January 2022
Observing Report

January 2022

Planets:

- Evening:
  - Mercury Very low in SW at sunset 7th to 14th.
  - Saturn Low, just above Mercury.
  - Jupiter Higher and bright.

January 2022

Planets:

- Evening:
  - Mercury Very low in SW at sunset 7th to 14th.
  - Saturn Low, just above Mercury.
  - Jupiter Higher and bright.
- Morning:
  - Mars Near red Antares.
  - Venus Appears in SE starting mid-month
  - Moon Thin crescent in conjunction with Mar & Venus on the 29th.

January 2022

Planets:

- Evening:
  - Mercury Very low in SW at sunset 7th to 14th.
  - Saturn Low, just above Mercury.
  - Jupiter Higher and bright.
- Morning:
  - Mars Near red Antares.
  - Venus Appears in SE starting mid-month
  - Moon Thin crescent in conjunction with Mar & Venus on the 29th.

January 2022

Planets:

- Evening:
  - Mercury Very low in SW at sunset 7th to 14th.
  - Saturn Low, just above Mercury.
  - Jupiter Higher and bright.
- Morning:
  - Mars Near red Antares.
  - Venus Appears in SE starting mid-month
  - Moon Thin crescent in conjunction with Mar & Venus on the 29th.

Moon:

- Jan 02 – New
- Jan 09 – 1st Quarter
- Jan 17 – Full
- Jan 25 – 3rd Quarter

January 2022

Planets:

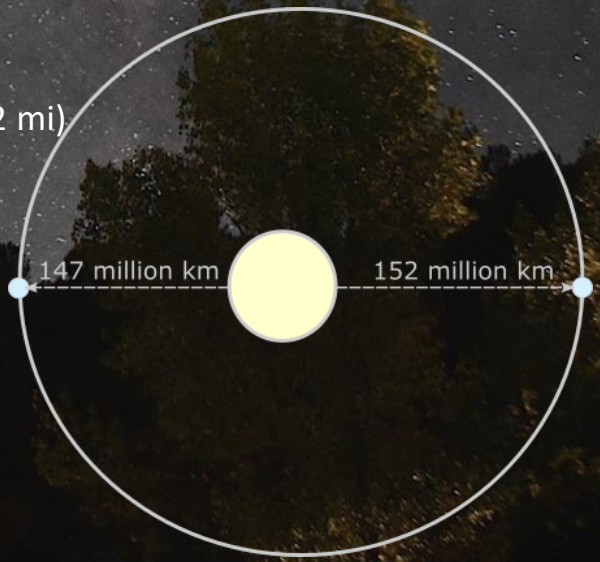
- Evening:
  - Mercury Very low in SW at sunset 7th to 14th.
  - Saturn Low, just above Mercury.
  - Jupiter Higher and bright.
- Morning:
  - Mars Near red Antares.
  - Venus Appears in SE starting mid-month
  - Moon Thin crescent in conjunction with Mar & Venus on the 29th.

Moon:

- Jan 02 – New
- Jan 09 – 1st Quarter
- Jan 17 – Full
- Jan 25 – 3rd Quarter

Earth:

- Jan 3, Perihelion *tonight* at 10:52 PM.
  - Distance from Sun center 147,105,052 km (91,406,842 mi)
  - Aphelion on July 4th, 152,098454 km (94,509,598 mi)
  - Change in apparent solar diameter of 3.4%



January 2022

Planets:

- Evening:
  - Mercury Very low in SW at sunset 7th to 14th.
  - Saturn Low, just above Mercury.
  - Jupiter Higher and bright.
- Morning:
  - Mars Near red Antares.
  - Venus Appears in SE starting mid-month
  - Moon Thin crescent in conjunction with Mar & Venus on the 29th.

Moon:

- Jan 02 – New 
- Jan 09 – 1st Quarter 
- Jan 17 – Full 
- Jan 25 – 3rd Quarter 

Earth:

- Jan 3, Perihelion *tonight* at 10:52 PM.
  - Distance from Sun center 147,105,052 km (91,406,842 mi)
  - Aphelion on July 4th, 152,098454 km (94,509,598 mi)
  - Change in apparent solar diameter of 3.4%

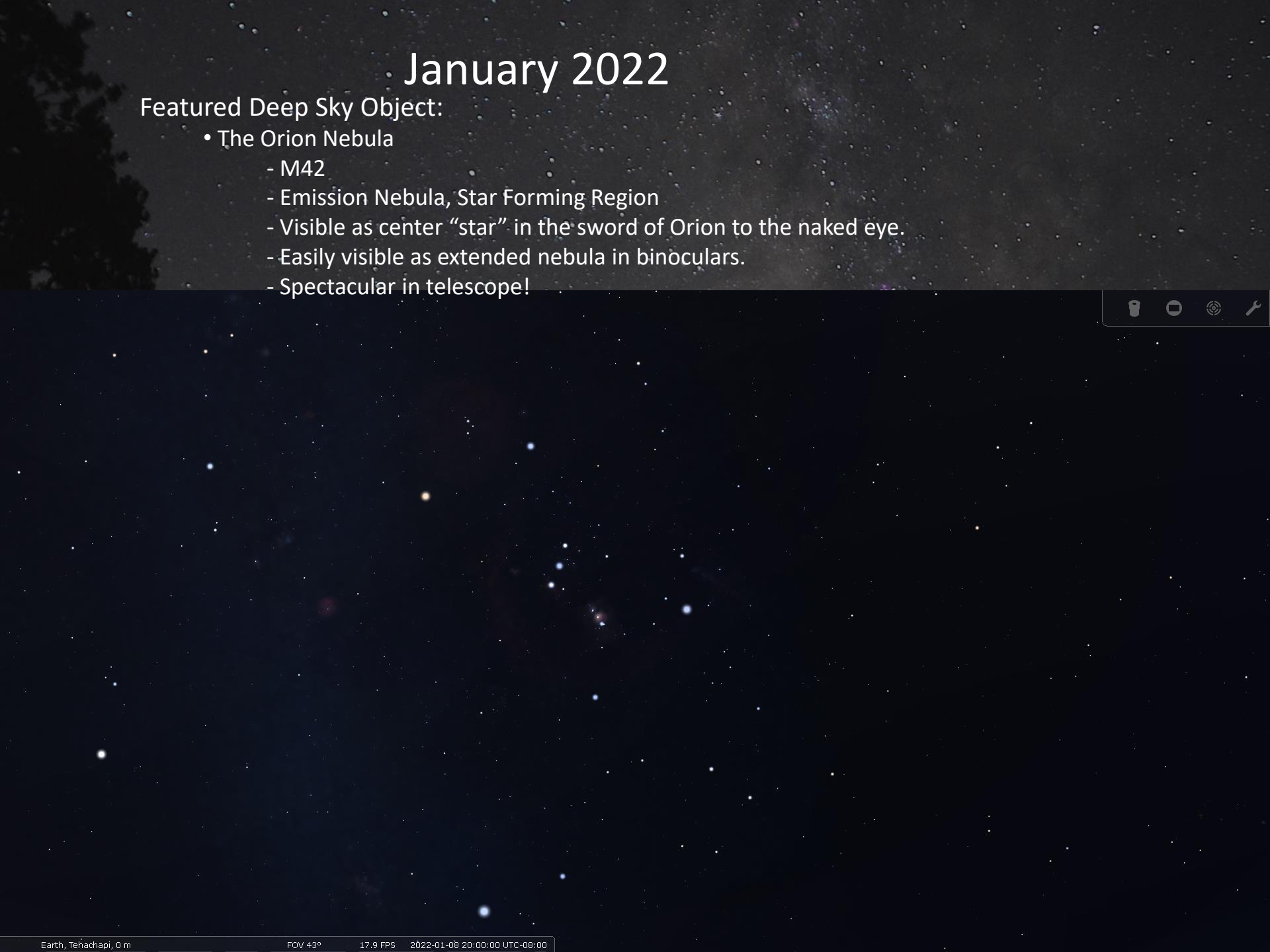
Meteors:

