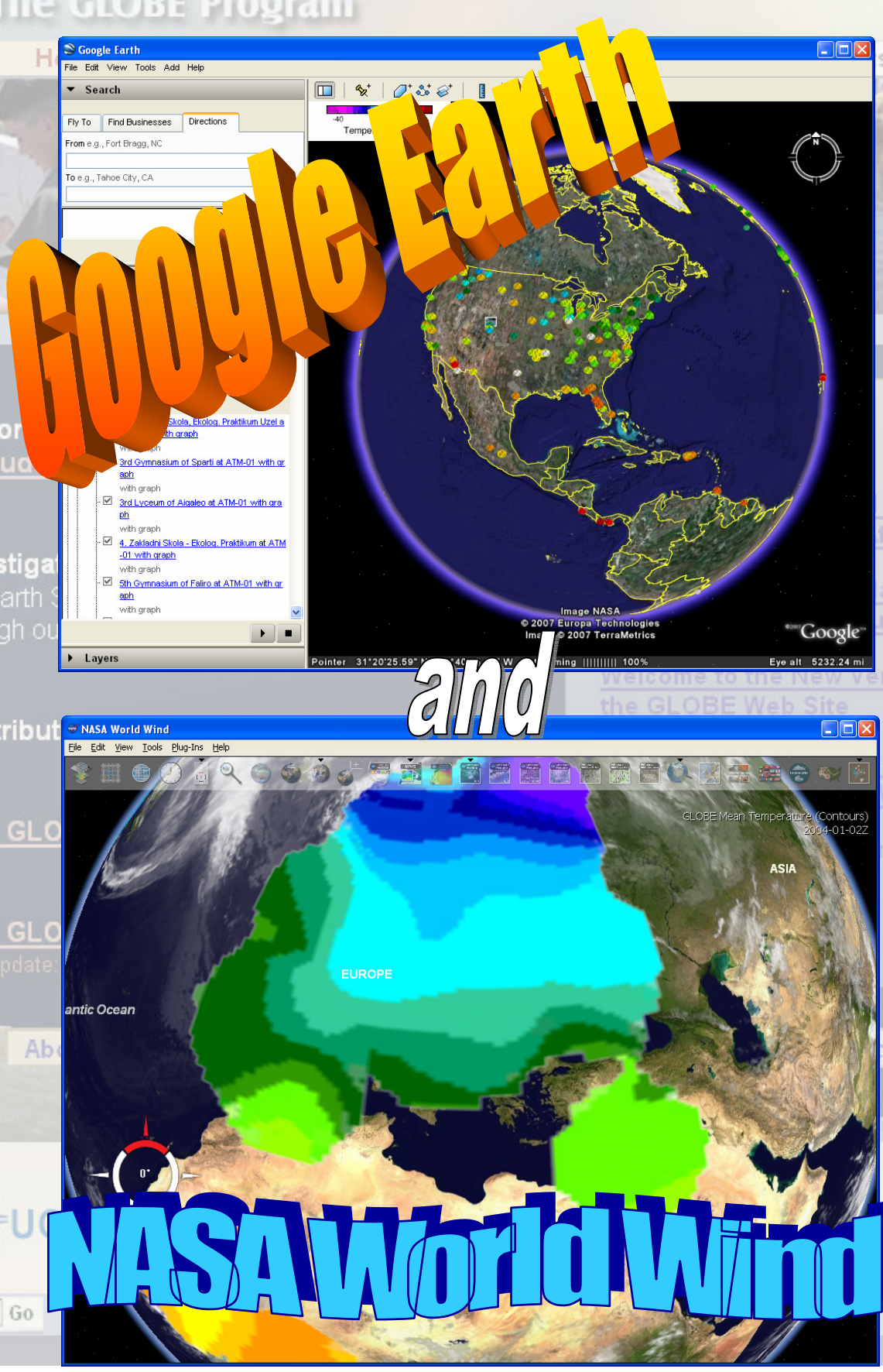
Viewing GLOBE data in Google Earth and World Wind



Dr. Feodor Surkov, GLOBE Russia Country Coordinator
Mr. Gary Randolph, GLOBE Regional Consortia Coordinator

How to *Quick* Guide for viewing GLOBE data using Google Earth:

Go to www.globe.gov, move the mouse over *For Students, down to Maps and Graphs, then down to* Google Earth (see below) and click.

