

Cambridge Core Science Series: GeoBasics

# ATMOSPHERE, CLIMATE, AND WEATHER



## Introduction

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This Teacher's Guide provides information to help you get the most out of *Atmosphere, Climate, and Weather*, Part 6 of the *GeoBasics* series. The contents in this guide will allow you to prepare your students before they use the program, assist them as they navigate through the program, and present follow-up activities to reinforce the program's key learning points.

The *GeoBasics* series is intended to excite young people about science and teach them concepts that meet national educational standards for science literacy. Science, in its multiple disciplines, is inherently fascinating and helps explain the world around us. In addition to fulfilling our natural curiosity, studying science and learning critical thinking skills provides numerous practical benefits, including helping us make informed and reasoned decisions, solve problems, think creatively, and continue to learn.

This 25-minute video provides students in grades 7 through 12 with an overview of the differences that distinguish atmosphere, climate, and weather. Because science literacy is important for all people, the information presented in *Atmosphere, Climate, and Weather* could also be presented to vocational / technical schools or in adult education courses that focus on science and health.

## Learning Objectives

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After watching *Atmosphere, Climate, and Weather*, students will understand how to:

- Distinguish between weather and climate, and provide examples of variation in both.
- Describe the composition of the Earth's atmosphere and list its four regions.
- Demonstrate an understanding of how humans are affecting the ozone layer and contributing to the greenhouse effect.
- Explain the Köppen Climate Classification System and the five major climatic types.
- Demonstrate an understanding of the factors that are primarily responsible for climate change on Earth.
- List the various normal and severe weather conditions and what causes them.
- Demonstrate an understanding of various weather patterns that affect the Earth.

## Educational Standards

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The *Atmosphere, Climate, and Weather* video program correlates with the following Standards: the National Standards of the National Academy of Sciences National Science Education, International Society for Technology in Education (ISTE), National Educational Technology Standards (NETS), and National Council of Teachers of English; and the State Standards of Florida, Ohio, and Texas for Earth and Space Sciences, Processes that Shape the Earth; How Living Things Interact with Their Environment; and Listening, Viewing, and Speaking.

- Develops an understanding of energy in the earth system, geochemical cycles, origin and evolution of the earth system, and origin and evolution of the universe. (*National Academy of Sciences National Science Education Standards, Earth and Space Science Standards: Grades 9-12*)

- Conducts research on issues and interests by generating ideas and questions, and by posing problems; gathers, evaluates, and synthesizes data from a variety of sources (e.g., print and non-print texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience; uses a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge. (*International Society for Technology in Education [ISTE] National Educational Technology Standards [NETS]*)
- Uses spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information). (*National Council of Teachers of English Standards for the English Language Arts*)
- Recognizes that processes in the lithosphere, atmosphere, hydrosphere, and biosphere interact to shape the Earth; understands the competitive, interdependent, cyclic nature of living things in the environment; and understands the consequences of using limited natural resources; uses listening strategies effectively; and uses viewing strategies effectively. (*Florida State Standards: Processes that Shape the Earth; How Living Things Interact with their Environment; Listening, Viewing, and Speaking*)
- Earth-based and space-based astronomy reveal the structure, scale, and changes in stars, galaxies, and the universe over time. Plate tectonics operating over geologic time has changed the patterns of land, sea, and mountains on Earth's surface. Energy enters the Earth system primarily as solar radiation and eventually escapes as heat. Heating of Earth's surface and atmosphere by the sun drives convection within the atmosphere and oceans, producing winds and ocean currents. Climate is the long-term average of a region's weather and depends on many factors. (*California State Earth Sciences Standards*)
- Demonstrates an understanding about how earth systems and processes interact in the geosphere resulting in the habitability of Earth. This includes demonstrating an understanding of the composition of the universe, the solar system, and Earth. In addition, it includes understanding the properties and the interconnected nature of Earth's systems, processes that shape Earth and Earth's history. (*Ohio State Earth and Space Science Standards*)
- Demonstrates an understanding of how concepts and principles of energy, matter, motion, and forces explain Earth systems, the solar system, and the universe. (*Ohio State Earth and Space Science Standards*)
- Defines and investigates self-selected or assigned issues, topics and problems; locates, selects and makes use of relevant information from a variety of media, reference and technological sources; uses an appropriate form to communicate their findings. (*Ohio State Earth and Space Science Standards*)
- Knows that interdependence and interactions occur within an ecosystem; knows the significance of plants in the environment; understands and interprets visual representations; analyzes and critiques the significance of visual representations; listens attentively for a variety of purposes; recognizes/interprets visual representations as they apply to visual media. (*Texas State Biology and English I, II, III, and IV Standards*)
- Understands and applies scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognizes the historical development of ideas in science. (*New York State Earth Science, Language for Information and Understanding, and Language for Social Interaction Standards*)

