

airplane, that analyze air all the way down and send measurements back to the plane.

sensor — a device for detecting, measuring or recording physical phenomena and to respond, as by transmitting information.

storm surge — during a hurricane, when huge areas of the ocean get lifted up between 20 and 40 feet, inundating the whole area.

thunderstorm — created when a lower layer of warm air rises into a layer of cold air, resulting in a powerful updraft of warm, moist air and violent downdraft of rain and hail.

tidal wave — a large wave caused by strong winds and not actually related to the tides; the nontechnical term for a tsunami.

troposphere — the atmospheric zone below the tropopause (the atmospheric transition zone located between the troposphere and the stratosphere, six to 12 miles above the Earth); at increasing altitudes, the troposphere is characterized by water vapor, vertical winds, weather and decreasing temperatures.

typhoon — another name for a hurricane.

water vapor — water in the form of a gas; steam.

Things to think about

*What causes a hurricane to finally die out?

*Which do you think causes more damage overall, a big, big storm or an ordinary, heavy rain that goes on for hours and hours?

*Penguins are "at home" in Antarctica. How can they withstand the extreme cold and wind?

Internet Resources

<http://www.earthweek.com>

A weekly update on weather activities around the globe; includes kids' and educators' pages.

<http://explorezone.com/weather/index.htm>

Lots of news stories on extreme weather, divided into types of storms and disasters.

<http://hurricanes.noaa.gov/>

A comprehensive site dedicated to the massive weather systems.

<http://geography.about.com/sitesearch.htm?terms=floods&SUName=geography&TopNode=3042>

A site complete with facts, definitions and historical floods.

<http://www.wind.ttu.edu>

Maintained by the Institute for Disaster Research at Texas Tech, this site is chock-full of information about wind and wind-related phenomena—for kids, adults and teachers.

<http://www.cnn.com/fyi/interactive/specials/weather/>

News, FAQs and coverage on a variety of topics including people's impact on weather and climate

<http://weather.about.com/science/weather/cs/blizzards/>

Links to a blizzard almanac and a few major blizzards in recent history.

Other Resources

For students:

Allaby, Michael. *How the Weather Works: 100 Ways Parents and Kids Can Share the Secrets of the Atmosphere*. Readers Digest Association Inc., 1995.

Allen, Missy, and Michel Piessel. *Dangerous Natural Phenomena*. Chelsea House Publishers, 1993.

Erlbach, Arlene. *Blizzards: A New True Book*. Children's Press, 1995.

Erlbach, Arlene. *Hurricanes: A New True Book*. Children's Press, 1993.

Hooker, Merrilee. *Hurricanes*.

The Rourke Corporation Inc., 1993.

Kahl, Jonathan. *Weatherwise: Learning about the Weather*. Lerner Publications Co., 1992.

Lauber, Patricia. *Hurricanes: Earth's Mightiest Storms*. Scholastic, 1996.

Ludlum, David M., Ronald L. Holle, and Richard A. Keen. *National Audubon Society Pocket Guide to Clouds and Storms*. Alfred A. Knopf, 1995.

For adults:

Allaby, Michael. *Dangerous Weather: Blizzards*. Facts On File, Inc., 1997.

Allaby, Michael. *Dangerous Weather: Hurricanes*. Facts On File, Inc., 1997.

Cosgrove, Brian. *Weather*. Alfred A. Knopf., 1991.

Fraidley, Warren. *Storm Chaser: In Pursuit of Untamed Skies*. Independent Publishers Group, 1996.

Stevens, William K. *The Change in the Weather: People, Weather, and the Science of Climate*. Delacorte Press, 1999.

Twist, Clint. *Hurricanes and Storms: Repairing the Damage*. Dillon Press, 1992.

Wade, Nicholas, Ed. *The Science Times Book of Natural Disasters*. The Lyons Press, 2000.

Williams, Jack. *The Weather Book*. Vintage Books, 1997.

EXTREME WEATHER

INTRODUCTION: PART II

To order this and other programs call:

(888) 570-5400



Choices, Inc.

369 S. Doheny Drive, PMB1105
Beverly Hills, California 90211

©2001 Choices, Inc. All rights reserved.

WORLD ALMANAC® —VIDEO—

EXTREME WEATHER

Although "you can't do anything about the weather," as the old saying goes, people are fascinated with it. Extreme climates, such as the frigid, desolate plains of Antarctica, attract adventurers who pit their stamina against the unrelentingly harsh environment. Armchair weather-watchers are curious about the oddities: the hottest place on Earth, the driest, the rainiest. Episodes of violent weather—tornadoes, hurricanes, blizzards, turbulent thunderstorms—remind us that much in the natural world is still outside of human control. This series explores many types of extreme weather, from inhospitable locations such as the completely arid Atacama Desert in northern Chile to killer storms that can destroy a town in minutes. It also discusses how meteorologists use increasingly sophisticated technology to track approaching storms and issue life-saving warnings before "nature takes its course."

INTRODUCTION PART II

Learn how atmospheric turmoil turns into a killer storm and how meteorologists, aided by computer simulations, try to predict its course. See the damage wreaked by the churning, murderous mass of waterlogged air called a hurricane, with its pelting wind and rain. Even worse is its destructive storm surge, which can raise the tide 20 feet and wash out seaside communities. Go with scientists into the clouds as they study how a rain cloud works from the inside. And get acquainted with the destructive force of blizzards, from Antarctica's desolate hillsides to the Eastern U.S., where a 1934 spring storm dumped 40 million tons of snow.



Hurricanes

Hurricane . . . typhoon . . . cyclone . . . different names from different languages, all referring to the same churning, murderous mass of waterlogged air, with power equivalent to all the world's nuclear armories.