Using GLOBE Data with Google Earth

A 3D Earth-viewing application developed by Google

Introduction

Google Earth is a software program that combines satellite imagery, maps and the power of Google Search that puts the world's geographic information at your fingertips. There are different versions of the software including a Free version.

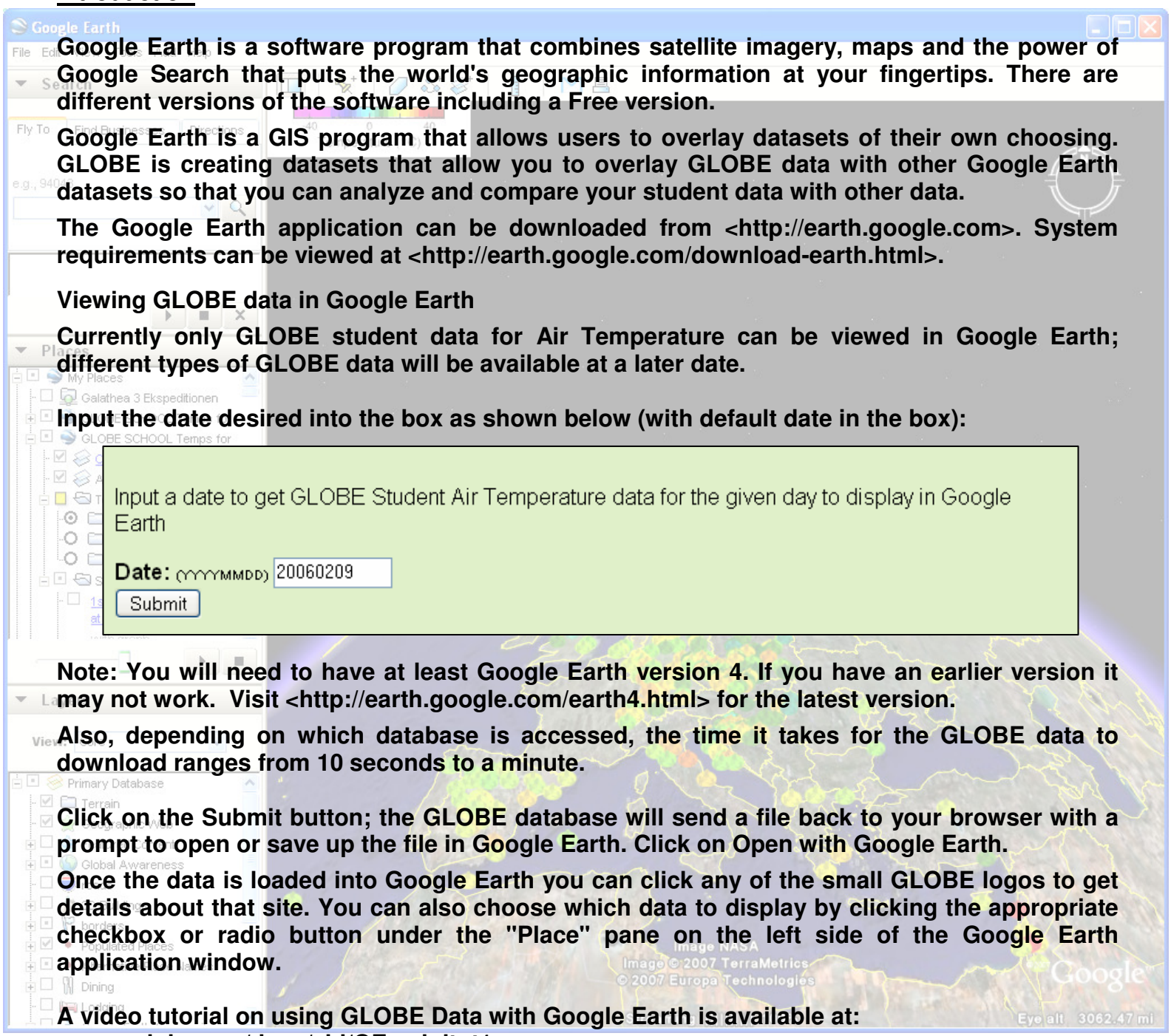
Google Earth is a GIS program that allows users to overlay datasets of their own choosing. GLOBE is creating datasets that allow you to overlay GLOBE data with other Google Earth datasets so that you can analyze and compare your student data with other data.

