= Radius of maximum wind =

The radius of maximum wind (RMW) is the distance between the center of a cyclone and its band of strongest winds . It is a parameter in atmospheric dynamics and tropical cyclone forecasting . The highest rainfall rates occur near the RMW of tropical cyclones . The extent of a cyclone 's storm surge and its maximum potential intensity can be determined using the RMW . As maximum sustained winds increase , the RMW decreases . Recently , RMW has been used in descriptions of tornadoes . When designing buildings to prevent against failure from atmospheric pressure change , RMW can be used in the calculations .

= = Determination = =

The RMW is traditionally measured by reconnaissance aircraft in the Atlantic basin . It can also be determined on weather maps as the distance between the cyclone center and the system 's greatest pressure gradient . Using weather satellite data , the distance between the coldest cloud top temperature and the warmest temperatature within the eye , in infrared satellite imagery , is one method of determining RMW . The reason why this method has merit is that the strongest winds within tropical cyclones tend to be located under the deepest convection , which is seen on satellite imagery as the coldest cloud tops . Use of velocity data from Doppler weather radar can also be used to determine this quantity , both for tornadoes and tropical cyclones near the coast .

= = Tornadoes = =

In the case of tornadoes , knowledge of the RMW is important as atmospheric pressure change (APC) within sealed buildings can cause failure of the structure . Most buildings have openings totaling one square foot per 1 @,@ 000 @-@ cubic @-@ foot (28 m3) volume to help equalize air pressure between the inside and outside of the structures . The APC is around one @-@ half of its maximum value at the RMW , which normally ranges between 150 feet (46 m) and 500 feet (150 m) from the center (or eye) of the tornado . The widest tornado as measured by actual radar wind measurements was the Mulhall tornado in northern Oklahoma , part of the 1999 Oklahoma tornado outbreak , which had a radius of maximum wind of over 800 metres (2 @,@ 600 ft) .

= = Tropical cyclones = =

An average value for the RMW of 47 kilometres (29 mi) was calculated as the mean (or average) of all hurricanes with a lowest central atmospheric pressure between a pressure of 909 hectopascals (26 @.@ 8 inHg) and 993 hectopascals (29 @.@ 3 inHg) . As tropical cyclones intensify , maximum sustained winds increase as the RMW decreases . The heaviest rainfall within intense tropical cyclones has been observed in the vicinity of the RMW .

The radius of maximum wind helps determine the direct strikes of tropical cyclones . Tropical cyclones are considered to have made a direct strike to a landmass when a tropical cyclone passes close enough to a landmass that areas inside the radius of maximum wind are experienced on land . The radius of maximum wind is used within the maximum potential intensity equation . The Emanuel equation for Maximum Intensity Potential relies upon the winds near the RMW of a tropical cyclone to determine its ultimate potential .

The highest storm surge is normally coincident with the radius of maximum wind . Because the strongest winds within a tropical cyclone lie at the RMW , this is the region of a tropical cyclone which generates the dominant waves near the storm , and ultimately ocean swell away from the cyclone . Tropical cyclones mix the ocean water within a radius three times that of the RMW , which lowers sea surface temperatures due to upwelling .

Much is still unknown about the radius of maximum wind in tropical cyclones , including whether or not it can be predictable .