

= Typhoon =

A typhoon is a mature tropical cyclone that develops in the western part of the North Pacific Ocean between 180 ° and 100 ° E. This region is referred to as the Northwestern Pacific Basin , and is the most active tropical cyclone basin on Earth , accounting for almost one @-@ third of the world 's annual tropical cyclones . For organisational purposes , the northern Pacific Ocean is divided into three regions : the eastern ( North America to 140 ° W ) , central ( 140 ° to 180 ° W ) , and western ( 180 ° to 100 ° E ) . The Regional Specialized Meteorological Center ( RSMC ) for tropical cyclone forecasts is in Japan , with other tropical cyclone warning centers for the northwest Pacific in Hawaii ( the Joint Typhoon Warning Center ) , the Philippines and Hong Kong . While the RSMC names each system , the main name list itself is coordinated among 18 countries that have territories threatened by typhoons each year . The Philippines use their own naming list for systems approaching the country .

Within the northwestern Pacific there are no official typhoon seasons as tropical cyclones form throughout the year . Like any tropical cyclone , there are six main requirements for typhoon formation and development : sufficiently warm sea surface temperatures , atmospheric instability , high humidity in the lower to middle levels of the troposphere , enough Coriolis force to develop a low pressure center , a pre @-@ existing low level focus or disturbance , and low vertical wind shear . The majority of storms form between June and November while tropical cyclone formation is at a minimum between December and May . On average , the northwestern Pacific features the most numerous and intense tropical cyclones globally . Like other basins , they are steered by the subtropical ridge towards the west or northwest , with some systems recurving near and east of Japan . The Philippines receive the brunt of the landfalls , with China and Japan being impacted slightly less . Some of the deadliest typhoons in history have struck China . Southern China has the longest record of typhoon impacts for the region , with a thousand @-@ year sample via documents within their archives . Taiwan has received the wettest known typhoon on record for the northwest Pacific tropical cyclone basins .

= = Nomenclature = =

= = = Etymology and usage = = =

The term Typhoon is the regional name in the northwest Pacific for a severe ( or mature ) tropical cyclone , whereas hurricane is the regional term in the northeast Pacific and northern Atlantic . Elsewhere this is called a tropical cyclone , severe tropical cyclone , or severe cyclonic storm .

The Oxford English Dictionary cites several Oriental words from Persian and Chinese giving rise to two early forms in English : touffon ( from Persian ) and tuffoon / tay @-@ fun ( from Chinese ) .

The Persian source is the word ????? t?f?n ( " storm " ; also Arabic ????? ( ??f?n , " to turn round " ) , Hindi ??? ? ?? ( t?f?n ) ) from the verb t?f?dan ( Persian : ?????? / ?????? , " to roar , to blow furiously " ) .

The Chinese source is the word tai fung ( simplified Chinese : ?? ; traditional Chinese : ?? ; pinyin : táif?ng ) , cited as a common dialect form of Mandarin dà " big " and f?ng " wind " . In Mandarin the word for the windstorm is ?? ( dàf?ng , " big wind " ) and in Cantonese ?? ( daai6 fung1 , " big wind " ) .

The Ancient Greek ????? ( Tüphôn , " Typhon , father of the winds " ) is unrelated but has secondarily contaminated the word .

= = = Intensity classifications = = =

A tropical depression is the lowest category that the Japan Meteorological Agency uses and is the term used for a tropical system that has wind speeds not exceeding 33 knots ( 38 mph ; 61 km / h ) . A tropical depression is upgraded to a tropical storm should its sustained wind speeds exceed 34

knots ( 39 mph ; 63 km / h ) . Tropical storms also receive official names from RSMC Tokyo . Should the storm intensify further and reach sustained wind speeds of 48 knots ( 55 mph ; 89 km / h ) then it will be classified as a severe tropical storm . Once the system 's maximum sustained winds reach wind speeds of 64 knots ( 74 mph ; 119 km / h ) , the JMA will designate the tropical cyclone as a typhoon ? the highest category on its scale .

