Dark Sky Observing Preview

BSA Troop 4

Pasadena, CA

Topics

- ☆ Finding Dark sky
- ☆ Observing etiquette
- ☆ Observing basics
- ☆ Things to see
- ☆ Resources

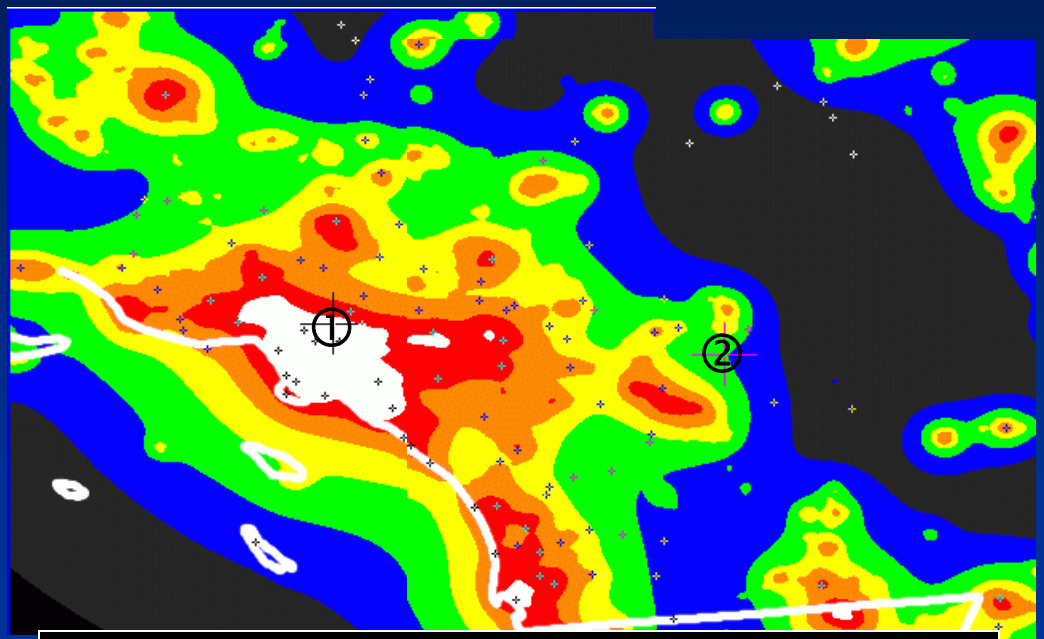
Finding Dark Sky

- ☆ To see faint objects, you want the darkest sky possible

- ☆ Before 100 years ago, the Moon was the main thing that would light up the night sky

Finding Dark Sky (2)

- ☆ These days, in order to find a dark sky, you also have to avoid city lights
- ☆ The brightening of the night sky due to artificial lights is called light pollution



Light Pollution Map of Southern California

① Pasadena, CA

② Jumbo Rocks Camp Ground, Joshua Tree N.P.

Observing Etiquette

- Cover your flashlights with red cellophane, red paper, or shine it through a brown shopping bag
  - Red filtering helps preserve night vision
- Keep your flashlights pointed down
  - Even red light will ruin night vision when shined directly in someone's eyes
  - Be extra careful with hat or head mounted lights

Observing Etiquette (2)

- ☆ Be patient, and wait your turn to look
- ☆ Remember that telescope equipment is expensive, please do not push, run, eat food, etc. next to the telescopes

Observing Basics

- ☆ Questions you might have about looking through a telescope

Refractors (use lenses)

Reflectors (use mirrors)

Catadioptrics (use both lenses & mirrors)

Observing Basics (2)

How *Powerful* is the Telescope?

- The *power* of a telescope is its ability to gather light
- The larger the mirror or lens (the aperture), the more powerful the telescope is
- Magnifying power (e.g., 250x) doesn't matter
  - Any telescope can be made to have any magnification

Observing Basics (3)

When I look through a telescope, should I close one eye?

