= Typhoon Chan @-@ hom (2015) =

Typhoon Chan @-@ hom , known in the Philippines as Typhoon Falcon , was a large and long @-@ lived tropical cyclone that affected most countries in the western Pacific basin . The ninth named storm of the 2015 Pacific typhoon season , Chan @-@ hom developed on June 29 from a westerly wind burst that also spawned Tropical Cyclone Raquel in the southern hemisphere . Chan @-@ hom slowly developed while moving to the northwest , aided by warm waters but disrupted by wind shear . The storm meandered near the Northern Marianas Islands , passing over the island of Rota before beginning a steady northwest track . While near the island , the storm dropped heavy rainfall on neighboring Guam , causing flooding and minor power outages . Chan @-@ hom intensified into a typhoon on July 7 , and two days later passed between the Japanese islands of Okinawa and Miyako @-@ jima . There , strong winds left 42 @,@ 000 people without power , while 27 people were injured . Around that time , the storm caused a surge in the monsoon trough , in conjunction with Tropical Storm Linfa , which caused flooding and killed 16 people in the Philippines .

After passing by Okinawa , the typhoon reached peak winds of 165 km / h (105 mph) , according to the Japan Meteorological Agency . It passed north of Taiwan , where it brought beneficial rainfall that replenished reservoirs . On July 11 , Chan @-@ hom became the strongest typhoon to make landfall in the Chinese province of Zhejiang . About 1 @.@ 1 million people were evacuated ahead of the storm , and across the country , the storm left ¥ 9 @.@ 8 billion (US $ 1 @.@ 5 billion) in damage , as well as one death . Later , the storm turned to the northeast toward the Korean Peninsula . Jeju Island offshore South Korea recorded 1 @,@ 250 mm (49 in) of rainfall , and one person died due to a thunderstorm in the country . On July 12 , the storm struck the Ongjin peninsula in North Korea , and became an extratropical cyclone shortly thereafter . The remnants later caused flooding and power outages in the Russian Far East .

= = Meteorological history = =

During June 2015 , a near record strength pulse in the Madden ? Julian oscillation , lead to a period of significant weather across the Western Pacific . This significant weather included a major westerly wind burst during late June , which caused a set of twin tropical cyclones to develop . The first tropical cyclone developed in the Southern Hemisphere during June 28 , before it later developed into Tropical Cyclone Raquel during June 30 . The second tropical cyclone was first noted by the United States Joint Typhoon Warning Center (JTWC) as a tropical disturbance during June 25 , while it was located about 345 km (215 mi) to the south @-@ southeast of Pohnpei State in the Federated States of Micronesia .

Drifting generally northward , the disturbance slowly organized within a region of low to moderate wind shear and favorable outflow aloft . The circulation was enhanced by a surge of westerly winds to the south . At 06 : 00 UTC on June 29 , the Japan Meteorological Agency (JMA) classified the system as a tropical depression . Following further organization , the JTWC issued a Tropical Cyclone Formation Alert that day at 22 : 30 UTC with the system located about 345 km (215 mi) northeast of Pohnpei . Convection steadily deepened over the center and banding features began consolidating around the periphery . On June 30 , the JMA upgraded the cyclone to Tropical Storm Chan @-@ hom . The JTWC assessed Chan @-@ hom to be slightly weaker at this time , initiating it as a tropical depression .

Situated along the southern periphery of a subtropical ridge , Chan @-@ hom moved steadily to the west . Upper @-@ level ventilation allowed for growth of the cyclone , but moderate wind shear displaced the center from the deepest convection for much of July 1 . That day , the JMA upgraded the system to a severe tropical storm . Early on July 2 , the large circulation of Chan @-@ hom absorbed a smaller disturbance to its southeast , and the storm turned to the west @-@ southwest . Dvorak satellite classifications indicated that the system reached typhoon intensity following an expansion of the central dense overcast ; the JTWC classified Chan @-@ hom as such by 15 : 00 UTC , although the JMA maintained it as a severe tropical storm . Shortly thereafter , strong wind

shear from a Tropical Upper Tropospheric Trough (TUTT) cell to the northeast dramatically weakened the storm . Convection was stripped away from Chan @-@ hom 's center and the storm 's forward motion abruptly slowed . Alongside the shear , subsidence over the cyclone , a trough to the north , and a remnant vortex to the northeast all served to suppress convection . By 12 : 00 UTC on July 3 , Chan @-@ hom had weakened to a tropical storm with winds of 85 km / h (50 mph) .

Coinciding with Chan @-@ hom 's abrupt collapse on July 3 , the system turned northeast as it entered a weakness in the steering ridge . Later that day , the broad circulation turned north @-@ northwest . Wind shear eased early on July 4 as the TUTT cell retreated to the north and the subtropical ridge steadily re @-@ established itself . Convection started redeveloping over the tropical storm . Late on July 4 into July 5 , the center of Chan @-@ hom skirted the southern coast of Rota in the Mariana Islands . While near the island , Chan @-@ hom executed an unusual counter @-@ clockwise loop owing to interaction with a monsoon trough . Once clear of the Mariana Islands , steady development ensued owing to low wind shear and good outflow . Early on July 7 , Chan @-@ hom attained typhoon intensity according to the JMA , following to a burst in central convection . Microwave satellite imagery indicated the formation of an eye as convection deepened and banding features tightened around the circulation .

