National Weather Service Forecast Office – Tampa Bay Area
2525 14th Ave SE, Ruskin, FL 33570
(813) 645-2323, 8 AM to 4 PM, M-F

Questions from a K-5 Summer Camp
8/8/2008

The following questions are from students at a summer camp near Sebring, FL. The camp is for students entering Kindergarten to fifth grade.

From Hayden: How big is the eye of a hurricane?
The eye of a tropical storm or a hurricane is usually 20 to 40 miles wide but can range from 5 miles to 100 miles wide. Large hurricane eye walls can push a lot of water onshore as the storm makes landfall. This water can be over 25 feet deep and is called the "storm surge". More hurricane facts can be found at http://www.aoml.noaa.gov/hrd/tcfaq/tcfaqHED.html. A fun training on tropical cyclones can be found at http://www.srh.noaa.gov/jetstream/tropics/tc.htm.

From Kaylan: How powerful are the strongest tornados?
The United States averages 1,200 tornadoes each year. Florida averages 54 tornadoes each year which makes the state 4th among the states with the most tornadoes. Florida would be 1st if we counted waterspouts as tornadoes. A waterspout is a tornado over the water, a tornado occurs over the land.

The strongest tornado ever recorded occurred on May 3, 1999 in Moore, OK, which is a suburb of Oklahoma City. A special weather research radar recorded winds inside the tornado around 301 MPH just before 7 PM. Thirty six people were killed in this tornado. More than 10,000 buildings were destroyed. The death toll may have been higher if it were not for advanced warning from the National Weather Service and the outstanding job the local television and radio stations did in letting people know what was coming their way and the best way to protect themselves and their families.

In 1971, a gentleman named Doctor Theodore Fujita introduced the world to his tornado scale. The Fujita Scale ranged from F0 to F5, with F5 tornadoes producing winds of 261 MPH to 318 MPH. This is strong enough to level homes and throw cars over 300 feet. In 2007, the National Weather Service began rating tornado strength using the Enhanced Fujita Scale, the EF-Scale. A F5 tornado and an EF-5 tornado would cause the same amount of damage, but the wind speed estimate in the EF-Scale is more accurate than the wind speed estimate of the F-Scale.

From Nixolas: How is hail made?
Hail is a small ball or lump of ice that is produced by a thunderstorm. The hail can appear clear like glass or cloudy like fog on glass. To make hail, the atmosphere needs to push rain and cloud drops into the cold part of a storm. The best temperature to make hail in a storm is 9 degrees above zero; which was about 22,000 feet above the ground in central Florida on August 8, 2008. Florida storms can create hail during the summer. However, it is easier to make hail in states north of Florida because the thunderstorms are colder than the storms in Florida.

From Garret: How big are the waves in the ocean in a hurricane?
Many times the waves in hurricanes are 12 to 20 feet high, which is the height of a two story building. However, the strongest hurricanes can create waves over 60 feet. In 2004, Hurricane Ivan moved into the Gulf of Mexico and passed over six instruments that recorded waves more than 90 ft high. Hurricane Ivan was a Category 4 hurricane at the time with winds of 150 MPH.

From Clayton: Why is the center of hurricane calm?
This small question has a really big answer. The wind at the center of a hurricane is usually less than 15 MPH, which seems calm when compared to winds of 74 MPH or stronger in the eye wall of a storm. So why doesn't the strong wind reach the center of the eye of the hurricane?

1. Wind blows from high pressure to low pressure. Low pressure in the center of the hurricane causes wind from outside to move toward the eye.
2. Our Earth is a rotating globe. This keeps the air from blowing in a straight line from high to low pressure. Instead, the winds circulate about the center of a low pressure area with increasing speed as the center is approached. This force is called the Coriolis Effect.
3. I must now mention something called centripetal force. This is the force required to make the wind (or an object) follow a curved path. Think of tying a rope to a ball, and then spin the rope like a cowboy. The ball follows a curved path. The rope keeps the ball from flying across the room. The centripetal force is the tension on the rope.
4. The winds are relatively calm in the center of a hurricane because the Coriolis Effect and the centripetal force are in balance. The strong winds can never make it to the center of the storm (because the "rope" isn't strong enough to keep the ball from flying across the room).

From Tanner: What does the ground look like when lightning strikes?
Lightning strikes can make glass if conditions are just right and the lightning strikes the sand. Each cloud-to-ground lightning strike involves a lot of energy. Most of the lightning energy is spent producing hot air, light, and radio waves. Only a small part of the total energy actually hits the ground, but this little bit of energy is more than enough to hurt people, start fires, and damage buildings.

A “fulgurite” may develop when conditions are just right and lighting strikes the sand. A fulgurite is a hollow carrot-shaped glass tube formed in the sand during a lighting strike. The glass tube usually is only a few inches long and less than an inch wide. The glass tube also looks like a rock because sand sticks to it just after it was created. However, the inside of the fulgurite is hollow, smooth, and glassy. Other natural events that can create glass include meteorite impacts and volcanic explosions.

From Anthony: How is heat lightning different from regular lightning?
Heat lightning occurs when a person can see a lightning flash but can not hear the thunder. There is thunder with every lightning flash, but the person may be too far away from the storm to hear the thunder. The name heat lightning likely came from the fact that it was often observed on hot summer nights. Lightning can also occur during snow and sand storms. The thunder can be muffled by the snow or sand and a person a few miles away may not be able to hear the thunder.

From Sabrina: Why does it rain during some tornados and hurricanes?
Water is all around us in the atmosphere. However, the water is in the form of invisible water vapor. To receive rain, the atmosphere must turn the invisible water vapor into visible cloud droplets which can combine to make rain drops. The fastest way to make visible cloud droplets is to lower the atmospheric pressure, and the best way to lower the atmospheric pressure is to force the water vapor upward. You can physically feel the effects of changes in pressure in your ears if you’ve ever been on an airplane or drove over a large hill or mountain. Thunderstorms that produce tornadoes may be the size of a county while a hurricane can be larger than the size of Florida. One thing they both have in common is air that is moving upward into lower atmospheric pressure, creating clouds and rain.