The Google Earth application can be downloaded from <http://earth.google.com>. System requirements can be viewed at <http://earth.google.com/download-earth.html>.

Viewing GLOBE data in Google Earth

Currently only GLOBE student data for Air Temperature can be viewed in Google Earth; different types of GLOBE data will be available at a later date.

Input the date desired into the box as shown below (with default date in the box):



Note: You will need to have at least Google Earth version 4. If you have an earlier version it may not work. Visit <http://earth.google.com/earth4.html> for the latest version.

Also, depending on which database is accessed, the time it takes for the GLOBE data to download ranges from 10 seconds to a minute.

Click on the Submit button; the GLOBE database will send a file back to your browser with a prompt to open or save up the file in Google Earth. Click on Open with Google Earth.

Once the data is loaded into Google Earth you can click any of the small GLOBE logos to get details about that site. You can also choose which data to display by clicking the appropriate checkbox or radio button under the "Place" pane on the left side of the Google Earth application window.

A video tutorial on using GLOBE Data with Google Earth is available at: <www.globe.gov/docs/vid/GE_minitut1.wmv>.

Links to further information

* **Google Earth User's guide: >http://earth.google.com/userguide/v4/>;**
* **To write your own KML files (for use with Google Earth) visit: <http://earth.google.com/kml/>.**

How to *Quick* Guide for viewing GLOBE data using NASA World Wind:

Go to www.globe.gov, move the mouse over *For Students, down to Maps and Graphs, then down to* NASA World Wind (see below) and click.

Using World Wind with GLOBE data

A 3D Earth-viewing application developed by NASA Ames Research Center

Introduction

World Wind lets a user zoom from satellite altitude into any place on Earth, automatically selecting appropriate resolution satellite imagery and elevation data to create aerial views or views of flying across the world in any direction. It was designed to be easy to use, and the only control needed is a two button mouse. Navigation is accomplished with single mouse clicks and the ability to type in any location and automatically zoom to it.

World Wind also allows viewing of other datasets in its 3D environment, including GLOBE data, weather event animations developed by Goddard Space Flight Center, MODIS data updated daily, and various map reference layers such as country borders, city names, etc. Many of the datasets that can be displayed by World Wind are too large to download the entire dataset to the user's machine, so only the parts being viewed are downloaded and stored in compressed format.

The World Wind application can be downloaded from NASA's World Wind web site: <*http://worldwind.arc.nasa.gov/download.html*>, and can be used under the terms of the NASA Open Source Agreement. It requires a fairly high-end PC to run, including Windows 2000 or XP; Pentium 3, 1 GHz or higher; 256 MB of RAM; 3D graphics card; DSL/Cable internet connection or faster; 2 GB disk space.

Viewing GLOBE data in World Wind

GLOBE data can be viewed in World Wind through WMS (Web Map Service) by these steps:

1. Start up World Wind with the world called "Earth". (This is the default; other available worlds include Jupiter, Mars, the Moon, SDSS, and Venus)

2. In the top menu bar, click “Tools” and scroll down to the "WMS Browser". This may take several minutes to load and brings up a window with two servers listed, NASA SVS Image Server and The GLOBE Program Visualization Server.

3. Click the "+" sign next to The GLOBE Visualization Server to expand the hierarchy, then click the "+" sign next to the data category of interest (e.g. Air Temperature, Rainfall, etc.).

4. Once a dataset is selected, you can either:

- **View the dataset for a particular date by clicking the "Still Image" button; or**
- **Animate the dataset over some length of time by choosing the "Animation" tab in the lower half of the box; select a date range and click on the play button at the bottom of the box.**

5. The data points are now being displayed on the world image. As you click on the Earth it will turn or spin in the direction of the click and will display the new data points as they are available.

Links to further information

- **A helpful Key Chart is available on World Wind's Web site at: <worldwind.arc.nasa.gov>.**
- **The World Wind open source community Web site is at <worldwindcentral.com>.**

How to find *GLOBE Investigation Activities*:

Go to www.globe.gov, move the mouse over *For Students, down to Maps and Graphs, then down to* Investigation Activities (see below) and click.