- Jan 3, Quadrantids. Sharp peak this afternoon. Up to 40/hr with an almost new Moon.

January 2022

Featured Deep Sky Object:

- The Orion Nebula
  - M42
  - Emission Nebula, Star Forming Region
  - Visible as center “star” in the sword of Orion to the naked eye.
  - Easily visible as extended nebula in binoculars.
  - Spectacular in telescope!



January 2022

Featured Deep Sky Object:

- The Orion Nebula
  - M42
  - Emission Nebula, Star Forming Region
  - Visible as center “star” in the sword of Orion to the naked eye.
  - Easily visible as extended nebula in binoculars.
  - Spectacular in telescope!

January 2022

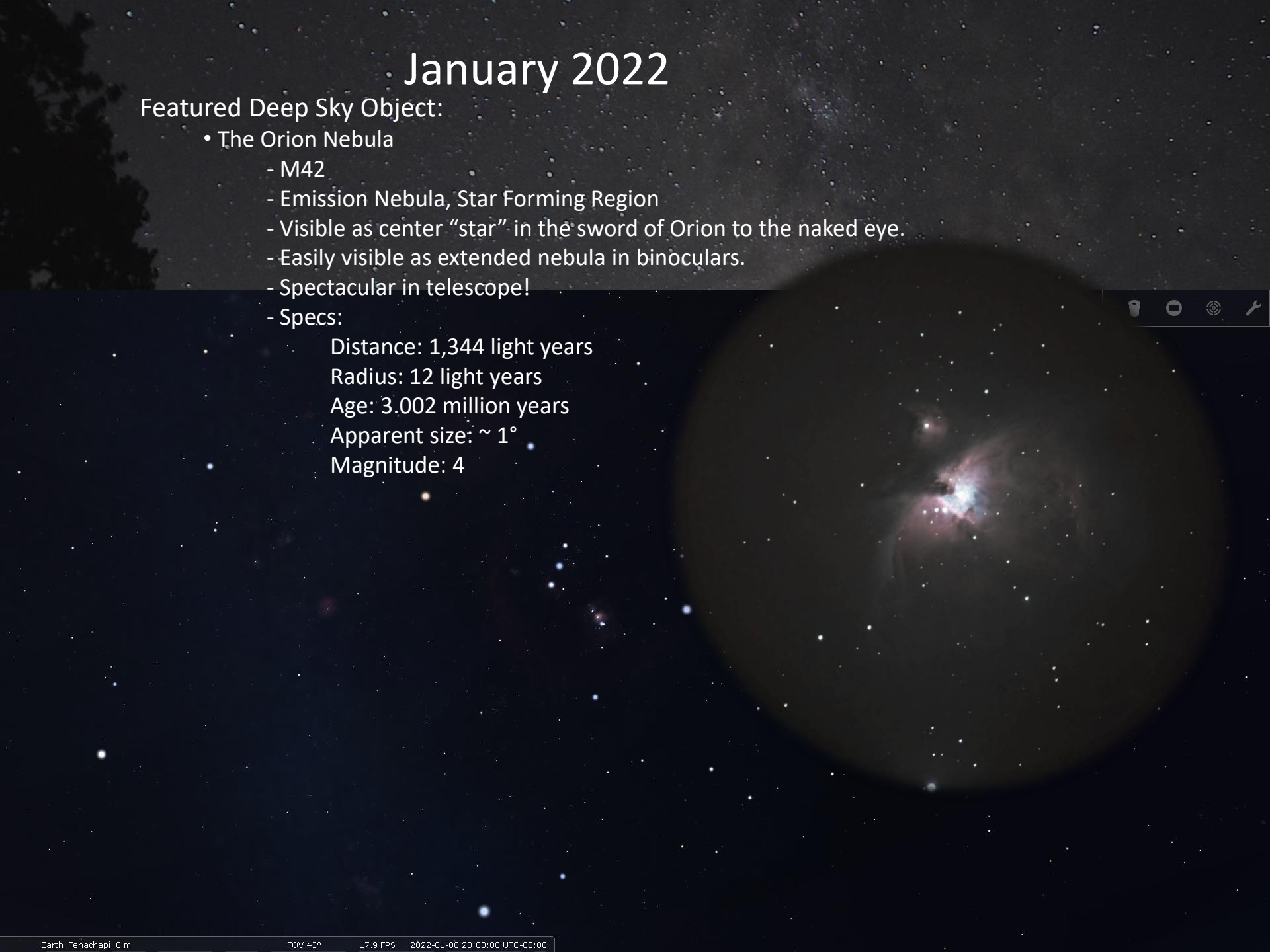
Featured Deep Sky Object:

- The Orion Nebula
  - M42
  - Emission Nebula, Star Forming Region
  - Visible as center “star” in the sword of Orion to the naked eye.
  - Easily visible as extended nebula in binoculars.
  - Spectacular in telescope!