From 2009 the Hong Kong Observatory started to further divide typhoons into three different classifications : typhoon , severe typhoon and super typhoon . A typhoon has wind speed of 64 @-@ 79 knots ( 73 @-@ 91 mph ; 118 ? 149 km / h ) , a severe typhoon has winds of at least 80 knots ( 92 mph ; 150 km / h ) , and a super typhoon has winds of at least 100 knots ( 120 mph ; 190 km / h ) . The United States ' Joint Typhoon Warning Center ( JTWC ) unofficially classifies typhoons with wind speeds of at least 130 knots ( 67 m / s ; 150 mph ; 241 km / h ) ? the equivalent of a strong Category 4 storm in the Saffir @-@ Simpson scale ? as super typhoons . However , the maximum sustained wind speed measurements that the JTWC uses are based on a 1 @-@ minute averaging period , akin to the U.S. ' National Hurricane Center and Central Pacific Hurricane Center . As a result , the JTWC 's wind reports are higher than JMA 's measurements , as the latter are based on a 10 @-@ minute averaging interval .

= = Genesis = =

There are six main requirements for tropical cyclogenesis : sufficiently warm sea surface temperatures , atmospheric instability , high humidity in the lower to middle levels of the troposphere , enough Coriolis force to develop a low pressure center , a pre @-@ existing low level focus or disturbance , and low vertical wind shear . While these conditions are necessary for tropical cyclone formation , they do not guarantee that a tropical cyclone will form . Normally , an ocean temperature of 26 @-@ 5 ° C ( 79 @-@ 7 ° F ) spanning through a depth of at least 50 metres ( 160 ft ) is considered the minimum to maintain the special mesocyclone that is the tropical cyclone . These warm waters are needed to maintain the warm core that fuels tropical systems . A minimum distance of 500 km ( 300 mi ) from the equator is normally needed for tropical cyclogenesis .

Whether it be a depression in the Intertropical Convergence Zone ( ITCZ ) or monsoon trough , a broad surface front , or an outflow boundary , a low level feature with sufficient vorticity and convergence is required to begin tropical cyclogenesis . About 85 to 90 percent of Pacific typhoons form within the monsoon trough . Even with perfect upper level conditions and the required atmospheric instability , the lack of a surface focus will prevent the development of organized convection and a surface low . Vertical wind shear of less than 10 m / s ( 20 kn , 33 ft / s ) between the ocean surface and the tropopause is required for tropical cyclone development . Typically with Pacific typhoons , there are two outflow jets : one to the north ahead of an upper trough in the Westerlies , and a second towards the equator .

In general , westerly wind increases associated with the Madden ? Julian oscillation lead to increased tropical cyclogenesis in all tropical cyclone basins . As the oscillation propagates from west to east , it leads to an eastward march in tropical cyclogenesis with time during that hemisphere 's summer season . On average , twice per year twin tropical cyclones will form in the western Pacific ocean , near the 5th parallel north and the 5th parallel south , along the same meridian , or line of longitude . There is an inverse relationship between tropical cyclone activity in the western Pacific basin and the north Atlantic basin , however . When one basin is active , the other is normally quiet , and vice versa . The main reason for this appears to be the phase of the Madden ? Julian oscillation , or MJO , which is normally in opposite modes between the two basins at any given time .

= = Frequency = =

Nearly one @-@ third of the world 's tropical cyclones form within the western Pacific . This makes this basin the most active on Earth . Pacific typhoons have formed year round , with peak months from August to October . The peak months correspond to that of the Atlantic hurricane seasons .

Along with a high storm frequency , this basin also features the most globally intense storms on record . One of the most recent busy seasons was 2013 . Tropical cyclones form in any month of the year across the northwest Pacific ocean , and concentrate around June and November in the northern Indian ocean . The area just northeast of the Philippines is the most active place on Earth for tropical cyclones to exist . Across the Philippines themselves , activity reaches a minimum in February , before increasing steadily through June , and spiking from July through October , with September being the most active month for tropical cyclones across the archipelago . Activity falls off significantly in November , although Typhoon Haiyan , the strongest Philippine typhoon on record , was a November typhoon . The most frequently impacted areas of the Philippines by tropical cyclones are northern and central Luzon and eastern Visayas . A ten @-@ year average of satellite determined precipitation showed that at least 30 percent of the annual rainfall in the northern Philippines could be traced to tropical cyclones , while the southern islands receive less than 10 percent of their annual rainfall from tropical cyclones . The genesis and intensity of typhoons are also modulated by slow variation of the sea surface temperature and circulation features following a near @-@ 10 @-@ year frequency .

