

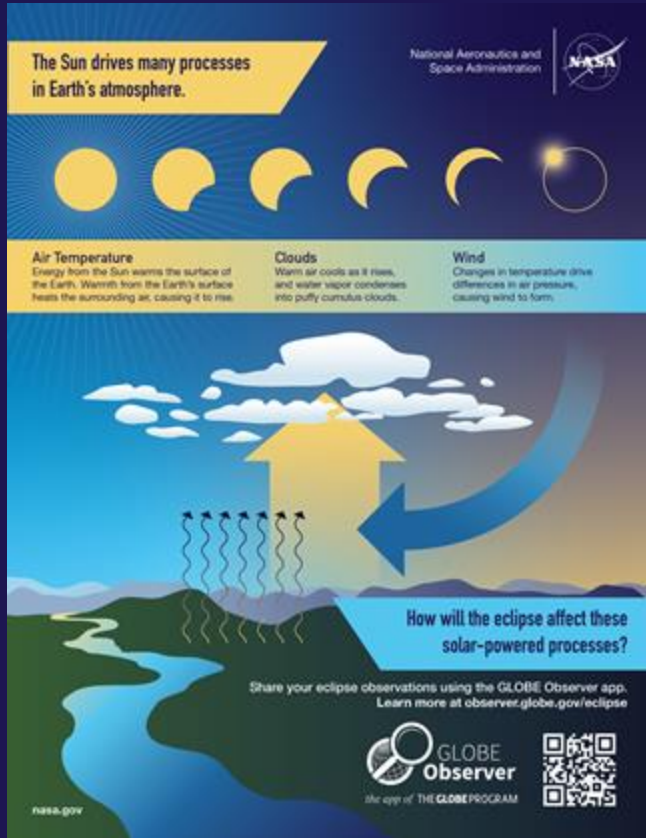
GLOBE Eclipse poster, available in the Eclipse Resource Library.

# GLOBE Eclipse: Preparing for April 2024

## Introduction & Safety



# The Earth Science Angle: Study eclipses as a volunteer observer with GLOBE



Energy from the Sun warms our planet, and changes in sunlight can also cause changes in temperature, clouds, and wind. What happens when the Sun is blocked by the Moon during an eclipse? How will the eclipse affect these solar-powered processes?

Diagram from the front side of a one-page document outlining the changes that might be observed during a solar eclipse, which is available on the [GLOBE Observer Eclipse website](https://observer.globe.gov/eclipse).

# Using the GLOBE Eclipse tool, volunteer scientists are able to:

- Observe how the eclipse changes atmospheric conditions near you by reporting on clouds and air temperature



Taking clouds observations using the Clouds tool is always available in the GLOBE Observer app, and is incorporated into the observation prompts for the Eclipse tool. Credit: GLOBE Clouds Team, NASA LaRC



Above: A simple thermometer that can be used to take air temperature measurements. Credit: GLOBE  
Right: An example of what the home screen of the GLOBE Observer app will look like when the Eclipse tool is available. Credits: GLOBE



- Report surface conditions (photograph and describe the landscape) that may have an impact on differences in the atmospheric effects in varying locations



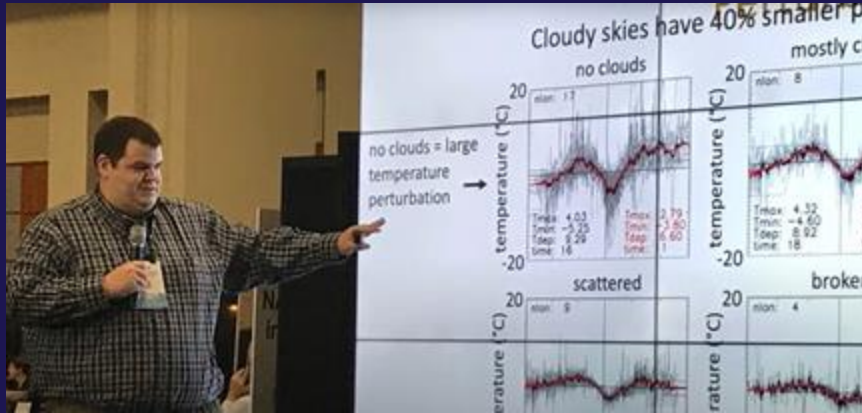
A participant using the GLOBE Observer app Land Cover tool to take photos of the surrounding landscape. Credit: GLOBE



A screenshot from the GLOBE Visualization System, <https://vis.globe.gov>, showing images of land cover taken around the United States. Credit: GLOBE