- You should do what is most comfortable for you
  - Some people prefer to close one eye, others like to keep both eyes open and cover the eye that is not used with their hand or with an eye-patch

Observing Basics (4)

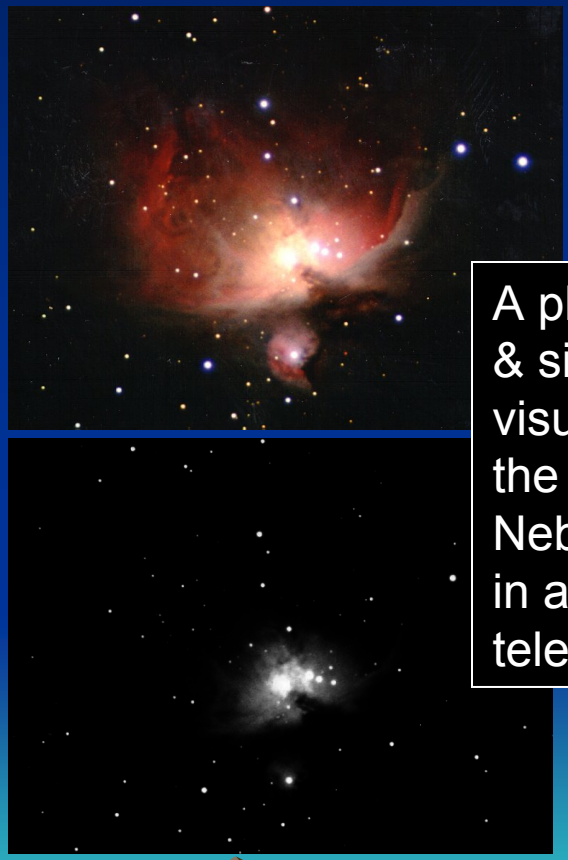
When I look through a telescope, should I wear my eyeglasses, or take them off?

- ☆ If you are near-sighted or far-sighted, it is generally better to remove your glasses and simply re-focus the telescope
- ☆ If you have astigmatism, you'll probably want to keep your glasses on

Observing Basics (5)

Why don't objects look like their picture?

- ☆ Cameras allow long exposures (minutes or hours) so light can build up on the film or detector and show more faint detail
- ☆ The eye captures light for only about 1/10th of a second before sending the information to the brain



A photograph & simulated visual view of the Orion Nebula (M42) in a small telescope

Observing Basics (6)

Why can't I see color in the telescope?

- ☆ The receptors in your eyes that see faint objects (rods) only see black & white
- ☆ You can sometimes see subtle colors in bright objects when looking through big telescopes

A photograph & simulated visual view of the Orion Nebula (M42) in a small telescope

Things to See

- The Night Sky has lots of things to look at:
  - The Moon (when it's not a *New Moon*)
  - Planets (when not too near the Sun in the sky)
  - Comets (when we're very lucky)
  - Meteors & Meteor Showers (when we're lucky)
  - The Milky Way
  - "Deep Sky" Objects

Joshua Tree N.P. – 11/03/07

- Moon & Planets
  - The Moon phase is *Last Quarter*, so it be visible in the morning (it rises at about 2:30 am)
  - Mercury & Venus rise after 4 am
  - Mars rises about 9:30 pm, but it will look very small even in my biggest telescope
  - Jupiter will be very low in Southwest at sunset, and may be to low to be seen
  - Saturn is visible in the early morning, rising about 2 am
  - Uranus & Neptune may also be observable

