



GLOBE  
**Observer**

Holli Riebeek Kohl

[holli.riebeek@nasa.gov](mailto:holli.riebeek@nasa.gov)

# International Science Center and Science Museum Day: The Global Experiment

## GLOBE Observer Cloud Challenge

- Download the GLOBE Observer app
- Encourage participants to observe clouds between October 1 and October 15
- May support with hands-on activities and programming
- Data animation released for November 10

# What is the experiment?

How to observe clouds with the  
GLOBE Observer App

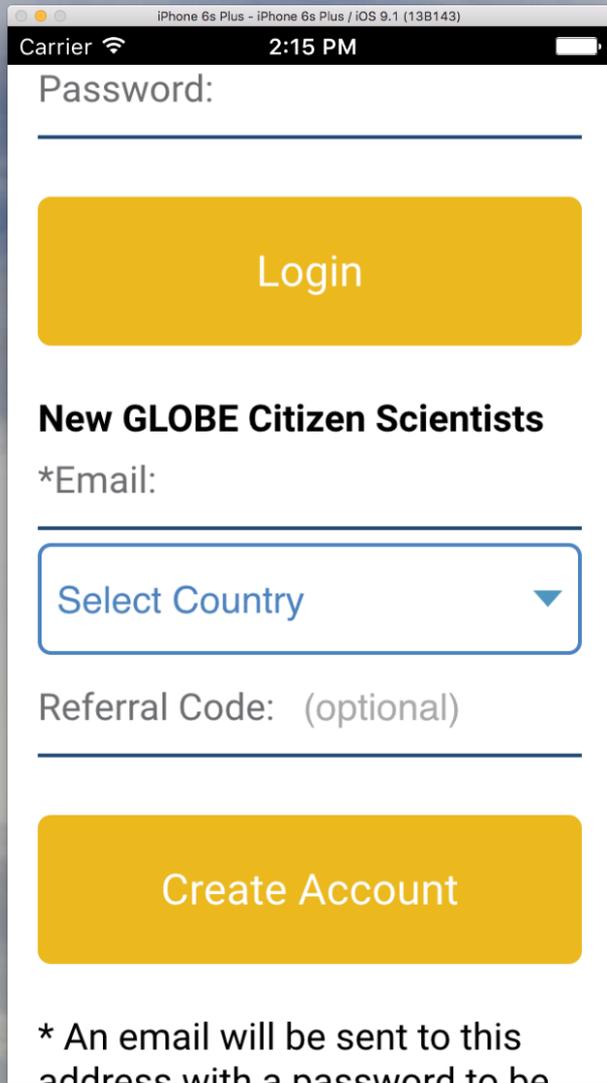


# How does it work?



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## Museum Registration

A screenshot of the GLOBE Observer mobile app registration screen. The screen is white with a black status bar at the top showing "Carrier", "2:15 PM", and a battery icon. Below the status bar, there is a "Password:" label followed by a text input field. A large yellow button labeled "Login" is positioned below the password field. Underneath, the text "New GLOBE Citizen Scientists" is displayed. This is followed by a "\*Email:" label and a text input field. Below the email field is a dropdown menu labeled "Select Country" with a blue arrow pointing down. Further down, there is a "Referral Code: (optional)" label and another text input field. At the bottom of the form is a large yellow button labeled "Create Account". A small asterisk note at the very bottom reads: "\* An email will be sent to this address with a password to be".

- Museum creates a referral code and sends it to GLOBE Observer
- Museum provides referral code to users
- User enters referral code during registration or login
- All observations will be gathered under the museum

# How does it work?

Verizon 9:07 AM 87%

Tutorial (1 of 4) >

## GLOBE Observer: Home Page

Welcome to the GLOBE Observer application. The Observer home page lists the types of observations you can perform. Select Clouds to begin, more options will become available over time.

Your observations are stored on your phone or tablet until you click send. Be sure to send your data to GLOBE to share with students, teachers, NASA and Citizen Scientists world wide.

Learn more about The GLOBE

Home, Bar Chart, Question Mark icons

Verizon 9:09 AM 87%

< Tutorial (2 of 4) >

## GLOBE Observer: Cloud Edition

A handy tool for recording clouds and sky conditions as you go about your day. This app also connects you to a worldwide community of cloud observers, whose reports you can explore. It also connects you to observations of clouds that NASA satellites make on a regular basis. Align your observing times to a satellite overpass, and you will be able to compare your reports to the satellite data.