= = Paths = =

Most tropical cyclones form on the side of the subtropical ridge closer to the equator , then move poleward past the ridge axis before recurving north and northeast into the main belt of the Westerlies . When the subtropical ridge position shifts due to El Niño , so will the preferred tropical cyclone tracks . Areas west of Japan and Korea tend to experience many fewer September ? November tropical cyclone impacts during El Niño and neutral years . During El Niño years , the break in the subtropical ridge tends to lie near 130 ° E , which would favor the Japanese archipelago . During La Niña years , the formation of tropical cyclones , along with the subtropical ridge position , shifts westward across the western Pacific ocean , which increases the landfall threat to China and greater intensity to Philippines . Those that form near the Marshall Islands find their way to Jeju Island , Korea .

Typhoon paths follow three general directions .

Straight track ( or straight runner ) . A general westward path affects the Philippines , southern China , Taiwan , and Vietnam .

A parabolic , recurving track . Storms recurving affect eastern Philippines , eastern China , Taiwan , Korea , Japan , and the Russian Far East .

Northward track . From point of origin , the storm follows a northerly direction , only affecting small islands .

A rare few storms , like Hurricane John , were redesignated as typhoons as its track originated from the Eastern / Central Pacific and moved its way into the western Pacific .

= = Basin monitoring = =

Within the Western Pacific , RSMC Tokyo @-@ Typhoon Center , part of the Japan Meteorological Agency has had the official warning responsibility for the whole of the Western Pacific since 1989 , and the naming responsibility for systems of tropical storm strength or greater since 2000 . However each National Meteorological and Hydrological Service within the western Pacific has the responsibility for issuing warnings for land areas about tropical cyclones affecting their country , such as the Joint Typhoon Warning Center for United States agencies , the Philippine Atmospheric , Geophysical and Astronomical Services Administration ( PAGASA ) for interests in the island archipelago nation , and the Hong Kong Observatory for storms that come close enough to cause the issuance of warning signals .

= = = Name sources = = =

The list of names consists of entries from 14 Southeast and East Asian nations and the United

States who have territories directly affected by typhoons . The submitted names are arranged into five lists , and each list is cycled with each year . Unlike tropical cyclones in other parts of the world , typhoons are not named after people . Instead , they generally refer to animals , flowers , astrological signs , and a few personal names . However , PAGASA retains its own naming list , which does consist of human names . Therefore , a typhoon can possibly have two names . Storms that cross the date line from the central Pacific retain their original name , but the designation of hurricane becomes typhoon . In Japan , people use the numerical designation of typhoons according to the sequence of their occurrence in the calendar year .

= = Records = =

The most active Western Pacific typhoon season was in 1964 , when 39 storms of tropical storm strength formed . The least activity seen in the northwest Pacific ocean was during the 2010 Pacific typhoon season , when only 14 tropical storms and seven typhoons formed . In the Philippines , the most active season , since 1945 , for tropical cyclone strikes was 1993 when nineteen tropical cyclones moved through the country . There was only one tropical cyclone that moved through the Philippines in 1958 . The 2004 Pacific typhoon season was the busiest for Okinawa since 1957 . Within Guangdong in southern China , during the past thousand years , the most active decades for typhoon strikes were the 1660s and 1670s .

The highest reliably @-@ estimated maximum sustained winds on record for a typhoon were those of Typhoon Haiyan at 195 miles per hour ( 314 km / h ) shortly before its landfall in the central Philippines on Nov. 8 , 2013 . The most intense storm based on minimum pressure was Typhoon Tip in the northwestern Pacific Ocean in 1979 , which reached a minimum pressure of 870 hectopascals ( 26 inHg ) and maximum sustained wind speeds of 165 knots ( 85 m / s , 190 mph , 310 km / h ) . The deadliest typhoon of the 20th century was Typhoon Nina , which killed nearly 100 @, @ 000 in China in 1975 due to a flood that caused 12 reservoirs to fail . After Typhoon Morakot landed in Taiwan at midnight on August 8 , 2009 , almost the entire southern region of Taiwan ( Chiayi County / Chiayi City , Tainan County / Tainan City ( now merged as Tainan ) , Kaohsiung County / Kaohsiung City ( now merged as Kaohsiung ) , and Pingtung County ) and parts of Taitung County and Nantou County were flooded by record @-@ breaking heavy rain . The rainfall in Pingtung County reached 2 @, @ 327 millimeters ( 91 @. @ 6 in ) , breaking all rainfall records of any single place in Taiwan induced by a single typhoon , and making the cyclone the wettest known typhoon .