The appearance of Venus, Mars, Jupiter and Saturn in a small telescope

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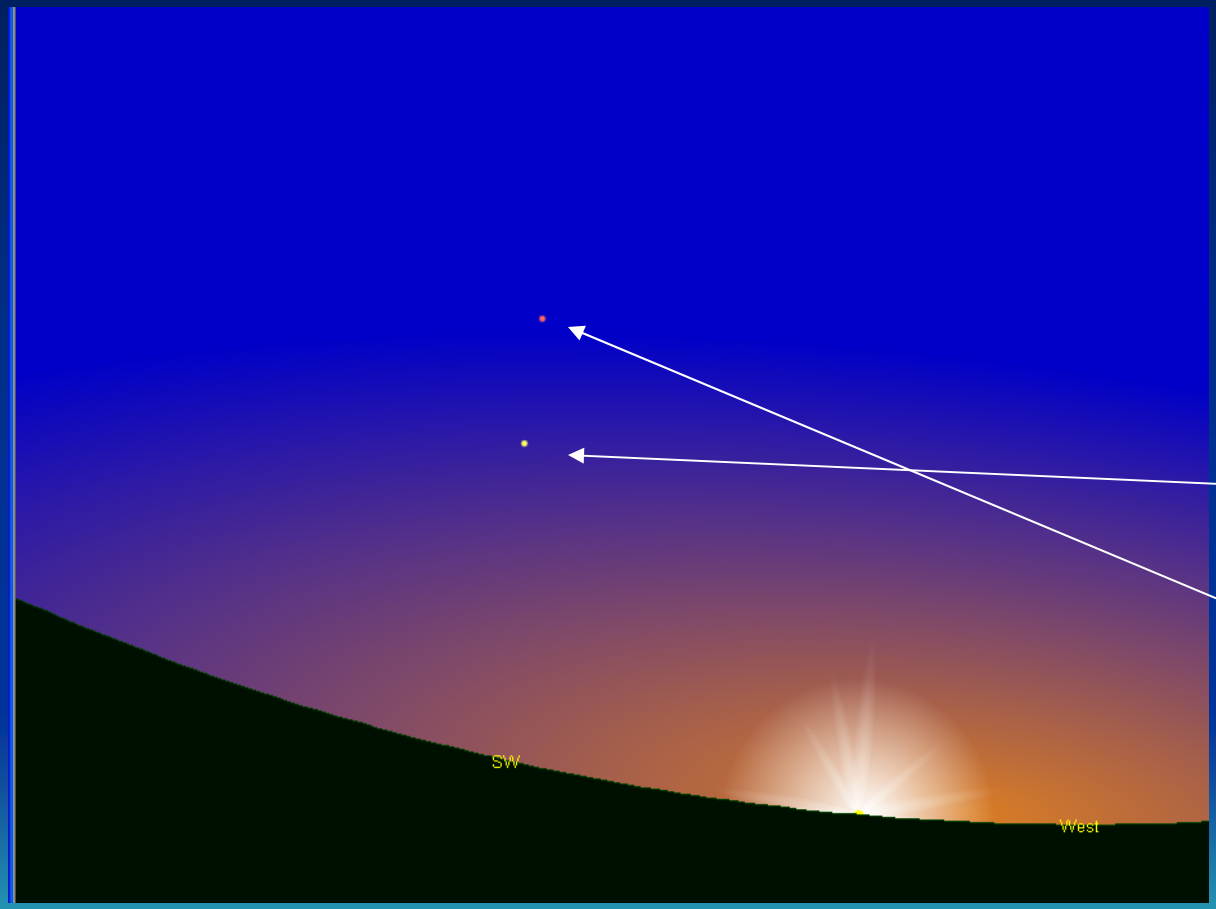