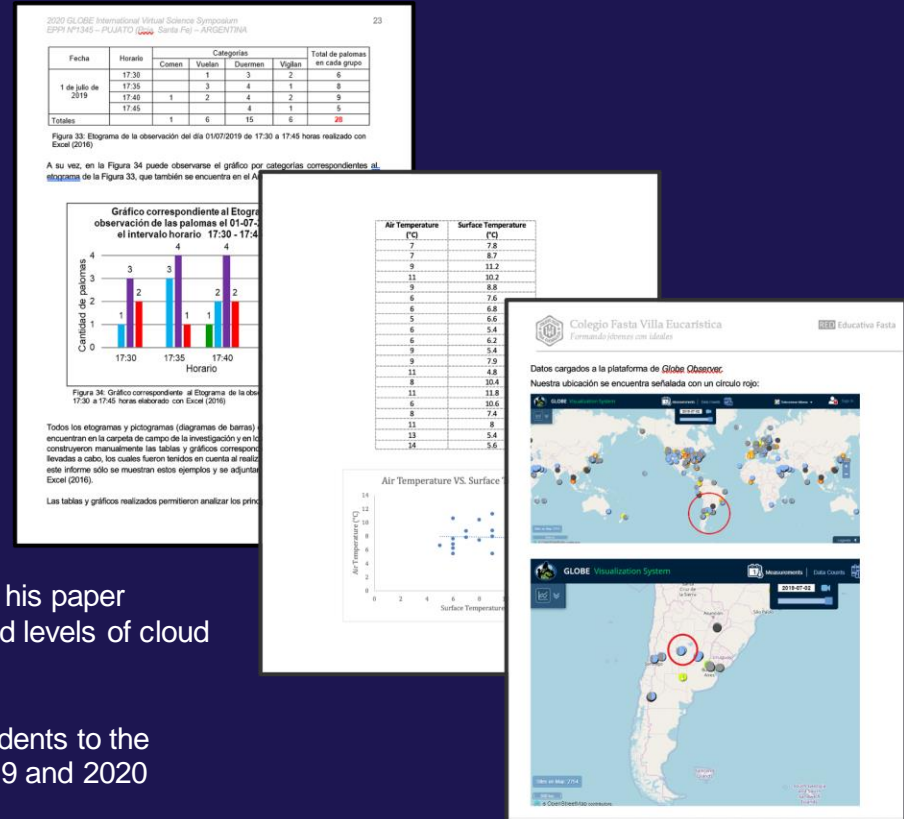


- Contribute to a citizen science database used by scientists and students to study the effects of eclipses on the atmosphere



Left: Dr. Brant Dodson (NASA Langley Research Center) presents his paper comparing the citizen science temperature data at different reported levels of cloud cover, [doi.org/10.1175/JAMC-D-18-0297.1](https://doi.org/10.1175/JAMC-D-18-0297.1)

Right: Pages from several of the research reports submitted by students to the GLOBE International Virtual Science Symposia after the 2017, 2019 and 2020 eclipses, [observer.globe.gov/eclipses#studentresearch](https://observer.globe.gov/eclipses#studentresearch)



- Provide comparison data even if not on the path of maximum eclipse

Eclipse shadow location  
is an estimation.

[View data animation](#)

Air Temperature (°C)



August 21, 2017 Eclipse  
Air Temperature Measurements



# Eye Safety During a Total Solar Eclipse

Looking directly at the Sun without proper eye protection is unsafe **EXCEPT** during the brief total eclipse phase (“totality”). This happens **ONLY** within the narrow path of totality. At all other times, it is safe to look directly at the Sun **ONLY** through special- purpose solar filters, such as “eclipse glasses.” Ordinary sunglasses, even very dark ones, are not safe for looking at the Sun.



A solar eclipse watcher in Argentina in December 2020.  
Credit: Marta Kingsland



A crowd uses handheld solar viewers and solar eclipse glasses to safely view a solar eclipse. Credit: National Park Service



View the eclipse with special solar viewing glasses



Regular sunglasses are not safe to view the eclipse



# Eye Safety, Continued

If you are inside the path of totality on 08 April 2024, remove your solar filter **ONLY** when the Moon completely covers the Sun's bright face. As soon as the Sun begins to reappear, replace your solar filter to look at the remaining partial phases.

Outside the path of totality, it is **NEVER** safe to look directly at the Sun without using a solar filter that complies with the transmittance requirements of the ISO 12312-2 international standard.