Home, Bar Chart, Question Mark icons

Verizon 9:09 AM 87%

< Tutorial (3 of 4) >

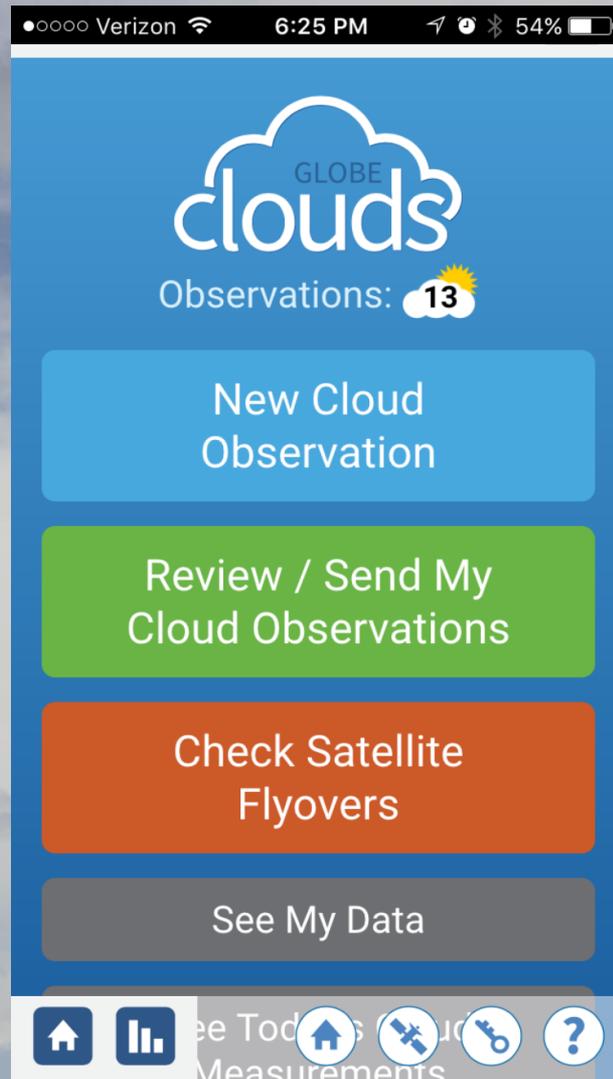
To make a cloud observation you will:

1. Capture the date, time and location
2. Identify whether the sky is clear, cloudy, or obscured
3. Estimate what percent of the sky is covered
4. Identify cloud types
5. Count any contrails you see
6. Photograph the sky (optional)

The app will walk you through these steps.

Home, Bar Chart, Question Mark icons

# How does it work?



# How does it work?

Verizon 9:10 AM 87%

## Time and Location

Enter the **local** date and time of the observation:

Apr 11, 2016

9:10 AM

Enter location coordinates:

Latitude: 35.3441

Longitude: -106.5956

Next



Verizon 9:12 AM 86%

## Cloud Coverage

Is the sky Clear, Cloudy, or Obscured?

Clear (no clouds)

**Clouds Visible (1-100% covered by clouds or contrails)**

Obscured (more than 25% of the sky is not visible)



Verizon 9:12 AM 86%

## Types of Clouds

What percentage of the sky is covered by clouds?

Isolated 10 to 25

Click all cloud types seen:

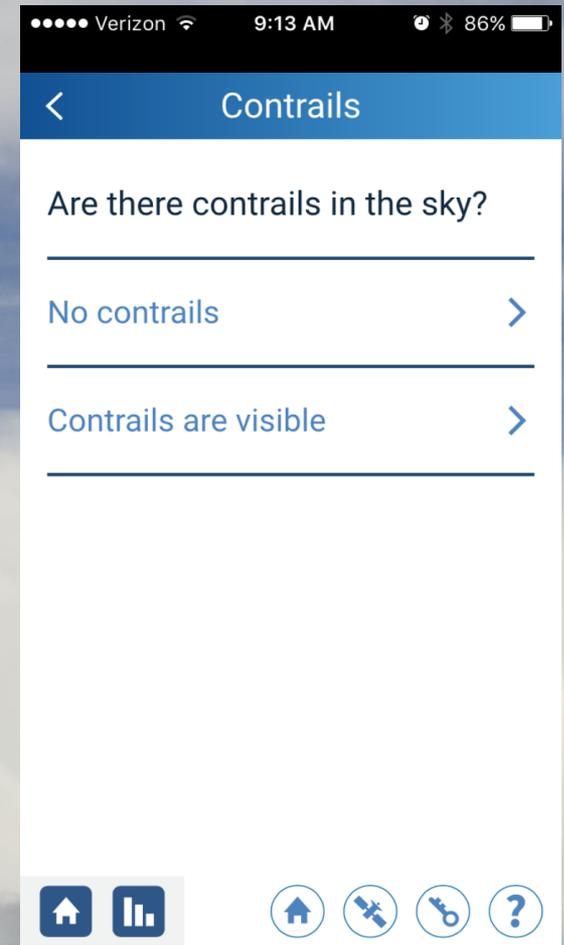
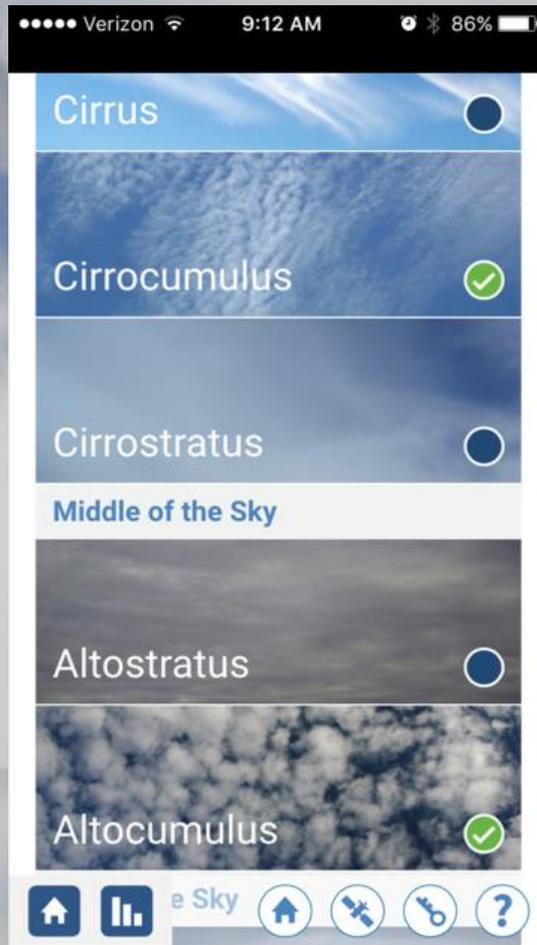
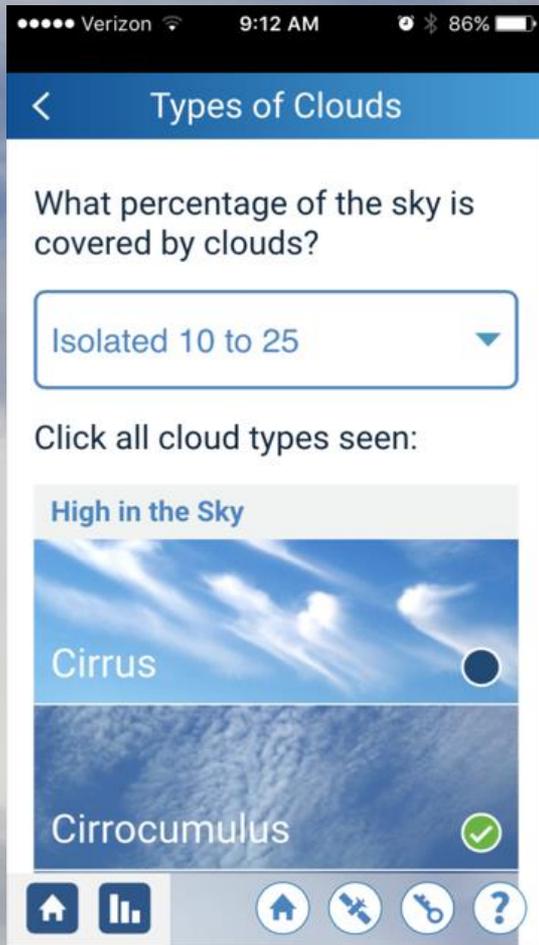
High in the Sky

Cirrus

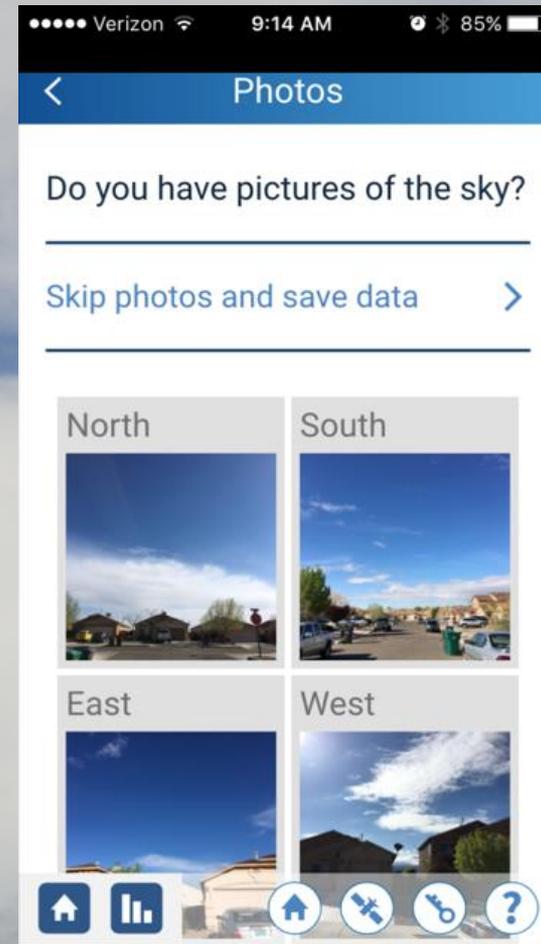
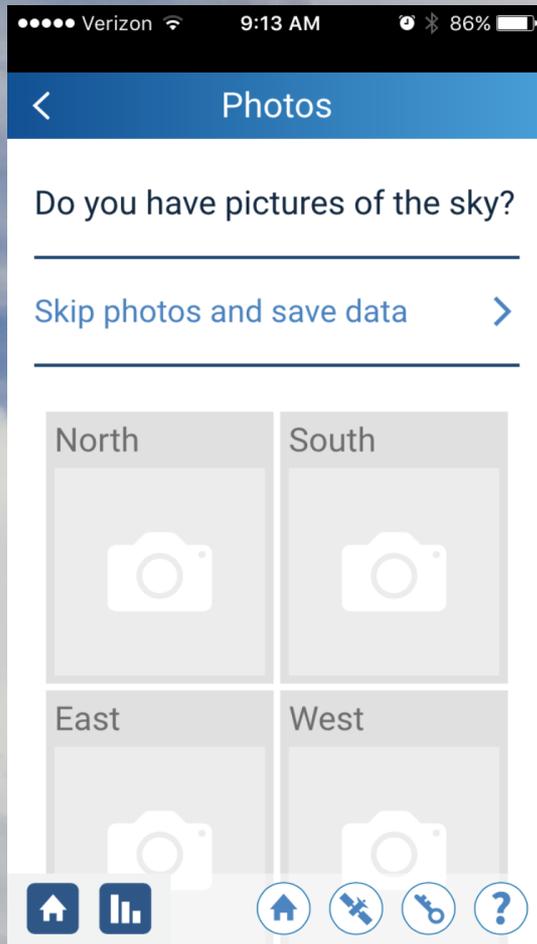
Cirrocumulus