All tropical hurricanes start in the same general areas and in the same seasons, when the ocean has been warmed to at least 80 degrees Fahrenheit. Sometimes a hurricane will pass over cooler water and die out at sea, but as often as not, it slams into seacoasts. A hurricane starts with a simple thunderstorm—a study in the transfer of heat. Hot air rises, and when the ocean surface is 80 degrees or more, the rising air carries a lot of water vapor with it. But as the air rises, it cools a little, and the vapor turns to droplets, or rain. This very process releases heat, and the overheated air now rushes to the top of the thundercloud. When that happens, it creates a vacuum underneath, and more wet air whooshes up from the surface of the ocean to replace it. The lift of the warm air causes the pressure to fall at the surface which in turn moves the air in a counterclockwise motion around the calm center of the storm, the eye.

The intense winds of a hurricane move inward toward the center and spiral up to perhaps 200 miles an hour. The rain also does damage, as it causes flooding that can wash away land and property. The most terrifying part of a hurricane is the storm surge that can lift the ocean up 40 feet and wash it over the land. Hurricanes can't be stopped, but their movements can be predicted, and people can be warned. At the Goddard Space Center in Maryland, for example, scientists use computer simulation to study a hurricane and manipulate its image. Then when a real hurricane comes along, simple observations can increase warning times.

Blizzards

A blizzard is snow blown in a wind at more than 35 miles an hour. Antarctica, with temperatures as low as minus 80 degrees Fahrenheit in the winter, is swept by blizzards. Winds can reach 120 miles an hour, whipping up the snow that is on the surface and causing blizzard conditions called ground blizzards because the snow does not fall from the sky.

Blizzards have also stunned the United States over the years. The blizzard of 1934, for example, paralyzed the Eastern U.S., with snow blanketing Washington, D.C., and Niagara Falls being brought almost to a standstill—the mighty cataract was a mountain of ice. On a spring day in 1993, Atlanta, Georgia, was hit by a blizzard of Polar proportions. People were stranded in offices, and some who tried to get home were marooned on the freeway. People froze in their homes when power failed. The storm raced northwards up the coast, hitting New York with gale-force winds that blew windows out of skyscrapers. In all, the blizzard dropped 40 million tons of snow over a 2,000-mile stretch.

Timeline

March 11, 1888 — A huge blizzard buries New York and New England, killing 400 people. The drifts blow up to 50 feet high, and thousands are marooned for days.

September 1900 — A hurricane strikes Galveston, Texas, early one morning, sending a five-foot tidal wave through the city; up to 12,000 people drown, the most deaths from any hurricane.

January 1934 — A blizzard paralyzes the Eastern U.S. and even brings Niagara Falls almost to a standstill.

December 1944 — The U.S. Third Pacific Fleet accidentally sails into the center of a typhoon off the Philippines; three destroyers capsize, and 146 planes and 800 men are lost.

1970s — Weather satellites begin moving across the planet to measure the weather as a whole

August 1992 — Hurricane Andrew sweeps across the Virgin Islands, Puerto Rico, Florida and Louisiana, causing over \$20 billion in damage—the most costly natural disaster ever. Fortunately, there are only 13 deaths.

1993 — In early March, Atlanta, Georgia, is hit with a blizzard, part of a storm that drops 40 million tons of snow over a 2,000-mile stretch; people are stranded in offices and marooned on the freeway, and people freeze in their homes when power fails.

November 1998 — Hurricane Mitch kills 20,000 people in Central America and sets back the economies of several countries 30 years.

Ice storms are also treacherous. They result when rain falls through very cold air near the ground, and large droplets spread out and freeze on impact. The freezing rain coats surfaces with clear ice known as glaze. Trees collapse under the weight of the ice; power cables freeze, their poles broken; and houses and buildings go without light or heat.

To predict devastating storms such as these, weather forecasters have, since the 17th century, gradually turned weather recording from an art into science. First weather buoys and balloons, then, since the 1970s, weather satellites, have allowed forecasters three or four days prediction time. But a newer generation of instruments might make it possible to predict a hurricane or tornado a week or two ahead, giving people ample time to prepare. One of these instruments is the aerosonde, a gasoline-powered, flying robot that carries miniaturized weather sensors. Piloted by a satellite-linked computer, the aerosonde can be directed anywhere, no matter how remote or how turbulent the weather. It can last in the air for up to four days, while it sends back every meteorological detail. With several thousands of aerosondes deployed to remote areas at any one time, we could have a quantum leap in weather forecasting capacity.

Vocabulary

aerosonde — a gasoline-powered, flying robot that carries miniaturized weather sensors; piloted by a satellite-linked computer, it can be directed anywhere, no matter how remote or turbulent the weather.

blizzard — snow blown in a wind at more than 35 miles an hour.

cyclone — another name for a hurricane.

desiccated — completely dried out; preserved by drying.

cumulonimbus cloud — a giant thundercloud. This type of dense cloud develops vertically through all cloud levels; consisting of water droplets, ice crystals and sometimes hail, it is associated with thunder, lightning and heavy showers.

flash flood — results from a lot of rain over a large area being funneled into a small area.

global warming — a slight but continuing increase in the temperature of the lower atmosphere that could lead to harmful climatic conditions.

hurricane — a windstorm with a violent, whirling movement and waterlogged air; also called a cyclone or a typhoon.

monsoon — in India, the season from April to October during which a wind from the Indian Ocean and South Asia blows from the southwest, bringing heavy rains.

negative charge — having an excess of electrons. (See also "positive charge.")

positive charge — having a deficiency of electrons. (See also "negative charge.")

quantum leap — a sudden and extensive change or advance.

radiosondes — weather-sensitive capsules dropped from an