Investigate the Earth System using GLOBE data and visualization tools

Locate and graph GLOBE data to study patterns and relationships in the Earth System and learn about Earth System science! Teachers can also work with your students to develop your own research questions and projects using GLOBE data. Through these projects students do science, creating hypotheses, analyzing data, drawing conclusions, and reporting their findings. Student investigation reports can be submitted to the GLOBE Web site to share the results with the rest of the world. For more information, see Student Investigations and Find schools with the most data.

Understanding GLOBE Student Data Activities

Student Resources

Activities using GLOBE data to support scientific inquiry and to inspire student understanding of Earth science. By Gary Randolph, The GLOBE Program, Fall 2005.

Looking at Data Activities

- **"In Search of GLOBE Data" Projects:**

	Download format	Spanish
Creating graphs using GLOBE data: Part 1	PDF	PDF
Creating graphs using GLOBE data: Part 2	PDF	PDF
Creating graphs using GLOBE data: Part 3	PDF	PDF
Creating maps using GLOBE data	PDF	PDF
Advanced search for GLOBE data	PDF	PDF

- Where in the World...? PDF

- **What is the Temperature in...?**

The Americas	PDF
Africa, Europe, and the Near East	PDF
Asia and the Pacific	PDF

Learning Activities That Encourage Inquiry

Just Passing Through
Earth as a System Poster Activity

For complete activity materials, see Teacher Resources. ← **Requires Log in**

Other Inquiry Activities

How does location affect trees' seasonal change?

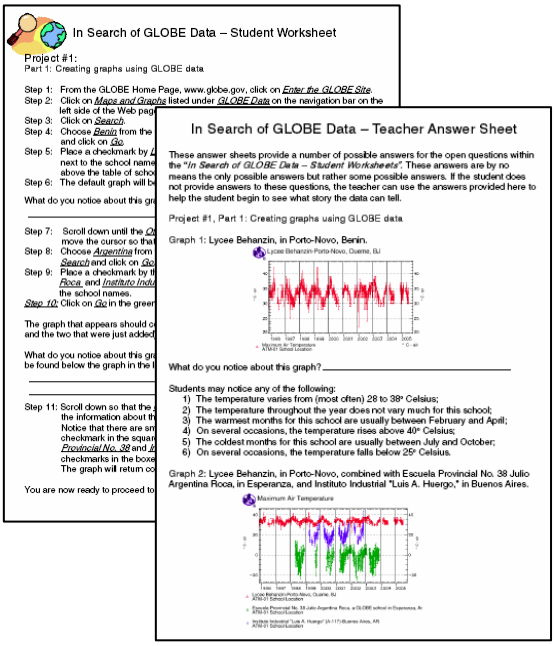
The complete set of activities is available at:
http://viz.globe.gov/globe/en/docs/UnderstandingGLOBEStudentData.pdf

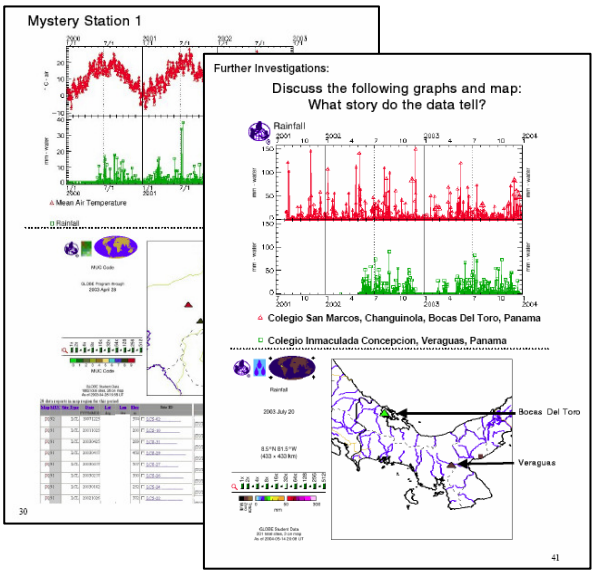
Understanding GLOBE Student Data

A collection of activities for the classroom focusing on GLOBE student data to support inquiry and to inspire student understanding of Earth science.

