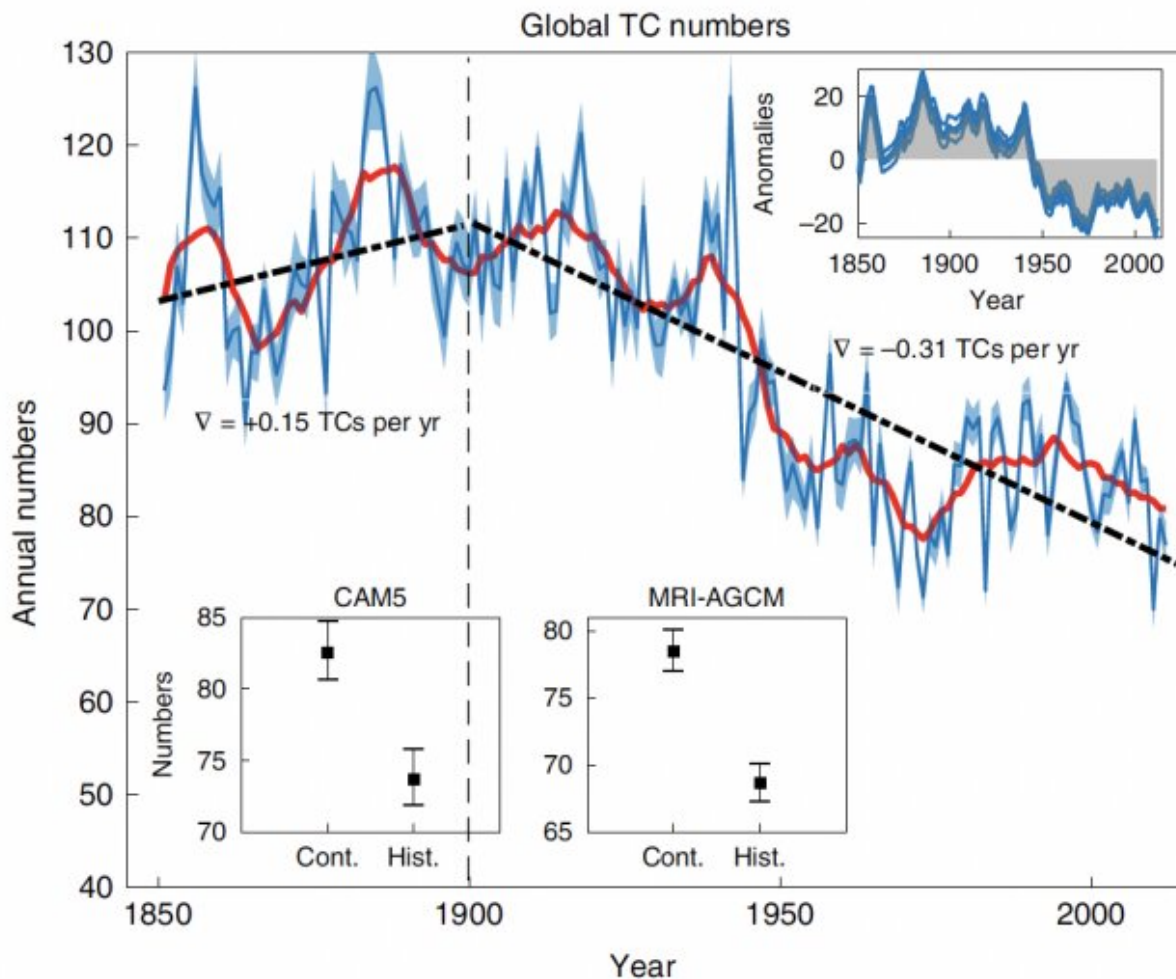


# Tropical cyclones have decreased alongside human-caused global warming, but don't celebrate yet

June 28 2022, by Savin Chand



A new study based on reanalysis data finds that tropical cyclones (also known as hurricanes) have been decreasing in number since the beginning of the 20th

century. Credit: Chand et al., *Nature Climate Change* 2022

The annual number of tropical cyclones forming globally decreased by about 13% during the 20th century compared to the 19th, according to research published today in *Nature Climate Change*.

