

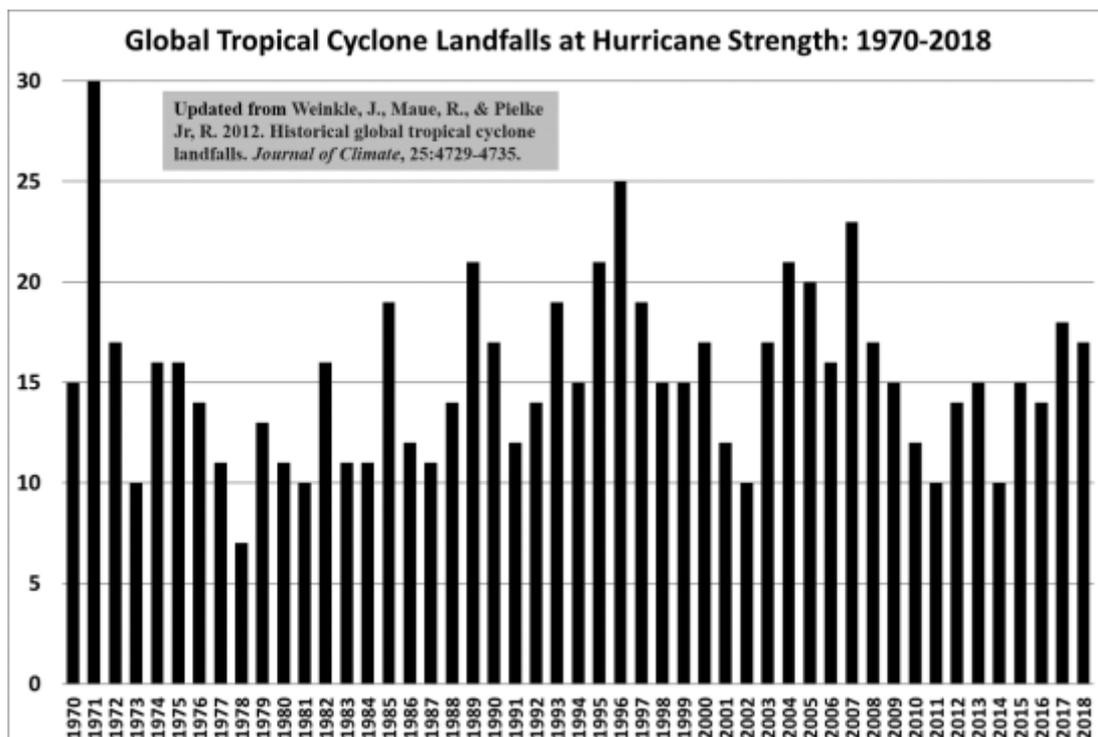
Global Tropical Cyclone Landfalls, 1970 to 2018

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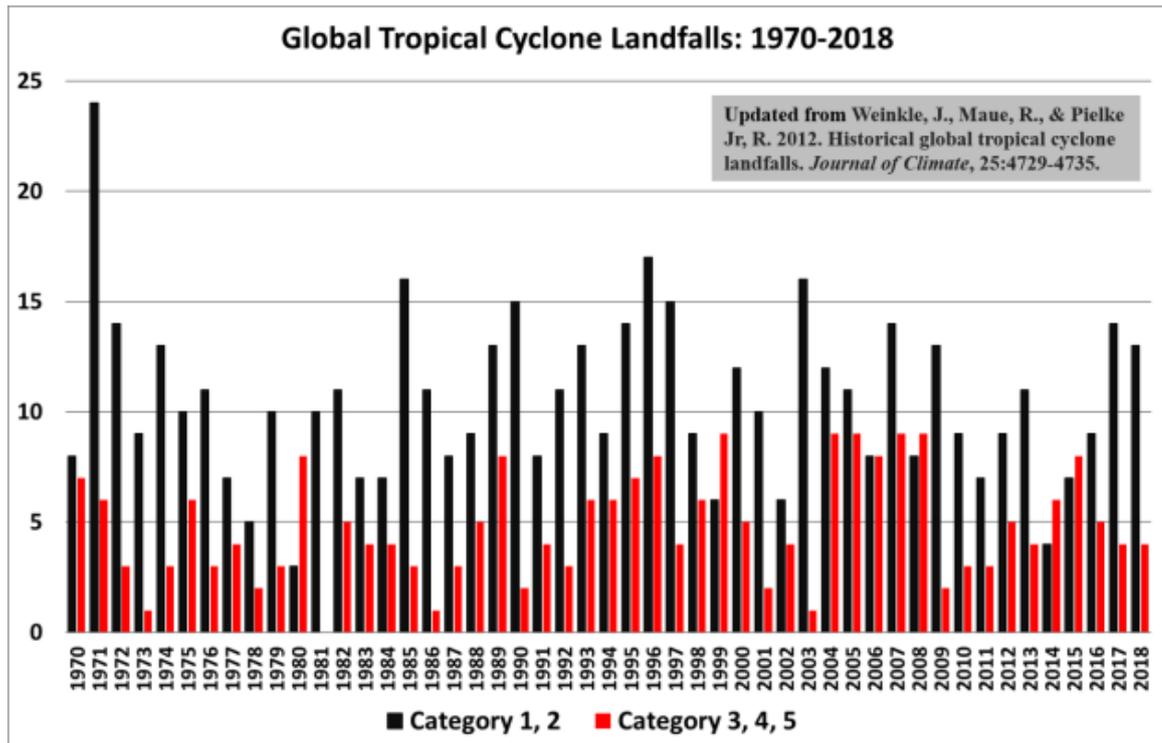
In 2012 we (along with Jessica Weinkle) published a time series of historical global tropical cyclone landfalls (available [here in PDF](#)). Much to our surprise at the time, no such database had previously been assembled. Since then we have updated our dataset on an annual basis, and report here some details of our 2019 update, which extends our global time series to 1970 to 2018.

