

TORNADOES IN YOUR CLASSROOM

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In this article Sylvia shares a range of ideas to get pupils thinking and learning about tornadoes, a fascinating extreme weather phenomenon. The ideas were designed and trialled with year 3 pupils, but could easily be adapted to suit any primary year group and tackled in the order you see fit.

Resource requirements

A projector or interactive whiteboard, with internet access to YouTube.

Round jam jars, with tightly fitting lids

Vinegar

Washing up liquid

Glitter

Water

A tornado tube, if available

An anemometer, if available, preferably digital

An inflatable globe, if available

Tornado PowerPoint presentation available from www.metlink.org/careers-courses-weather-climate/meteorology-ambassadors/ambassador-resources.html

What is a tornado?

The word tornado is an altered form of the Spanish word *tronada*, which means 'thunderstorm'. It most likely reached its present form through a combination of the Spanish *tronada* and *tornar* ('to turn').



Figure 1: A tornado in full force.

A tornado is a rotating column of air that is in contact with, and extends between, a thunderstorm cloud and the ground (Figure 1). Tornadoes usually form in violent thunderstorms when there is instability and wind shear in the lower atmosphere: instability is where there are warmer, more humid, conditions in the lower atmosphere and cooler air above; wind shear is where the wind changes direction with speed and height. For example, a southerly wind travelling at 15 miles per hour (mph) at ground level changing to a south-westerly wind travelling at 50mph at 5000 feet. The updrafts and downdrafts caused by unstable air in the thunderstorm interacts with the wind shear, spinning it and tilting it upright to form a vortex. As heavy rain falls from the clouds it can drag the vortex downwards to the ground. When it reaches all the way from the cloud to the ground it is called a tornado; if it reaches from the cloud to the sea it is called a waterspout.

Discussion points

1. Who has read or seen *The Wizard of Oz*? It was a tornado that picked up Dorothy's house. You could show a clip or read the extract to the pupils.
2. Ask if any of the pupils have watched cumulus clouds on a hot sunny day. You can sometimes see them growing. Clouds are made up of water droplets whenever there is more condensation (think of bathroom windows) than evaporation – this usually happens when rising air cools. Hot air rises (think of hot air balloons) in the cloud and is replaced at the bottom, coming in from all directions. (You could use one of the 'hot air rising' demonstrations from www.metlink.org/weather-climate-resources-teachers/experiments-and-demonstrations.html).
3. The winds high up near the tops of the storm clouds start rotating because the earth is spinning. Using an inflatable globe, discuss the distance you have to travel around the equator in a day. Because different parts of the atmosphere, depending on how high they are or how far from the equator, are spinning at different rates, air that moves up or down tends to end up rotating. The rotating air is called a vortex.
4. A tornado is a swirling funnel of air that can come down from some of the biggest clouds, called Cumulonimbus.

At the same time, there can be thunder and lightning (Figure 1) because all the dust and water droplets in the cloud rub against each other – it is the same effect that makes your hair stand on end if you rub your hair against a balloon.

5. If tornadoes form over water, they are called waterspouts. See image 5 in PowerPoint: would you like to be on one of those boats?
6. In 2010, tornadoes killed 50 people in the world. It was a very quiet year as 134 people were killed by tornadoes in 2008.

Activity 1: How hard can you blow?

Show the pupils an anemometer and discuss what it does. Let each pupil have a go at blowing the anemometer while another reads the speed. Explain that inside a tornado, winds may be swirling at 300 miles an hour – that's even faster than Formula One cars!

Listen/Read/Share

A child's account of a tornado in the USA

It was a hot, steamy day for an afternoon football game. I was 10 years old and forgot to bring my football shoes along, so the coach made me play goalie in sandals. My team was ahead by a few goals. From where I stood in the net, bored and sweating, I had a perfect view of thunderclouds swelling on the horizon.

The game was held at the National Sports Center in Blaine, Minnesota [USA]. With nearly forty fields, the National Sports Center is the largest collection of football fields in the country. Today it has athletic facilities and offices, but back then it was a flat expanse of plains with nothing but a few parking spaces and drainage ditches.

The longer the game went on, the darker the sky got. Thunderstorms can blow in quickly on summer days in southern Minnesota, but even so, we were surprised at how soon the first raindrops fell. By half-time it was pouring and lightning strikes were close enough to our field that the referee temporarily stopped the game.

I was huddling with my teammates in a canvas tent by the side of the field waiting for the storm to pass when we saw a funnel forming at the bottom of the clouds. Before we realized what was happening, a tornado was spiralling down from the sky, spinning tight and fast toward the ground. The tornado touched down on the football field. A few miles away, another twister [another name for a tornado] was also dropping from the clouds. A third twister would appear shortly in the distance over the town of Blaine.

In a flurry of flying lawn chairs, wet blankets and football bags, parents grabbed their kids and ran in different directions. My family's car was several fields away and there was no good shelter nearby and no time to think. We ran to the nearest drainage ditch.

We crouched just above the ditch water, worried about lightning strikes, and watched the tornado come closer until it was just across the field and the grass flew in its wake. I could see every detail of its twisting body. We ran across the next field and ducked into another ditch.

We ran from ditch to ditch three times, planning our routes and sprinting through the wind. I remember being scared but also thinking that the three tornadoes were the most amazing things



Figure 2: Can you spot the path of the tornado? Photo: © NASA's MODIS Rapid Response.

I'd ever seen. In the distance we even saw debris flying at the base of the tornado over town. And then, in the same way it came, the tornado shrank and melted back into the sky into wisps of cloud. The rain stopped and the clouds loosened. The sun came out and dried our clothes as we walked to the car, cold and tired, but happy to be safe and grateful for what we'd just seen.

(adapted from <http://eo.ucar.edu/kids/dangerwx/tornado2.htm>)

Discussion point

What do you think it would be like to come close to a tornado? You could watch footage of tornadoes at www.youtube.com/watch?v=43VoMesUd2Q.

Activity 2: Can you spot the tornado track?

Look at the photo in Figure 2. It shows the path of a tornado that passed over the Wolf River in Wisconsin, USA on 7 June 2007. The path of destruction ranges between approximately 150m and 720m wide – that's 3-14 lengths of an Olympic sized swimming pool! The entire path was 64km long (the same as the distance from Manchester to Chester Zoo).

Discussion point

1. View image 7 from the PowerPoint and ask the pupils where they think this is. The slide shows tornado damage in London, December 2006.

2. Ask the pupils to suggest where in the world they think gets the most tornadoes, and to find those countries on the globe. View www.ncdc.noaa.gov/img/climate/research/tornado/globdist.jpg to find out more.

Activity 3: Hear a tornado warning siren!

Meteorologists use satellite images to look for big clouds developing, and radar to watch for rotating air inside the clouds. People can be warned using a siren. To hear a siren, visit www.youtube.com/watch?v=nuu2iNisoQc&feature=player_embedded.

Activity 4: Make a tornado!

If available, you could demonstrate using a tornado tube (see www.stevespanglerscience.com/experiment/00000056).

Pupils can then make their own tornado in a jar:

1. Fill the jar 3/4 full of water.
2. Put in one teaspoon of vinegar and one teaspoon of washing up liquid.
3. Sprinkle in a small amount of glitter.
4. Close the lid and twist the jar to swirl the water, and then stop, and see a vortex form in the centre of the jar.

So there you have it – lots of ideas on how to bring a tornado into your classroom including how to make one! Do let us know how you used these ideas and how the pupils responded.

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