On July 7 , the typhoon entered the Philippine area of Responsibility and was assigned the local name Falcon . Chan @-@ hom 's eye briefly improved in structure before entering a state of flux and collapsing later that day ; convection on the northern side of the storm diminished simultaneously . The 65 km (40 mi) wide eye soon re @-@ established itself and slowly contracted to a diameter of 40 km (25 mi) by July 8 . A large storm , gale @-@ force winds extended 445 km (275 mi) from Chan @-@ hom 's center on July 9 . Late on July 9 into July 10 , Chan @-@ hom passed between the Japanese islands of Okinawa and Miyako @-@ jima . The typhoon reached its peak strength during this time with estimated winds of 165 km / h (105 mph) and a barometric pressure of 935 mbar (hPa ; 27 @.@ 61 inHg) . Featuring multiple intense feeder bands and a well @-@ defined 27 km (17 mi) eye , the JTWC assessed Chan @-@ hom to have peaked as a Category 4 @-@ equivalent typhoon on the Saffir ? Simpson hurricane wind scale with one @-@ minute sustained winds of 220 km / h (140 mph) .

An eyewall replacement cycle and weakening convection along the northern side resulted in steady weakening starting on July 10 . Increasing wind shear prevented the system from reorganizing as it neared East China . Early on July 11 , the typhoon reached the southwestern edge of the subtropical ridge and began turning to the north and later north @-@ northeast . Chan @-@ hom made landfall in Zhoushan , Zhejiang , or roughly 140 km (80 mi) south @-@ southeast of Shanghai , around 08 : 40 UTC . The JMA assessed the storm to have had winds of 140 km / h (85 mph) while the JTWC estimated one @-@ minute sustained winds at 155 km / h (100 mph) . Based on the JTWC estimate , Chan @-@ hom was the strongest typhoon to pass within 160 km (100 mi) of Shanghai in at least 35 years , and it was the strongest landfall in Zhejiang since recordkeeping began in 1949 . Thereafter the storm accelerated north @-@ northeast and moved over the cool waters of the Yellow Sea , prompting further degradation of its structure . Chan @-@ hom weakened below typhoon @-@ force around 18 : 00 UTC on July 11 . The system 's low @-@ level center completely exposed on July 12 as it approached the Korean Peninsula . Around 18 : 00 UTC , Chan @-@ hom moved ashore on the Ongjin peninsula in North Korea , southwest of the capital Pyongyang , with winds of 95 km / h (60 mph) . By 00 : 00 UTC on July 13 the system transitioned into an extratropical cyclone while retaining gale @-@ force winds , and six hours later the system dissipated over north @-@ central North Korea .

= = Preparations and impact = =

= = = China = = =

Due to the typhoon , about 1 @.@ 1 million people evacuated from areas along the coast . Nearly 30 @,@ 000 ships were called back to port , and 600 flights were canceled within the area . Over

100 train rides were also canceled , and portions of the Shanghai Metro was shut down . The storm caused a concert for Chinese singer Wang Feng to be canceled .

While moving over eastern China , Chan @-@ hom produced sustained winds of 119 km / h (74 mph) and gusts to 177 km / h (110 mph) , both at a station south of Shanghai called Shipu . Shanghai Pudong International Airport recorded wind gusts of 90 km / h (56 mph) . Gusts were strongest along the coast and along offshore islands . Rainfall from the storm peaked at 531 mm (20 @.@ 9 in) in Yuyao , Ninghai , and Xiangshan , all parts of Ningbo city within Zhejiang . The rains caused widespread flooding in eastern China ; 11 rivers in Zhejiang surpassed the warning level of 1 @.@ 91 m (6 @.@ 3 ft) . The storm produced high waves from Fujian to Jiangsu provinces , reaching five storeys high in Wenling , washing fish ashore and flooding the coast .

Winds from Chan @-@ hom were strong enough to knock down street signs across Zhejiang , as well as destroying an unoccupied building in Cixi City . The storm 's heavy rainfall caused a landslide in Ningbo and necessitated flood gates to be opened . Also in the city , storm rains caused a hotel roof to collapse , killing one person and injuring two . Throughout Zhejiang , Chan @-@ hom wrecked 700 homes and damaged another 1 @,@ 400 . In neighboring Jiangsu , 300 homes were damaged or destroyed , causing ¥ 120 million (US $ 19 million) in economic losses . The storm wrecked greenhouses and irrigation systems while also damaging crops . Storm impacts mostly affected agriculture and transportation in the country ; over 200 @,@ 000 ha (490 @,@ 000 acres) of crop fields were impacted . In the Nanhui District of Shanghai , 20 % of peaches and 40 % of pears were lost after being damaged by the storm 's winds . In Shanghai , the winds knocked down over 3 @,@ 000 trees . The high agriculture damage ? estimated at ¥ 3 @.@ 62 billion (US $ 550 million) ? was mostly due to the typhoon 's concurrence with the local harvesting of vegetables and melons . Overall , Chan @-@ hom affected 3 @.@ 9 million people in eastern China , causing about ¥ 9 @.@ 8 billion (US $ 1 @.@ 5 billion) in damage .