Tropical cyclones are massive low-pressure systems that form in [tropical waters](#) when the underlying [environmental conditions](#) are right. These conditions include (but aren't limited to) [sea surface temperature](#), and variables such as [vertical wind shear](#), which refers to changes in wind speed and direction with altitude.

[Tropical cyclones](#) can cause a lot of damage. They often bring extreme rainfall, intense winds and coastal hazards including erosion, destructive waves, [storm surges](#) and estuary flooding.

The Intergovernmental Panel on Climate Change's latest [report](#) detailed how human emissions have warmed [tropical oceans](#) above pre-industrial levels, with most warming happening since around the middle of the 20th century. Such changes in sea surface temperature are expected to intensify storms.

At the same time, [global warming](#) over the 20th century led to a weakening of the underlying [atmospheric conditions](#) that affect tropical cyclone formation. And our research now provides evidence for a decrease in the frequency of [tropical cyclones](#) coinciding with a rise in human-induced global warming.

## **Reckoning with a limited satellite record**

To figure out whether cyclone frequency has increased or decreased

over time, we need a reliable record of cyclones. But establishing this historical context is challenging.

Before the introduction of geostationary weather satellites in the 1960s (which stay stationary in respect to the rotating Earth), records were prone to discontinuity and sampling issues.

And although observations improved during the satellite era, changes in satellite technologies and monitoring throughout the first few decades imply global records only became consistently reliable around the 1990s.

So we have a relatively short post-satellite tropical cyclone record. And longer-term weather trends based on a short record can be obscured by [natural climate variability](#). This has led to conflicting assessments of tropical cyclone trends.

## **Declining global and regional trends**

To work around the limits of the tropical cyclone record, our team used the Twentieth Century Reanalysis [dataset](#) to reconstruct cyclone numbers to as far back as 1850. This reanalysis project uses detailed metrics to paint a picture of global atmospheric weather conditions since before the use of satellites.



Beaches at Bowen, Queensland, were photographed while being hit by a cyclone in 1903. Credit: Wikimedia

Drawing on a link to the observed weakening of two major atmospheric circulations in the tropics—the Walker and Hadley circulations—our reconstructed record reveals a decrease in the annual number of tropical cyclones since 1850, at both a global and regional scale.

Specifically, the number of storms each year went down by about 13% in the 20th century, compared to the period between 1850 and 1900.

For most tropical cyclone basins (regions where they occur more regularly), including Australia, the decline has accelerated since the 1950s. Importantly, this is when human-induced warming also accelerated.

The only exception to the trend is the North Atlantic basin, where the number of tropical cyclones has increased in recent decades. This may be because the basin is recovering from a decline in numbers during the late 20th century due to [aerosol](#) impacts.

But despite this, the annual number of tropical cyclones here is still lower than in pre-industrial times.

## It's a good thing, right?

While our research didn't look at cyclone activity in the 21st century, our findings complement other [studies](#), which have predicted tropical cyclone frequency will decrease due to global warming.

It may initially seem like good news fewer cyclones are forming now compared to the second half of the 19th century. But it should be noted *frequency* is only one aspect of risk associated with tropical cyclones.

The geographical distribution of tropical cyclones is shifting. And they've been getting [more intense](#) in recent decades. In some parts of the world they're moving closer to coastal areas with growing populations and developments.

These changes—coupled with increasing rain associated with tropical cyclones, and a trend towards hurricanes lasting longer after [making landfall](#)—could point to a future where cyclones cause unprecedented damage in tropical regions.

Then again, these other factors weren't assessed in our study. So we can't currently make any certain statements regarding future risk.

Moving forward, we hope improvements in climate modeling and data will help us identify how human-induced climate change has affected other metrics, such as [cyclone](#) intensity and landfalling activity.

**More information:** Savin S. Chand et al, Declining tropical cyclone frequency under global warming, *Nature Climate Change* (2022). [DOI: 10.1038/s41558-022-01388-4](https://doi.org/10.1038/s41558-022-01388-4)

This article is republished from [The Conversation](#) under a Creative Commons license. Read the [original article](#).

Provided by The Conversation

Citation: Tropical cyclones have decreased alongside human-caused global warming, but don't celebrate yet (2022, June 28) retrieved 12 September 2024 from <https://phys.org/news/2022-06-tropical-cyclones-decreased-human-caused-global.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.