- Understands the fundamental concepts, principles, and interconnections of the life physical, and earth/space sciences; listens and speaks effectively in a variety of situations. (*Illinois State Concepts and Principles, Listening and Speaking Standards*)

## Program Overview

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The *Cambridge Core Science* series is a 40-part series composed of subsets of programs addressing Life Science, Earth Science, Physical Science, Human Body Systems, and Space Science. The series is designed as a whole to give high school and some college students a basic scientific understanding of themselves and the world around them.

The *GeoBasics* video program series consists of eight titles:

- Our Planet Earth
- Plate Tectonics
- Rocks and Minerals
- Oceans and Seas
- Geocycles
- Atmosphere, Climate, and Weather
- Energy and Resources
- Environmental Issues and Human Impact

The sixth title of the series, *Atmosphere, Climate, and Weather*, provides an overview of the differences that distinguish the three. It delves into the composition of the Earth's atmosphere, the four regions of atmosphere classified by temperature, the ozone layer, and the greenhouse effect. It continues with the climate zones, as classified by the Köppen Climate Classification System, and the climatic regions, explaining what causes changes in climate. And it explores various weather situations such as pressure, precipitation, and wind, weather patterns such as the jet stream and El Niño, and extreme weather conditions such as thunderstorms, tornadoes, and hurricanes.

## Main Topics

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### Topic 1: Introduction

The program begins by introducing weather and climate, describing the differences between them, and explaining what climatology is and how the climate has changed over time.

### Topic 2: Predicting Weather

In this section, students are introduced to the inventions and tools used for predicting the weather, such as the barometer, hygrometer, and thermometer. The science of meteorology is offered as a pure example of the scientific method at work.

### Topic 3: Atmosphere, Climate, and Severe Weather

The atmosphere is the lead-off topic of this section, including its evolution, composition, and layers. Next, students learn about climatic classification schemes such as the Köppen System, and about the effects of the Coriolis force. Finally, weather is discussed, including types of clouds and fronts, and the types of storms and severe weather that are created from them.

#### Topic 4: Human Impact

From the destruction of the ozone layer from chlorofluorocarbons (CFCs) to the burning of fossil fuels that contributes to global warming, humans are severely impacting the Earth's atmosphere. Experts weigh in on these environmental issues and offer steps that can be taken to more positively affect the atmosphere, and resulting climate and weather.

#### Topic 5: Conclusion

In this concluding section, experts discuss how meteorologists and planetologists strive to better understand Earth's atmosphere in order to more accurately predict the weather and save lives.

### Fast Facts

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- The first mercury barometer was devised by Evangelista Torricelli, a student of Galileo Galilei, in 1643. He created a vacuum in the top of a tube of mercury, noticed that the level of the fluid in the tube changed slightly each day, and concluded that this was due to the changing pressure in the atmosphere. The pressure is quoted as the level of the mercury's height in the vertical column, with 1 atmosphere equivalent to about 29.9 inches of mercury. Barometers of this type can usually measure atmospheric pressures in the range between 28 and 31 inches of mercury. The use of this unit is still popular in the United States, although other parts of the world now use SI or metric units.
- The sun goes through cycles of high and low activity that repeat approximately every 11 years. The number of dark spots on the sun (sunspots) marks this variation; as the number of sunspots increases, so does solar activity. Sunspots are sources of flares, the most violent events in the solar system. In a matter of minutes, a large flare releases a million times more energy than the largest earthquake.
- The location of the jet stream is extremely important for airlines. In the United States and Canada, for example, the time needed to fly east across the continent can be decreased by about 30 minutes if an airplane can fly with the jet stream, or increased by about the same amount if it must fly west against it. On international flights, the difference is even greater, and it is often actually faster and cheaper flying eastbound along the jet stream rather than taking the shorter great circle route between two points.
- The work of climatologists has found evidence to suggest that only a limited number of factors are primarily responsible for most of the past episodes of climate change on the Earth. These factors include variations in the Earth's orbital characteristics; atmospheric carbon dioxide variations; volcanic eruptions; and variations in solar output.
- Cyclones are large revolving tropical storms caused by winds blowing around a central area of low atmospheric pressure. In the southern hemisphere these tropical storms are called *cyclones*, and rotate in a clockwise direction, while in the northern hemisphere cyclones are called *hurricanes* or *typhoons* and rotate in a counter-clockwise direction. Cyclones develop over warm waters in the tropical regions of the oceans where areas of very low pressure are created by air being heated by the sun. This causes the air to rise very rapidly and become saturated with moisture that condenses into large thunderclouds.