January 2022

Featured Deep Sky Object:

- The Orion Nebula
  - M42
  - Emission Nebula, Star Forming Region
  - Visible as center “star” in the sword of Orion to the naked eye.
  - Easily visible as extended nebula in binoculars.
  - Spectacular in telescope!
  - Specs:
    - Distance: 1,344 light years
    - Radius: 12 light years
    - Age: 3.002 million years
    - Apparent size: ~ 1°
    - Magnitude: 4



January 2022

Featured Deep Sky Object:

- The Orion Nebula
  - M42
  - Emission Nebula, Star Forming Region
  - Visible as center “star” in the sword of Orion to the naked eye.
  - Easily visible as extended nebula in binoculars.
  - Spectacular in telescope!
  - Specs:
    - Distance: 1,344 light years
    - Radius: 12 light years
    - Age: 3.002 million years
    - Apparent size: ~ 1°
    - Magnitude: 4

Solar Activity

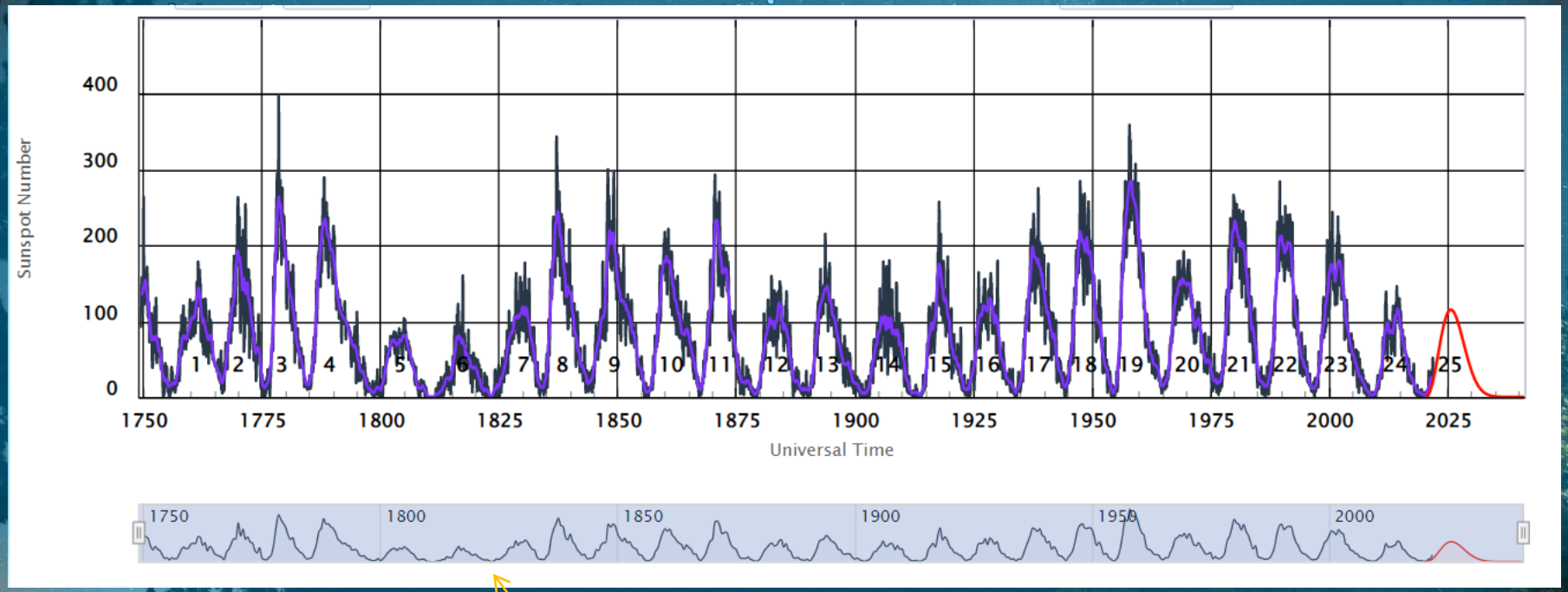
- Cycle 25 well underway with Solar Max expected in around 2025.
- Expecting a weak maximum, similar to Cycle 24.
- Reminiscent of the Dalton Minimum and low around 1900.
- Northern Hemisphere activity appears to increasing.
- Rising slightly faster than predicted. (Maximum earlier or higher than expected?)

Dalton Minimum

NOAA/SWPC

Solar Activity

- Cycle 25 well underway with Solar Max expected in around 2025.
- Expecting a weak maximum, similar to Cycle 24.
- Reminiscent of the Dalton Minimum and low around 1900.
- Northern Hemisphere activity appears to increasing.
- Rising slightly faster than predicted. (Maximum earlier or higher than expected?)



Dalton Minimum

NOAA/SWPC

Solar Activity

- Cycle 25 well underway with Solar Max expected in around 2025.
- Expecting a weak maximum, similar to Cycle 24.
- Reminiscent of the Dalton Minimum and low around 1900.
- Northern Hemisphere activity appears to increasing.
- Rising slightly faster than predicted. (Maximum earlier or higher than expected?)

SDO (Solar Dynamics Observatory) Helioseismic and Magnetic Imager (HMI).

Movies generated at: https://sdo.gsfc.nasa.gov/data/aiahmi/

NASA/SDO/HMI/Intensity

Solar Activity

- Cycle 25 well underway with Solar Max expected in around 2025.
- Expecting a weak maximum, similar to Cycle 24.
- Reminiscent of the Dalton Minimum and low around 1900.
- Northern Hemisphere activity appears to increasing.
- Rising slightly faster than predicted. (Maximum earlier or higher than expected?)

SDO (Solar Dynamics Observatory) Atmospheric Imaging Assembly (AIA).

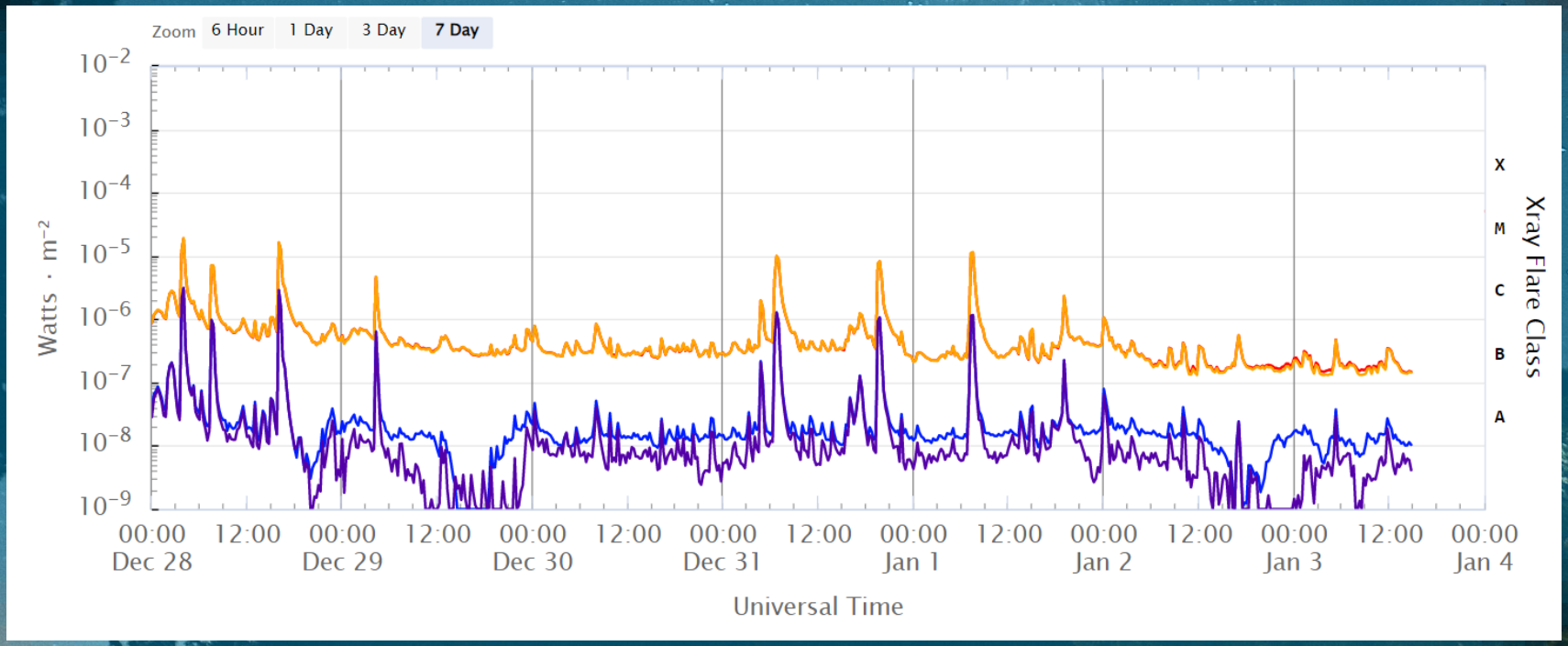
The 304 Å bandpass shows emission of singly ionized Helium (He II) at a characteristic temperature of ~ 50,000 Kelvin from the high chromosphere and Transition Region.