# How does it work?

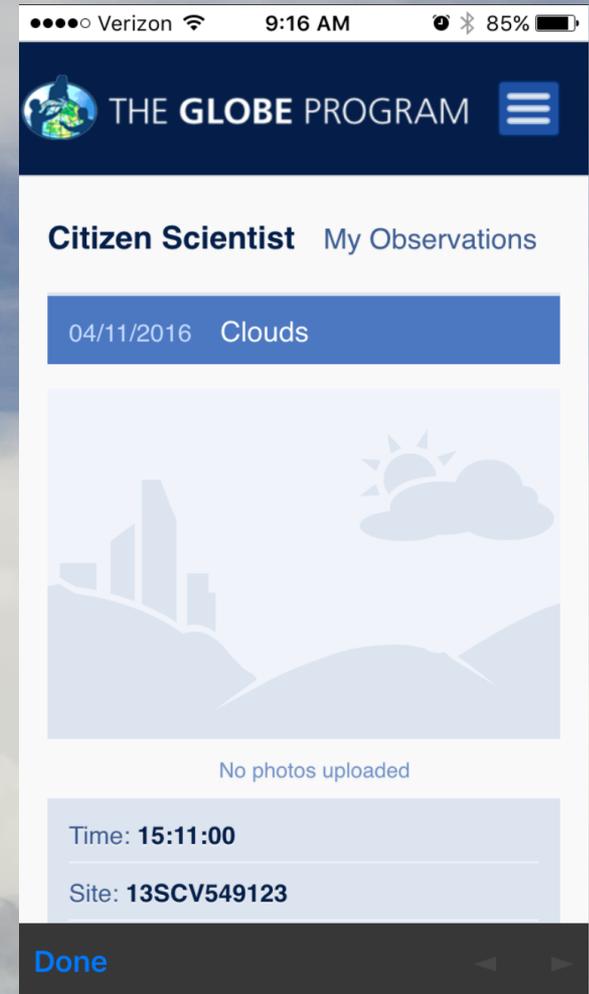
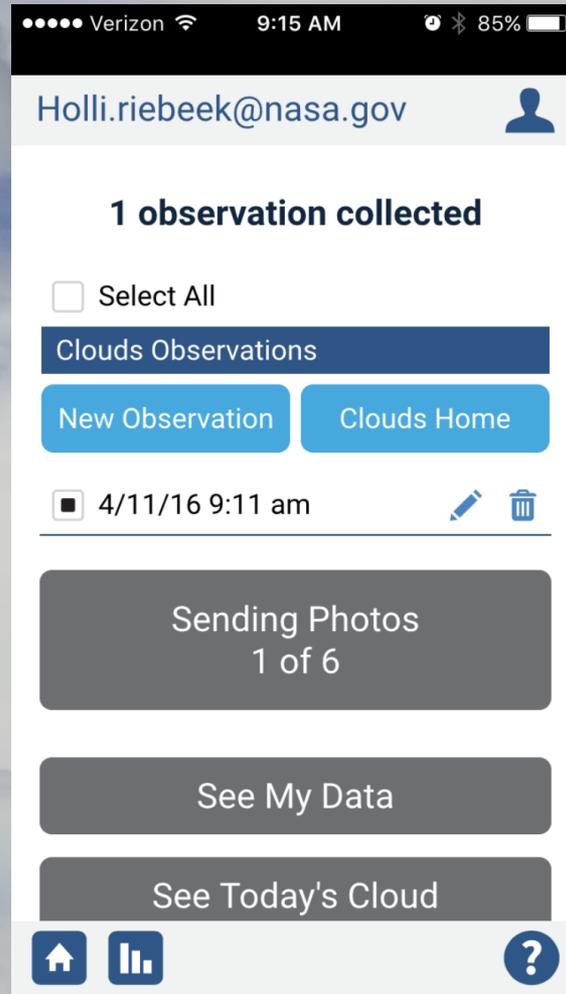
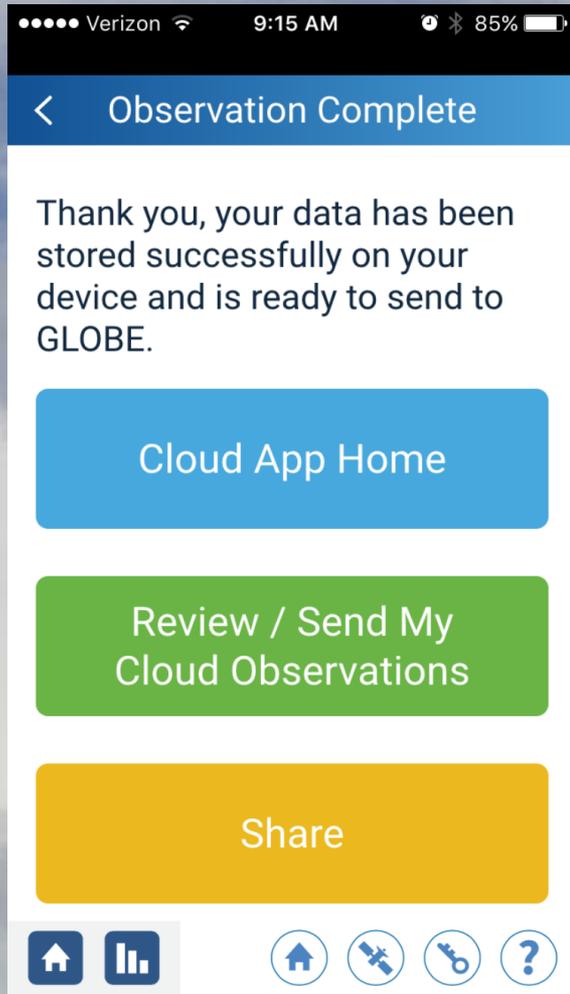