- Generally, two types of thunderstorms are common: air mass thunderstorms which occur in the mid-latitudes in summer and at the equator all year long, and thunderstorms associated with mid-latitude cyclone cold fronts or dry lines. This type of thunderstorm often has severe weather associated with it.
- A tornado is a vortex of rapidly moving air associated with some severe thunderstorms. High-velocity winds cause most of the damage associated with these weather events. Tornadoes also cause damage through air pressure reductions. The air pressure at the tornado center is approximately 800 millibars (average sea-level pressure is 1,013 millibars); many human-made structures collapse outward when subject to pressure drops of this magnitude. The destructive path of a tornado is usually about half a kilometer wide, and usually no more than 25 kilometers long. However, a spring tornado in 1917 traveled 570 kilometers across Illinois and Indiana, and lasted well over 7 hours.
- The Earth's atmosphere is divided into four regions of atmosphere classified by temperature, chemical composition, movement, and density: Troposphere, Stratosphere, Mesosphere, and Thermosphere.
- The Köppen Climate Classification System is the most widely used system for classifying the world's climates. Its categories are based on the annual and monthly averages of temperature and precipitation. The Köppen system recognizes five major climatic types: A: tropical moist climates, with all months having average temperatures above 18° Celsius; B: dry climates, with deficient precipitation during most of the year; C: moist mid-latitude climates with mild winters; D: moist mid-latitude climates with cold winters; and E: polar climates, with extremely cold winters and summers.
- The climate of a particular place is the function of a number of factors, such as the location's latitude and the resultant solar radiation received; air mass influences; location of global high and low pressure zones; heat exchange from ocean currents; distribution of mountain barriers; pattern of prevailing winds; distribution of land and sea; and altitude.

## Vocabulary Terms

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**air mass:** A large body of air with only small horizontal variations of temperature, pressure, and moisture.

**atmosphere:** The gaseous mass or envelope surrounding the Earth and retained by the Earth's gravitational field.

**barometer:** Invented by Evangelista Torricelli in 1643, it is an instrument for measuring atmospheric pressure, used especially in weather forecasting.

**biosphere:** The part of the Earth and its atmosphere in which living organisms exist or which is capable of supporting life.

**chlorofluorocarbon (CFC):** Any of various halocarbon compounds consisting of carbon, hydrogen, chlorine, and fluorine, once used widely as aerosol propellants and refrigerants. Chlorofluorocarbons are believed to cause depletion of the atmospheric ozone layer.

**climate:** The meteorological conditions, including temperature, precipitation, and wind, that characteristically prevail in a particular region.

**climatology:** The study of long-term weather patterns and the fluctuations in climate.

**clouds:** A visible body of very fine water droplets or ice particles suspended in the atmosphere at altitudes ranging up to several miles above sea level. Clouds are classified as cirrus, cumulus, cumulonimbus, stratus, or nimbostratus.

**Coriolis effect:** The observed effect of the Earth's rotation on an object moving above the Earth, deflecting the object rightward in the northern hemisphere and leftward in the southern hemisphere.

**cyclone:** An atmospheric system characterized by the rapid inward circulation of air masses about a low-pressure center, usually accompanied by stormy, often destructive weather. Cyclones circulate counterclockwise in the northern hemisphere and clockwise in the southern hemisphere.