Movies generated at: https://sdo.gsfc.nasa.gov/data/aiahmi/

NASA/SDO/AIA/304 Å

Solar Activity

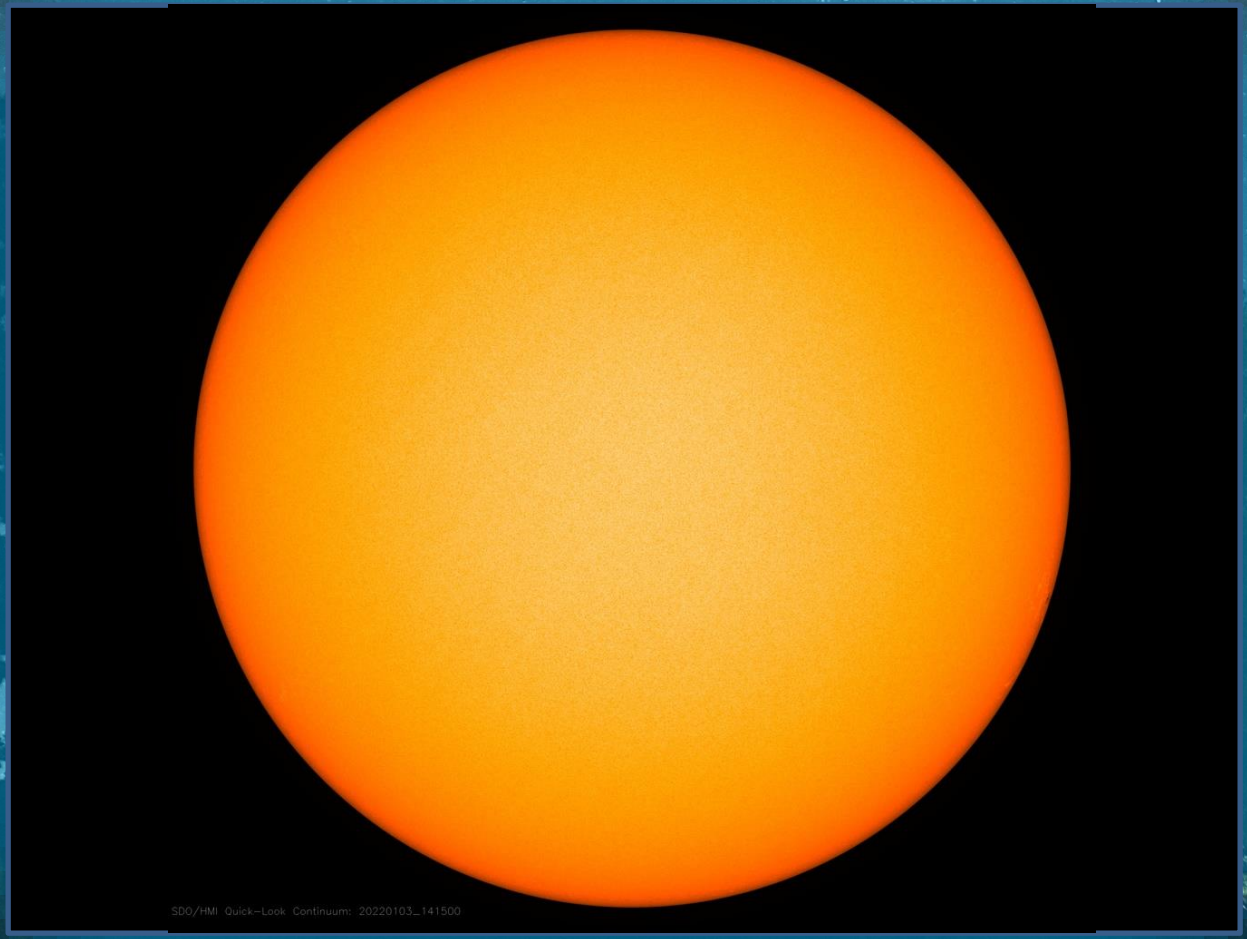
- Cycle 25 well underway with Solar Max expected in around 2025.
- Expecting a weak maximum, similar to Cycle 24.
- Reminiscent of the Dalton Minimum and low around 1900.
- Northern Hemisphere activity appears to increasing.
- Rising slightly faster than predicted. (Maximum earlier or higher than expected?)



NOAA/SWPC/GOES X-Ray Flux

Solar Activity

- Cycle 25 well underway with Solar Max expected in around 2025.
- Expecting a weak maximum, similar to Cycle 24.
- Reminiscent of the Dalton Minimum and low around 1900.
- Northern Hemisphere activity appears to increasing.
- Rising slightly faster than predicted. (Maximum earlier or higher than expected?)

