The Fujiwhara effect: When cyclones 'dance'

When two hurricanes (or cyclones, depending on where you live), spinning in the same direction, are brought close together, they begin 'an intense dance around their common center' – this interaction is called the Fujiwhara effect.

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The Fujiwhara effect refers to a particular, highly unusual interaction between two cyclones/hurricanes. (NWS/Representational)

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The United States west coast recently **witnessed Hurricane Hilary** (a sub-tropical storm by the time it hit the US), prompting the National Hurricane Centre (NHC) to **issue its first ever tropical storm watch** for parts of Southern California. This was the latest incident in a string of unusual weather phenomena in the region.

Earlier this year, California witnessed an unusually wet winter, with at least twelve **'atmospheric river' storms** battering the state. 'Atmospheric rivers' are vast airborne currents carrying dense moisture and hanging low in the atmosphere.

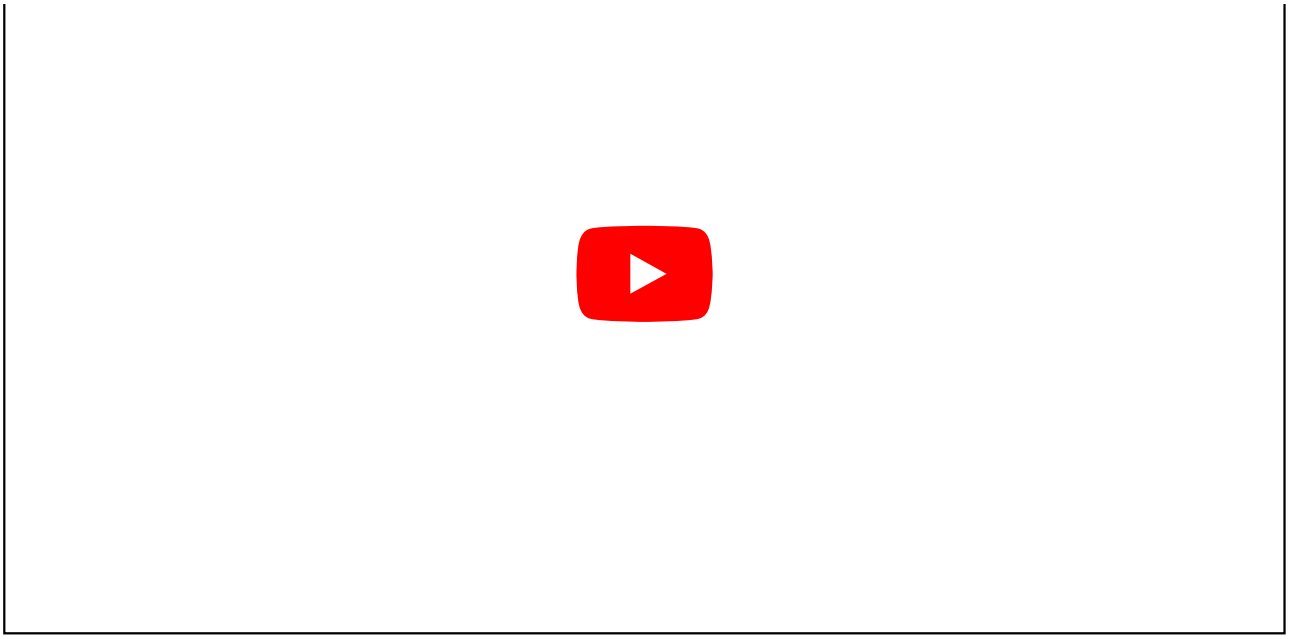
In one of these storms, two small areas of low pressure were drawn together in a 'dance': instead of merging together, the stronger low pressure area became the dominant one in the system – displaying, for a brief moment, what is known as the 'Fujiwhara effect'.

GOES-16 satellite imagery over the eastern Pacific Ocean from July 25 to August 1. Hurricane Irwin on the left collided with Hurricane Hilary on the right; the two merged before fading out over the ocean. (NWS)

As world temperatures rise, increasing the intensity and frequency of cyclones across oceans, we discuss this atypical phenomenon.

What is the Fujiwhara effect?

As per the National Weather Service (NWS), when two hurricanes (or cyclones, depending on where you live), spinning in the same direction, are brought close together, they begin 'an intense dance around their common center' – this interaction between two cyclones is called the Fujiwhara effect.



If one hurricane's intensity overpowers the other, then the smaller one will orbit it and eventually crash into its vortex to be absorbed. On the other hand, if two storms of similar strengths pass by each other, they may gravitate towards each other until they reach a common center and merge, or merely spin each other around for a while before shooting off on their own paths.

In rare instances, the two 'dancing' cyclones, if they are intense enough, may merge with one another, leading to the formation of a mega cyclone capable of wreaking havoc along coastlines.

Identified by Sakuhei Fujiwhara, a Japanese meteorologist, this phenomenon first found mention in a paper published in 1921. Decades after the paper was published, it was observed for the first time over the western Pacific ocean, when typhoons Marie and Kathy merged in 1964.

The 'dance' and its damage

In March 2023, powerful winds tormented the Bay Area and other parts of Central and Southern California, uprooting trees, shattering window glass, and disrupting the power supply, the Los Angeles Times reported.