Image from the [2024 Total Solar Eclipse Safety Sheet](#)



Map from [NASA's Scientific Visualization Studio](#)

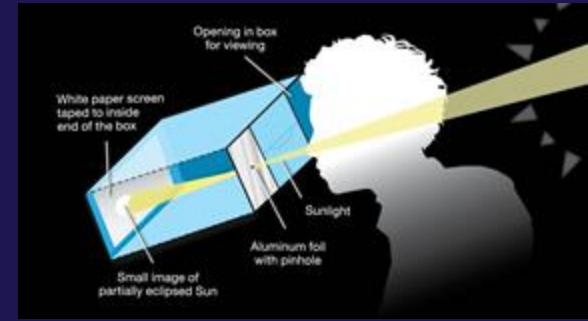


# Indirect viewing methods

If you don't have eclipse glasses or a handheld solar viewer, you can use an indirect viewing method, which does not involve looking directly at the Sun. For example, a pinhole projector or a colander or other object with circular holes. The GLOBE Eclipse cards also have a place where a hole can be punched to serve as an indirect viewer.



Read more on  
[NASA's Eclipse  
Safety page.](#)



You can make your own eclipse projector using a cardboard box, a white sheet of paper, tape, scissors, and aluminum foil. Credit: NASA



Left: A GLOBE Eclipse card used to project the Sun onto the ground. Credit: GLOBE Above: The circular holes of a colander project crescent shapes onto the ground during the partial phases of a solar eclipse. Credit: Joy Ng

# How to Observe with GLOBE Eclipse



[Watch the video](#)

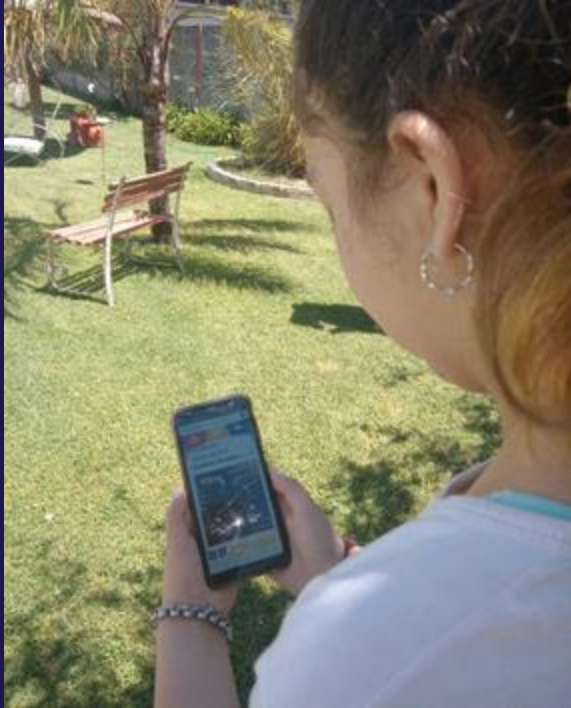
# GLOBE Eclipse: Preparing for April 2024 App Basics



Materials laid out and ready to observe the eclipse in December 2020: the Eclipse tool in the app, solar viewing glasses, and a thermometer. Credit: Marta Kingsland



# Using the GLOBE Eclipse tool



Observer using the GLOBE Eclipse tool during the total eclipse in Argentina on 14 Dec 2020. Credit: Marta Kingsland



The app screen showing the countdown to the next observation, as well as an (optional) paper data sheet. Credit: Pablo Cecchi



Settings ✕

Please confirm your thermometer type:

Type of Thermometer: ▼

C F

Measurement Alarm: On

---

Location:  
39.0009, -76.9146

---

Do a Land Cover observation to characterize your location (include your thermometer in the down photo).

Land Cover

# Using the App: Configuration

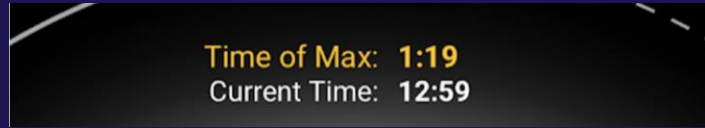
- Set the type of thermometer to be used (liquid filled, digital, weather station, other)
- Choose Celsius or Fahrenheit to display the temperature in the app (all data is stored in Celsius in the GLOBE database)
- Activate reminders for taking measurements
- Current location (automatically set)
- Take a Land Cover observation to tell us about the landscape where the observations are being collected



Example thermometers. Credit: GLOBE  
NOTE: A weather app does not count as “other” - you should have a separate physical thermometer.