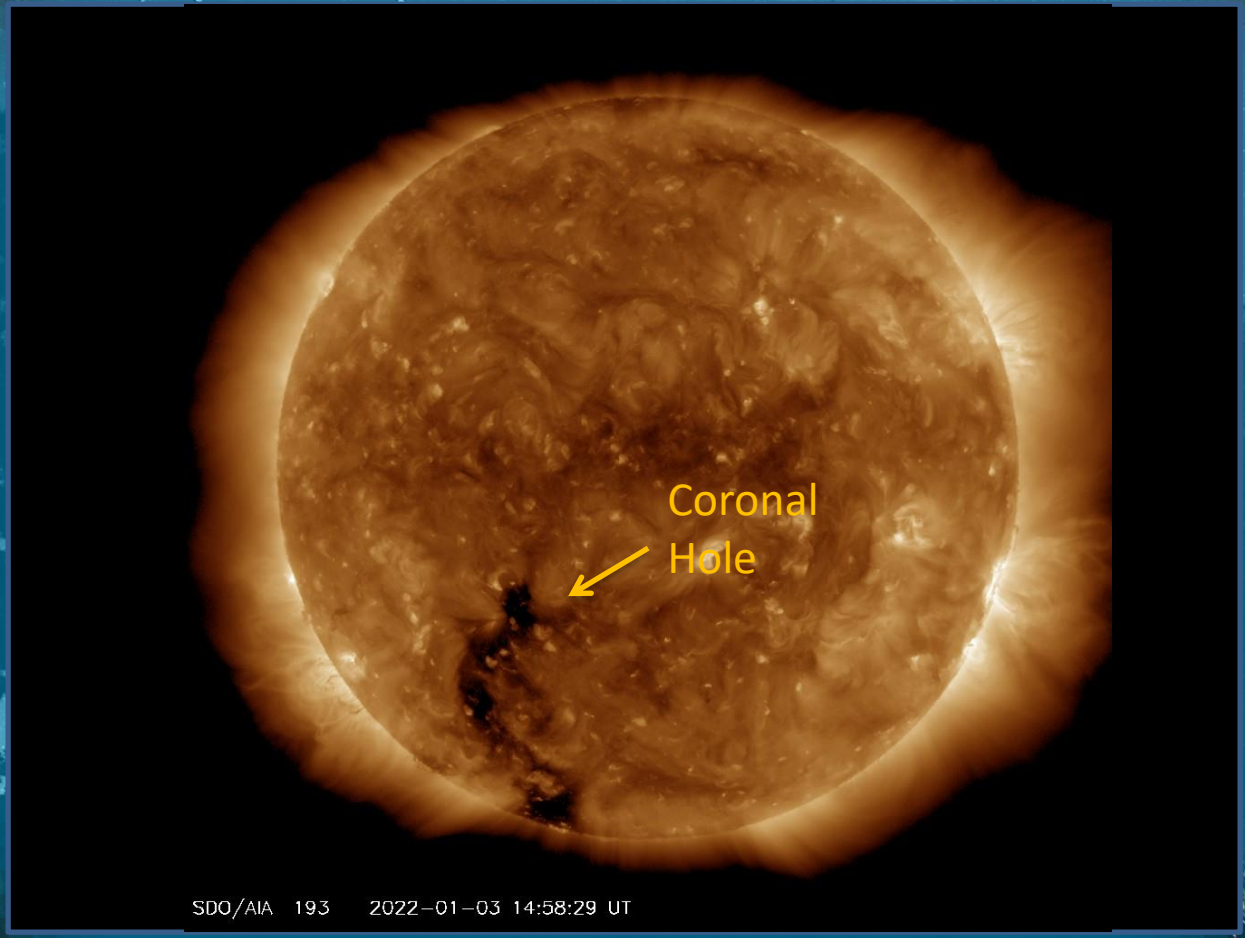


SDO (Solar Dynamics Observatory) Helioseismic and Magnetic Imager (HMI).

NASA/SDO/HMI/Intensity

Solar Activity

- Cycle 25 well underway with Solar Max expected in around 2025.
- Expecting a weak maximum, similar to Cycle 24.
- Reminiscent of the Dalton Minimum and low around 1900.
- Northern Hemisphere activity appears to increasing.
- Rising slightly faster than predicted. (Maximum earlier or higher than expected?)



SDO (Solar Dynamics Observatory) Atmospheric Imaging Assembly (AIA).

The 193 Å bandpass is sensitive to the Fe XII at ~ 1,000,000 K and Fe XXIV at 20,000,000 K.

Coronal Holes are source the of the “Fast Solar Wind” at ~ 800 Km/s, about twice the speed of normal “slow Solar Wind.”

NASA/SDO/AIA/171Å

January 2022

Planets:

- Evening:
  - Mercury Very low in SW at sunset 7th to 14th.
  - Saturn Low, just above Mercury.
  - Jupiter Higher and bright.
- Morning:
  - Mars Near red Antares.
  - Venus Appears in SE starting mid-month
  - Moon Thin crescent in conjunction with Mar & Venus on the 29th.

Moon:

- Jan 02 – New
- Jan 09 – 1st Quarter
- Jan 17 – Full
- Jan 25 – 3rd Quarter

Earth:

- Jan 3, Perihelion *tonight* at 10:52 PM.
  - Distance from Sun center 147,105,052 km (91,406,842 mi)
  - Aphelion on July 4th, 152,098454 km (94,509,598 mi)
  - Change in apparent solar diameter of 3.4%

Meteors:

- Jan 3, Quadrantids. Sharp peak this afternoon. Up to 40/hr with an almost new Moon.

Featured Deep Sky Object:

- M42, The Orion Nebula
- Center “star” in the Sword of Orion
- Very large Emission Nebula (a.k.a. Star Forming Region).

Observing the Sun:

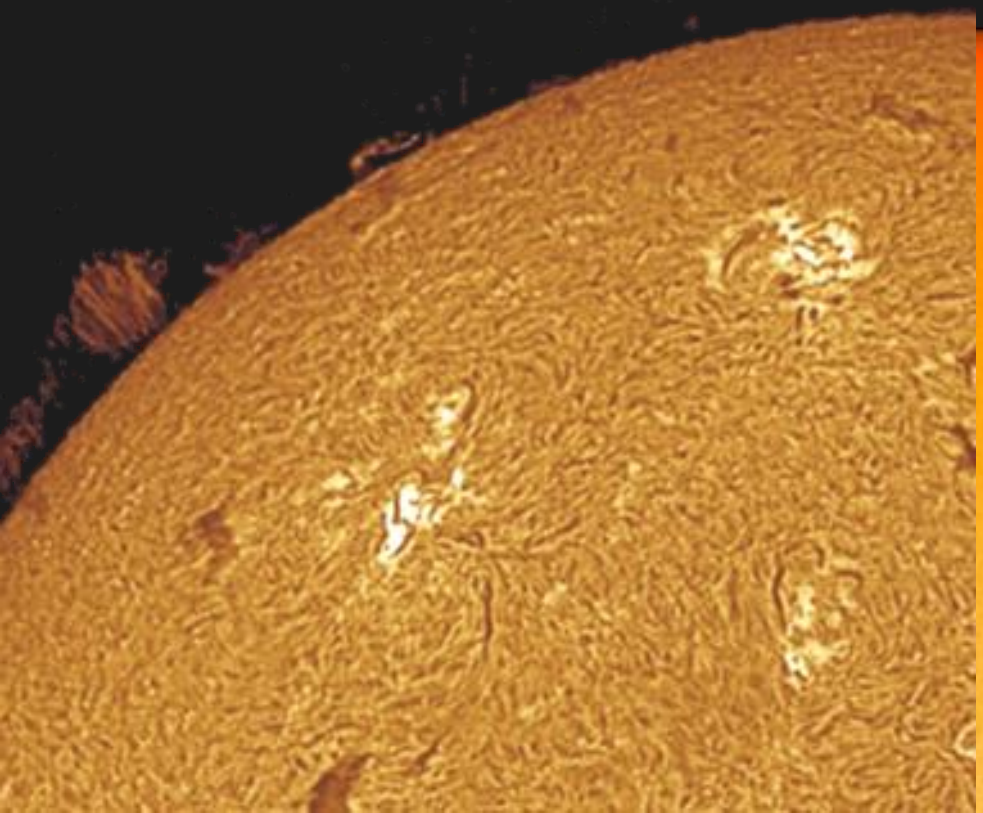
- WARNING: Never look at the Sun without proper protection and precautions.
  - Eclipse Glasses
  - Telescope front aperture filter.
  - Special dedicated solar telescope.

