**PAESTA Podcast Series  -- You Asked, We Answered!**

**Episode 30  -- How Do Hurricanes Form?**

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Hurricane season hits the Atlantic from June to November every year. Hurricanes that hit the United States form in the Caribbean or the Atlantic Ocean. Many people are familiar with hurricanes and may know them as typhoons or cyclones depending on where they live in the world. Most people know they are bad storms and cause a lot of damage but do they really know how a hurricane is formed? My name is Alyssa Abbonizio and I am a junior at Penn State Brandywine. In this podcast, I will explain how a hurricane is formed, how it’s categorized, and I’ll use examples of the worst hurricanes the United States has seen recently to help you understand how they work.

A hurricane is created when a disturbance forms in the atmosphere that becomes an area of low pressure [1]. Winds coming from areas of high pressure make there way to the center of the hurricane. In order for a hurricane to form, the water needs to be warm. The oceans warmth and moisture provides energy that makes the warm air in the center of the storm rise. As it condenses in the atmosphere, a thunderstorm is created. This can lead to a tropical depression, which turns into a tropical storm, then eventually a hurricane. Heat is produced as the rising air in the center condenses forcing it to rise faster. The air is pushed out of the top of the storm and more air has to come in at the surface to take the previous airs place. To make this clearer, let’s picture a chimney with smoke coming out of the top of it, that’s what a hurricane looks like when the air is being pushed out of the top.

An interesting thing about hurricanes is that they always travel counterclockwise [1]. When low atmospheric pressure forms, wind begins to blow toward the center of the storm near the surface. While this is happening, Earth is rotating under the atmosphere. Earth’s spin causes a deflection of the wind to the right in the Northern Hemisphere. You may know this is called the Coriolis effect and because of this, all storms rotate counterclockwise. To visualize this, picture a record album spinning on a turntable and draw a line from the edge of the record to the center as the records spinning. You’ll notice the line will be curved, as your motion is straight. As the fuel supply cools, the hurricane loses strength.

The eye of the hurricane forms at the center of the storm. The surface pressure is a minimum value at the center of the storms rotation [2]. The severe rotation of the air causes air to evacuate from the center of the storm. The eye of a hurricane is often described as a stadium effect. If you fill a glass of water and stir the water forcefully, you’ll see the water level in the middle fall. Because the mass is being moved from the center, it moves toward the edges. This is what the center of the eye looks like in a hurricane. Once the hurricane weakens, the eye breaks down.

To make the predicted hazards of looming hurricanes clearer to emergency managers, the National Oceanic and Atmospheric Administration’s hurricane forecasters use a disaster-potential scale, which assigns storms to five categories [3]. It’s used to give an estimate of the potential property damage and flooding expected with a hurricane. The scale was created by Herbert Saffir, a consulting engineer and Dr. Bob Simpson, who was the director of the National Hurricane Center, in 1969. The World Meteorological Organization was doing a report on structural damage due to windstorms and Dr. Simpson added information about hurricanes in each category.

A Category Five is the largest and most dangerous category a hurricane can be and is considered catastrophic [4]. They have wind speeds of over 157 miles per hour and a surge of more than 5.5 meters above normal water levels. The scale also considers the amount of damage the storm can do and that is taken into consideration when categorizing a hurricane. A category 4 is the second highest category labeled extreme and has wind speeds of 130 to 156 miles per hour and a storm surge of 13-18 feet [5]. A Category 3 has wind speeds of 111 to 129 miles per hour and is considered extensive with a storm surge of 9 to 12 feet.A category 2 hurricane is moderate with wind speeds of 96 to 110 miles per hour with a 6 to 8 foot storm surge. A category one is minimal and has wind speeds of 74-95 miles per hour. The storm surge is 4 to 5 feet. Once a storm hits 74 miles per hour, it’s considered a hurricane.

Most recently, Hurricane Matthew hit the United States in early October. It developed in the Atlantic Ocean and traveled through the Caribbean before landing in Florida. It wreaked havoc in Florida and then traveled up the east coast into the Carolinas and caused damage there as well. It was a category 4 and had wind speeds of 135 mph [6].

In 2005, Hurricane Katrina ripped through New Orleans, Louisiana destroying everything in its path. It was classified as a Category Five hurricane as it used warm air and convection to become a dangerous hurricane [4]. The winds exceeded 175 miles per hour and Katrina is still considered one of the worst hurricanes to ever hit the United States.

That is all on how a hurricane develops. I hope the visuals I described help you picture what a hurricane looks like and helps you understand how they work. Again, my name is Alyssa Abbonizio and I hope you found this podcast enjoyable.

*(This audio file was recorded by Alyssa Abbonizio on November 6, 2016)*

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