# Using the App: Data Collection Screen



Top portion shows the time of maximum eclipse based on the current location



Buttons navigate to safety/intro pages, configuration/ settings (see previous slide), and a listing of the already collected data, respectively

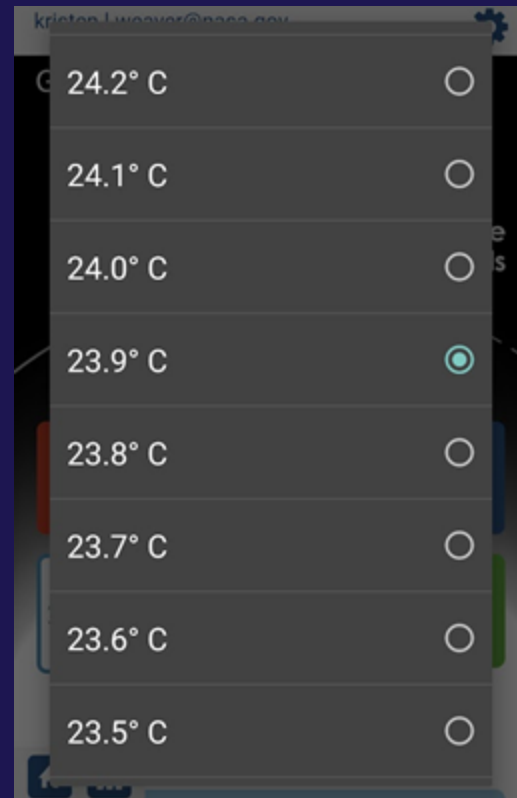


# Using the App: Entering Temperature Data

Next Observation:  
9 mins 18 secs

Enter Data Now:

Display shows a countdown to the time for the next observation, or “Enter Data Now” when it’s time to collect another air temperature measurement. Tapping “Enter Data Now” brings up a selection menu for temperature values (right).



# Using the App: Review/Edit Data



The graph icon goes to a listing of previously collected air temperature data, with options to edit or delete data points if needed.

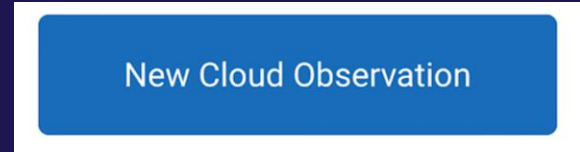
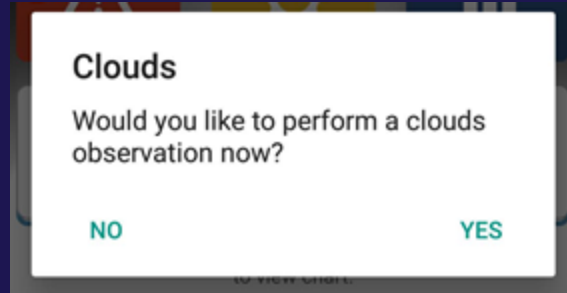
The screenshot shows the "Data" screen in the Eclipse app. It has a title bar "Data" with a close button (X). Below the title bar is a section header "Air Temperature Observations". The table below lists observations with timestamps and temperatures in Celsius. Each row has edit and delete icons.

Air Temperature Observations		
11:57 am	27.5° C	
12:07 pm	27.3° C	
12:17 pm	27.2° C	
12:27 pm	27.2° C	
12:37 pm	27.1° C	
12:42 pm	27.0° C	
12:48 pm	26.8° C	
12:53 pm	26.6° C	