= = = Elsewhere = = =

Before the storm affected the Marianas Islands , the National Weather Service issued a typhoon watch and tropical storm warning for Guam and Rota , as well as a typhoon warning for Tinian , and Saipan . The United States Department of Defense issued a Condition of Readiness 3 . While looping near Rota , Chan @-@ hom produced gusts of 60 km / h (37 mph) . On the other side of the Rota Channel , Andersen Air Force Base on northern Guam recorded wind gusts of 117 km / h (72 mph) . Rainfall on the island totaled over 300 mm (12 in) , based on radar estimates from the University of Guam , and possibly as high as 410 mm (16 in) . On Guam , the storm caused minor power outages and flooding .

Although Chan @-@ hom did not directly affect the Philippines , both Chan @-@ hom and Tropical Storm Linfa enhanced the monsoon for several days , which caused severe flooding throughout the country . Heavy rains impacted portions of Luzon and the Western Visayas , with various events resulting in five deaths . Four people also went missing when their boat sank amid strong winds off the coast of Pangasinan . A brief tornado caused minor damage in Iba , Zambales . Nearly 34 @,@ 000 people were affected by the monsoon event , which killed 16 people and caused ? 3 @.@ 9 million (US $ 86 @,@ 500) in agricultural losses .

On July 9 , the outer rainbands of Chan @-@ hom began affecting the Japanese island of Okinawa . Between July 9 and 10 , 326 flights were canceled at Naha Airport , affecting more than 32 @,@ 000 people . A total of 176 people sought refuge in public shelters . American military bases on the island were placed under Condition of Readiness 1 , the highest level . Early on July 10 , a station near the southern end of Okinawa recorded peak wind gusts of 179 @.@ 6 km / h (111 @.@ 6 mph) , along with sustained winds of 118 @.@ 8 km / h (73 @.@ 8 mph) . Strong winds affected other Japanese islands in the region , and Miyako @-@ jima recorded peak gusts of 118 @.@ 8 km / h (73 @.@ 8 mph) . The storm dropped heavy rainfall , peaking at 230 mm (9 @.@ 1 in) in Nago , Okinawa . At the height of the storm , 42 @,@ 000 people lost power across Okinawa Prefecture . The storm injured 27 people in Okinawa , three seriously . Two buildings were damaged . Agricultural damage across Okinawa reached ¥ 524 million (US $ 4 @.@ 2 million) , most of

which was sustained by the mango crop .

Passing north of Taiwan , the threat of Chan @-@ hom caused the Taiwan Stock Exchange and other public buildings to close , as well as canceling several flights . The storm brought ultimately heavy rainfall , reaching 388 @.@ 5 mm (15 @.@ 30 in) in Taipei . The Shihmen Dam , which had dropped to 55 % capacity before the storm , rose to 90 @.@ 26 % of its capacity due to the storm 's rains .

In South Korea , 574 flights were canceled and 163 boats were forced to remain at port . The large circulation of the storm dropped heavy rainfall throughout the Korean Peninsula , beneficial in easing drought conditions . Notably , Mount Halla on the offshore Jeju Island recorded 1 @,@ 250 mm (49 in) of rainfall during Chan @-@ hon 's passage . Wind gusts reached 76 km / h (47 mph) in Muan County in southwestern South Korea . Thunderstorms killed one person in the country . When Chan @-@ hom made landfall along North Korea , winds were generally less than 40 km / h (25 mph) , with gusts reaching up to 54 km / h (33 mph) . The storm dropped heavy rainfall , reaching over 300 mm (12 in) in North Hamgyong Province along the east coast . Flooding was limited , as most of the country received about 102 mm (4 @.@ 0 in) of rainfall from the storm .

The remnants of Chan @-@ hom later impacted southern areas of Khabarovsk Krai , producing heavy rain and high winds , peaking at 79 km / h (49 mph) . The winds downed numerous trees , some of which fell on cars , and uprooted tombs in a graveyard in Khabarovsk . The towns of Bikin , Sovetskaya Gavan , and Vyazma , saw 40 to 80 mm (1 @.@ 6 to 3 @.@ 1 in) of rain or roughly 60 ? 70 percent of their average monthly precipitation for July during the storm 's passage . Flooding affected dozens of homes in the region as rivers rose by 1 to 2 m (3 @.@ 3 to 6 @.@ 6 ft) . Power and telephone service was lost in 34 communities . Ferry service between Vanino and Kholmsk was suspended , temporarily stranding 1 @,@ 300 passengers .