The Sky at Sunset (about 6 pm) on 11/03/07

Jupiter is visible low in Southwest

The dwarf planet Pluto is above Jupiter, but too faint to be seen

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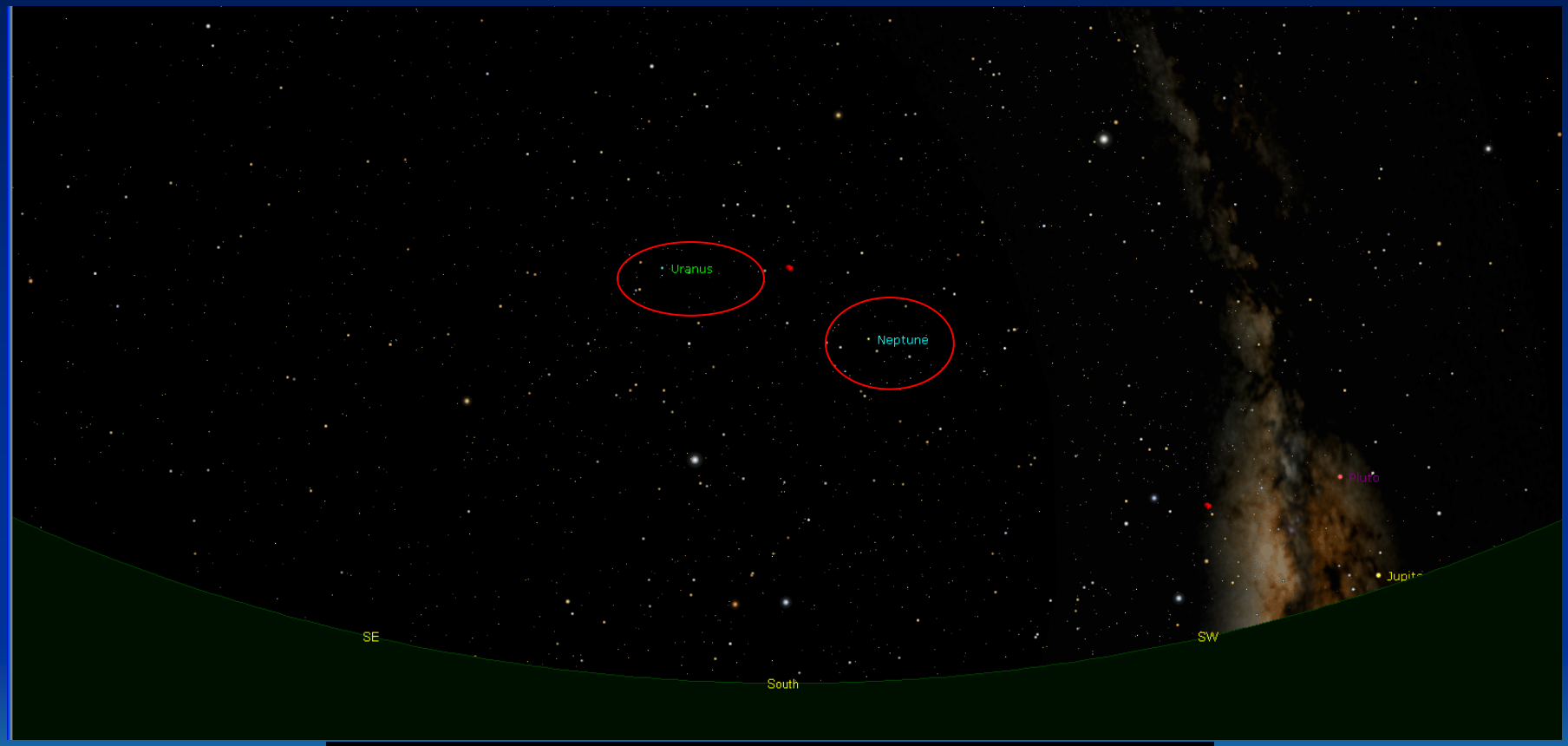

Looking South at 8:00 pm on 11/03/06

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- Comets
  - Comets are small icy rocks that typically orbit the sun out past the orbit of Pluto
    - Out there, they are too faint to be seen with most telescopes
  - Sometimes, the orbit of a comet gets disturbed by gravity and the comet comes into the inner solar system where we can see it

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- Comets (2)
  - Most comets take many thousand of years to go around the Sun once
  - A few comets are in smaller orbits and their return can be predicted
    - Any comet observed more than once by astronomers is a *Periodic Comet*
    - Halley's Comet is the most famous periodic comet and the 1st to be discovered (P/1)

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- Comets (3)
  - Around October 23, 2007, Periodic Comet Holmes (P/17) went through an outburst and brightened by more than 1 million times compared to its normal brightness (which is 15x dimmer than Pluto)!
    - Astronomers aren't sure why
  - It should be easily visible to the naked eye but it looks like a star unless binoculars or a telescope are used

