

Climate Change Curriculum Links for Educators

CSI: Climate Status Investigations



The Keystone Center's curriculum website offers over 65 lessons developed to introduce middle and high school teachers and their students to the topic of climate change and to provide new ways of thinking about the problem and potential solutions. The curricula provide teachers with a non-biased framework for investigating climate change.

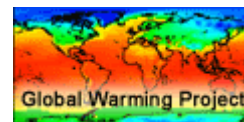
The Keystone Center (<http://www.keystone.org/>), in partnership with the **Department of Energy** (DOE) (<http://www.doe.gov/>), and **The National Energy Technology Laboratory** (NETL) (<http://www.netl.doe.gov/>), presents interdisciplinary curriculum modules for middle and high school level students on the topic of global climate change, entitled CSI: Climate Status Investigations.
<http://www.keystonecurriculum.org/>



The GLOBE Program is a nonpartisan effort of the U.S. Government to gather environmental data globally. Based in primary and secondary schools, the program reaches nearly every corner of the world and engages young people in common scientific endeavor. For information visit GLOBE's website at www.globe.gov - [Final Draft of GLOBE Green-up/down Phenology studies](http://archive.globe.gov/tctg/tgchapter.jsp?sectionId=241) (<http://archive.globe.gov/tctg/tgchapter.jsp?sectionId=241>)

The Global Warming Project (www.letus.nwu.edu/projects/gw/)

"In this project students learn about the scientific factors that contribute to the controversial global warming debate. The project places students as advisors to the heads of state of several different nations, prompting students to learn about the issue as they respond to the various questions and concerns of these leaders." Great curriculum guide in .pdf format includes lesson plans, background information and student sheets. Intended for grades 7-10.



A.R.M. Education Center (www.arm.gov/docs/education/aboutarm.html)

The Atmospheric Radiation Measurement (ARM) Program is involved in research and education with regard to understanding global climate change. This Education Center, intended for students and teachers, has a wealth of information, downloadable lessons plans, links and more.

PLANTWATCH (<http://www.devonian.ualberta.ca>)

Plantwatch is a phenology program tracking the green wave of spring linked to the effect of climate change on local plant life. Intended for grades 4-12, the downloadable Teachers' Guide describes Plantwatch protocols but also suggests activities connecting these studies to related science, math, social studies and language arts concepts.



TAIGA NET Guidelines for Observing Freeze-up and Break-up on Lakes
(www.taiga.net/coop/projects/lakeprotocol.html)

The timing of freeze-up and break-up on lakes could be a useful measure of how temperature varies between years. This site describes simple guidelines for collection of information on ice conditions at the start and end of winter.

The Climate Change Awareness and Action Education Kit by the Pembina Institute
(http://www.pembina.org/publication_item.asp?id=9) is the most comprehensive multimedia education kit on climate change ever devised for Canadian high schools.



Global Warming and the Greenhouse Effect

(<http://www.lawrencehallofscience.org/gems/gemsguides.html>) Grades 7–8; 8

Sessions/184 pages. This guide's hands-on activities and experiments investigate a crucial environmental issue and help students see environmental problems from different points of view. Students also play simulation games and hold a "world conference" on global warming. Acid Rain makes a good environmental partner.

Global Warming: Early Warning Signs

Exploring Climate Change Impacts

About the Curriculum Guide

(<http://www.climatehotmap.org/curriculum/index.html>)

This set of teaching materials is designed to accompany *Global Warming: Early Warning Signs* - a science-based world map depicting the local and regional consequences of global climate change. The map was produced as a collaborative project by several environmental organizations, and has been peer-reviewed by scientists.

The Union of Concerned Scientists produced this Curriculum Guide. Geared towards students and teachers in grades 9-12, individual exercises are adaptable to different grade levels. Each activity is structured to include an initial Engagement exercise, one or more steps of a Student Exploration project, and further ideas for extended study. The materials align with National Learning Standards for Science, Geography, Social Studies, Language Arts, Environmental Education, and Technology.

The map -- an exciting visual tool for learning about the impacts of global climate change -- highlights recent events around the world in two broad categories: direct indicators of the observed long-term global warming trend (fingerprints), and events that are consistent with the projections for global climate change and are likely to become more frequent and widespread with continued warming (harbingers).



The Curriculum Guide activities engage students in an exploration of the impacts of global climate change on ecosystems and natural resources, on community, and on individuals and society. The first two activities look at the questions what do we mean by global climate change? And how does the record of climate compare at local versus global scales? Later activities address the impacts of climate change on natural ecosystems, human health, and economy and personal lifestyle.

A Description of the Activities

Activity 1: Climate Change in My City. Students use an historical climate index to analyze climate change at local, regional, and global scales.

