= Tropical Storm Vamei =

Tropical Storm Vamei was a Pacific tropical cyclone that formed closer to the equator than any other tropical cyclone in Pacific Ocean . The last storm of the 2001 Pacific typhoon season , Vamei developed on December 26 at 1 @.@ 4 ° N in the South China Sea . It strengthened quickly and made landfall along extreme southeastern Malaysia . Vamei rapidly dissipated over Sumatra on December 28 , and the remnants eventually re @-@ organized in the North Indian Ocean .

Though officially designated as a tropical storm , the intensity of Vamei is disputed ; some agencies classify it as a typhoon , based on sustained winds of 140 km / h (85 mph) and the appearance of an eye . The storm brought flooding and landslides to eastern Malaysia , causing $ 3 @.@ 6 million in damage (2001 USD , $ 4 @.@ 81 million 2016 USD) and five deaths .

= = Meteorological history = =

On December 19 , a small low @-@ level circulation was located along the northwest coastline of Borneo ; at the same time a plume of cold air progressed southward through the South China Sea on the southeastern periphery of a ridge over the Far East . The vortex drifted southwestward , reaching open water by December 21 . The northerly air surge was deflected after interacting with the circulation , and at the same time a portion of the air surge crossed the equator . The southerly flow turned eastward , then northward , and in combination with the northerly flow it wrapped into the vortex , resulting in rapid development of the low @-@ level circulation , just a short distance north of the equator . By December 25 , an area of scattered convection persisted about 370 km (230 mi) east of Singapore within an area of low wind shear , in association with the low @-@ level circulation . Continuing slowly westward , the convection deepened and organized further , and at 1200 UTC on December 26 the disturbance developed into a tropical depression about 230 km (145 mi) east of Singapore , or 156 km (97 mi) north of the equator . This was the first recorded occurrence of a tropical cyclone near the equator .

The depression strengthened further and officially attained tropical storm status at 0000 UTC on December 27 , based on the analysis by the Japan Meteorological Agency (JMA) , though the Joint Typhoon Warning Center (JTWC) unofficially classified it as a tropical storm six hours prior . Shortly thereafter , an eye with a 39 km (24 mi) diameter became apparent on satellite imagery , along with rainbands extending southward to the opposite side of the equator . At 0600 UTC , the JMA first classified the system as Tropical Storm Vamei , about 65 km (40 mi) northeast of Singapore , and the agency estimated the storm attained peak winds of 85 km / h (50 mph) at the same time . However , the JTWC upgraded Vamei to typhoon status with peak winds of 140 km / h (85 mph) , based on a United States Navy ship report from within the eye ; a second ship reported wind gusts of 195 km / h (120 mph) in the southern portion of the eyewall . The storm was small and compact , with gales extending about 45 km (30 mi) from its center . At about 0830 UTC on December 27 , Vamei made landfall approximately 60 km (35 mi) northeast of Singapore , in the southeastern portion of the Malaysian state of Johor . Initially , the Malaysian Meteorological Department classified the cyclone as a tropical storm , though it was later re @-@ assessed as a typhoon at landfall .

Tropical Storm Vamei weakened quickly as it crossed the extreme southern portion of the Malay Peninsula , and late on December 27 the JMA downgraded it to tropical depression status before the cyclone emerged into the Straits of Malacca . The JTWC initially maintained it as a minimal tropical storm , though the agency downgraded the storm to depression status as the center again approached land . Early on December 28 , Vamei moved ashore along northeastern Sumatra , and at 0600 UTC the JMA classified the storm as dissipated . However , convection persisted near the circulation over land , believed to have been caused by the process known as upper @-@ level diffluence . On December 29 , what was originally believed to be a separate system reached the southeastern Bay of Bengal . In a post @-@ season re @-@ evaluation , the JTWC classified the system as a continuation of Vamei , based on analysis of satellite imagery that indicated the circulation of Vamei crossed Sumatra without dissipating . Convection re @-@ developed , and late

on December 30 the JTWC classified the cyclone as a tropical storm about 390 km (245 mi) west @-@ southwest of the northwestern tip of Sumatra ; initially , due to being treated as a separate system , it was classified as Tropical Cyclone 05B . Vamei quickly developed good outflow and organization , though increased wind shear on December 31 rapidly weakened the storm ; by late that day , the center was exposed from the deep convection , and Vamei quickly dissipated .

= = = Unusual formation = = =

Vamei formed and reached tropical storm strength at 1.5º N , only 156 km (97 mi) from the equator . This broke the previous record of Typhoon Sarah in the 1956 Pacific typhoon season , which reached tropical storm strength at 2.2º N. Due to a lack of Coriolis effect near the equator , the formation of Vamei was previously considered impossible . However , a study by the Naval Postgraduate School indicated that the probability for a similar equatorial development was at least once every four centuries .

Vamei developed in a vortex that appears every winter along the northwest coast of Borneo and is maintained by the interaction between monsoonal winds and the local topography . Often , the vortex remains near the coastline , and in an analysis of 51 winters , only six reported the vortex as being over the equatorial waters for four days or more . As the area in the South China Sea between Borneo and Singapore is only 665 km (415 mi) wide , a vortex needs to move slowly to develop . A persistent northerly wind surge for more than five days , which is needed to enhance the vortex , is present , on average , nine days each winter . The probability for a pre @-@ existing tropical disturbance to develop into a tropical cyclone is between 10 ? 30 percent . Thus , the conditions which resulted in the formation of Vamei are believed to occur once every 100 ? 400 years .

= = Preparations and impact = =

Four days prior to Vamei moving ashore , the Malaysian Meteorological Department (MMD) issued storm advisories for potentially affected areas . Subsequently , the agency issued warnings for heavy rainfall , high winds , and rough seas . However , few citizens knew of the passage of the rare storm .

Offshore of Malaysia , two U.S. Navy ships in Vamei 's eyewall were damaged by strong winds . Upon moving ashore , the storm brought storm surge damage to portions of southeastern Malaysia . Vamei brought strong winds and heavy rainfall to portions of Melaka , Negeri Sembilan , and Selangor as well as to Johor , where rainfall reached over 200 mm (8 in) in Senai . Additionally , monsoonal moisture , influenced by the storm , produced moderate to heavy precipitation across various regions of peninsular Malaysia . The passage of the cyclone resulted in flooding and mudslides , which forced the evacuation of more than 13 @,@ 195 people in Johor and Pahang states into 69 shelters . Along Gunung Pulai , the rainfall caused a landslide which destroyed four houses and killed five people . River flooding was also reported , as a result of the precipitation from Vamei as well as previous rainfall . Damage from the flooding was estimated at RM13.7 million (2001 MYR , $ 3 @.@ 6 million 2001 USD) . About 40 percent of the damage occurred to crops at a farm in Kota Tinggi . Moderate damage to transportation , education , and health @-@ care facilities was also reported . The Malaysian government provided affected families up to RM5,000 (2001 MYR , $ 1 @,@ 300 2001 USD) in assistance for food , clothing , and repairs . Vamei also brought heavy rainfall to Singapore , which caused air traffic disruptions at the Singapore Changi Airport . The passage of the cyclone resulted in many downed trees .

In 2004 , the name " Vamei " was retired and replaced with " Peipah " , becoming the first retired name since the Japan Meteorological Agency began naming Pacific typhoons in 2000 . Vamei was one of three tropical cyclones in the current naming list that was retired without attaining typhoon status ; the others were Tropical Storm Bilis in 2006 and Tropical Storm Washi in 2011 .