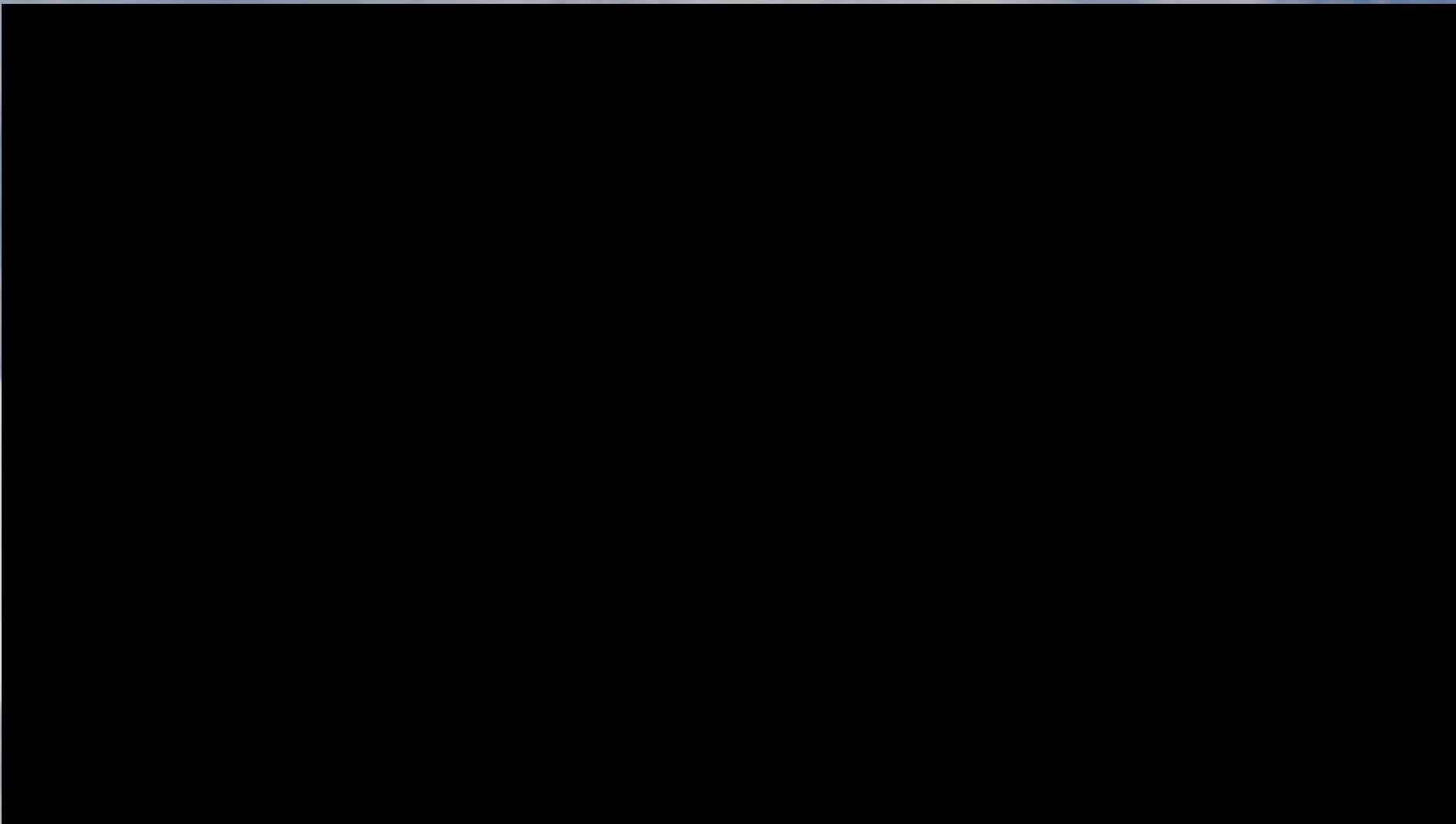
# How does it work?





