HOW DOES A HURRICANE FORM?

What is a hurricane?

A **hurricane** is a tropical storm that feeds on moisture and wind from warm oceans to form a rotating cluster of clouds. Hurricanes are the most powerful storms on our planet. Although tropical storms form all over the world and can be known by several names, the word *hurricane* applies only to storms that form near the equator over the Atlantic Ocean or eastern Pacific Ocean. Hurricane season usually happens from mid-May through November each year.

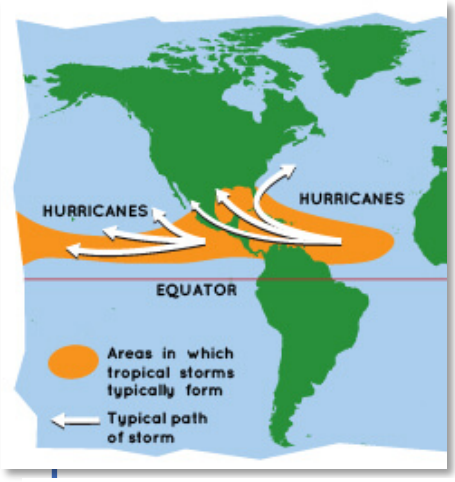

Figure 1: Hurricanes form in the orange areas - the Atlantic and eastern Pacific Oceans.. Modified from source: https://spaceplace.nasa.gov/hurricanes/en/

When atmospheric conditions are right, hurricanes begin to form. Let's find out how that happens.

What's a hurricane made of?

The basic ingredients for a hurricane are air and water.

Near the equator, the ocean water is so warm that it warms the air right above it. When the moist ocean air becomes warm, it rises, leaving less air below. This gap is known as a **low pressure area**. As winds blow across the ocean, higher pressure air pushes its way into the low pressure area.

Then the process begins again: the newly-arrived air picks up moisture and becomes warm, it rises and leaves a low pressure area underneath, and nearby high pressure air pockets move in to take its place.

When the warm air gets high enough, it begins to cool down. The water in the cooling air forms **cumulonimbus clouds**, which are large, dark clouds full of rain. As the cycle repeats, more clouds develop, creating a column pattern, and the wind builds into a spinning storm that can measure over 100 miles across.

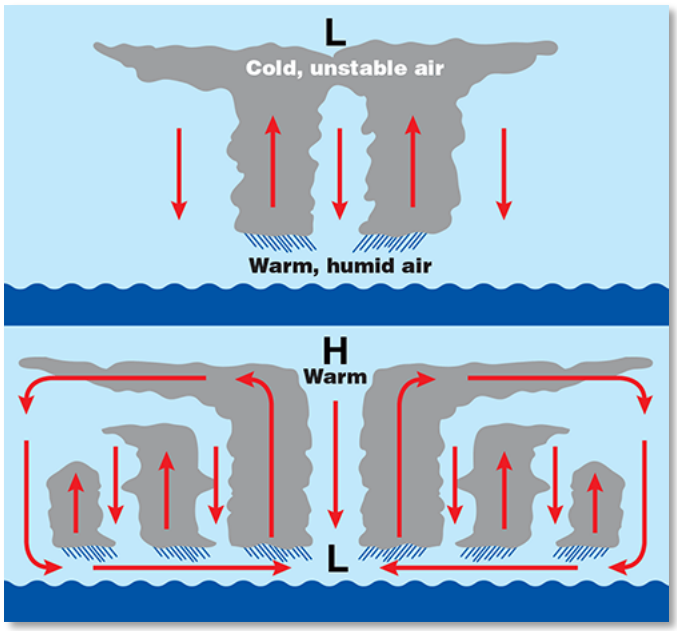

Figure 2: The columns of clouds continue to build and rotate. Source: https://scijinks.gov/hurricane/

What happens to the spinning clouds?

The clouds form a rotating thunderstorm, feeding off a ready supply of its preferred fuel—warm, moist air from the ocean's surface.

FUN FACT Because of the Earth's rotation, storms that form north of the equator spin **counterclockwise** ↺. If the storm forms south of the equator, it spins **clockwise** ↻.

The spinning builds momentum as more fuel is added, and as the storm rotates faster and faster, an eye is created. The **eye** is a calm area of low pressure in the middle of the storm. Soon the storm's winds reach very high speeds, pushing it into a new category.