**deforestation:** The removal of trees.

**drought:** A long period of abnormally low rainfall, especially one that adversely affects growing or living conditions.

**El Niño:** Warming of the ocean surface off the western coast of South America that occurs every 4 to 12 years when upwelling of cold, nutrient-rich water does not occur. It causes die-offs of plankton and fish and affects Pacific jet stream winds, altering storm tracks and creating unusual weather patterns in various parts of the world.

**energy:** A source of usable heat or power, such as petroleum or coal.

**environmental impact:** Human environmental health impact, risk to ecological health, and changes to the ways in which nature benefits humans—sometimes referred to as “nature’s services”—caused by an activity.

**flood:** An overflowing of water onto land that is normally dry.

**fossil fuel:** Fuel consisting of the remains of organisms preserved in rocks in the Earth's crust with high carbon and hydrogen content, such as petroleum, coal, or natural gas.

**front:** The interface between air masses of different temperatures or densities.

**geocycle:** Processes on Earth that move and recycle matter.

**glacier:** A huge mass of ice slowly flowing over a land mass, formed from compacted snow in an area where snow accumulation exceeds melting and sublimation.

**global warming:** An increase in the average temperature of the Earth's atmosphere, especially a sustained increase sufficient to cause climatic change.

**greenhouse gas:** Any of the atmospheric gases that contribute to the greenhouse effect.

**humidity:** A moderate degree of wetness, especially of the atmosphere.

**hurricane:** A severe tropical cyclone originating in the equatorial regions of the Atlantic Ocean or Caribbean Sea or eastern regions of the Pacific Ocean, usually involving heavy rains. A wind with a speed greater than 74 miles per hour, according to the Beaufort scale.

**hydrologic cycle (a.k.a., the water cycle):** The cycle of evaporation and condensation that controls the distribution of the Earth's water as it evaporates from bodies of water, condenses, precipitates, and returns to those bodies of water.

**hydrosphere:** The watery layer of the Earth's surface; includes water vapor.

**hygrometer:** An instrument that measures the relative humidity of the atmosphere.

**ice core:** A core sample of ice removed from an ice sheet, most commonly from a polar ice cap or from a high mountain glacier. As the ice forms from the incremental buildup of annual layers of snow, lower layers are older than upper, and an ice core contains ice formed over a range of years. The properties of the ice or inclusions within the ice can then be used to reconstruct a climatic record over the age range of the core.

**La Niña:** A cooling of the ocean surface off the western coast of South America, occurring periodically every 4 to 12 years and affecting Pacific and other weather patterns.

**meteorology:** The scientific study that focuses on weather processes and forecasting.

**natural resource:** A material source of wealth, such as timber, fresh water, oil, or a mineral deposit, that occurs in a natural state and has economic value.

**nitrogen cycle:** The circulation of nitrogen in nature, consisting of a cycle of chemical reactions in which atmospheric nitrogen is compounded, dissolved in rain, and deposited in the soil, where it is assimilated and metabolized by bacteria and plants, eventually returning to the atmosphere by bacterial decomposition of organic matter.

**nuclear power:** Nuclear energy regarded as a source of electricity for the power grid (for civilian use). Also called *atomic power*.

**Ozone Hole:** An area of the ozone layer (near the poles) that is seasonally depleted of ozone.

**photosynthesis:** Carbon taken up by plants, which then produce oxygen and sugars.

**rock:** A relatively hard, naturally formed mineral or petrified matter; stone.

**rock cycle:** The process by which rocks are formed, altered, destroyed, and reformed by geological processes and which is recurrent, returning to a starting point.

**sedimentary:** Of or relating to rocks formed by the deposition of sediment.

**solar power:** Energy from the sun that is converted into thermal or electrical energy. Also called *solar energy*.

**thermometer:** Invented by Daniel Fahrenheit, it is an instrument for measuring temperature, usually having a graduated glass tube with a bulb containing a liquid, typically mercury or colored alcohol, that expands and rises in the tube as the temperature increases.

**tidal power:** A means of electricity generation achieved by capturing kinetic energy of currents arising between ebbing and surging tides, and potential energy from the difference in height between high and low tides. Tidal power is classified as a renewable energy source because tides are caused by the orbital mechanics of the solar system, are considered inexhaustible within a human timeframe, and are reliably predictable.