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How-to videos available on NASA GLOBE Observer YouTube channel:  
[https://www.youtube.com/channel/UCvj8fFyDhD2ajH0\\_XFqWmRw](https://www.youtube.com/channel/UCvj8fFyDhD2ajH0_XFqWmRw)

**YouTube** Search Upload

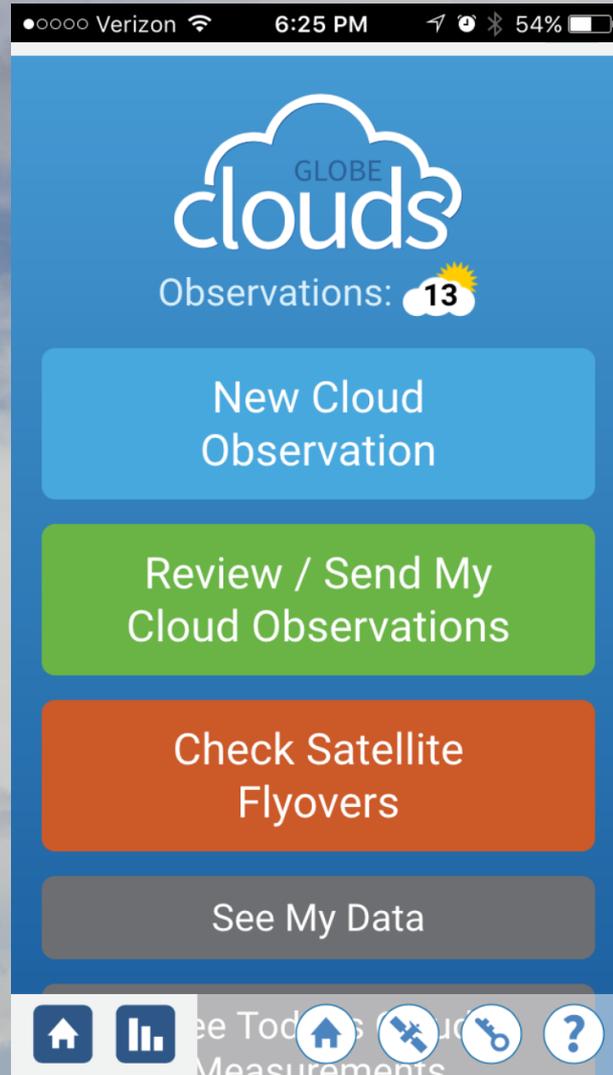
## NASA GLOBE Observer

Do #citizenscience with #NASAGLOBEObserver. P.S. We've got an #app for that.

**Uploads** Public

- Navigation Tips** 0:30  
3 views • 20 hours ago
- Review and Submit** 0:48  
8 views • 23 hours ago
- Taking Pictures** 0:27  
15 views • 1 day ago
- Making Observations with GLOBE Observer** 0:56  
21 views • 2 days ago

# Questions?





# Seeing the Data

Finding participant data on the  
GLOBE Observer web page

Return to GLOBE



Sign In

About News & Events Training Data Science Connections Observer Community Tips & Help **Get the App**

Get the App

See the Data

Get Training

**NASA and GLOBE Launch  
New Opportunity for  
Citizen Scientists**

Want to be a citizen Earth scientist?  
Join GLOBE Observer.