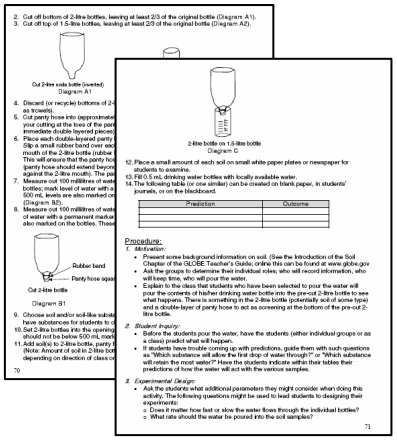
"In Search of GLOBE Data" contains two self-paced projects on using the graphing and mapping tools available on the GLOBE Web site. These sequential how-to guides on searching for schools with usable data include questions inquiring into what the user sees or thinks about the data presented. These questions are intended to stimulate the thinking process.

An answer sheet has been provided to assist the teacher in this activity. These student worksheets are followed by an advanced search for GLOBE data. This is a step-by-step, or click-by-click, how-to guide to help expand the list of tools when searching for GLOBE data. There are no questions associated with the Advanced Search, however if the user proceeds directly from the Student Worksheets they may be able to construct their own questions when visualizing the data using these new tools.

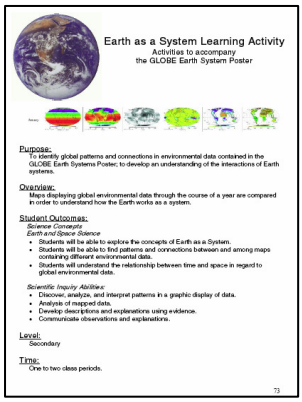




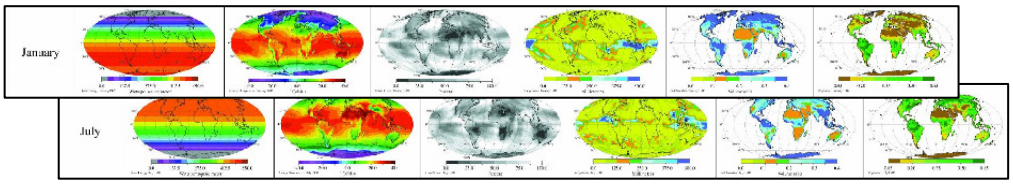
"Where in the World…?" presents maps and graphs of GLOBE student without the location identified, prompting the student to determine the locations using prior knowledge and visual clues in the data. Can students determine the location of a school based on the shape of the air temperature graph? Teachers are provided "Graph and Map Notes" in order to assist students with finding the clues in the data. Further investigations and an assessment exercise are also available.



"Just Passing Through" Learning Activity has students time the flow of water through different soils and observe the amount of water held in these soils and observe the filtering ability of soils.



"Earth as a System" Learning Activity has students identify global patterns and connections in environmental data contained in the GLOBE Earth Systems Poster in order to develop an understanding of the interactions of Earth systems.

