastern portion of the basin . It initially failed to develop more , but after an increase in convection , the system intensified into a tropical depression on March 14 while moving generally west @-@ northwestward . On the next day , the system began drifting to the southwest due to weak steering currents . On March 16 , the JTWC initiated advisories on the system as Tropical Cyclone 28S , briefly upgrading it to tropical storm status on the next day . On March 18 , the depression began weakening , dissipating three days later .

= = Storm names = =

A tropical disturbance is named when it reaches moderate tropical storm strength . If a tropical disturbance reaches moderate tropical storm status west of 55 ° E , then the Sub @-@ regional Tropical Cyclone Advisory Centre in Madagascar assigns the appropriate name to the storm . If a tropical disturbance reaches moderate tropical storm status between 55 ° E and 90 ° E , then the Sub @-@ regional Tropical Cyclone Advisory Centre in Mauritius assigns the appropriate name to the storm . A new annual list is used every year , and this list was provided by the country of Seychelles .