# Using the App: Clouds Data



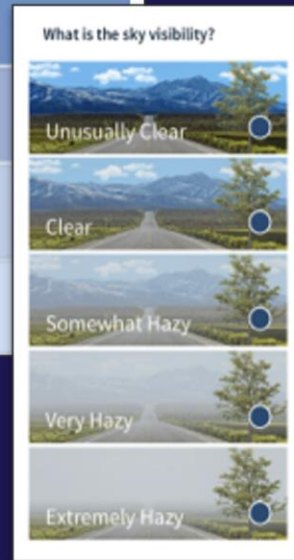
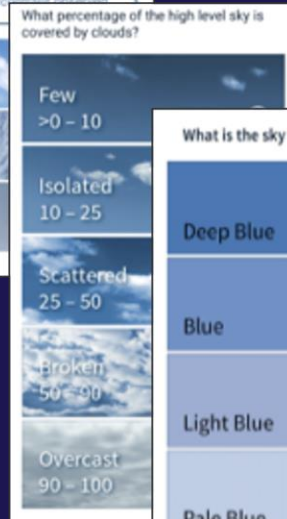
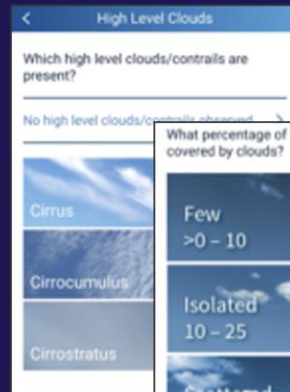
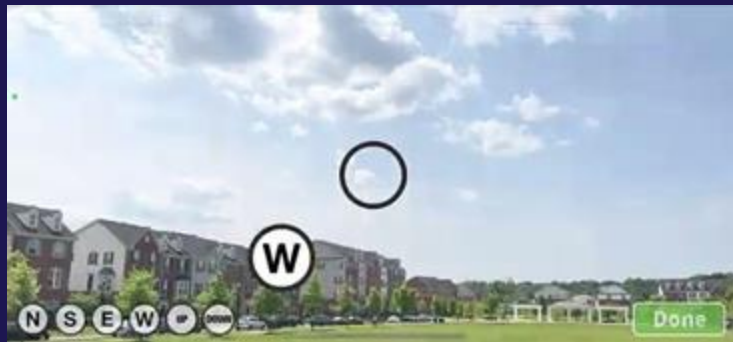
Periodically, the app will also pop up a reminder to take an observation of clouds, although users are also encouraged to take an observation at any time if they notice something changing in the cloud conditions (New Cloud Observation button).

# Taking a Clouds Observation

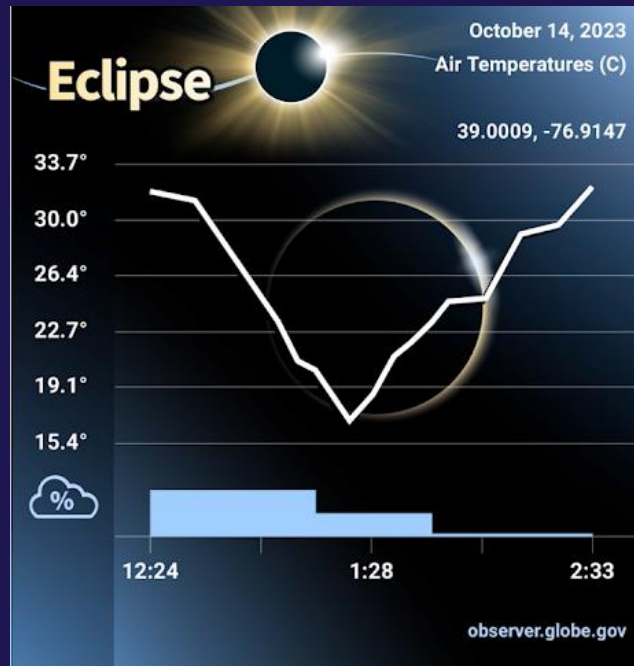


## Steps to observe:

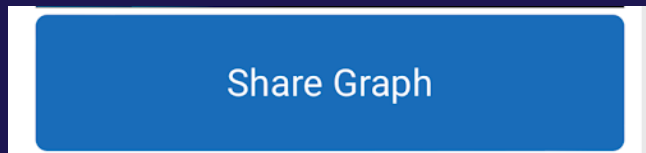
- Overall cloud cover
- Sky conditions
- Cloud types, cloud cover, and opacity by height
- Take photos



# Using the App: Graphing the Data



The graph will update as new data points are added, both for air temperature and overall cloud coverage.



The "Share Graph" button allows easy sharing to social media.

## What is GLOBE Eclipse?



GLOBE Eclipse is a temporary tool in the GLOBE Observer app ([details about downloading the app](#)) that will help you document air temperature and clouds during an eclipse. The tool is not visible in the app on a regular basis, but is only opened up when a solar eclipse is happening somewhere in the world. The Eclipse tool will prompt you to take air temperature measurements using a meteorological thermometer, as well as taking regular observations of sky conditions using the [Clouds](#) tool, and an observation with the [Land Cover](#) tool to characterize the vegetation near the data collection site. For more details about equipment needed, how to take observations, and frequently asked questions, visit the [Taking Observations](#) page. Our [Resource Library](#) includes additional activities, references and videos. In addition, additional resources (including presentation slides) for facilitators leading a program related to the eclipse can be found in the eclipse section of the [Toolkit for Informal Educators](#).