We employ the definition of a tropical cyclone landfall used by the U.S. National Hurricane Center as “[the intersection of the surface center of a tropical cyclone with a coastline](#).” We include all major land areas and islands, but do not include some tiny islands (see our paper for details). Also, landfall data are available for many basins prior to 1970, which we employ as the starting date for our comprehensive, homogenous, global dataset. Finally, for consistency we categorize tropical cyclones using the Saffir/Simpson scale, recognizing that other metrics of intensity are used around the world.

The figure below shows the total number of tropical landfalls at hurricane strength for 1970 through 2018. Note that 2018 data are preliminary, and will be finalized when each reporting agency finalizes their “best track” data. There is no obvious or simple trend in the data, and one can generate up or down trends by picking and choosing dates to examine.



Similarly, the figure below shows these data separating out S/S category 1 and 2 storms (black bars) from those at S/S category 3+. Again, there are no simple trends observable over this period.



Here are some summary statistics for these data:

- All landfalls: 15 (median), 15.3 (average), 4.4 (sd)
- Categories 1 & 2 at landfall: 10, 10.5, 3.8
- Category 3+ at landfall: 4, 4.8, 2.5
- Most total landfalls in one year: 30 (1970)
- Fewest total landfalls in one year: 7 (1978)
- Most Category 3+ landfalls in one year: 9, (1999, 2004, 2005, 2007, 2008)
- Fewest Category 3+ landfalls in one year: 0 (1981)
- Most total landfalls over a 10-year period: 177 (1988-1997)
- Fewest total landfalls over a 10-year period: 120 (1975-1984)
- Total landfalls 2009-2018: 140
- Most Category 3+ landfalls over a 10-year period: 65 (1999-2008)
- Fewest Category 3+ landfalls over a 10-year period: 33 (1978-1987)
- Total Category 3+ landfalls 2009-2018: 44
- Total landfalls 1970-2018: 750, (516 were Categories 1 & 2, 234 were Category 3+)

While data on global tropical cyclone occurrence are of utmost importance in understanding storm dynamics and how they may be changing, now and in the future, landfall data are of



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particular importance to those whose focus is on damage, including insurance and reinsurance.

To that end, Aon has also started to publish annual statistics on global landfalls (available [here in PDF](#)). The Aon dataset, which uses slightly different definitions and methods than we do, is for 1980 through 2018 and is correlated with our dataset at 0.96 (more precisely: our counts differ only in 6 of 39 years, in most cases by just 1 storm).

Both datasets indicate for the world as a whole, and in each of its ocean basins that experience tropical cyclones, there is at present little empirical evidence to support claims that land-falling tropical cyclones have increased in number or intensity on climate time scales.

In an era where the weather is often the subject of contentious political debate and modern communication technologies can bring every disaster to our living rooms, it remains important to maintain an empirical perspective on long-term trends in those extreme events which cause death and destruction around the world.