**tornado:** A rotating column of air ranging in width from a few yards to more than a mile and whirling at destructively high speeds, usually accompanied by a funnel-shaped downward extension of a cumulonimbus cloud.

**typhoon:** A tropical cyclone occurring in the western Pacific or Indian oceans.

**water table:** The level below which the ground is completely saturated with water. Also called *water level*.

**weather:** The state of the atmosphere at a given time and place, with respect to variables such as temperature, moisture, wind velocity, and barometric pressure.

**wind power:** Power derived from the wind (as by windmills).

## Pre-Program Discussion Questions

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1. Consider where you live. What climate do you live in? Describe the weather outside today.
2. Name various instruments you could use to predict the weather. What methods, equipment, and technology do local forecasters use that allow them to provide potentially more accurate predictions?
3. Can you name the types of clouds and what they look like?
4. What examples of extreme weather have you or your family personally experienced?
5. Do you know what a CFC is? Why are CFCs of concern?

## Post-Program Discussion Questions

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1. What are the four layers of the atmosphere? Describe them.
2. What is the Köppen System? Describe the five types of climates in the classification scheme. Which letter would describe where you live?
3. Keeping in mind all of the cloud types, what kinds of clouds are present today when you look out the window? What kind of weather is to be expected with that particular kind of cloud?

4. In what ways are you or members of your community contributing to or helping to prevent global warming?
5. In what ways has weather forecasting improved over the last few years? When do you think it will become more accurate, and how will that be possible?

## **Internet Activities**

- Divide the class into small groups. Using the Internet as the primary research tool, have each group research the history of weather prediction. Then have each group present its findings to the class. If possible, the presentation should include pictures of inventions and inventors, and pictures or video clips of the latest technology in action.
- Using the Internet, ask your students to investigate what research projects are being done on ice cores. Then, have them choose a project of interest to them and write a paper of 3-5 pages in length on what is being researched and what results have been found.

## **Group Activities**

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- Pair up your students and give each pair an orange, grapefruit, or other small round object and a felt marking pen. Ask one student to spin the orange while the other holds the pen at the middle to draw a virtual equator. Then, have one student spin the object from west to east. As it spins, the second student should try to draw a line from the equator to the North Pole. Record whether the marker moved clockwise or counterclockwise. Then, spinning the object in the same direction, have one student draw a line from the equator to the South Pole. Again record the direction of the pen's movement. Explain to your students how they have simulated the Coriolis effect.
- Divide your students into small groups and have each group monitor the weather reports on a different television channel, radio station, or Web site (such as [weather.com](http://weather.com) or [weatherunderground.com](http://weatherunderground.com)). For one week, have each group record not only that channel's predictions for the 7-day forecast but also the actual weather for that day, including amount of precipitation, type of clouds present, barometric pressure, etc. Each day, the 7-day forecast should be updated and the day's weather recorded. At the end of the week, ask each group to judge how well their source did in accurately predicting the weather, and to make a presentation (poster, oral presentation, multimedia presentation, etc.) that details the daily weather events for that week. Determine which sources of weather information were most and least accurate.

## **Individual Student Projects**

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- Ask each student to create a project that details the four regions of the atmosphere and how they work together. The student should feel free to express his findings through any of the following: a research paper; a large, detailed, and labeled poster; or a PowerPoint or multimedia presentation.
- Have students research the current debate on global warming. Why do some people believe that global warming is a threat, while others believe that if it is occurring at all, it is due to natural causes and is of no concern? Students should sum up their findings in a short paper.

## Assessment Questions

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**Q1:** What are two ways of investigating the Earth's past climates?

**A:** To investigate past climates, one can look at ice cores, which detail past climates in their bands, or at rocks, which give clues to the past through ocean sediments and rock sediments.

**Q2:** What is the difference between a barometer and a hygrometer?

**A:** A barometer is an instrument for measuring atmospheric pressure, and a hygrometer is an instrument that measures the relative humidity of the atmosphere.

**Q3:** What two elements make up 99% of Earth's dry atmosphere?

**A:** Nitrogen and oxygen.

**Q4:** What do greenhouse gases do?

**A:** Greenhouse gases (also called trace gases) let rays pass through the planet and help hold in heat to warm the Earth. Without these gases, heat would escape back into space and the average temperature on Earth would drop by some 60°F.