Observing the Sun:

- 3 Visible Layers
  - Photosphere

Observing the Sun:

- 3 Visible Layers
  - Photosphere
  - Chromosphere

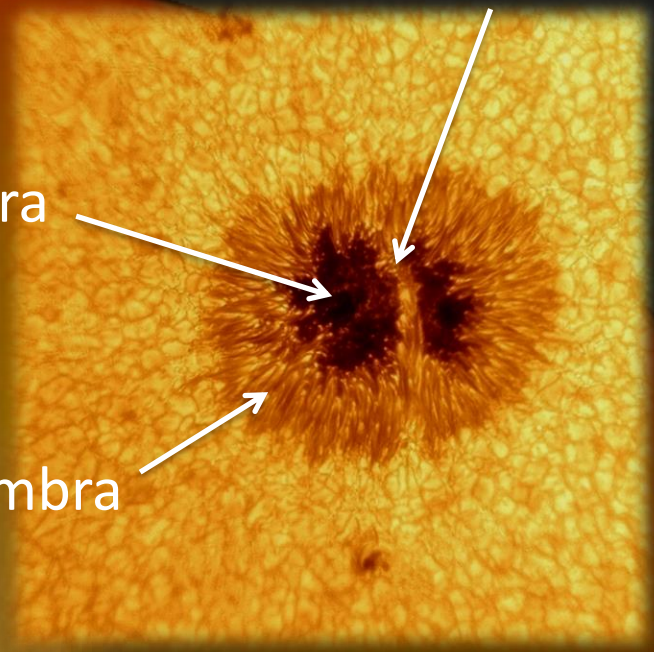


Observing the Sun:

- 3 Visible Layers
  - Photosphere
  - Chromosphere
  - Corona

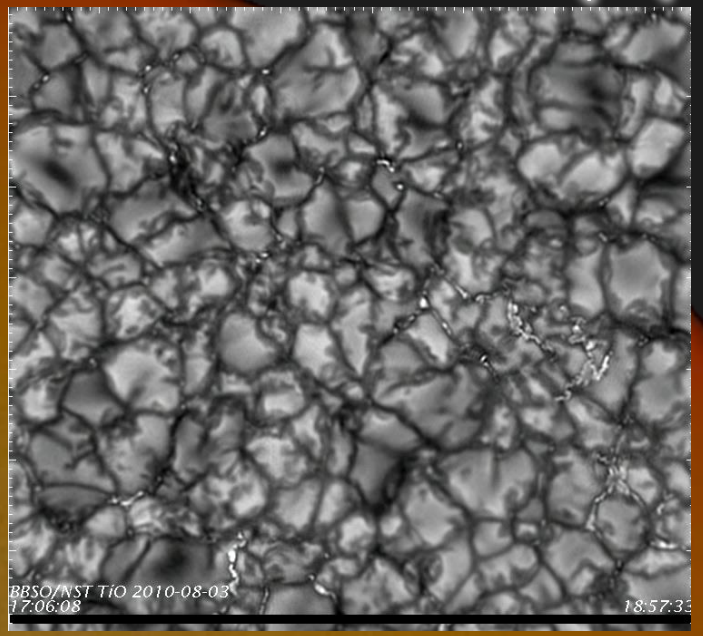
Photosphere:

- Commonly called the White Light Surface or Continuum.
- ~ 100 km thick layer going from opaque to transparent.
- Effective temperature 5777 K (5504 °C, 9939 °F).
- Visible features:
  - Sunspots
    - Regions of strong magnetic fields comparable to size of Earth.
    - Darkest center called Umbra (3000-4500 K).
    - Surrounding Umbra is Penumbra (~5780 K).
    - (Small spots without penumbra call pore.)
    - Largest visible to unaided eye!
    - Last from hours to months.



Photosphere:

- Commonly called the White Like Surface or Continuum.
- ~ 100 km thick layer going from opaque to transparent.
- Effective temperature 5777 K (5504 °C, 9939 °F).
- Visible features:
  - Sunspots
    - Regions of strong magnetic fields comparable to size of Earth.
    - Darkest center called Umbra (3000-4500 K).
    - Surrounding Umbra is Penumbra (~5780 K).
    - (Small spots without penumbra call pore.)
    - Largest visible to unaided eye!
    - Last from hours to months.
  - Granulation
    - Top of convection cells
    - Everywhere on the solar disk
    - ~ 1000 km (620 mi)
    - Average life ~ 20 min.
    - Flow ~ 7 km/s



Big Bear Solar Observatory/GST 13,775 km

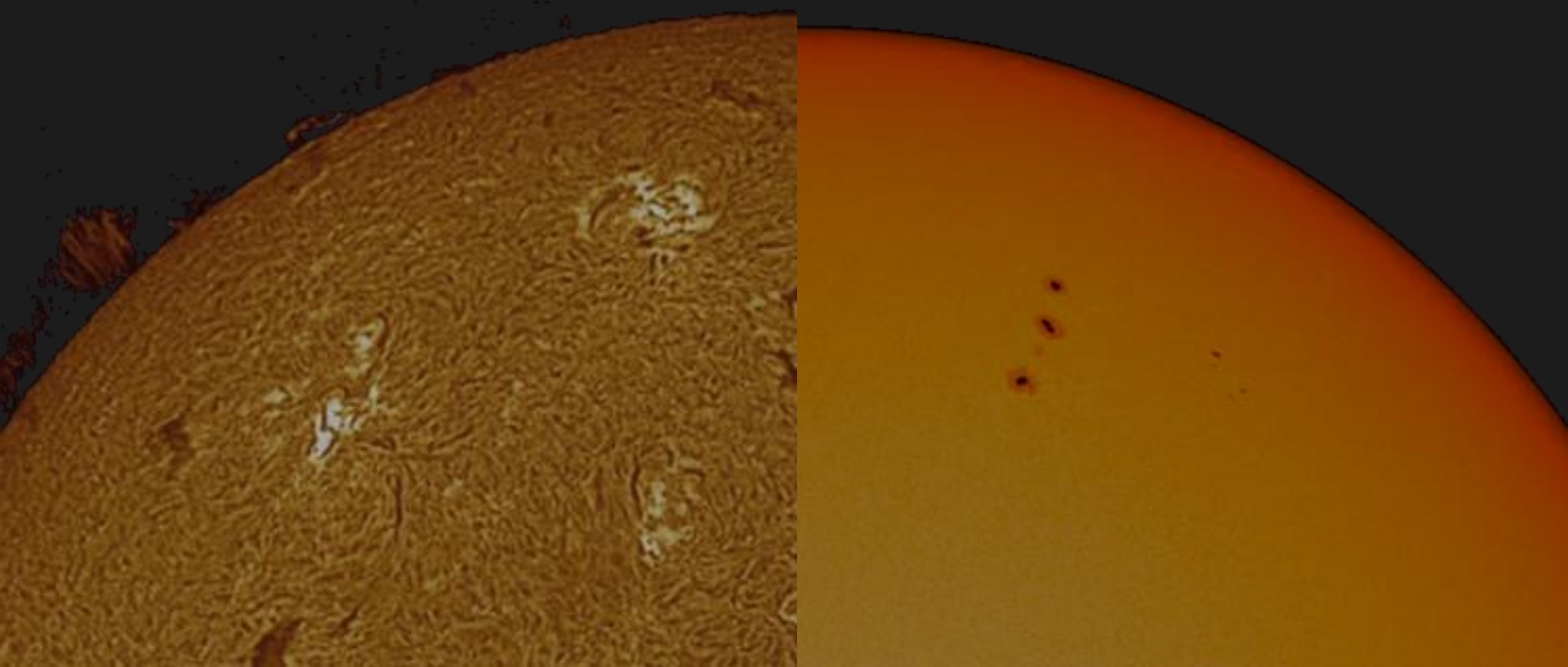
Photosphere:

- Commonly called the White Light Surface or Continuum.
- ~ 100 km thick layer going from opaque to transparent.
- Effective temperature 5777 K (5504 °C, 9939 °F).
- Visible features:
  - Sunspots
    - Regions of strong magnetic fields comparable to size of Earth.
    - Darkest center called Umbra (3000-4500 K).
    - Surrounding Umbra is Penumbra (~5780 K).
    - (Small spots without penumbra call pore.)
    - Largest visible to unaided eye!
    - Last from hours to months.
  - Granulation
    - Top of convection cells
    - Everywhere on the solar disk
    - ~ 1000 km (620 mi)
    - Average life ~ 20 min.
    - Flow ~ 7 km/s
  - Faculae
    - Bundles of magnetic fields
    - Seen as bright region around ARs
    - More visible near limb.
    - More than make up for dark sunspots.

NASA/SDO 12/31/2021

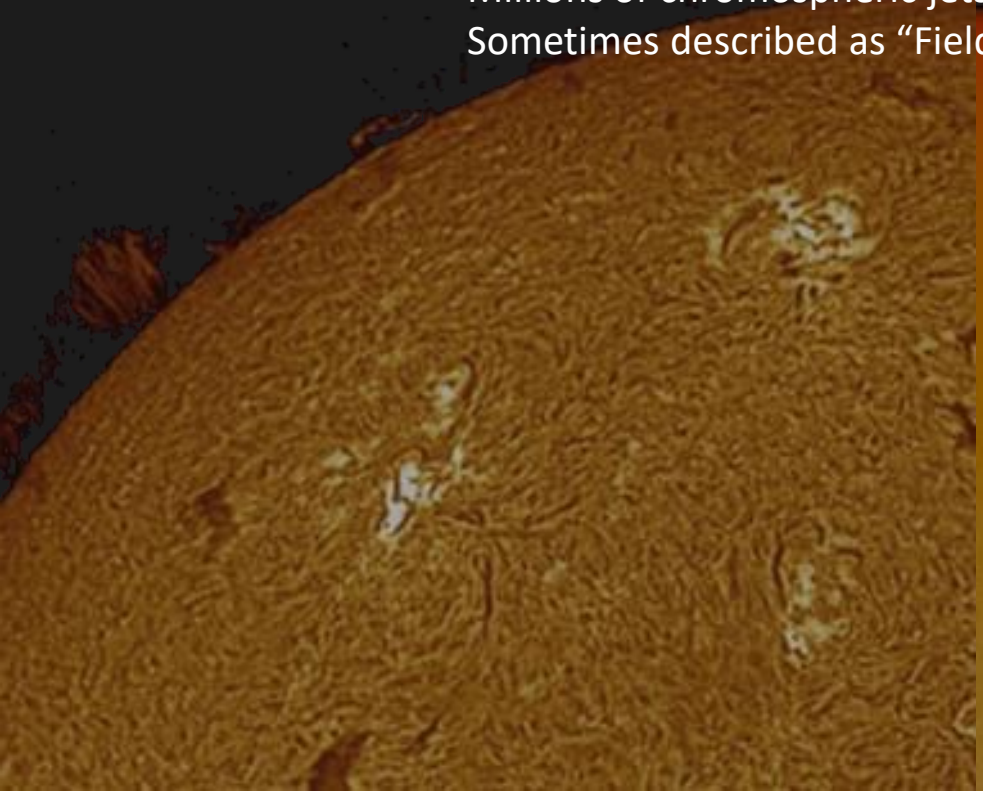
Chromosphere:

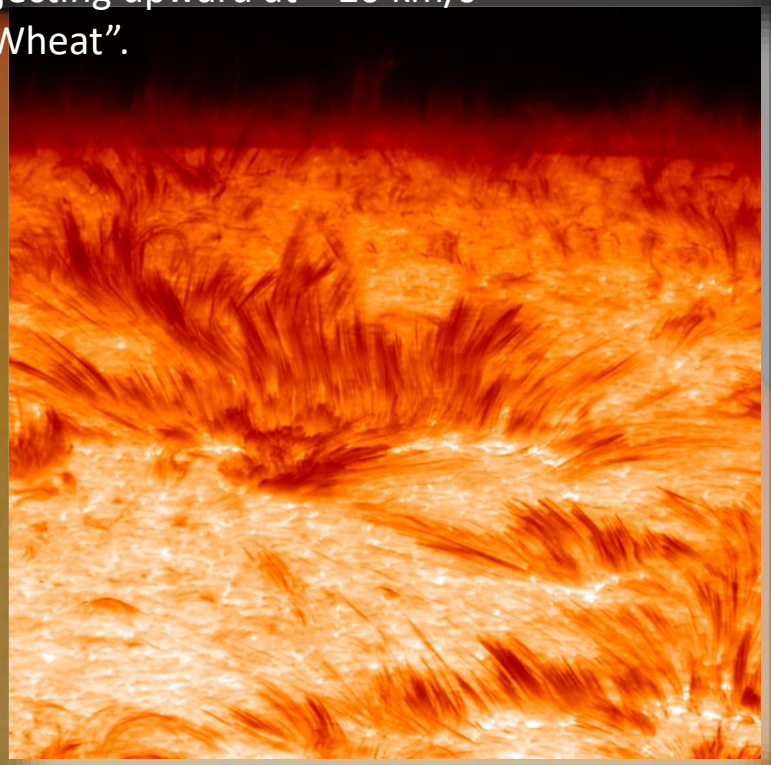
- Above the Photosphere.
- ~ 5,000 km thick but quite irregular due to differing structures.
- ~ 6,000 – 20,000 °C *increasing* from bottom to top.
- Most prominently visible in Hα (6562.8 Å)