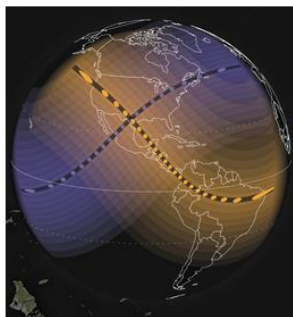


Image source: NASA's Scientific Visualization Studio


The next total solar eclipse will take place on 08 April 2024 and the path of totality will pass across North America, including Canada, the United States and Mexico (the lower left to upper right path with blue circles in the diagram above). Outside this path, a partial solar eclipse will be visible in Greenland and Central America. To find out exactly how much of the eclipse a particular location will experience, visit this map of the 2024


Learn More


Find more details, including activity guides and extended opportunities for data collection, on the Eclipse page of the GLOBE Observer website, [observer.globe.gov/eclipse](https://observer.globe.gov/eclipse)





 THE GLOBE PROGRAM

 GLOBE Observer



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Home > Do GLOBE Observer > Eclipse > Resource Library

OverviewTaking ObservationsData AnalysisResource Library

Eclipse Resource Library

Salta a recursos en español. If you are an educator or otherwise leading a program related to eclipses, additional resources for facilitators are available in the Eclipse Toolkit for Informal Educators.




### 2024 Total Solar Eclipse Safety Sheet - Multilingual

On April 8, 2024, a total solar eclipse will cross Mexico, the United States, and Canada. Except during the brief total phase of a total solar eclipse, when the Moon completely blocks the Sun's bright face, it is not safe to look directly at the Sun without specialized eye protection for solar viewing. This safety sheet, available in English and Spanish, provides information on how to safely experience the total solar eclipse.


[PDF File - English](#)

[Archivo PDF - Español](#)



### Exploratorium Eclipse Resources

The eclipse website from the Exploratorium museum in San Francisco (supported by a NASA grant) includes resources about eclipses, activities, an informational app, and more. On the days of the annular and total solar eclipses, they will also be streaming live telescope feeds and educational programming.



### GLOBE Eclipse Atmosphere One-Pager

Energy from the Sun warms our planet, and changes in sunlight can also cause changes in temperature, clouds, and wind.

# Additional Resources

The Eclipse Resource Library has a number of useful resources aimed at individual observers, and we will add more as they are developed.

También hay una sección de recursos en español.




THE GLOBE PROGRAM



Sign In
  
Forgot/Change Password

Get the App
Do GLOBE Observer
**Lead a Program**
Get Data
News, Events, and People
Publications
About
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Home > Lead a Program > Eclipse

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GLOBE
Eclipse


Citizen scientists contributed over 80,000 air temperature measurements and nearly 20,000 clouds observations during the 2017 solar eclipse across North America, as well as hundreds of additional observations during the 2019 and 2020 eclipses in South America, and thousands of observations for the annular eclipse in October 2023. The Eclipse tool will next be active in the GLOBE Observer app for the total solar eclipse in April 2024. In the meantime, you can analyze eclipse data with your participants or start preparing for an upcoming solar eclipse.

**Analyze Eclipse Data**

Did your museum or library host a big event for a past eclipse? Invite your participants back to take a look at the observations collected by citizen scientists. [Learn more about accessing and analyzing eclipse data.](#)

NOAA's Science On a Sphere program and the [GLOBE Program](#) are collaborating to display your data at nearly 200 museums and science institutions around the world that have Science On a Sphere. You may have one [close to you!](#) We also have a [mobile version](#) that you can download. Science On a Sphere is a spherical visualization display system that presents amazing Earth data and visualizations.

For the 2024 eclipse we will use it to display the data you collect on the 2023 eclipse! You will be able to see how temperature changes across the country on a 6 foot sphere or even in your own sphere and learn more about how community science can help us understand our planet.



[Learn more about the upcoming solar eclipse on the NASA Eclipse page.](#)

# Lead a Program

The Eclipse Toolkit for Informal Educators has resources specifically for facilitators, and more are coming.





Download the app from the Apple App Store or Google Play.



Get the latest information as the eclipses approach by following us on social media:

- [facebook.com/TheGLOBEProgram](https://facebook.com/TheGLOBEProgram)
- [twitter.com/GLOBEProgram](https://twitter.com/GLOBEProgram)
- [instagram.com/globeprogram](https://instagram.com/globeprogram)

Contact the GLOBE Observer team with any questions.



Making notes during the December 2020 eclipse in Argentina. Credit: Ana Prieto

# GLOBE Eclipse: Preparing for April 2024 Supplemental Observation Tips





# Air Temperature Tips: Timing

- Ideally, take a measurement at least every ten minutes for two hours before and after maximum eclipse
- If you can, increase that to every five minutes for the half hour before and after totality or the maximum eclipse at your location.