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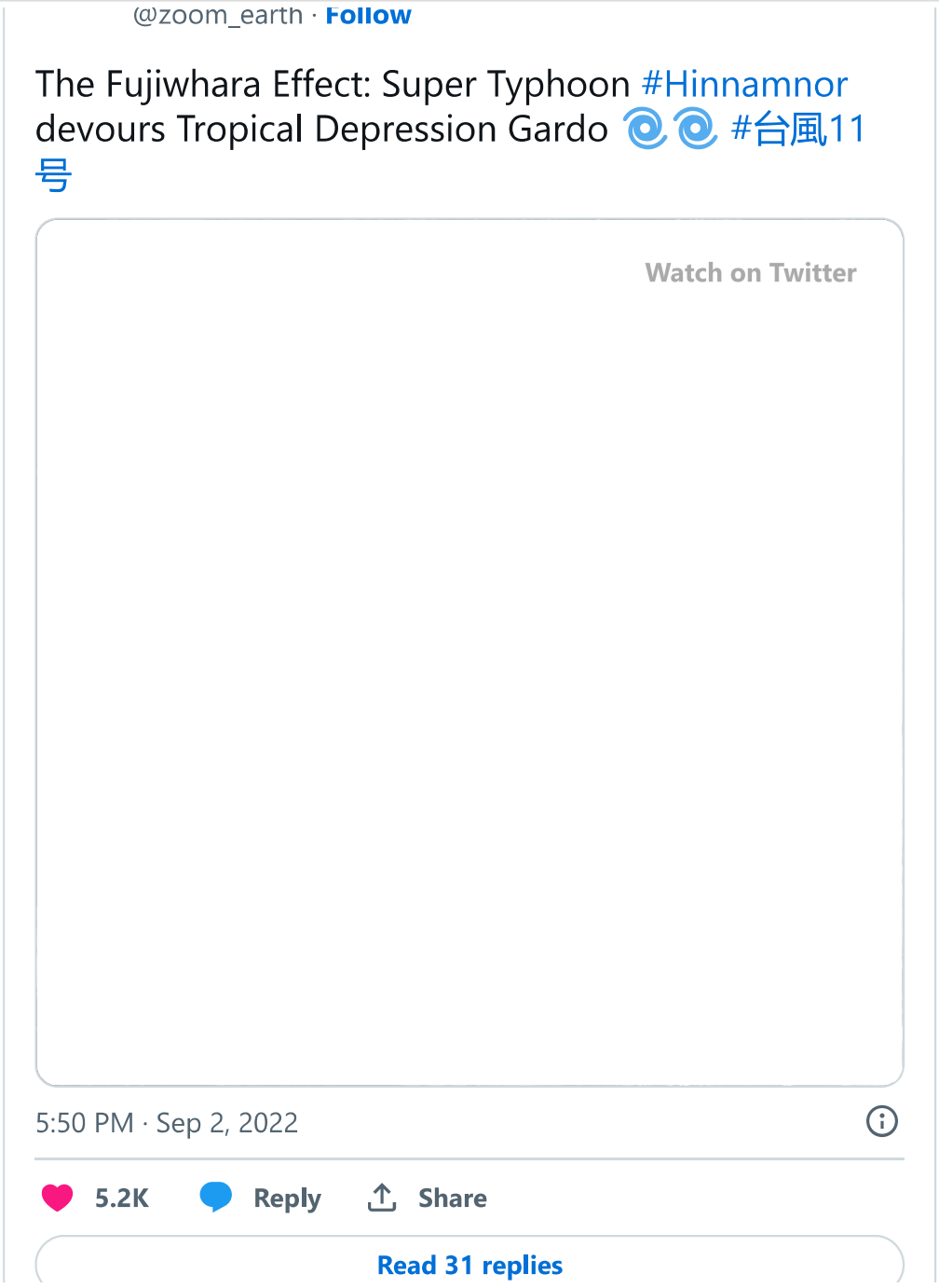
indicated that the Fujiwhara effect was contributing to peak gusts upward of 60 to 75 mph in the Santa Cruz Mountains, with 50- to 60-mph winds across Santa Cruz and Santa Clara counties.

The Bay Area storm came months after typhoon Hinnamnor, the strongest tropical cyclone of 2022, underwent the same effect with tropical storm Gardo in the eastern Pacific ocean. The two cyclones were locked in a dance for over a day, before Gardo was assimilated in Hinnamnor.



South Korea bore the brunt of these systems, and 7 people were killed from drowning.

In 2017, the effect resulted in two cyclones – Hilary and Irwin – to merge together, again, over the eastern Pacific ocean.

Hurricane scientist David Longshore, who observed in effect in hurricanes Hilary and Irwin in 2017 noted that the influx of additional heat, moisture, and positive

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Additionally, the occurrence of the Fujiwhara effect also makes cyclonic systems harder to predict, as every interaction between two storm systems is unique and difficult to assess within the present climate models.

How is this related to today's climate?

Experts have noted the rising frequency of this unusual effect, attributing it to a rapidly warming world and the subsequent heating of ocean waters.

Ravi Shankar Pandey, a research scholar at the Department of Atmospheric Science at the National Central University in Taipei, found that in the 4 years between 2013 and 2017, there were 10 cases of the Fujiwhara Effect in the northwest Pacific Ocean.

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Contending that a warming climate is giving rise to stronger cyclones, and thus, increasing the possibility of the Fujiwhara effect, Pandey noted that "there has been a 35 per cent increase in the strength of typhoons that have hit Taiwan between 1977 and 2016. This happened due to a 0.4 to 0.7°C rise in the sea surface temperature during these 40 years in the northwest Pacific," as quoted by *Down to Earth*.

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