Welcome

## Our Data



Observed Today

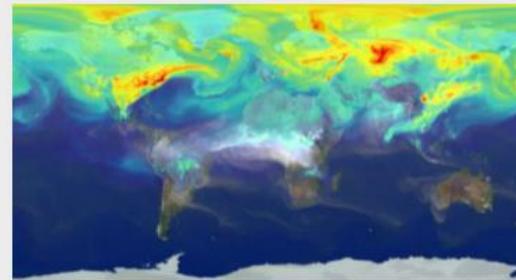


Top Photos

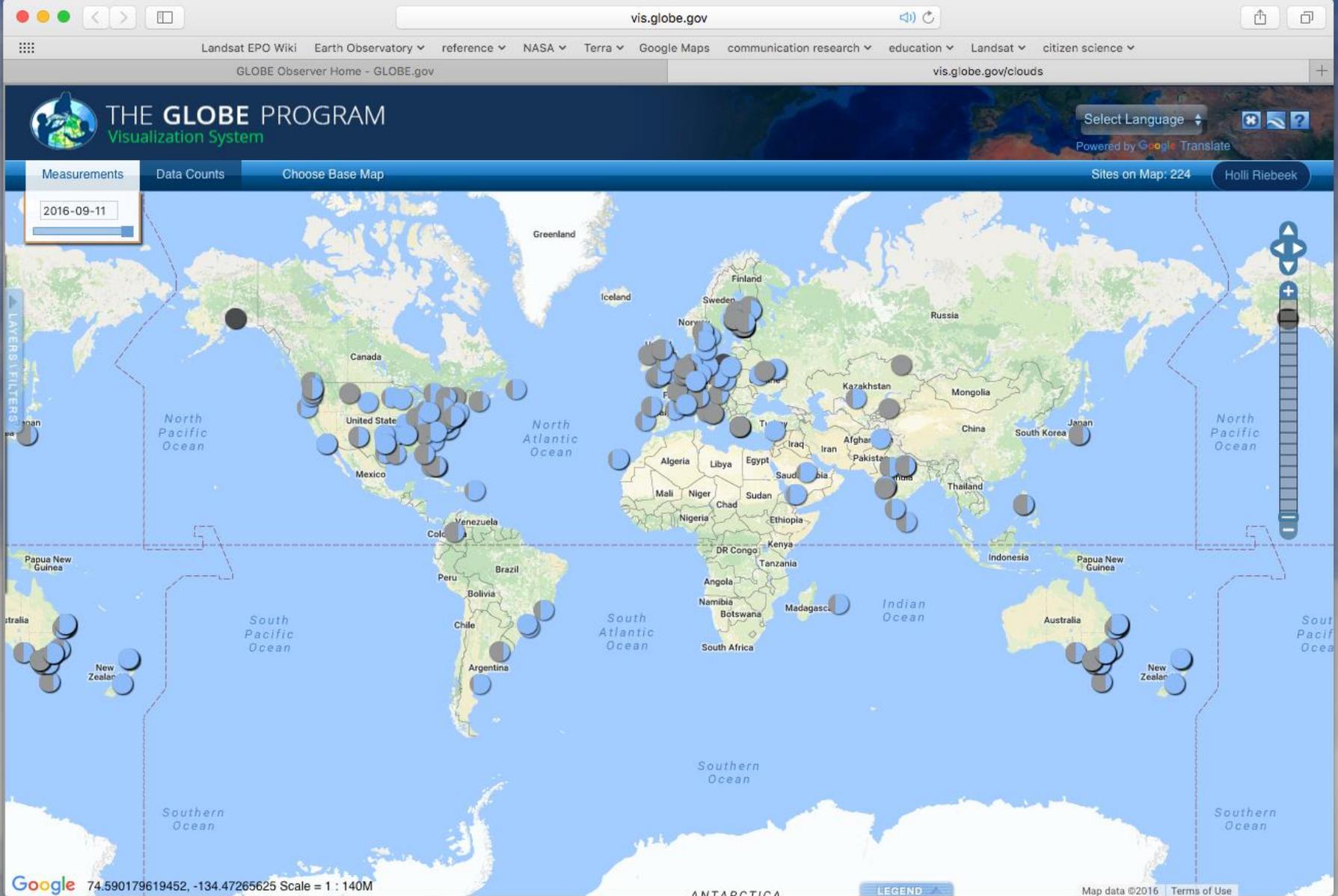
## The Science



Scientist Connection



GEOS-5



To see observations from your museum, we will provide a URL (way to modify this URL) at <http://observer.globe.gov/observer-community/museums-libraries>



# Why clouds?

How your cloud observations help  
support science



## What are Clouds?

When a large number of water droplets or ice crystals are present, they block light enough for us to see them – they form **visible** clouds.



At any given time, over half of Earth's surface is shadowed by clouds.

Images NASA



- *“Clouds are so commonplace that their beauty is often overlooked.”* -Manifesto of the Cloud Appreciation Society



## What can clouds tell us?

- Clouds tell us something about air temperature, water and wind up in the sky
  - Helps to predict weather
- Clouds also affect how much sunlight is reaching the ground and escaping back to space
  - Helps to understand climate



Dry air aloft



Moist air aloft  
Wind perpendicular to contrail



High, thin clouds transmit sunlight



Low, thick clouds block sunlight

*Images: NASA*



Atmosphere



Clouds

## Science Questions that depend on cloud observation: Question 1

How much does cloud cover affect surface temperature and surface air temperature?



