

My NASA Data - GLOBE Connections

GLOBE Connections: Volcanic Eruptions

GLOBE protocols and learning activities that complement the Volcanic Eruptions phenomenon through hands-on investigations are detailed below. Students conduct their own investigations and see how their data related to global patterns by using GLOBE and My NASA Data together.

Visit the [GLOBE Geosphere Protocols & Related ESDE Datasets](#) page that outlines the datasets available in the Earth System Data Explorer. These data complement student GLOBE investigations using the following protocols.

[Volcanic Eruptions](#)

These protocols and learning activities can help students study the impacts of recent and older volcanic activity.

Blog

[Volcanic Eruptions and Cooling of the Planet](#)



Image Credit: GLOBE

Student Project

See a [GLOBE project](#) that students completed following volcanic activity in their area.

Protocols

GLOBE protocols are used to collect many types of data to examine the effects of volcanic eruptions. Students implement the protocols to collect data and share their data with other GLOBE students around the world. As scientists continue their study of the impacts of volcanic eruptions on temperatures, soil, and vegetation, they also use these data.

Atmosphere Protocols

- **Aerosols** - Measure the aerosol optical thickness of the atmosphere (how much of the sun's light is scattered or absorbed by particles suspended in the air). Students point a GLOBE sun photometer at the sun and record aerosol optical thickness or voltage which is converted to aerosol optical thickness. Students observe sky conditions near the sun, perform the Cloud, Barometric Pressure and Relative Humidity Protocols.
- **Air Temperature** - Current air temperature is measured using a thermometer held in the open air but in the shade for at least 3 minutes.
- **Clouds** - Observe and report which types of clouds are visible, how much of the sky is covered by clouds, and the opacity of clouds. Also report sky and surface conditions. Each observation is matched to satellite data of clouds taken about the same time and location. Cloud observations can be taken at any time! This Protocol is designed to be flexible and fit into your schedule, classifying, observing, and reporting cloud observations when it works for you. If you observe while a satellite is overhead, you can then receive an email from NASA comparing your observations to satellite data.
- **Wind** - Determine wind direction using a wind direction instrument. Students construct their own instruments.

Biosphere Protocols

- **Biometry** - Students measure properties of vegetation and identify species in order to classify land cover using the MUC System and to provide supplemental information about their site.
- **Fire Fuel** - Students take additional measurements of fire fuel at Land Cover Sample Sites.
- **Land Cover Classification** - Students locate, photograph, and determine the MUC class for 90 m x 90 m areas of homogeneous land cover.

Pedosphere (Geosphere) Protocols

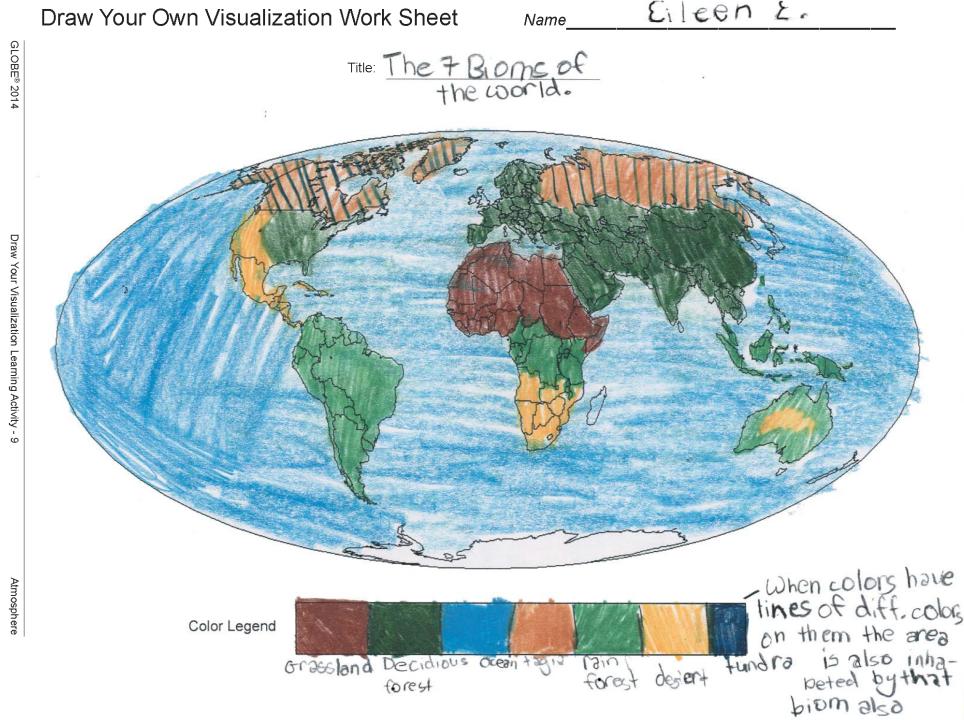
- **Soil Characterization** - Students identify horizons in a soil profile, observe the structure, color, consistency, texture, and the presence of rocks, roots, and carbonates of each horizon, and take samples for use in laboratory characterization protocols.
- **Soil Particle Density** - Students measure the volume of a known mass of dry soil particles and calculate the density of the particle portion only of a soil sample.
- **Soil Particle Size Distribution** - Students suspend a known mass of dry soil in water and measure the specific gravity of the suspension after sand and then silt has settled out of the suspension to determine the amount of each soil particle size group in the sample.

