“We seek to remind people that clouds are expressions of the atmosphere’s moods, and can be read like those of a person’s countenance.”

– From the Manifesto of the Cloud Appreciation Society
Why Observe Clouds?

- It’s fun!
- It’s science!

Clouds are highly variable in space and time, so observations and photos from people in many places, especially when timed to a satellite overpass, provide useful “ground truth” information.
What do you need to start?

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Your eyes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helpful References</td>
<td><a href="English/French/Spanish">GLOBE cloud chart</a> and contrail ID chart (Russian/Chinese/Arabic)</td>
</tr>
</tbody>
</table>
| When | Good: Any time  
Better: Within one hour of [local solar noon](English/French/Spanish)  
Best: Within +/- 15 minutes of a satellite overpass (times available in app) |
| Where | A good observation site (See next slides) |
What makes a good observation site?

Obstacle test:
- Below hands extended at about head-top level
- Good observation site

Good:
What makes a good observation site?

Obstacles present:
- Minimize as much as possible
- Document (with photos) and proceed

Okay:
What makes a good observation site?

Obstacles present:
- Sky really not visible
- Not a good site

Bad:

14°
How to Observe

Introduction

NEVER look directly at the Sun!

• Look at the sky above 14° in every direction.

• Cloud identification is an art; you will get better with practice.

• You may get feedback from satellite matching, but keep in mind that the view from the ground should NOT always match that from space.
How to Observe

Is the Sky Clear?

If yes:

1) Assess sky color (optional)
   Pick the shade that most closely matches the bluest part of the sky

What is the sky color?

- Deep Blue
- Blue
- Light Blue
- Pale Blue
- Milky
- Cannot Observe

Tip – this may be a good place to look if not cloudy
   • Turn your back to the Sun
   • Look at the sky halfway between the horizon and straight up
How to Observe

Is the Sky Clear?

If yes:

2) Assess visibility (optional)
   Your best assessment based on local landmarks

What is the sky visibility?

- Unusually Clear
- Clear
- Somewhat Hazy
- Very Hazy
- Extremely Hazy
How to Observe

Is the Sky Clear?

If yes:
3) Take Photos (optional)
and you are DONE!
How to Observe:

Is the Sky Obscured?

If over 1/4 is obscured:

1) Record and report the reason
2) Take photos (optional)

and you are DONE!

Blowing Snow
Heavy Snow
Heavy Rain
Fog
Spray
Volcanic Ash
Smoke
Dust
Sand
Haze
If Clouds are Present

The app walks you through the steps:

- **Cloud fraction***
- **Sky Color** – explained above
- **Visibility** – explained above
- **High Cloud (if present):**
  - **Type*/fraction/opacity**
  - Including contrails
- **Mid cloud (if present):**
  - **Type*/fraction/opacity**
- **Low cloud (if present):**
  - **Type*/fraction/opacity**
- **Surface Conditions***
- **Surface Measurements**
- **Take Photos**

The following pages explain these steps.

- **Required item***
- **All others optional**
How to Observe: Cloud Fraction*

Divide the sky in four quadrants (North, South, East, West) and estimate cloud cover in each first. Then take the average to get the whole sky value.

What Percent of the Sky is Covered by Clouds?

- No Clouds: 0%
- Few: 0 - 10%
- Isolated: 10 - 25%
- Scattered: 25 - 50%
- Broken: 50 - 90%
- Overcast: >90%
How to Observe: Cloud Fraction*

• Observing hint: If directly overhead there is a pattern of cloud cover with puffs or rolls of cloud separated by clear areas, it is reasonable to infer that pattern continues and the cloud cover is not 100% toward the horizon.
How to Observe: Cloud Fraction

If possible, repeat the estimate of cloud fraction for low, mid, high clouds.

If you cannot see a level due to overcast lower levels, skip it.