Stop taking measurements during the maximum eclipse/totality to enjoy the experience!



Image of the solar corona taken in Argentina on 14 December 2020. Credit: Science Club Huechulafquen, Junín de los Andes, Argentina

- If you want the full temperature curve to appear in your graph, make sure you keep taking observations after the point of maximum eclipse.

# Air Temperature Tips: Choosing a Thermometer

- Make sure you have a separate thermometer of some sort, whether digital or liquid-filled. DON'T rely on a weather app on your phone, as that could be pulling data from a weather station some distance away.
- GLOBE has a [list of equipment suppliers for North America](#), but many available thermometers are acceptable. Look for one with with an accuracy of  $\pm 0.5^{\circ}\text{C}$  (and  $0.5^{\circ}\text{C}$  divisions for liquid filled models).



Example thermometers. Credit: GLOBE

# Air Temperature Tips: Accuracy of Measurements

- Using an instrument box is ideal, but if that isn't possible, make measurements in the shade (even your own shadow will help)



A mounted instrument box being checked by GLOBE students.  
Credit: GLOBE



Examples of taking the current temperature in the shade: Holding a simple liquid-filled thermometer in your shadow (left) or propping up a digital thermometer in a tree (right). Credit: GLOBE



# Air Temperature Tips: Thermometer Calibration

For maximum accuracy, check the calibration of your thermometer.

- Prepare a mixture of fresh water and crushed ice with more ice than water in a container.
- Put the thermometer in the ice-water bath and let sit for about 10 minutes.
- Read the thermometer. If it reads between  $-0.5^{\circ}\text{C}$  and  $+0.5^{\circ}\text{C}$ , the thermometer is fine.



Testing the calibration of a liquid filled thermometer and a digital thermometer at the same time. Credit: GLOBE



# Clouds Observations for the Eclipse

- Make observations about every 15-30 minutes, more often if you wish, especially any time you notice something changing.
- If you are also measuring air temperature, the eclipse tool will remind you with notifications to make your measurements about every third air temperature measurement.
- Feel free to add narrative comments to your photos about anything interesting you see happening.



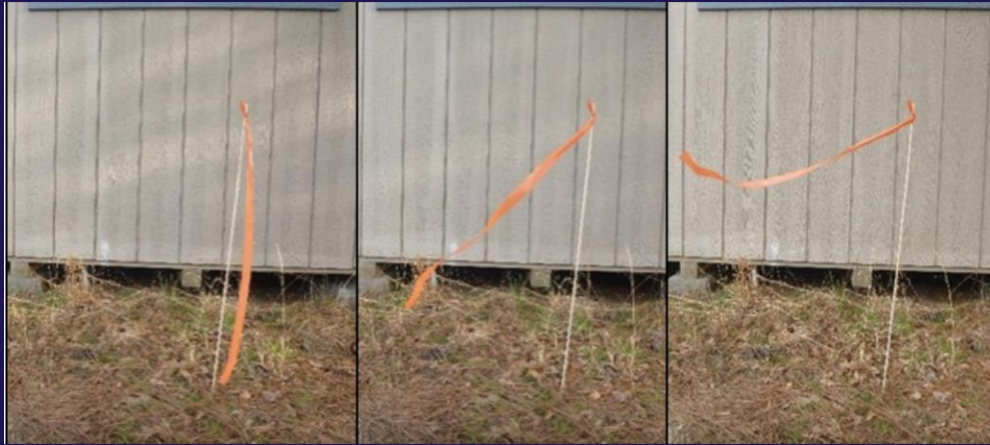
Taking a Clouds observation with a mobile device. Credit: Lindsey Weaver



Students from Colegio Fasta Villa Eucarística, Córdoba, Argentina observing the July 2019 eclipse. Credit: Pablo Cecchi

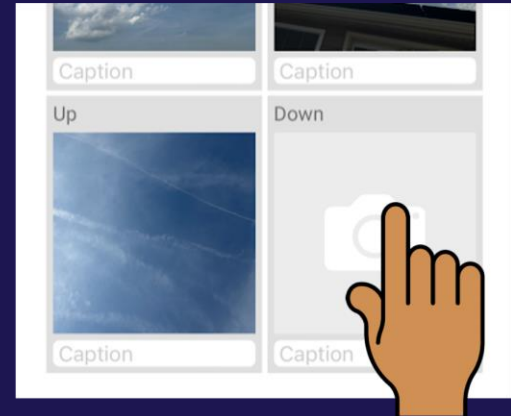
# Basic Wind Observations

- A simple rod and a ribbon (a wind stick) can be a way to visually estimate if the wind is increasing or decreasing, or changing direction
- Include your stick in the down photo of any clouds observations you take to document the changes during the period of the eclipse.