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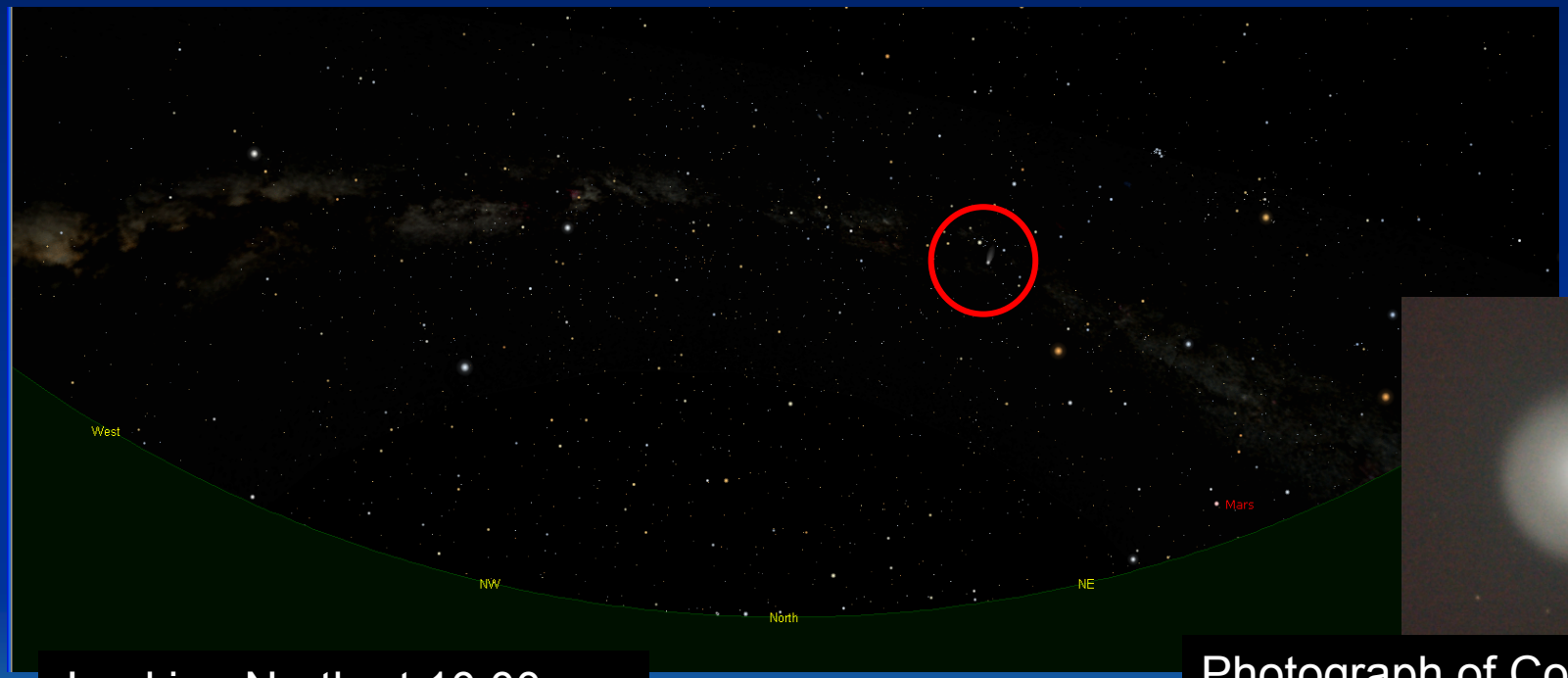
- ☆ Comet P/17 Holmes



Looking North at 10:00 pm on 11/03/07

Photograph of Comet P/17 Holmes – 10/28/07 (DH)

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- Meteors & meteor showers
  - Meteors are typically very small bits of dust or debris in orbit around the sun, that collide with Earth's atmosphere
  - The collision causes the path through the air to glow, which is what we see
  - Many times during a year, the Earth's orbit will pass through the orbital debris of a comet, and we get a meteor shower

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- Taurid Meteor Shower
  - The name of the meteor shower is based on the constellation in the sky where the meteors appear to be falling from
  - The Taurid meteors all appear to emanate from Taurus (in the East), and we may see several meteors that belong to this shower on 11/03
  - Taurid meteors are from Comet Encke dust, the 2nd periodic comet ever discovered (P/2)!

Meteor shower image from ap.stmarys.ca

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- The Milky Way
  - Usually when we refer to the Milky Way, we mean the hazy band of faint light that cuts across the dark night sky
  - The Milky Way is also the name of the galaxy that contains the solar system

