

Tips 'n' Tricks for Teachers

6 ways to use [NASA's Global Climate Change Website](#) in your classroom

GOALS	To experience an interactive representation of recent changes in Earth's global temperatures and to initiate a discussion about it.
TO DO	<ul style="list-style-type: none">• Open the interactive Climate Time Machine.• Select "Average Global Temperature" from the menu on the bottom right.• This map shows a progression of changing five-year average global surface temperatures from 1881 to 2009.• Have students direct your cursor as you slowly guide the handle along the timeline. Pause as often as necessary for questions or comments.• This demonstration typically creates a big stir as the cursor moves into the last decade; repeat the dragging a few times as the discussion continues.
OPTIONS	<ul style="list-style-type: none">• Select the other menu preferences: Sea Ice, Sea Level and and Carbon Emissions, and discuss the relationship of these topics with increased temperatures.• Students pursue further research on local surface temperatures.• Adapt for a small group lab activity by assigning specific geographical areas to student groups to graph the data.• Metadata for this visual and more can be found at Goddard Institute for Space Studies (GISS) Surface Temperature Analysis (GISTEMP) http://data.giss.nasa.gov/gistemp/
OUTCOMES	Students discover how Earth's surface temperatures have changed over time and place.
GOALS	To demonstrate the relationship between sea surface height and ocean temperatures and to observe events that influence sea level.
TO DO	<ul style="list-style-type: none">• Open the interactive Sea Level Viewer and select the "Latest View" from the menu top right. You can click the arrow on the globe to stop it from rotating.• Observe the latest sea level height closest to your local area.• Explain how warm water expands; sea level is higher where ocean water is warmer.• Discuss the color scale and what this amount of extra water height would look like in you local area.• Click on "Overview" at the bottom of the screen to hear information on how data was collected to make this visualization.• Half the world population lives within 100 Km of a coastline. Lead a discussion about the impacts of sea level rise on coastal communities.
OPTIONS	<ul style="list-style-type: none">• Select the additional menu options: El Niño, Hurricane Katrina, Tsunami, and La Niña.• Select "Missions" at the bottom of the global view screen to get further information on the satellites involved in collecting this data.• Select the "Sea Level" button on Climate Time Machine to view sea level rise at four low-lying coastal areas.
OUTCOMES	Students learn that sea level varies over space and time, is affected by changes in climate and naturally occurring events (earthquakes, tsunamis) and can have a vast global impact.

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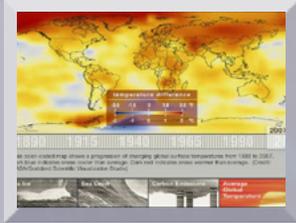
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GOALS	To demonstrate some of the ongoing consequences of global climate change in a visually impactful way.
TO DO	<ul style="list-style-type: none">• Open the Images of Change page on the left side bar.• A featured image pair is at the top of the page with many thumbnail images below.• Click on any of the thumbnail images to open a light-box with before and after image pairs, the corresponding dates, and a description.• Topics include: changes in global ice, fresh water, population, land use, deforestation, and sea level.• Have students choose one image set and list every difference they can find between the before and after images.• Make a comprehensive list of the consequences of global climate change.• Lead a discussion about the effects of climate change.
OPTIONS	<ul style="list-style-type: none">• Have students write a descriptive paragraph comparing and contrasting the pair of images that they find most impactful.• Have students write a descriptive paragraph predicting how one area might change further into the future.• Have students write a research paper on the effects of climate change pictured in one set of images and suggest some solutions that may help to mitigate this effect.
OUTCOMES	Students get a first-hand view of some dramatic changes that have already occurred on planet Earth.

GOALS	To experience an interactive representation of the effects of global climate change on Earth's ice.
TO DO	<ul style="list-style-type: none">• Open the interactive Global Ice Viewer.• Divide the class into four groups, one for each of the tabs: Glaciers, Greenland, Arctic and Antarctica.• Each group is responsible for clicking on and reading the "About" button (near the bottom on the right hand side) for their category.• Student groups are also responsible for clicking on and watching the videos, time-lapse animations and images for their category.• The student groups will then make oral presentations to the rest of the class.• Lead a discussion about the impacts of global climate change on all the various types of Earth's ice.
OPTIONS	<ul style="list-style-type: none">• Lead a discussion about the effects that changes in Earth's ice may have on other Earth systems such as albedo, ocean currents, and ecosystems.• Give students a writing assignment based on the Global Ice Viewer interactive, what they learned, interpretations of what they saw and possible solutions.• Have students do further research on Earth's cryosphere.
OUTCOMES	Students learn about the various forms, locations and global impact of climate change on Earth's icy regions, collectively called the cryosphere.

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GOALS

This series of short internet science videos is perfect to use as an overview, to summarize a theme or as a review tool.

TO DO

Play a video from [Climate Reel](#) at the beginning of each class period. A few of our favorites include:

• Warming World	• Remotely Sensing Global Ocean	• Earth: The Water Planet
• Frozen Earth	• Striking a Solar Balance	• Oceans of Climate Change
• Sea Ice 2008	• Keeping up with Carbon	• Molecule Max

OPTIONS

- Let students search for appropriate course related videos and submit them for class viewing.
- Give students a writing assignment based on their favorite videos.
- Have student groups make their own videos for climate change or solutions to climate change.

OUTCOMES

Students become engaged with scientific topics. The videos are short, fun, and interesting and may even draw students to class on time!

GOALS

To experience how scientists use satellites to gain a global perspective on Earth science.

TO DO

- Open [Eyes on the Earth 3D](#) under “Cool Stuff.”
- Watch the demonstration video before class and familiarize yourself with the tool.
- Warning: You may need to download and install Unity Web Player-Software before being able to use the 3D viewer.
- The visualization is exciting and typically elicits a big “wow” as viewers become aware of the scope of NASA’s Earth orbiting satellites for the first time. Allow students to ask questions and make comments freely.
- Select the Aqua satellite from the menu bar across the top of the page.
- Then select “Carbon Dioxide-monthly” from the data map options on the right. The Carbon Dioxide Monthly Average data for the current month loads automatically.
- Red areas indicate where CO₂ concentrations are the highest and are often located over large cities although winds can distribute the CO₂ around the globe.
- Run the cursor across the datamap and the exact CO₂ concentration appears in the key on the lower right.
- Use your cursor turn on the light, spin the planet, choose the speed of the Earth’s rotation, or zoom in to satellite view.

OPTIONS

- Select GRACE, OSTM, CloudSat, or TRIMM and download the satellite data maps.

OUTCOMES

Students fly alongside NASA satellites in 3D and access near real-time satellite data.