**Q5:** Why is Earth's atmosphere so important?

**A:** Besides allowing us to breathe, the atmosphere protects us from dangerous solar rays and radiation, and recycles water and other chemicals.

**Q6:** What are the four layers of the atmosphere in order of closest to the Earth to farthest away?

**A:** Troposphere, stratosphere, mesosphere, and thermosphere (upper atmosphere).

**Q7:** What are the five types of climates described by the Köppen System?

**A:** A: Tropical (moist); B: Dry; C: Mild (moist, mid-latitude climates with mild winters); D: Cold (moist, mid-latitude climates with cold winters); E: Polar (climates with extremely cold winters and summers).

**Q8:** What is a warm front?

**A:** A warm front is when a warm air mass meets a cold air mass.

**Q9:** Clouds that have started out as flat, low-lying sheets that cover the sky but have become very thick and dark have become what kind of clouds?

**A:** They have become nimbostratus clouds, which can produce precipitation.

## Additional Resources

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**USGS Education: Science for a Changing World**

[www.usgs.gov/education](http://www.usgs.gov/education)

**Educypedia: The Educational Encyclopedia**

<http://users.pandora.be/educypedia/education/geology.htm>

**NASA's Science Mission Directorate Website**

<http://science.hq.nasa.gov>

**The Center for International Earth Science Information Network (CIESIN)**

[www.ciesin.org](http://www.ciesin.org)

## **The Earth Institute at Columbia University**

[www.earthinstitute.columbia.edu](http://www.earthinstitute.columbia.edu)

## **The WWW Virtual Library: Earth Science**

<http://vlib.org/EarthScience>

## **Earth Science Week**

[www.earthsciweek.org](http://www.earthsciweek.org)

## **National Earth Science Teachers Association**

[www.nestanet.org](http://www.nestanet.org)

## **Additional Resources at [www.filmsmediagroup.com](http://www.filmsmediagroup.com)**

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*Available from Films Media Group • [www.filmsmediagroup.com](http://www.filmsmediagroup.com) • 1-800-257-5126*

### **Earth Science I Video Library**

- VHS #30977
- VHS #30992—in Spanish
- DVD #30962
- Closed captioned
- Correlates to National Science Education Standards
- Includes a User's Guide

Contains 18 video clips on the history of the Earth, fossils, paleontology, and mapping the Earth. Clips include *Introduction to Earth History*, *Thermal Features*, *Blue Hole*, *Extinction*, *Glaciers*, *Fossil Hunter*, *Fossil Voyage*, *Amber*, *Mammoth*, *Rhino Fossils*, *Fossil Tunnels*, *Early Maps*, *Remote Sensing*, *Global Positioning System*, *Mountains*, *Seafloor Maps*, *Measuring Latitude*, *Measuring Longitude*. A User's Guide is included, containing an overview; a numbered index of clips, with brief descriptions and lengths; time codes (VHS only); suggested instructional strategies; and a list of additional resources. A Discovery Channel/FFH&S Production. © 2003.

### **Earth Science II Video Library**

- VHS #30978
- VHS #30993—in Spanish
- DVD #30963
- Closed captioned
- Correlates to National Science Education Standards
- Includes a User's Guide

The *Earth Science II Video Library* contains 24 video clips on volcanoes, earthquakes, oceans, seasons, weather, and climate. Clips include *Introduction to Volcanoes*, *Birth of a Volcano*, *Death and Destruction*, *Types of Volcanoes*, *Volcanology*, *Plate Tectonics*, *Earth in Motion*, *San Andreas Fault*, *Seismology*, *Earthquake-Proof*, *Earthquake Zone*, *Introduction to Oceans*, *Coral Reefs*, *Waves and Tides*, *Fish Harvesting*, *Currents*, *Introduction to Weather*, *Polar Weather*, *Man-Made Weather*, *Rain*, *Violent Weather*, *Heat and Weather*, *Weather Systems*, *Water Cycle*. A User's Guide is included, containing an overview; a numbered index of clips, with brief descriptions and lengths; time codes (VHS only); suggested instructional strategies; and a list of additional resources. A Discovery Channel/FFH&S Production. © 2003.