Image NASA



Atmosphere



Clouds

## Science Questions that depend on cloud observation: Question 2

Weather prediction and the relationship between clouds and precipitation



Images: NASA



# Science Questions that depend on cloud observation: Question 3

How will clouds respond to a changing climate?

**High Clouds Warm**

**Low Clouds Cool**

If clouds never formed in Earth's atmosphere, our planet would be over 20°C warmer on average.

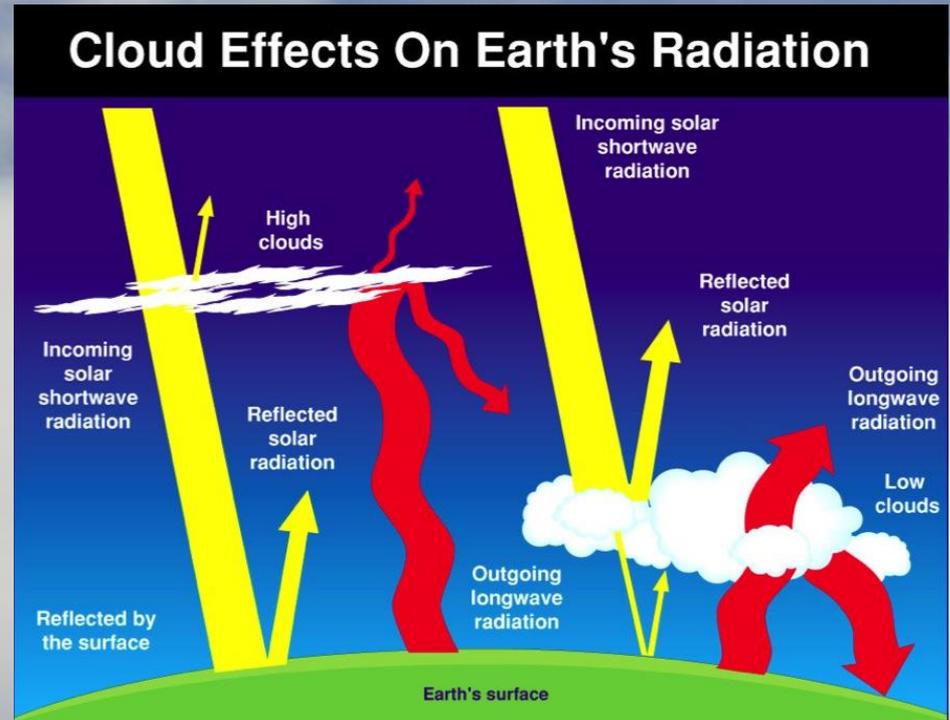


Image: NASA S'COOL



## Science Questions that depend on cloud observation: Question 4

4. Is there a relationship between contrails and cloud cover?
- 5...And more!

Contrails, or condensation trails, are the linear clouds formed when a jet aircraft passes through a portion of the atmosphere having the right combination of moisture and temperature.





## Your measurements can help!

- Understand how cloud climatology may be changing
- Provide ground-based data on contrails

Human observers can identify qualitative aspects (i.e., cloud type clues) that automated sensors cannot.



Human observers can see small features (i.e., short-lived contrails) that are not visible from satellite.





## More ways your measurements can help!

- Verification and improvement of automated remote sensing
- Improve interpretation of satellite observations of Earth's energy balance

***Hint:*** Observations timed to coincide with satellite imagery provide useful comparisons, for scientists, and for you!



From the bottom: Blue sky provides great contrast



From the top:  
Varied surface confounds detection

# Implementing the Challenge

Activities and resources for museums  
and other informal educators

# Hands on Activities & Demos

## Cloud in a Bottle



*Procedure* – put five drops of rubbing alcohol in the bottom of the 1-liter bottle. Swirl the bottle around to spread the alcohol around the bottom. Put the rubber stopper in the bottle ensuring there is a good seal. While holding the stopper down against the bottle, pump the air pump 10-12 times. Quickly pull the stopper out of the bottle and a cloud should appear. Have students make an inference explaining why the cloud formed. After a few minutes the cloud will disappear. Simply pumping the bottle up again and pulling the stopper out quickly will cause the cloud to reappear.



*Source:* <https://sciencewithtoys.wikispaces.com/Cloud+bottle>

*Another approach:* [https://scool.larc.nasa.gov/cgi-bin/view\\_lessonplan.cgi?id=87](https://scool.larc.nasa.gov/cgi-bin/view_lessonplan.cgi?id=87)



*More at*

<http://observer.globe.gov/observer-community/museums-libraries>

# Questions?

Contact me at [holli.riebeek@nasa.gov](mailto:holli.riebeek@nasa.gov)

Team contact:

[globeobserverhelp@lists.nasa.gov](mailto:globeobserverhelp@lists.nasa.gov)

<http://observer.globe.gov/tips-help/support>