Activity 2: Oral History Project: Climate Change Then and Now. Students interview older residents in the community about climate changes during their lifetime and compare the results to a climate change index that is based on historical temperature measurements.

Activity 3: Climate Change and Disease. Students research the relationship between hosts, parasites, and vectors for common vector-borne diseases and evaluate how climate change could affect the spread of disease.

Activity 4: Climate Change and Ecosystems. Students research the interdependencies among plants and animals in an ecosystem and explore how climate change might affect those interdependencies and the ecosystem as a whole.

Download the [Early Warning Signs Curriculum Guide](http://www.climatehotmap.org/curriculum/climate_change_guide.pdf).
(http://www.climatehotmap.org/curriculum/climate_change_guide.pdf)

About the Global Impacts Map

Global Warming: Early Warning Signs can be viewed on the web at <http://www.climatehotmap.org>. The Web site also includes the complete list of scientific references for the events highlighted on the map. Additional copies of the 2 by 3 color poster can be ordered from the web site. (There is a shipping fee.)

<http://www.climatehotmap.org/curriculum/index.html>



<http://www.climatechoices.org/ne/index.html>

<p>Explore the regional effects of global warming, from declining lobsters to changing forests to flooding in NYC—today's choices shape everyone's future.</p>	<p>See what individuals, businesses and towns across the Northeast are doing today to reduce emissions.</p>	<p>Visit My Climate Choices to share your story and see photos from other people living in the Northeast.</p>	<p>Download reports and summaries, read news, and get more global warming information.</p>

<http://climatechangeeducation.org/>

A banner for Climate Change Education .Org. The top left features a hand holding a glowing orange globe, with four smaller glowing globes on stands below it. The background is black. Text on the right lists the site's focus: Global Warming Education, Climate Change Education, and Science, Solutions -- Resources Directory. The bottom of the banner is a solid orange bar with white text.

Climate Change Education .Org
Portal Web Site Dedicated to:
Global Warming Education
Climate Change Education
Science, Solutions -- Resources Directory

Portal Website -- used by millions. For Students, Teachers, Families, Researchers, Everyone

<http://www.carboncontrol.org.uk/carbonator/default.aspx>

A colorful banner for Carbon Control. It features a green landscape with a sun, a bicycle, a cow, and a city skyline. Five white clouds contain the text: Light bulbs, Car sharing, Energy saving, Cycling, and Local food. A larger cloud on the right says 'Best project wins your school a green makeover!' with a red arrow pointing right. The Carbon Control logo is in the bottom left, and a sign in the bottom right says 'TOMORROW'S CLIMATE Today's Challenge'.

Light bulbs

Car sharing

Energy saving

Cycling

Local food

Best project wins your school a green makeover! →

carbon CONTROL
Tune in to change

TOMORROW'S CLIMATE
Today's Challenge

Discovery Education offers a lesson plan, curriculum center with hands-on activities, puzzles and project ideas for teaching about weather and climate for grades K-12. More at: <http://school.discovery.com/>



NCAR/ University Corporation for Atmospheric Research (UCAR) provides education and outreach for K-12 online learning of science. Web site with hands-on, inquiry focused activities, building literacy and science skills for educators that link to the Biocomplexity project designed to help the secondary education community understand the context of the carbon cycle in climate change including classroom activities and a video of scientist interview http://www.eol.ucar.edu/apol/E_O.htm

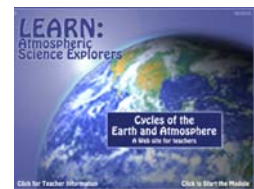
UCAR and the National Weather Service (NWS) established the **Cooperative Program for Operational Meteorology, Education and Training (COMET®)** with Distance Education: interactive professional development materials; residence classes; outreach program providing financial support to universities for applied research projects. <http://www.comet.ucar.edu/>



The Digital Library for Earth System Education (DLESE) provide collections of educational resources Earth data sets and imagery, Support services and Communication networks to facilitate interactions and collaborations across all dimensions of Earth system education <http://www.dlese.org/about/>



LEARN atmospheric science explorer. **The Cycles of the Earth and Atmosphere** (<http://www.ucar.edu/learn/1.htm>)— online teacher module for middle school background information, general learning concepts, and seven sections such as Introduction to Climate, The "Greenhouse Effect", Global Climate Change, Introduction to Ozone Stratospheric and Troposphere Ozone.



