



**THE GLOBE PROGRAM**

## **Student Climate Research Campaign**

### **Climate and Land Cover Intensive Observing Period**



### **Teacher Participation Guide**

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## Purpose

To involve students in short-term and long-term scientific studies focused on climate and land cover near their school and in comparisons with schools across the globe as a contribution to scientific research and modeling efforts of scientists.

## Overview

The Climate and Land Cover Intensive Observing Period is a research effort between GLOBE schools and climate scientists to improve land cover classifications for climate models. Using GLOBE land cover protocols, students take photographs and classify representative land cover areas near their schools and upload these data to the GLOBE database. These data can be used by students to compare land cover around the world and will be used by scientists to improve land cover classifications for climate models.

## Climate and Land Cover Intensive Observing Periods (IOPs)

Although photographs can be taken and uploaded at any time throughout the year, land cover scientists have identified key times that are representative of the peak seasonal conditions for vegetation. This peak time will vary across latitude and continents depending on factors such as climate variability, proximity to water, elevation, topography, and other conditions like drought or impacts due to extreme events. To enable schools to participate during periods with the most representative seasonal vegetation where maximum participation can occur, the following focused intensive observing periods (IOPs) for Climate and Land Cover have been designated, beginning October 2011:

	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Climate and Land Cover											

## What is needed

In order to participate in the Climate and Land Cover IOP, you will need the following materials:

- GPS
- Compass
- MUC Field Guide or MUC System Table and MUC Glossary of Terms
- Camera
- Student Field Guide for GPS Protocol and GPS Data Sheet
- Land Cover Sample Site Data Sheet
- Pencil or pen

- 50 m tape measure
- Local vegetation field guides
- Markers for permanent sites
- Clipboard

## Time needed to participate

- Identify and establish a new land cover site and report data: *1 – 2 class periods*
- Conduct repeat observation of an established land cover site and report data: *30 minutes*

## What to do and how to do it

### Collect land cover data and site photographs

1. Identify and establish a representative Land Cover Study Site, if your school has not previously established a study site. Refer to the Sample Site Selection and Set-up guide ([http://classic.globe.gov/tctg/land\\_prot\\_siteselect.pdf?sectionId=207&lang=EN](http://classic.globe.gov/tctg/land_prot_siteselect.pdf?sectionId=207&lang=EN)) for information regarding identification and establishment of a land cover site that is representative of local land cover.
2. Follow the Land Cover Sample Site Protocol ([http://classic.globe.gov/tctg/land\\_prot\\_samplesite.pdf?sectionId=209&lang=EN](http://classic.globe.gov/tctg/land_prot_samplesite.pdf?sectionId=209&lang=EN)) directions for collecting land cover data and record data on the Land Cover Investigation: Sample Site Data Sheet ([http://classic.globe.gov/tctg/lc\\_ds\\_samplesite.pdf?sectionId=469&lang=EN](http://classic.globe.gov/tctg/lc_ds_samplesite.pdf?sectionId=469&lang=EN)). High quality, labeled, site photographs of uniform and representative sites are particularly important for the CLC project!
3. Use the Modified UNESCO Classification MUC Field Guide ([http://classic.globe.gov/fsl/pdf/MUC\\_guide.pdf](http://classic.globe.gov/fsl/pdf/MUC_guide.pdf)) to classify the land cover at your site.

### Report data to the GLOBE database

1. Sign In ([http://globe.gov/signin?return\\_to=%2F](http://globe.gov/signin?return_to=%2F)) using your school's Classic ID and Password.
2. Navigate to the GLOBE Data Entry portal (<http://classic.globe.gov/fsl/DATA/G2/MainDisplay.opl?lang=en>).
3. Mouse over the "Land Cover/Biology" tab and select the "Define a Land Cover/Biology Sample Site" data entry page.
4. Select either "Define a New Site" or an existing site from the list of existing sites for your school. (Note: If you're submitting new photos for an existing site, for example one you used in a previous IOP, you'll be directed to a page asking you why you're updating this site, and so make sure to select "Updating information because conditions have changed" to get you to the page to enter the new photos)

5. Fill in (or update) the data form as directed and select "Send Data".
6. Upload your Site Photos via the link on the bottom of the "Your input has passed system checks!" confirmation page.
  - a. Please note that each image must be no larger than 5 MB and one of the following file types: .png, .jpg, .gif, .tiff, .jpeg, .x-png

## View land cover data and site photographs

View your school's land cover data, as well as land cover data from all other GLOBE schools in Google Earth via any of the following three methods.

1. Browser-based Google Earth (<http://globe.gov/sites/photos>)
2. Download a Google Earth KML file (<http://globe.gov/sites/photos.kml>) and open in Google Earth
3. Create a "Network Link" in Google Earth by adding <http://globe.gov/sites/photos.kml> as a Network Link in Google Earth

## Optional Extensions

### Key Science Questions

The following are key land cover/land use science questions that scientists are interested in answering. These big picture questions should be considered during participation in the climate and land cover IOP and when conducting the IOP activities:

- In what locations are land cover and land use changing, what is the extent, over what time scale, and how do the changes vary from year to year?
- What changes are occurring in global land cover and land use, and what are their causes?
- What are the impacts of climate variability and change on land cover / land use and what is the potential feedback?
- What are the consequences of changing land use activities for ecosystems and how do they respond to and affect global environmental change?
- What are the consequences of land cover and land use change for human societies and the sustainability of ecosystems?
- How might land cover change on time scales from years to centuries?
- What are the projected changes in land cover and their potential impacts?
- How does land cover relate to the global carbon cycle?

## Additional Activities

### Using GLOBE Data to Analyze Land Cover

In this extension, students find another GLOBE school that reported the same MUC class and systematically compare the other GLOBE measurements that each school reported.

[http://classic.globe.gov/tctg/land\\_la\\_analyze.pdf?sectionId=226&lang=EN](http://classic.globe.gov/tctg/land_la_analyze.pdf?sectionId=226&lang=EN)

Ex. activity - Obtain the name and location of two GLOBE schools who have reported the same MUC code. Ask students to make comparisons between the photographs submitted by their school and those submitted by another school reporting the same MUC class.

### **GLOBE Soil and Soil Temperature Protocols**

In this extension, students will examine the GLOBE soil protocols to answer some key questions that connect soil and land cover. Some key questions include:

- How would soil temperature change as land use changes? Why is this important?
- How does this relate to air temperature and the water cycle?

Protocols needed:

1. GLOBE Soil Protocol
2. Soil Temperature Protocol

### **GLOBE Biometry Protocol**

In this extension, students will examine the GLOBE biometry protocol to answer some key questions that connect vegetative species and land cover. Some key questions include:

- What are the dominant and co-dominant species in your Land Cover Sample Site? Do these species always occur in sites that have the same MUC class?
- Are the dominant and co-dominant species common in your area? Are these species native to your area? Are the trees mature or juvenile?

Protocol needed:

1. GLOBE Biometry Protocol

### **GLOBE Phenology Protocol (Green-up, Green-down)**

The period between green-up and green-down or senescence is known as the growing season, and changes in the length of the growing season may be an indication of global climate change. On-the-ground observations of plant green-up and green-down are needed to validate satellite estimates.

Protocols needed:

1. GLOBE Green-up Protocol
2. GLOBE Green-down Protocol