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How to Observe:

Cloud Type*

Factor 1: Cloud Shape

The three main cloud shapes are:

- Cumulus (Puffy)
- Stratus (Layered)
- Cirrus (Wispy)

Images: NASA
How to Observe:
Cloud Type*

Factor 2: Cloud Height

High Clouds: Base > 6 Km

Composed of ice crystals, which gives them a delicate appearance. Generally, the Sun can be seen through high clouds and ice particles in cirrostratus scatter sunlight to form a bright ring, called a halo, around it.

Cirrostratus

Cirrus
Cirrocumulus

Images: NASA
How to Observe: **Contrail Type***

If contrails are present, **Count** the number of each type:

**Short-lived**
Contrails that form short line segments that fade out as the distance from the airplane that created them increases.

**Persistent Non-spreading**
Remain long after the airplane has left the area. They form long, generally straight, lines of ~constant width across the sky. These contrails are no wider than an index finger held at arm’s length.

**Persistent Spreading**
Remain long after the airplane has left the area. They form long streaks that have widened with time since the plane passed. These contrails are wider than an index finger held at arm’s length.
How to Observe: Cloud Type*

Factor 2: Cloud Height

Middle Clouds: Base 2–6 Km

Always begin with the prefix alto- and are predominantly comprised of water droplets; may contain some ice. Sometimes the Sun can be seen through these clouds, but without a ring.

Altocumulus

Images: NASA
How to Observe: Cloud Type*

Factor 2: Cloud Height

Low Clouds: Base < 2 Km

Closest to the observer, and often appear to be quite large compared to higher clouds. They may be much darker and grayer than high or middle clouds.

Stratus

Stratocumulus

Cumulus

Images: NASA
Observing Hints: Puffy Clouds

*Hint:* For cumulus (puffy) clouds, use fist/thumb/pinky finger rule to estimate cloud height.

High Clouds (cirrocumulus)
Appearance comparable in size to pinky (smallest) finger held at arm’s length

Mid-level Clouds (alocumulus)
Appearance comparable in size to thumb held at arm’s length

Low Clouds (cumulus)
Appearance comparable in size to fist held at arm’s length

Images: NASA
Observing Hints: Layered Clouds

*Hint:* For stratus (layered) clouds, look for clues near the Sun.

¡NEVER look directly at the Sun!

Cirrostratus

The only cloud type which can produce a halo around the Sun or moon. The halo will have all the rainbow colors in it.

Altocumulus

Produces a thinly veiled Sun or moon, and will often be darker in appearance, a medium gray color.

Stratus

Usually very gray and often very low to the ground. The Sun is not visible.

Images: NASA
How to Observe: **Cloud Type***

**Factor 3: Precipitation**

Clouds with Precipitation

**Nimbostratus**

*Images: NASA*

**Cumulonimbus**

*Images: NASA*

*Nimbus means cloud in Latin*
Cloud Opacity

Transparent

Thin clouds through which light passes easily, and through which you can even see blue sky. Note the milky bluish-whitish appearance.

Translucent

Medium-thickness clouds that let some sunlight through. There may be some milky bluish-white near the edges, and a very little bit of gray; but these clouds are mostly a bright white.

Opaque

Thick clouds which do not allow light to pass directly, although light can diffuse through them. Clouds look gray. When these clouds are in front of the Sun, it is impossible to tell where the Sun is.
Observing Hints: Cloud Opacity

**Transparent**
Well defined shadows

**Translucent**
Fuzzy shadows

**Opaque**
Little to no shadow
Surface Conditions*

Required, Define the surface conditions of your observation site.

TIPS:
- Standing water means *many* puddles.
- Leaves on tress refers to the majority of the deciduous trees around your observation site.
Surface Measurements

• Temperature
• Barometric Pressure
• Relative Humidity

These are all optional. Unless you have been trained in the associated GLOBE protocol, just: Skip surface measurements
Final Steps

• Take photos (optional)
• You are DONE!

Send report now

Or

Send report later once connected to internet

• Repeat as desired
• Compare your results to satellite images, if times align