

Earth's Climate and Climate Change

Forty-seven 40-minute sessions

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I. Project Description

This project introduces the student to the development of the earth's atmosphere and its importance to our weather and climate. The class next moves through earth's weather patterns that are driven by the atmosphere. The evidence for a human cause to global warming is presented next, followed by how humankind can act to lessen the impacts of global warming.

II. Outline

Class requirements

- ✓ Cloud types – Students research one cloud type, find a link to an online picture of that type of cloud, and give an oral presentation about the cloud type
- ✓ Portfolio – Students find one article per week, summarize the article, and offer comments about the article's validity, statements, and conclusions
- ✓ Weather station – Students make a simple weather station with a thermometer, barometer and wind vane – From *Weatherwisdom*
- ✓ Closed system – Students make a simple glass jar closed system with a plant – From *Weatherwisdom*
- ✓ Personal commitment – Students write about 3 things they can do, and will follow through with, to help limit global warming

Class work

Week 1/2

Introduce subject

KWL graphic organizer

Weather

Greenhouse effect/global

Portfolio assignment

Cloud assignment

Construct closed system

Video - *An Inconvenient Truth*

Week 3/4

Oral presentations of cloud assignments

Earth's Atmosphere

How it came to be

Gas composition

Layers

Troposphere

Most weather occurs

Clouds

Airplanes

Stratosphere

Ozone layer (protection)

Mesosphere

Thermosphere

Aurora

Space shuttle

Ionosphere

Radio wave reflection

Exosphere

Construct

Bill Nye video - *Atmosphere*

Week 5/6

Earth's Weather

Definitions

Weather

Climate

Atmospheric engine

Sun

Water (moisture) and water cycle

Wind

Global circulation

Air masses

Coriolis Effect

Equatorial belt

Polar belt

Horse latitudes

High/low pressure

Jet stream

Ocean currents

Thermohalines

Gyres

Bill Nye - *Weather*

Bill Nye - *Climate*

Weeks 7/8

Severe weather

- Hurricanes
- Tornados
- Floods
- Droughts
- Thunderstorms
- Hailstorms
- Snow/Blizzards

Bill Nye – *Storms*

Weeks 9/10/11

Greenhouse gases

- CO₂
- Methane
- Nitrous oxide
- Beneficial effect
- Harmful effects

Production of greenhouse gases

- Plants
- Fossil fuels
 - Oil
 - Coal

- Landfills

- Cows

Global warming

- Theory

- Evidence

 - CO₂ measurements

 - Fossilized weather

- Predictions

 - Warmer temperatures

 - Higher sea level

 - Plant/Animal extinction

- Solutions

 - Conservation

 - Reduce, reuse, and recycle

 - CFLs

 - Heating/cooling

 - Fuel economy

- Alternative transportation
 - Hybrid cars
 - Hydrogen cars
 - Mass transportation
 - Walking
- Green Construction
- Alternative energy
 - Wind
 - Solar
 - Water
 - Tidal
 - Geothermal
 - Coal

Bill Nye - *Climate Change*

III. Lessons

In general, lessons consisted of checking in with students about their prior knowledge of the day's subject, followed by reading relevant information copied from a book or printed from the internet, followed as often as possible by going to appropriate web sites to reinforce the subject. Students were required to take two or three column notes. The notes were scanned for completeness during the lesson.

IV. Notes/Tips for Teachers

Reading material on the daily subjects can be obtained from many sources, including the following: 6th grade science text, any number of books on the subject, and any number of Internet sites on the subject. I generally used, and stressed the importance of using, educational and/or government sites and have provided several links under resources; however, these sites disappear or change often, so current searches are necessary. Be sure to preview the videos, as there may be some questionable language.

Google images proved the best resource for cloud images.

Near the end of the program I received material from the Living Wise program. It is free and provides lessons and take-home activities about the importance of water, energy, and related issues. The students loved it. Information about the program is below.

V. Resources

Books

An Inconvenient Truth, Al Gore
The Complete Idiot's Guide to Green Living, Trish Riley
Earth Science, Holt Science and Technology, SBSB 6th grade text
The Sierra Club Book of Weatherwisdom, Vicki McVey
Stormy Weather 101 Solutions to Global Climate Change, Guy Dauncey with Patrick Mazza

Guest Speakers

UCSB – Through UCSB ScienceLine – www.scienceline.ucsb.edu
Santa Barbara County APCD

Living Wise program – www.getwise.org

Videos

An Inconvenient Truth
Bill Nye Videos
Atmosphere
Climates
Weather
Storms
Climate Change

Websites

http://www.nasa.gov/audience/forstudents/9-12/features/912_liftoff_atm.html

<http://csep10.phys.utk.edu/astr161/lect/earth/atmosphere.html>

<http://www.solcomhouse.com/atmosphere.htm>

<http://en.wikipedia.org/wiki/Ionosphere>

<http://images.google.com/imgres?imgurl=http://www.kowoma.de/en/gps/additional/atmosphere.jpg&imgrefurl=http://www.kowoma.de/en/gps/additional/atmosphere.htm&h=364&w=500&sz=55&tbnid=4o6kEg36zJ2G-M:&tbnh=95&tbnw=130&prev=/images%3Fq%3Dearth%2527s%2Batmosphere%26um%3D1&start=3&sa=X&oi=images&ct=image&cd=3>

<http://images.google.com/imgres?imgurl=http://csep10.phys.utk.edu/astr161/lect/earth/atmosphere.gif&imgrefurl=http://csep10.phys.utk.edu/astr161/lect/earth/atmosphere.html&h=340&w=520&sz=5&tbnid=HWvHX3EOASqrEM:&tbnh=86&tbnw=131&prev=/images%3Fq%3Dearth%2527s%2Batmosphere%26um%3D1&start=1&sa=X&oi=images&ct=image&cd=1>

<http://www.econet.org.uk/weather/whatis.html>

<http://www.rcn27.dial.pipex.com/cloudsrus/whatpowers.html>

http://images.google.com/imgres?imgurl=http://www.uwgb.edu/dutchs/GRAPHIC0/Oceans/OceanCurrents.gif&imgrefurl=http://www.uwgb.edu/dutchs/EnvSC102Notes/102HowEarthWorks.HTM&h=373&w=493&sz=12&tbnid=3zDwrCY98176_M:&tbnh=98&tbnw=130&prev=/images%3Fq%3Docean%2Bcurrents%26um%3D1&start=1&sa=X&oi=images&ct=image&cd=1

<http://library.thinkquest.org/26804/weather.html>

<http://www.nssl.noaa.gov/edu/safety/tornadoguide.html>

<http://dsc.discovery.com/news/video/hurricanegallery.html>

http://www.metacafe.com/watch/360734/cool_lightning_from_may_2005_1_5_speed_playback/

<http://www.youtube.com/watch?v=uCf7gPXuZA4&feature=user>

<http://www.youtube.com/watch?v=wZr8jXo1Uso>

<http://www.youtube.com/watch?v=DNL7ASv14k4>