Learning Activities

Each of the GLOBE protocols has a set of learning activities to help students learn more about the instruments and procedures for the measurements, the content associated with the protocol and ways students and scientists can use the data that is being collected. There is a link for all atmosphere learning activities and those that have been selected for Volcanic Eruptions are detailed

below.

1. [Atmosphere Learning Activities Introduction](#)
2. [Biosphere Learning Activities Introduction](#)
3. [All GLOBE Pedosphere \(Geosphere\) Learning Activities](#)
4. [Soil Learning Activities Introduction](#)



Source: [GLOBE Website](#)

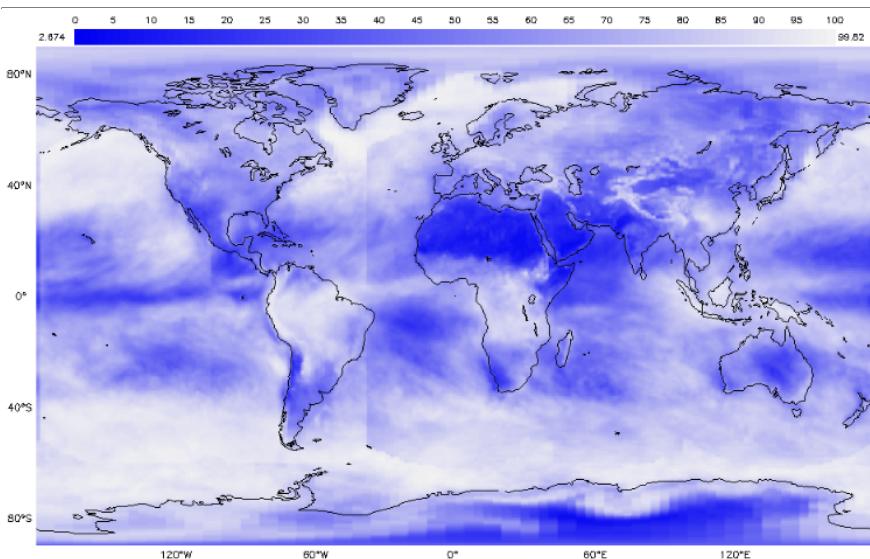
5. [Draw Your Own Visualization](#)



Overview: Students draw a visualization based either on their interests and ideas about the world or based on actual GLOBE data. Students are asked to justify the design choices they make and to interpret the visualizations of their peers.

Student Outcomes:

- Visual models help us analyze and interpret data
- Geographic visualizations help organize information about places, environments, and people



Earth System Data Explorer - Monthly

Total Cloud Coverage

[6. Estimating Cloud Cover: A Simulation](#)



Overview: Students practice assessing the sky's percent cloud cover to take more accurate cloud cover observations.

Student Outcomes:

- Students understand the difficulties of visually estimating the percentage of cloud cover and gain experience estimating cloud cover, evaluating the accuracy of estimates, and using fractions and percentages.