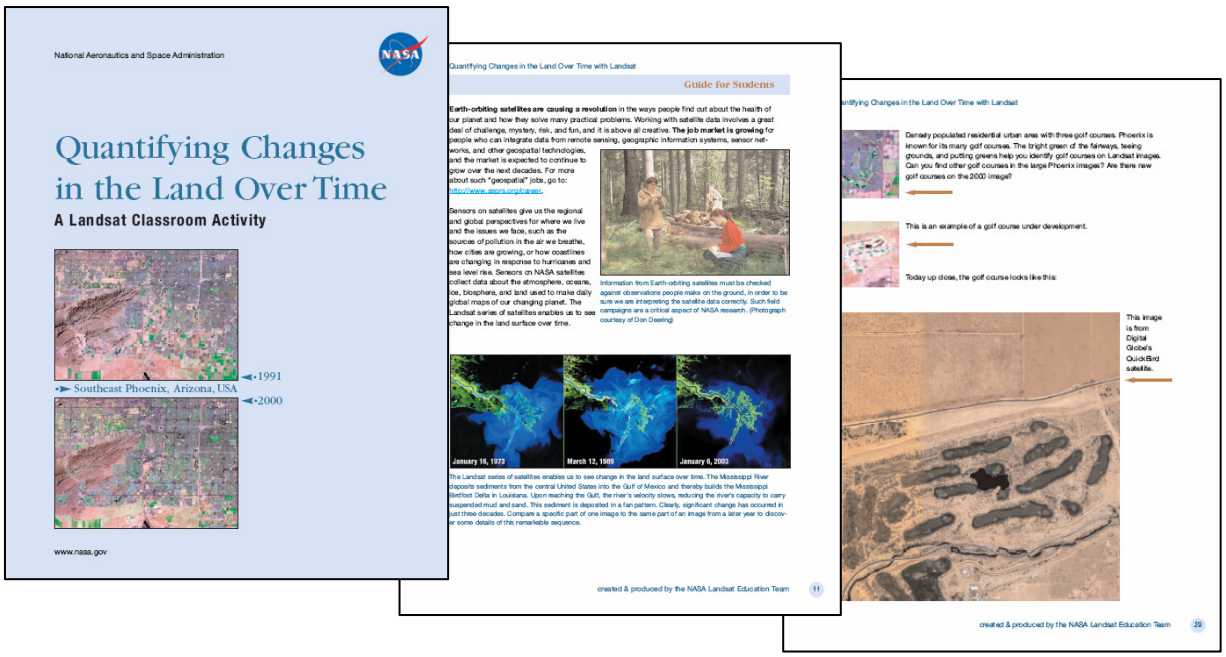


A Landsat Classroom Activity

Approved by NASA Science Mission Directorate Education Product Review

Quantifying Changes in the Land Over Time (pdf)

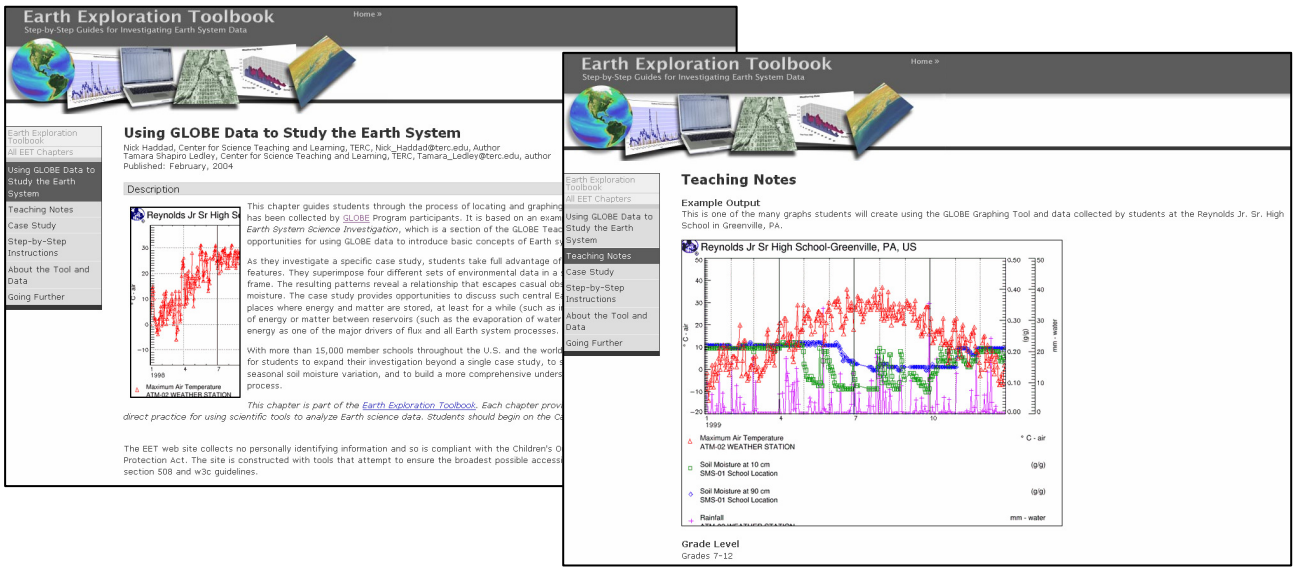
Students learn to identify kinds of land cover (such as roads, fields, urban areas, and lakes) in Landsat satellite images. They decide which land cover types are pervious (allow the passage of water into the soil), and which are impervious, and consider the effects of permeability on ecosystem health. Students then make land cover maps using two Landsat images taken about a decade apart. They quantify the changes in land cover during that time period, make predictions, and think about the consequences for the ecosystem and people. Students justify their predictions and speculations in writing.



Earth Exploration Toolbook Activity

Using GLOBE Data to Study the Earth System

Locate and graph GLOBE data to learn about concepts of Earth System science with this activity in the EET collection in the National Science Digital Library and the Digital Library for Earth System Education.