## Earth Story

- 8-part series
- VHS/DVD-R #8503
- “Extremely well done!” —*Booklist*

Beginning with the first land formations that emerged from the ocean 4 billion years ago, this series explores how all geologic phenomena, from volcanoes to earthquakes, are intertwined. Journeying from the sea bottom to the highest peak in the Andes, the series presents theories on plate tectonics, earthquakes, volcanoes, land formations, and continental drift. An indispensable resource for teaching earth science and geology. A BBC Production. (50 minutes each)

The series includes *Dating the Earth*, *Journey to the Ocean Floor*, *Continental Drift: Legacy of Fire*, *Death of the Dinosaurs*, *Winds of Change*, *Noah’s Children*, *Oxygen: The Poison Gas*, *The Earth and the Moon*.

## Landforms

- CD-ROM #6978 (Windows only)

What causes volcanoes and earthquakes? Why do tsunamis and floods occur? How do river beds and coastlines change? And what challenges do the forces that shape the Earth pose for people? Using this highly interactive CD-ROM, students can freely explore the Geodome, a virtual laboratory of geologic landforms. Learning stations provide targeted opportunities to manipulate 3-D topographical models, conduct simulations of natural disasters, examine hundreds of slides, and watch video clips. Plus, info/quiz features offer additional background and test comprehension. Headline-making catastrophes and issues of geologic concern drive home the present-day relevance of earth science, geology, and physical geography. Plate tectonics and seismology, eruptions and erosion, landslides and sedimentation—this disc has it all.

## The Life and Times of El Niño

- VHS/DVD-R #34956
- Closed captioned

It has been linked to famines, epidemics, even the fall of empires. This program follows El Niño’s deadly path through human history and the progress science has made in understanding the once-mysterious phenomenon. The effects of El Niño are presented in detail, including an 1878 outbreak of yellow fever in Tennessee, a concurrent drought that ravaged much of China, and more recent calamities that have brought the true nature of this climatic occurrence to light. Focusing on high-tech advances in meteorology, the video outlines El Niño’s significance in the global warming debate and illustrates the use of computer models that can predict its next appearance. A BBCW Production. (50 minutes) © 2005.

## Man and the Biosphere

- 12-part series
- VHS/DVD-R #2333
- *Recommended by Science Books & Films*

Using an integrated interdisciplinary approach combining the natural and the social sciences, these videos look at the relationships between living beings and their environments. The work of botanists, biologists, geologists, and demographers is used to examine the realities of ecological concerns in the framework of political realities. From the tops of the Himalayas to the bottom of the sea, from empty deserts to overcrowded cities, these videos show life where it thrives and where it has died out. Based on UNESCO’s ground-breaking Man and the Biosphere Program, they illustrate the problems and concerns of preserving life, including human life, on Earth, and demonstrate numerous environmental projects that have successfully met the needs of both humankind and nature. (28 minutes each)

The series includes *Life in Arid and Semi-Arid Lands; The Desert as Laboratory; Life at the Top; Equilibrium in a Mountain Habitat; The Tropical Rain Forest; Preserving the Rain Forest; Coastlines; Ecology of the Coral Reef; Lagoons; Wetlands and Pinelands; Urban Ecology; Toward a Livable City.*

### **BioBasics**

- 8-part series
- VHS/DVD-R #33833
- Preview clip online at [www.films.com](http://www.films.com) (Search on 33833)
- Includes viewable/printable Teacher's Guide
- Correlates to National Academy of Sciences National Science Education Standards and the American Association for the Advancement of Science Benchmarks for Science Literacy
- "A welcome replacement for outdated life science programs."—*School Library Journal*

Use the comprehensive 8-part *BioBasics* series to excite your students about life science as you present the fundamental concepts they'll need for a firm foundation in biology. An engaging blend of computer graphics, interviews with scientists, and animations will hold their attention as they open their minds to a wide range of essential life science topics.

The series includes *Introduction to Life Science; Cells: The Building Blocks of Life; Genetics and Evolution; Organization and Diversity; Life Processes of Animals; Life Processes of Plants; Microorganisms; Interdependence of Life.* A Cambridge Educational Production. Viewable/printable teacher's guides are available at [www.cambridgeeducational.com](http://www.cambridgeeducational.com). (25 minutes each) © 2005.



For information on other programs

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