Figure AT-stp-9: Maps

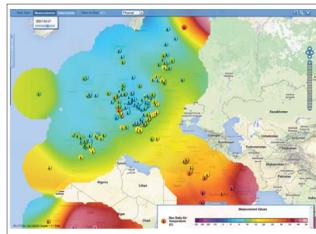


Figure AT-stp-10: Graphs

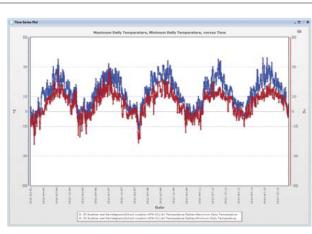


Figure AT-stp-11: Data Table

School Name	Latitude	Longitude	Elevation	Measured Value
Wilhelm-August-Lay-Schule	48.083	7.683	160.8	22.5
Feuerzentrum Erding	48.2977	11.8943	468	26
Stredni Odborne Uciliště Lesnické a Rybářské / SOUĽ a R/J	48.9345	17.2934	147.9	23
Základní škola Josefa Bublika, Banov	48.9908	17.7203	250	22
ZŠ a MS Donáni	49	15	495	20
Základní škola T.G.Masaryka	49	15	465	23
ZŠ Brumov Bylnice	49.0818	18.0198	286.9	21.3
Gymnázium Slavín	49.0905	17.88	363	21
ZŠ Otrokošice	49.2179	17.5115	135.8	23
Volksschule Petersaurach	49.3117	10.7448	445	21.2
Staatliche Realschule	49.32613	11.01033	301	23
ZŠ Bystrice nad Pernštejnem	49.519	16.26	570	21
Gymnázium Dr. A. Hrdlicky	49.542	15.3537	518	22.4
Wilhelm-Erb-Gymnasium	49.5673	7.8502	268	22.8
Gimnazium No 2 in Žywice	49.6833	19.2002	353	18.3
ZŠ Pomezí	49.7148	16.3003	565	29.5
Gymnasium an der Heinzenwies	49.7213	7.3092	341	22
Základní škola Opavská	49.7597	17.7845	401	20.7
ZŠ Golcův Jeníkov	49.8224	15.4836	395	25.1
Darmstadt Elementary School	49.8457	8.6412	217.1	17
VOS a SOST Litomyšl	49.8724	16.3041	299.6	19
Offene Schule Babenhausen	49.9	8.84	37	21.6
Gymnázium (CZCZMA4W)	49.9042	16.4432	350	24
ZŠ Borovského Karviná	49.9088	18.4522	279	27
ZŠ Vrané nad Vltavou	49.9368	14.3792	240	26
Offene Schule Babenhausen	49.96	8.95	37	21
Complex of Schools in Jarosław	50.0033	22.6786	212.2	22.6
Gymnázium Voděradská	50.0673	14.4977	185	24
Complex of Schools in Rudna Wielka	50.0874	21.954	174.5	22.5
Gimnazium No 7 Jana III Sobieskiego in Rzeszów	50.1466	22.1738	179.1	23
Základní škola (CZCZAHJA)	50.2057	16.2367	438	25
DDM	50.2066	15.6347	233.2	26
4. Základní škola - Ekolog, Praktikum	50.4387	15.3523	668	22.2
Mittelschule Elsterberg	50.4433	12.5057	643.5	19.1
Gimnazium in Toszek	50.4514	18.5163	209.1	19
Complex of Schools J. Kilińskiego in Krapkowice	50.4842	17.9581	200	21
Goethe Schule	50.5412	8.522	260	26.3

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Seasonal Temperature Patterns Learning Activity - 7

Atmosphere

Source: [GLOBE Website](#)

7. How Do Seasonal Temperature Patterns Vary Among Different Regions of the World?



Overview: Students use GLOBE visualizations to display student data on maps and to learn about seasonal changes in regional and global temperature patterns.

Student Outcomes:

- Summarize the effect of latitude, elevation, and geography on global temperature patterns;
- Explore local and regional seasonal variations.

Visibility and Sky Color Data Sheet

Observer(s): _____

*Alternatively, you can give the name of a paint color, or you can refer to a photograph you have taken previously.

Visibility Categories	Sky Color Categories
Unusually clear	Deep blue
Clear	Blue
Somewhat hazy	Light blue
Very hazy	Pale blue
Extremely hazy	Milky

GLOBE® 2014

Observing Visibility and Sky Color Learning Activity - 6

Atmosphere

Source: GLOBE Website

8. Observing Visibility and Sky Color



Overview: Students observe, document, and classify changes in visibility and sky color over time and to understand the relationship between sky color, visibility, and aerosols in the atmosphere.

Student Outcomes:

- To observe, document, and classify changes in visibility and sky color over time and to understand the relationship between sky color, visibility, and aerosols in the atmosphere



Image Credit: NASA

[9. Using GLOBE Data to Analyze Land Cover](#)



Overview: Students develop hypotheses about which environmental factors are most important to plants growing in a local Land Cover Sample Site by comparing local GLOBE data to those of other GLOBE schools reporting the same MUC class.

Student Outcomes:

- Using GLOBE Visualizations, students will identify two other GLOBE schools that have reported the same MUC class and compare their temperature, precipitation and soil moisture to their own.
- Students will identify which environmental factors are similar and which vary, suggesting which are more important in determining plant communities.



[Source: GLOBE Website](#)

10. Why Do We Study Soil?

Overview: Students are introduced to the importance of soil and why it needs to be studied.

Student Outcomes:

- Students will understand the importance of soil science.
- Students will be able to provide reasons for studying soil.
- Students will understand how soil properties are determined by the five soil-forming factors.
- Students will appreciate the relative amounts of usable soil that exist on Earth.