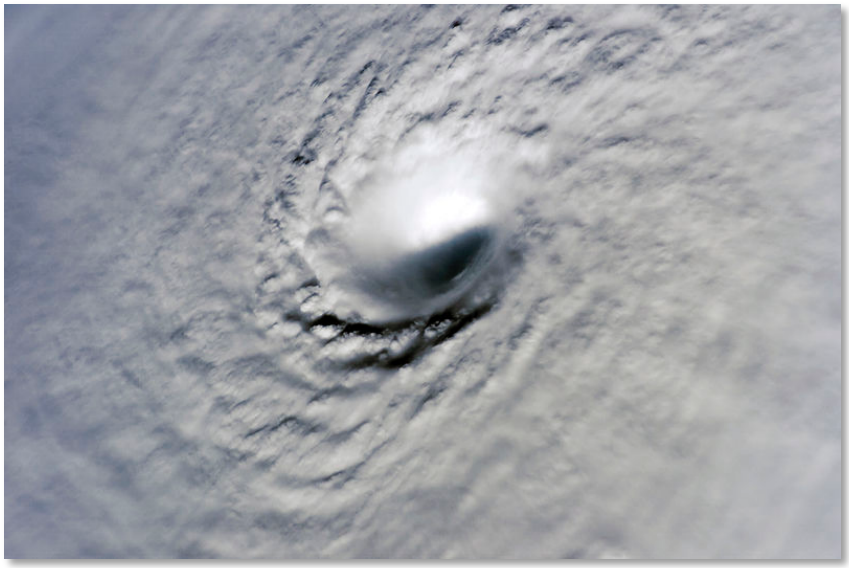

Figure 3: As seen from space, the eye in the center of a storm.
Source: https://commons.wikimedia.org/wiki/File:Hurricane_Wilma_eye.jpg

When does the storm become a hurricane?

With the right conditions, a storm forming near the equator in the Atlantic or Pacific oceans reaches wind speeds of 74 miles per hour and is now called a hurricane. Some storms have wind speeds over 150 miles per hour! They can be extremely dangerous if they hit land.

Scientists use satellites, aircraft, boats, and radar to find and measure hurricanes. Once they know how fast the winds are traveling in a storm, they classify it into one of five categories. Most hurricanes continue to grow while they are over water, so they may move into higher categories as time passes.

Category	Wind Speed (mph)	Damage at Landfall
1	74-95	Minimal
2	96-110	Moderate
3	111-129	Extensive
4	130-156	Extreme
5	157 or higher	Catastrophic

Table 1: Hurricanes are divided into five categories based on their wind speed.
Source: https://scijinks.gov/hurricane/

Hurricanes are at their strongest when they are at sea. Once they reach land, they begin to lose strength because they are unable to feed on warm, moist sea air. But hurricanes that make landfall can still cause terrible damage from flooding and high winds. The good news is scientists are able to find and track hurricanes before they reach land, giving us time to get to a safe place.

Why do we study hurricanes?

Hurricanes, made of only air and water, form over warm oceans and are pushed toward land by wind. These storms are an excellent example of how fierce nature can be. By learning how hurricanes work, scientists are able to predict where these storms will go, so they can warn us and keep us safe.

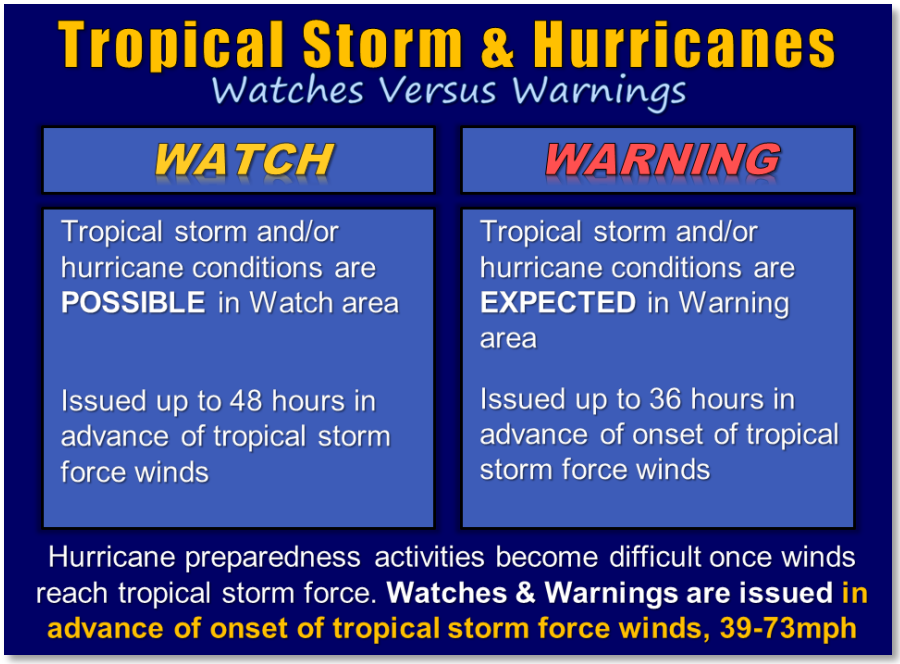

Figure 4: A public announcement explaining the difference between a hurricane watch and a hurricane warning. Modified from source: https://www.weather.gov/images/mob/tropics/Criteria_Tropical.png

Sources

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Image Sources

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ISS Crew. *Hurricane Wilma Eye.* 19 October 2005, *Wikimedia Commons*, https://commons.wikimedia.org/wiki/File:Hurricane_Wilma_eye.jpg.