Learn what makes weather wet and wild, do cool activities, and become hot at forecasting the weather on **Web Weather** <http://eo.ucar.edu/webweather/>



The National Oceanic and Atmospheric Administration (NOAA) help students, teachers, librarians and the general public access to many educational activities, publications, and booklets and establish the climate program office as resources for scientist and educators. <http://www.climate.noaa.gov/education/>



<http://www.climate.noaa.gov/index.jsp?pg=/.education/hurricanes/resources.jsp>

<http://www.weather.gov/os/edures.shtml>

The American Meteorological Society promotes the development and dissemination of information and education on the atmospheric and related oceanic and hydrologic sciences and the advancement of their professional applications and the online weather studies. <http://www.educapoles.org/>



Educapoles provides material explaining the climate in simple terms. Helps students to discover climate and climate change via practical experiments highlighting the problems of CO₂ and taking meteorological measurements. <http://www.educapoles.org/>



Columbia Earthscape (<http://www.earthscape.org/index.html>) is a comprehensive aggregation of resources in the Earth and Environmental Sciences. The four sections of the compass give you - the [teacher](#), [student](#), [scientist](#), or [decision-maker](#)



Friends of the Earth UK provide resources for educator with lesson plan as **Mad About Climate Change** and **Shout About Climate Change**. <http://www.foe.co.uk/learning/educators/resource/index.html>

The Southeast Regional Climate Center provides resources, games and activities for students and educator as well as weather trivia and how to make barometer and an anemometer. <http://www.sercc.com/index.html>



The Exploratorium is animated website to explore of the earth and demonstrate how scientists know the climate changes. <http://www.exploratorium.edu/educate/index.html>



The **Community Learning Network (CLN)** provides curricula on weather and climate and general resources on climate/weather including units on hurricanes, air quality, blizzards and snow, tornadoes, global warming, lightning, ozone depletion, and more. http://www.cln.org/teach_index.html



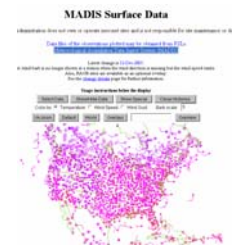
Florida State University has developed **EXPLORES!** a Teacher's Resource Guide to using weather satellites in the K-12 classroom. The website includes Outreach Programs, Basic Skills, Background, and Activities to enhance meteorological knowledge. The Teacher's Lounge/Planning Period /Global Change Resource Page is found at: <http://www.met.fsu.edu/explores/indexg.html>



WW2010™ by UIUC contain [Hurricane](#) instructional module [Modeling the Severe Storms](#) instructional module the [Forces and Winds Satellite Light & Optics](#) instructional modules. [http://ww2010.atmos.uiuc.edu/\(Gh\)/cd.rxml](http://ww2010.atmos.uiuc.edu/(Gh)/cd.rxml)



The **GLOBE** Program is a nonpartisan effort of the U.S. Government to gather environmental data globally. Based in primary and secondary schools from 108 country, the student will collect the data such as air, water, soil temperature, moisture, cloud, aerosol and etc and send it to the visualize website as map and graph or using the data to do the research in their own country or input the data to the [Meteorological Assimilation Data Ingest System](#) (<http://www-sdd.fsl.noaa.gov/MADIS/>) (MADIS) at <http://www.globe.gov>



The **Environmental Protection Agency (EPA)** provides a climate change education resources database that includes a wealth of education resources for educators, students, and the general public with links to lesson plans, videos, books, toolkits, and other fun materials. Find them on the Internet at: <http://yosemite.epa.gov/oar/resources.nsf/websearch?openform>

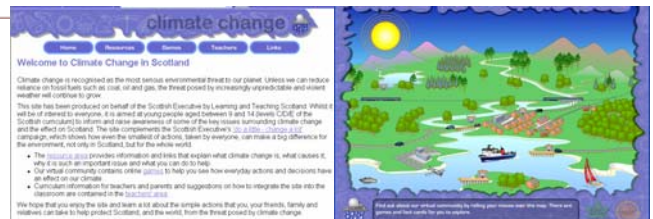


The **Center for International Earth Science information Network (CIESIN)** has many online educational resources for K-12 teachers and students, college classrooms, and graduate-level education and research. CIESIN is found on the Internet at: <http://www.ciesin.org/edresources.html>



The **Learning and Teaching Scotland** website provides games, resources, and lesson plans on climate change (in Scotland). Find them on the Internet at:

http://www.ltscotland.org.uk/climatechange/resources/lesson_plans.asp



The **Atmospheric Radiation Measurement (A.R.M.) Education Center** is involved in research and education with regard to understanding global climate change. This Education Center, intended for students and teachers, has a wealth of information, downloadable lessons plans, links and more. A.R.M. can be found on the Internet at:

