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Hurricane Research Division

Frequently Asked Questions

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Subject: D4) What does "maximum sustained wind" mean ? How does it relate to gusts in tropical cyclones ?

Contributed by Chris Landsea

The National Hurricane Center uses a 1 min averaging time for reporting the sustained (i.e. relatively long-lasting) winds. The maximum sustained wind mentioned in the advisories that NHC issues for tropical storms and hurricanes are the highest 1 min surface winds occurring within the circulation of the system. These "surface" winds are those observed (or, more often, estimated) to occur at the standard meteorological height of 10 m (33 ft) in an unobstructed exposure (i.e., not blocked by buildings or trees).

Since the inauguration of the Automatic Surface Observation System (ASOS) the National Weather Service has adopted a two minute average standard for its sustained wind definition. This is because the ASOS stations average and report their wind data over a two minute period. There is no conversion factor to change a two minute average wind into a one minute average wind, and it is pointless to try to estimate the highest one minute wind over a two minute period, as they are essentially the same.

Gusts are a few seconds (3-5 s) wind peak. Typically in a hurricane environment, the value of the maximum 3 second gust over a 1 minute period is on the order of 1.3 times (or 30% higher than) than the 1 min sustained wind.

One complication with the use of the 1 min averaging time for the standard for sustained wind in the Atlantic and Northeast Pacific tropical cyclone basins (where the United States has the official World Meteorological Organization tropical cyclone advisory responsibilities) is that in most of the rest of the world, a 10 min averaging time is utilized for "sustained wind". While one can utilize a simple ratio to convert from peak 10 min wind to peak 1 min wind (roughly 12% higher for the latter), such systematic differences to make interbasin comparison of tropical cyclones around the world problematic.

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National Hurricane Center



NOAA Aircraft Operations Center

Powell, M.D., S.H. Houston, and T.A. Reinhold, 1996: "Hurricane Andrew's Landfall in South Florida, Part I: Standardizing measurements for documentation of surface wind fields." Wea. Forecast. v.11, p.329-349

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