Case Study of Hurricane Harvey (2017)

Manuel Leal Morin, Allison Duran, Angie Lizette Garza, Capri Crespo

Mentors: Rusty Low, Cassie Soeffing, Peder Nelson, Yashraj Patil

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Abstract

This research describes hurricanes, more specifically, Hurricane Harvey, and the many ways that clouds contributed to its formation, strength, and effects. Clouds affect the storm power, organization, distribution, and how we can track it. Hurricane Harvey was a devastating hurricane that passed through Texas in 2017. Cloud formation and coverage during the hurricane made the natural disaster much stronger, leading it to become a category 4. Due to the several effects of climate change, El Niño, and La Niña, the hurricane posed even more threats to life and cities along the coast. By using patterns in a time lapse cloud cover, we can analyze the relation between cloud cover and hurricanes. This can help us better understand what cloud cover is showing us about general hurricane characteristics, allowing us to better combat these disasters. This research is crucial to the information and understanding we can obtain from such a horrific natural disaster.

Research Question

Our group has been focusing on not only how hurricanes form, but how cloud coverage has an impact. We wanted to see if cloud coverage can help us predict future storms or for any other kind of information over hurricanes. What can cloud coverage tell us about hurricane Harvey when it occurred in 2017?

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Introduction

Hurricane Harvey occurred in August 2017; it was a category 4 hurricane that significantly impacted Texas. It first made landfall nearby San Jose Island and gradually went upwards to Houston. Houston was one of the bigger cities that were impacted by hurricane Harvey, making it flood with over 50 inches of rain in four days. One big impact that caused hurricane Harvey to become so strong and powerful was because of the weather pattern called La Niña. La Niña is a weather pattern that brings warmer and dryer temperatures, this causes the Gulf of Mexico to get warmer and making it easier for storms and hurricanes to form. The year 2017, Texas was experiencing La Niña, making hurricane Harvey easier to grow and become stronger.

Discussion

Now that we understand how La Niña influences hurricanes and an understanding of cloud coverage, how can all this information benefit us? Well, now that we understand that hurricanes and storms have a bigger chance to form and become stronger during La Niña, every year with La Niña weather pattern people can be more aware that storms and hurricanes are more probable to form. Lastly, people can also better understand cloud coverage and how it affects hurricanes.

Methodology

Our team worked on looking through different satellite images and trying to figure out how cloud coverage had an impact on hurricanes, more specifically hurricane Harvey from 2017. One thing we realized from the year 2017 was that we were experiencing La Niña, we decided to look more into how La Niña influences hurricanes. During our research we realized that La Niña makes it easier for hurricanes and storms to form due to the warm and dry temperatures it brings. Taking this into consideration, we decided to compare satellite images from La Niña weather pattern and El Niño weather pattern. This is when we realized that the different weather patterns bring different cloud coverages.

Ground Satellite Image - 2020
Year of La Niña
Warmer temperature causing more storms and hurricanes to form, and making clouds to move off the coast.

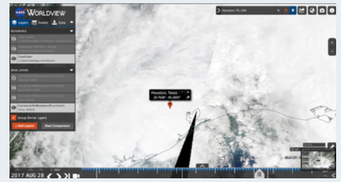
Ground Satellite Image - 2023
Year of El Niño
Cooler temperature causing less storms and hurricanes to form, making clouds to stay above ground

Conclusion

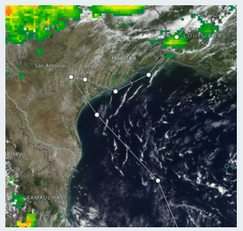
Overall, La Niña did have a big impact on hurricane Harvey and on its cloud coverage. La Niña brought little to no cloud coverage before hurricane Harvey, and we learned that it was due to the warm waters attracting clouds to create storms and hurricanes. With all this information, it can help predict future storms and hurricanes by the current weather pattern (Either El Niño or La Niña) and by looking at the cloud coverage before a storm. If there is little to no cloud coverage during La Niña before a storm, it can be an indication that the storm will be big and strong. Compared to a lot of cloud coverage during El Niño, this can show that it will not be as big or strong of a storm.

Results

Since La Niña brings warmer and dryer temperatures to the south and increases the temperatures of Gulf of Mexico waters, it makes it easier for storms and hurricanes to form in those kinds of warm conditions. This makes clouds move towards the coast and forms hurricanes and storms. This leaves little to no cloud coverage left from the ground. If you look up to the sky during La Niña, you will see little to no clouds and the reasoning behind that is because most clouds are off the coast creating storms. Compared to El Niño, if you look up in the sky during this weather pattern, you will see bigger and fluffier clouds. This is because the waters are not warm enough to attract clouds to create storms.



Ground Satellite Image - 2017
Year of La Niña
During hurricane Harvey



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