Images of a wind stick showing progressively stronger wind from left to right.  
Credit: AREN Project

Tip: Using the manual photo option for your down photo may make it easier to capture the wind stick fully.



# Land Cover Observations

- We ask you do to a Land Cover observation as part of the initial setup when you open the Eclipse tool to help with research questions that may look at the effect of different types of surface cover on temperature changes during the eclipse.
- As part of that site setup, please include your thermometer in one of your photos, which will allow us to confirm the type you are using for air temperature measurements.



A photo from a land cover observation.  
Credit: GLOBE



A person taking a land cover observation.  
Credit: GLOBE



A digital thermometer included in the down photo of a land cover observation. Credit GLOBE

# General Notes

- You should download the app and set up your account ahead of time, but you don't need to have wifi or cellular signal to collect data (can collect and send later).
- Cloud and land cover observations are always available in the GLOBE Observer app, so you can practice those types of observations ahead of time. For basic app users, air temperature will become available closer to each eclipse.






# Qualitative Observations

- In addition to adding narrative comments to the photo captions in a Clouds observation, or to the field notes in a Land Cover observation, we also have a paper Solar Eclipse Journal page available in the [Eclipse Resource Library](#) on the GLOBE Observer website.
- This can serve as an organizer for your thoughts or simply inspiration for creating your own style of eclipse journal page.

National Aeronautics and Space Administration




## Solar Eclipse Journal

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Location: \_\_\_\_\_

What does the Sun look like? These circles represent the Sun. Shade in how much of the Sun is covered by the moon at different times.

Max Cover:  %




Start Time:  Max Time:  End Time:

What is going on around you? Describe or draw other things you notice at different times during the eclipse. What are birds or other animals doing? What is the weather like (clouds, temperature, wind)?

At Start	Around Max	At End
<div></div>	<div></div>	<div></div>

Share cloud and air temperature data with NASA during the eclipse with the GLOBE Observer app.  
Learn More: [observer.globe.gov](https://observer.globe.gov)



**Safety First:** It is never safe to look directly at the Sun. The only safe way to look at the Sun is through special-purpose solar filters, such as "eclipse glasses" or hand-held solar viewers.

[www.nasa.gov](https://www.nasa.gov)

# Eclipse Soundscapes

The NASA-funded participatory science project Eclipse Soundscapes is studying how eclipses affect life on Earth by collecting multi-sensory observations and recorded sound data. Choose one or several of the roles below.



- Apprentice: take free online lessons to learn about eclipses and earn your Apprentice certificate
- Observer: use all of the senses available to you to collect and then share eclipse day observations
- Data Collector: use specialized equipment to collect and record soundscapes data on or near the eclipse path
- Data Analyst: analyze eclipse soundscapes data online after the 2023 & 2024 eclipses

Watch a video describing the project and learn more on the [Roles page](#) at [Eclipse Soundscapes](#)

# Observing Animal Behavior with Eclipse Soundscapes

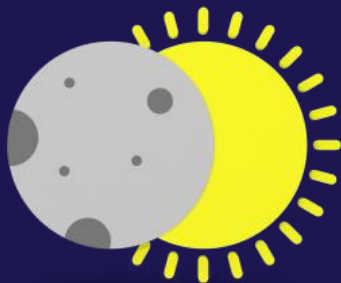
The Observer Role with Eclipse Soundscapes asks volunteer scientists to record information about animal and insect behavior during the eclipse. This data complements the environmental observations, such as air temperature, taken with GLOBE.

Eclipse Soundscapes wants to find out:

- How will animals and insects react during a solar eclipse?
- Do daytime animals and insects get quieter? Behave differently?
- Do nighttime animals and insects appear and get louder?



# How to be an Observer with Eclipse Soundscapes



Observe for a least 10 minutes before eclipse maximum, during eclipse maximum, and for at least 10 minutes after eclipse maximum.

Take notes on the Field Notes page, including latitude and longitude, times of observation, and changes you observe.

Submit your observations and location info after the eclipse on a website.

Learn more, find the Field Notes page, and take the short required training at [EclipseSoundscapes.org/observer](https://EclipseSoundscapes.org/observer)

