What about clouds?
Or individuals who can’t watch the eclipses?
What if I’m not in totality or annularity?
GLOBE Eclipse poster, available in the Resource Library.

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, which 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 Observer team

Right: An example of what the home screen of the GLOBE Observer app will look like when the Eclipse tool is available. Credits: 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.
Provide comparison data even if not on the path of maximum eclipse.
Using the GLOBE Eclipse tool

Observer using the GLOBE Eclipse tool during the total eclipse in Argentina 14 Dec 2020. You can be offline during observations. Credit: Marta Kingsland

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

- GLOBE Observer app: free on Google Play or in the App Store or paper data sheet (see observer.globe.gov/eclipse)
- Thermometer for measuring air temperature

Optional:
- Wind stick (you can make this!)
- Anemometer or weather station
GLOBE Eclipse Overview

- Set up your site
- Report what is around you (land cover)
- Starting before first contact and through last contact, record the air temperature (every 5-10 minutes)
- Starting before first contact and through last contact photograph clouds when prompted (15-30 minutes), or when you see change
- Optional, photograph wind stick using land cover tool to report changes
- Submit data to GLOBE

Example thermometers. Credit: GLOBE
NOTE: A weather app does not count as “other” - you should have a separate physical thermometer.
· Contribute to a public database (GLOBE Program) 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

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
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.
Questions?

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Photo copyright Colleen Pinski
https://solarsystem.nasa.gov/resources/2771/new-mexico-annular-eclipse/
GLOBE Eclipse Preparation

1. Download the GLOBE Observer app
2. Register for an account with an active email address
3. Take in-app training for clouds and land cover (less than 5 minutes)
4. Calibrate your thermometer by checking the temperature it records in an ice bath
5. Set up thermometer in a location that will be shaded during the eclipse
6. Optional: you could set up a GLOBE team so data collected by everyone at your observation site is collated in one location
GLOBE Eclipse Starting your observations

Done once on site before the eclipse begins:

• Tell us what kind of thermometer you are using
• Choose Celsius or Fahrenheit
• Set alarm to notify you when to report temperature and clouds
• Set your location (fills in automatically, but can check accuracy)
• Take a Land Cover observation to show us the observing site. This involves taking 6 photos (N, S, E, W, up and down). Include the wind stick in one photo if you are using it.

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

• 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 an accuracy of +/- 0.5 °C (and 0.5 °C divisions for liquid filled models).

Example thermometers.  
Credit: GLOBE Observer team
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)
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°C and +0.5°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.
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.

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 the down photo, which will allow us to confirm the type you are using for air temperature measurements.
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 photos 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.