<http://education.arm.gov/>

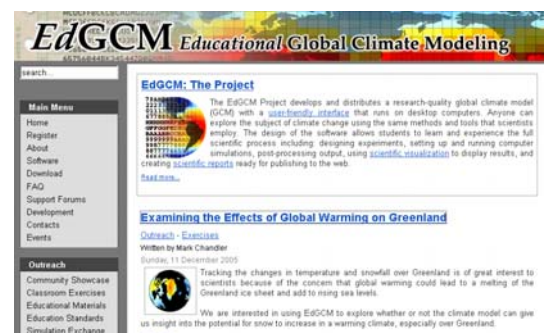


Great Explorations in Math & Science (GEMS) brings you **Global Warming and the Greenhouse Effect** activities for student grades 7–8 with hands-on activities and experiments investigating a crucial environmental issue and helping students to see environmental problems from different points of view. Students can play simulation games and hold a “world conference” on global warming and acid rain. The GEMS website can be found on the Internet at:

<http://www.lhs.berkeley.edu/GEMS/gemsguides.html>



Columbia University developed the climate change education model called Computer-driven **Global Climate Models (GCMs)** which is one of the primary tools used today in climate research. Students can explore the subject of climate change in the same way that actual research scientists do. The goal of EdGCM is to improve the quality of teaching and learning of climate-change science in grades 9-12 by providing broader access to an actual GCM and to help teachers use a research-quality climate model effectively in the classroom. The utilization of EdGCM in undergraduate and graduate courses and by the atmospheric/earth systems science research communities is also anticipated. <http://edgcm.columbia.edu/>



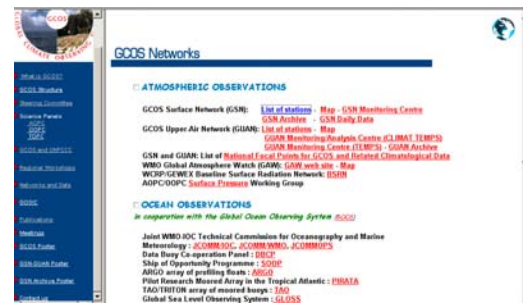
The U.S. Geological Survey (USGS) provides scientific information intended to help educate the public about natural resources, natural hazards, geospatial data, and issues that affect our quality of life. This website provides links to selected online resources to support education (K-12) and college inquiry and research. Find the USGS on the Internet at: <http://interactive2.usgs.gov/learningweb/>




The Australian government provides activities and education resources on climate change and energy for teachers and students to help them reduce greenhouse gases. Topics covered include smart travel, climate change question and answer, greenhouse gases, and preparing a pollution inventory. Find this website on the Internet at: <http://www.greenhouse.gov.au/education/index.html>



The Global Climate Observing System (GCOS) was established to ensure that the observations and information needed to address climate-related issues are obtained and made available to all potential users. GCOS is intended to be a long-term, user-driven operational system capable of providing the comprehensive observations required for monitoring the climate system, for detecting and attributing climate change, for assessing the impacts of climate variability and change, and for supporting research toward improved understanding, modeling and prediction of the climate system. Find GCOS on the Internet at: <http://www.wmo.ch/web/gcos/gcoshome.html>



 **The American Geological Institute** provides access to the geoscience literature of the world. **GeoRef** is the most comprehensive database in the geosciences such as curriculum, material and online resource. <http://www.agiweb.org/geoeducation.html>
<http://www.agiweb.org/education/curriculum/index.html>





NASA's education program supports informal education and public outreach efforts by increasing elementary and secondary education participation in NASA programs; relating with the climate change such as the **CLOUDSAT** and **CALIPSO** outreach or the **Global Change Master Directory (GCMD)** offers descriptions of Earth science data sets using a specified set of information. <http://gcmd.nasa.gov/> and NASA ISS **EarthKAM** provide stunning, high quality photographs of our planet taken from the Space Shuttle and International Space Station. <http://www.earthkam.ucsd.edu/>

<http://gcmd.nasa.gov/Resources/Learning/>

<http://gcmd.nasa.gov/Resources/Learning/data.html>



The National Weather Service (NWS) provides weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean. <http://www.nws.noaa.gov/>

NOAA/ESRL's Global Monitoring Division (formerly CMDL) conducts sustained observations and research related to source and sink strengths, trends and global distributions of atmospheric constituents <http://www.cmdl.noaa.gov/about/aboutgmd.html>



The Climate Change Collection is a suite of science education web-based resources covering natural climate dynamics as well as human impacts on the climate system. <http://serc.carleton.edu/climatechange/>

State climate offices provide climate data in long term period, research outreach and education resource such as:

Indiana State Climate Office: www.agry.purdue.edu/climate/

State Climate Office of North Carolina: www.nc-climate.ncsu.edu/

Maine State climate office: <http://www.umaine.edu/maineclimate/edulinks.htm>

