



What are hurricanes, typhoons and tropical cyclones?

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I've come into the studio to investigate the next weather phenomenon, hurricanes, because here in the UK we are fortunate to rarely encounter such extreme weather. Cyclones, typhoons and hurricanes are all names for severe tropical storms; some of the most destructive weather systems on the planet. Storm-force winds, torrential rain, massive pressure falls and storm surges are all produced simultaneously by this most deadly weather.

Around the Indian Ocean and the south-east Pacific these massive storms are known as cyclones. Cyclones tend to affect countries like Madagascar, India, and even parts of Australia. In the north-west Pacific, tropical storms are called typhoons, these often make the news when they batter Japan and parts of South East Asia.

However, the tropical storms we hear most about are those closer to home – hurricanes. Every year we hear about the devastation caused by hurricanes across the Caribbean and the south-eastern USA. You may remember the last really big one, hurricane Katrina, which struck New Orleans in August 2005. This devastating hurricane was one of the most expensive natural disasters in history. But whilst hurricanes wreak their damage around the Caribbean and the USA, most of them begin life thousands of miles away, out in the Atlantic, close to north-west Africa. Hurricanes draw their energy from warm seas, they can only begin to form where the ocean is warmer than 26 degrees Celsius or so, and can really only become a major storm when the sea is warmer than 28 degrees Celsius. That's like a warm bath, so you won't find one around the UK anytime soon!

Like a grain of sand in an oyster creating a pearl, hurricanes need an area of thunderstorms or a developing wave pattern to form around. Neither of these things occur near high pressure, where descending air keeps the atmosphere stable and the weather generally fine. Other limitations, like wind patterns in the upper atmosphere and the forces caused by the Earth's rotation, mean hurricanes are limited to an area between 8 and 20 degrees north of the equator. This may seem like a small zone, but it's exactly where the easterly trade winds converge and there is a plentiful supply of moisture. So it's a prime location for thunderstorms and wave development, it is the birthplace of the majority of hurricanes.

Everything is in place. Converging trade winds meet, the warm air heavily laden with water vapour, is forced to rise. In the cooling air, water vapour condenses into droplets. This change of state, from water vapour to liquid, releases latent heat, which further warms the atmosphere and allows it to become more and more buoyant. The air rises even more rapidly, and produces more and more violent thunder clouds.

But that's only the beginning. Trade winds, drawn in at the earth's surface arrive on a curved path caused by the Earth's rotation. Here we see the first recognisable pattern of a spinning tropical storm. As the storm grows larger more moist warm air is drawn in near the surface, more water vapour condenses into cloud droplets and more latent heat is released. This is how



more energy is driven into the storm and the speed of rotation increases. This system is now a tropical storm. When the surface winds reach sustained speeds of 74 miles an hour or more, the storm is officially a Category 1 hurricane.

We've all seen pictures of hurricanes hitting land, but what is happening inside the storm? Rising currents of warm, moist air form thunder clouds. As the air cools and becomes more dense, it falls again, and we get an alternating pattern of storm clouds and clear slots in between. This gives us the appearance of spiralling rain bands which we see in satellite pictures looking down on hurricanes from above. Hurricanes are measured on a scale from 1 to 5, depending on the wind strength. As a hurricane grows in intensity it develops a very distinctive structure with what looks like a hole in the middle of a swirling mass of clouds. This clear zone in the centre of the storm is called 'the eye' and around it is the 'eye wall'. The eye wall is the most destructive part of the hurricane, containing the most severe thunderstorms and the very strongest winds. In a Category 5 hurricane, winds in the eye wall can exceed 155 miles an hour. Yet in the eye itself the winds drop right away to give a short-lived, eerie calm.

As well as causing massive damage simply because of their destructive strength, hurricane force winds can have an even more devastating side effect. Have you ever blown hard across the surface of a hot drink, and spilt a little bit over the edge? In 2005, Hurricane Katrina blew a wall of seawater, known as a 'storm surge' ahead of it which was 8 metres high. It swept over New Orleans' sea defences, engulfing most of the city.

We are getting better and better at forecasting the strength and direction of hurricanes, giving people living in their path precious time to protect themselves and their property. And we are even able to predict roughly how many storms there will be in each Atlantic hurricane season, information that is very valuable to the insurance industry. But we still have lots to learn about tropical storms, especially what the impact of climate change will be on the strength and number of these storms and where they are likely to go.