

Natural Disasters

CLIMATE 101: WILDFIRES



WILDFIRES CAN BURN millions of acres of land at shockingly fast speeds, consuming everything in their paths. These rolling flames travel up to 14 miles an hour, which converts to about a four-minute-mile pace, and can overtake the average human in minutes.

Though they are classified by the Environmental Protection Agency as natural disasters, only 10 to 15 percent of wildfires occur on their own in nature. The other 85 to 90 percent result from human causes, including unattended camp and debris fires, discarded cigarettes, and arson.

Naturally occurring wildfires can spark during dry weather and droughts. In these conditions, normally green vegetation can convert into bone-dry, flammable fuel; strong winds spread fire quickly; and warm temperatures encourage combustion. With these ingredients, the only thing missing is a spark—in the form of lightning, arson, a downed power line, or a burning campfire or cigarette—to wreak havoc.

Wildfires occur when vegetated areas are set alight and are particularly common during hot and dry periods. They can occur in forests, grasslands, brush and deserts, and with sufficient wind can rapidly spread.

Unchecked, such fires can cause devastation to forests and other areas of vegetation. If fires approach or occur near towns or cities it often prompts a precautionary evacuation, as the direction fires may take are unpredictable.

A side-effect of wildfires that also threatens inhabited areas is smoke. Fires create large quantities of smoke, which can be spread far by wind and poses a respiratory hazard.

Satellites can be used to map the extent of a fire by observing the smoke plumes and identifying burn scars. Thermal infrared sensors can detect heat, thereby pinpointing the exact locations of fires and data acquired through the Charter may be passed on to firefighters on the ground within a matter of hours, providing helpful assistance for their efforts in locating and combating fires.

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The most common causes of fires are lightning strikes, sparks during arid conditions, the eruption of volcanoes, and man-made fires arising from deliberate arson or accidents.

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TSUNAMIS 101



A tsunami is a series of ocean waves that sends surges of water, sometimes reaching heights of over 100 feet (30.5 meters), onto land. These walls of water can cause widespread destruction when they crash ashore.

These awe-inspiring waves are typically caused by large, undersea earthquakes at tectonic plate boundaries. When the ocean floor at a plate boundary rises or falls suddenly, it displaces the water above it and launches the rolling waves that will become a tsunami.

Most tsunamis—about 80 percent—happen within the Pacific Ocean’s “Ring of Fire,” a geologically active area where tectonic shifts make volcanoes and earthquakes common.

Tsunamis may also be caused by underwater landslides or volcanic eruptions. They may even be launched, as they frequently were in Earth’s ancient past, by the impact of a large meteorite plunging into an ocean.

A tsunami’s trough, the low point beneath the wave’s crest, often reaches shore first. When it does, it produces a vacuum effect that sucks coastal water seaward and exposes harbor and sea floors. This retreating of sea water is an important warning sign of a tsunami, because the wave’s crest and its enormous volume of water typically hit shore five minutes or so later. Recognizing this phenomenon can save lives.

A tsunami is usually composed of a series of waves, called a wave train, so its destructive force may be compounded as successive waves reach shore. People experiencing a tsunami should remember that the danger may not have passed with the first wave and should await official word that it is safe to return to vulnerable locations.

The best defense against any tsunami is early warning that allows people to seek higher ground. The Pacific Tsunami Warning System, a coalition of 26 nations headquartered in Hawaii, maintains a web of seismic equipment and water level gauges to identify tsunamis at sea. Similar systems are proposed to protect coastal areas worldwide.

Tornadoes 101



Tornadoes are vertical funnels of rapidly spinning air. Their winds may top 250 miles an hour and can clear a pathway a mile wide and 50 miles long. Also known as twisters, tornadoes are born in thunderstorms and are often accompanied by hail. Giant, persistent thunderstorms called supercells spawn the most destructive tornadoes.

A tornado is a violently rotating column of air that extends from a thunderstorm to the ground. It's often portended by a dark, greenish sky. Black storm clouds gather. Baseball-size hail may fall. A funnel suddenly appears, as though descending from a cloud. The funnel hits the ground and roars forward with a sound like that of a freight train approaching. The tornado tears up everything in its path.

The most violent tornadoes come from supercells, large thunderstorms that have winds already in rotation.

Tornadoes can occur at any time of year, but they are more common during a distinct season that begins in early spring for the states along the Gulf of Mexico. The season follows the jet stream—as it swings farther north, so does tornado activity. May generally has more tornadoes than any other month,

but April's twisters are sometimes more violent. Farther north, tornadoes tend to be more common later in summer.

As the rotating updraft, called a mesocycle, draws in more warm air from the moving thunderstorm, its rotation speed increases. Cool air fed by the jet stream, a strong band of wind in the atmosphere, provides even more energy.

Water droplets from the mesocyclone's moist air form a funnel cloud. The funnel continues to grow and eventually it descends from the cloud. When it touches the ground, it becomes a tornado.

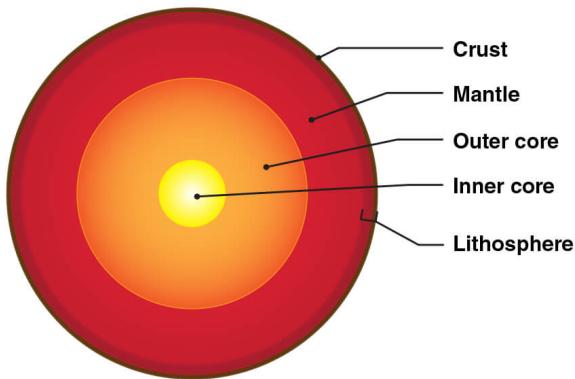
Earthquake 101



An earthquake is an intense shaking of Earth's surface. The shaking is caused by movements in Earth's outermost layer.

Although the Earth looks like a pretty solid place from the surface, it's actually extremely active just below the surface. The Earth is made of four

basic layers: a solid crust, a hot, nearly solid mantle, a liquid outer core and a solid inner core.



This non-stop movement causes stress on Earth's crust. When the stresses get too large, it leads to cracks called faults. When tectonic plates move, it also causes movements at the faults. An earthquake is the sudden movement of Earth's crust at a fault line.

The energy from an earthquake travels through Earth in vibrations called seismic waves. Scientists can measure these seismic waves on instruments called seismometer. A seismometer detects seismic waves below the instrument and records them as a series of zig-zags.

Earthquake is a name for seismic activity on Earth, but Earth isn't the only place with seismic activity. Scientists have measured quakes on the Earth's moon, and see evidence for seismic activity on Mars, Venus and several moons of Jupiter, too!

NASA's InSight mission will carry a seismometer to [Mars](#) to study seismic activity there, known as marsquakes. On Earth, we know that different materials vibrate in different ways. By studying the vibrations from marsquakes, scientists hope to figure out what materials are found on the inside of Mars.