Fisheye Lens “All Sky” Image by DH

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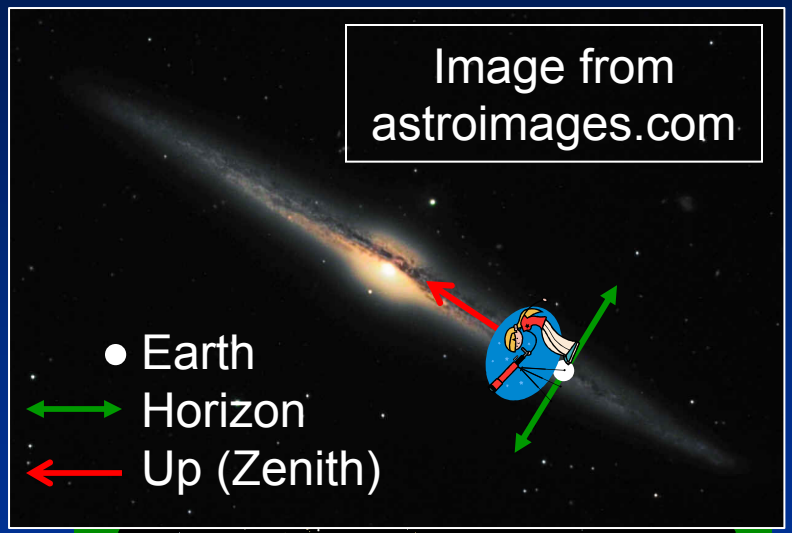
- ☆ All the stars that we see in the night sky are part of the Milky Way *galaxy*
- ☆ The Milky Way *band* is seen whenever we look along the disk of the galaxy



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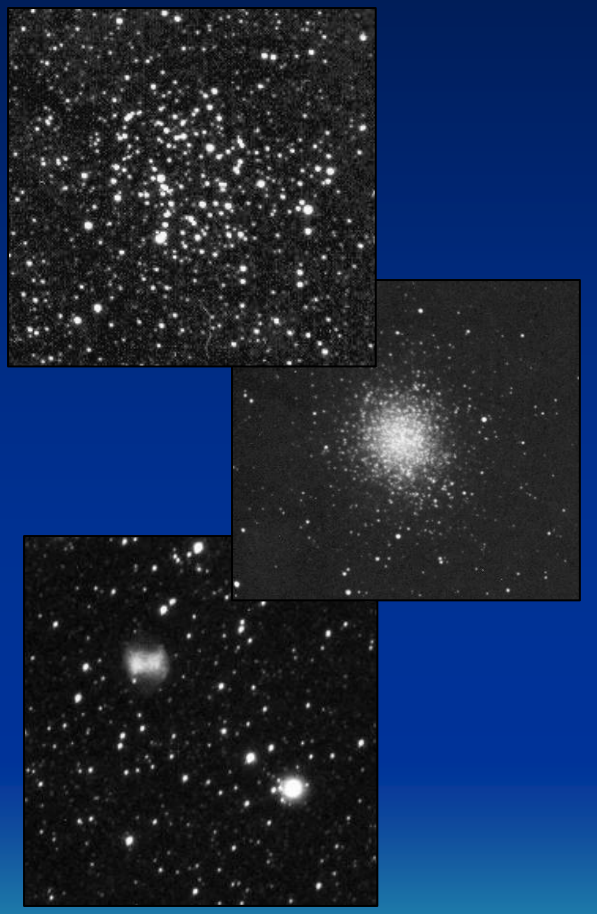
- Deep Sky objects
  - Open Star Cluster – Loose group of stars
  - Globular Star Cluster – A dense ball of stars
  - Planetary Nebula – A small ball of gas associated with a single star of average mass



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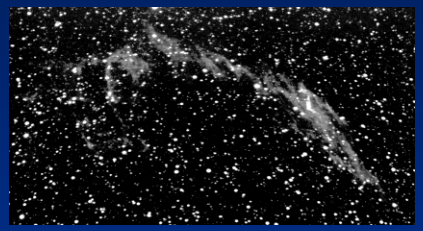
- Deep Sky objects
  - Supernova Remnants – Gas from an exploded star
  - Diffuse Nebula – A large region of Hydrogen gas where stars are being born
  - Galaxy – “Island Universes”, a collection of hundred of millions of stars, like our Milky Way galaxy



Resources

- ☆ Astronomy Periodical Websites
  - ☆ Astronomy.com (*Astronomy* magazine)
  - ☆ Skytonight.com (*Sky & Telescope* magazine)
- ☆ Satellite and Iridium Flare predictions
  - ☆ Heavens-above.com
- ☆ Clear Sky Clocks and Light Pollution Maps
  - ☆ Cleardarksky.com
- ☆ Old Town Sidewalk Astronomers
  - ☆ Otastro.org

Photograph of 08/28/07 Lunar Eclipse (DH)