El Niño Activities

How Does El Niño Affect Temperature and Rainfall?
Looking for the Effects of El Niño in GLOBE Student Data

El Niño Maps Measured and predicted climatic changes caused by El Niño

How Does El Niño Affect Rainfall and Temperature?

Developed by: Valerie LaHart, Cobb Middle School, Tallahassee, Florida, U.S.

Grade level: 6-8

Time: 1-2 class periods, approximately 2 hours

Overview:
During 1997, a major El Niño developed in the Pacific Ocean. This El Niño continued as of
and is expected to strongly affect global weather conditions during the December 1997 thro
1998 time period, and perhaps longer.

Objectives:

1. To develop a basic understanding of how El Niño works.
2. To learn about "normal" weather conditions in your area, and how they relate to condit
of the world.
3. To use GLOBE data to look for evidence of weather changes that might be related to

Procedure:

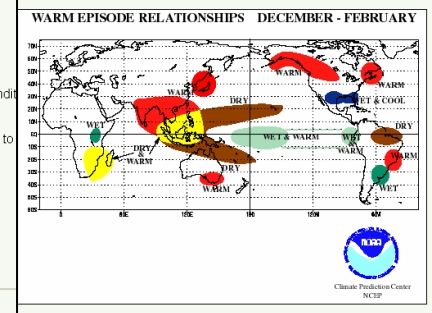
1. Read the short description of El Niño
2. Instructions for Part I: Your School or Area
3. Instructions for Part II: Global Conditions

Additional Resources
- Background: What is El Niño?
- La Niña / El Niño Experiment
- La Niña / El Niño datasets
- La Niña / El Niño / Southern Oscillation animations
- El Niño and La Niña dates

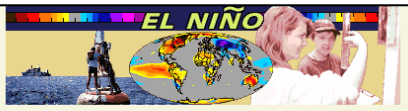
How Does El Niño Affect Rainfall and Temperature?

Part I: Your School or Area

Here you will use GLOBE data from your school, and climatological data from other sources, to examine your local weather conditions and determine how they might be affected by El Niño. Note, if your school does not yet have a year of atmospheric data, you can use a nearby school, or skip to the next section (Global Conditions). Also, the instructions below specifically mention the December through February time period. However, feel free to use any months you may be interested in!



1. What are "normal" weather conditions for your area? Find the normal mean temperature and precipitation for December, January and February and record these values (you can use the table below). Where can you find this data? Some possible sources: a newspaper, local weather service office or University, weather or climate books, or the internet. (If you are not close to an "official" station, you can use a nearby station, but be sure to record the distance and any other important differences from your site - such as elevation)
2. Using the map shown above, make a prediction as to how weather conditions at your school should compare with "normal" for the period December 1997 through February 1998. Should the temperature



Looking for the Effects of El Niño in GLOBE Student Data

Scientists at NOAA are developing models to predict the global effects of El Niño. They have given us access to their predictions so that we can use GLOBE data to test the accuracy of their model. In th
Experiment which we launched in September 1997, we can use these predictions as hypot
them using the data collected following the GLOBE measurement protocols.

The GLOBE visualizations now include a special set of model prediction maps designed to
GLOBE El Niño Experiment. Included in the maps are predictions for the monthly temperat
precipitation anomalies from the experimental NOAA model. These predictions were made
1997.

To help GLOBE teachers and students get started with El Niño, I would like to describe how
little local analysis. In looking through the GLOBE Student Data Archive, I found the Hahira
Hahira, Georgia, USA. They took their temperature and precipitation measurements every
1998, and this makes it easy to calculate monthly average temperature and total precipitati
didn't have any snow, so I need only consider the rainfall data in this example. To see how I
analysis, please read through the steps listed below:

- **Introduction**
- Step 1: Find the predicted temperature anomaly
- Step 2: Find the long-term average temperature
- Step 3: Find the predicted precipitation anomaly
- Step 4: Find the long-term average precipitation
- Step 5: Find the GLOBE school temperature and precipitation data
- Step 6: Graph the GLOBE school data
- Step 7: View the GLOBE school data
- Step 8: Average the GLOBE school data
- Step 9: Compare predictions and long-term averages with GLOBE measurements

GLOBE Maps