Chromosphere:

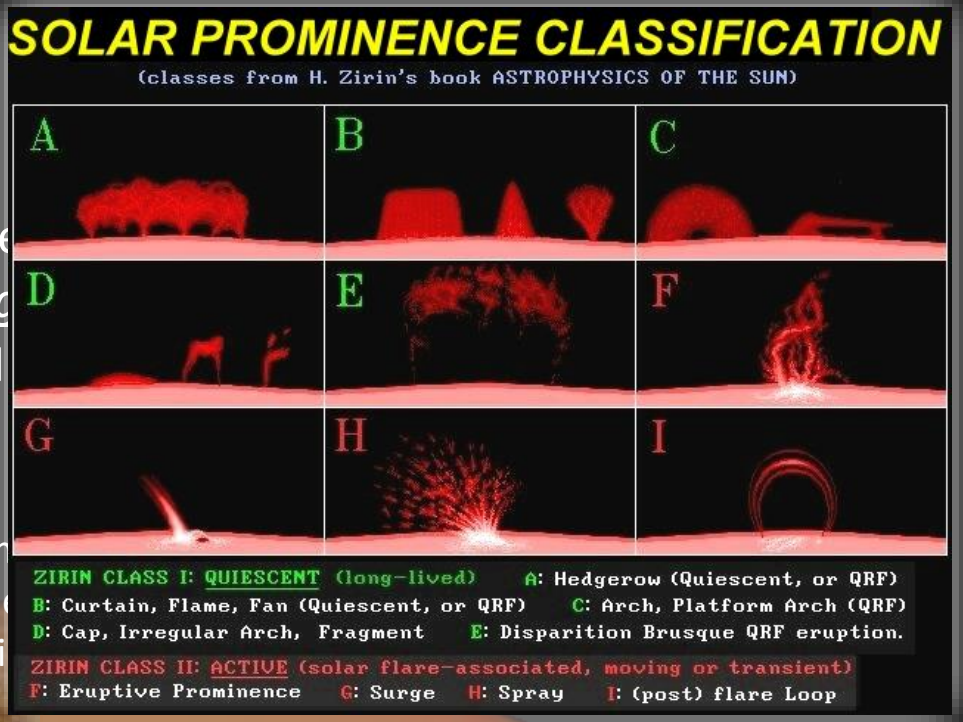
- Above the Photosphere.
- ~ 5,000 km thick but quite irregular due to differing structures.
- ~ 6,000 – 20,000 °C *increasing* from bottom to top.
- Most prominently visible in Hα (6562.8 Å)
- Visible features:
  - Spicules/Fibrils
    - Spicules projected above limb, Fibrils (a.k.a. Motes) on disk
    - Millions of chromospheric jets projecting upward at ~ 20 km/s
    - Sometimes described as “Field of Wheat”.

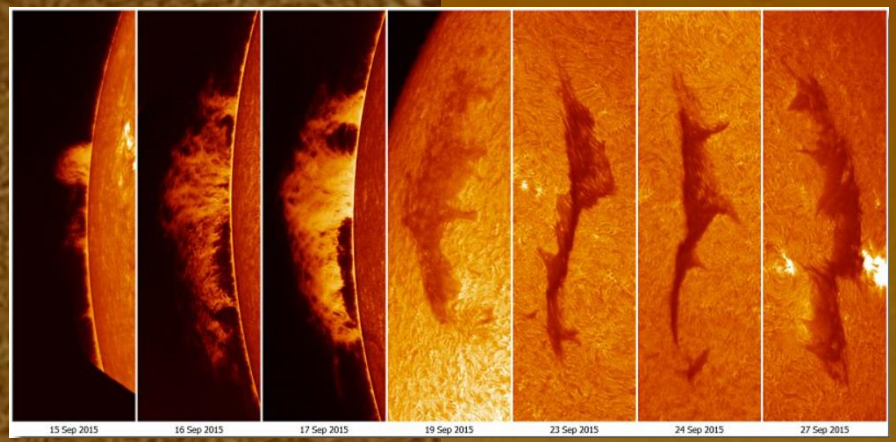




Chromosphere:

- Above the Photosphere.
- ~ 5,000 km thick but quite irr
- ~ 6,000 – 20,000 °C *increasing*
- Most prominently visible in H
- Visible features:
  - Spicules/Fibrils
    - Spicules projected above lir
    - Millions of chromospheric j
    - Sometimes described as "Fi
  - Prominence/Filaments
    - Dense material suspended above the surface on loops of magnetic field.
    - Prominences often appear as loop structures projected above limb.
    - Fibrils appear a dark linear structures when seen in front of the disk.
    - Erupting prominence that lifts off the disk is called a *Coronal Mass Ejection*.

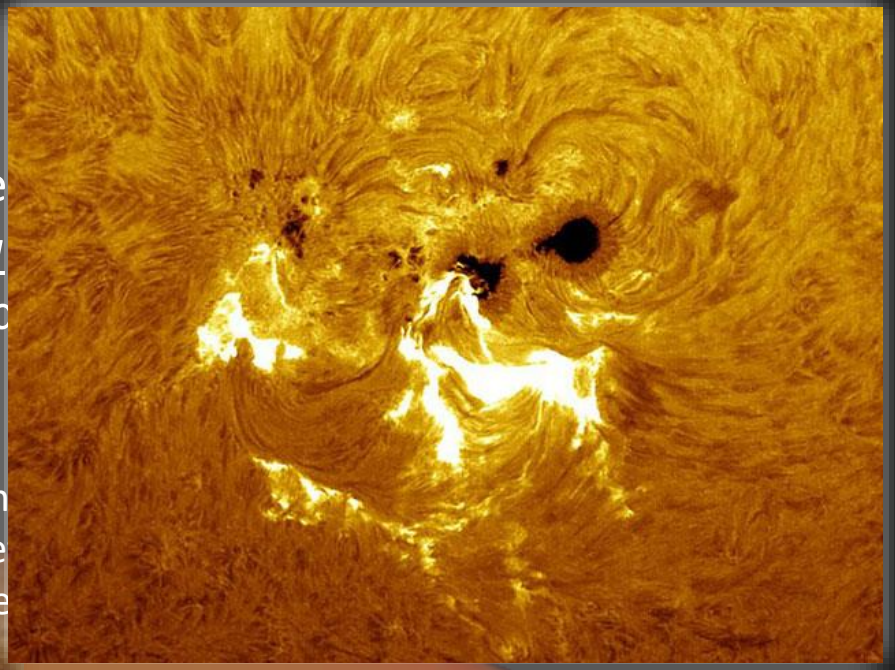




Bob Antol

Chromosphere:

APOD - 2004 July 26, Jack Newton

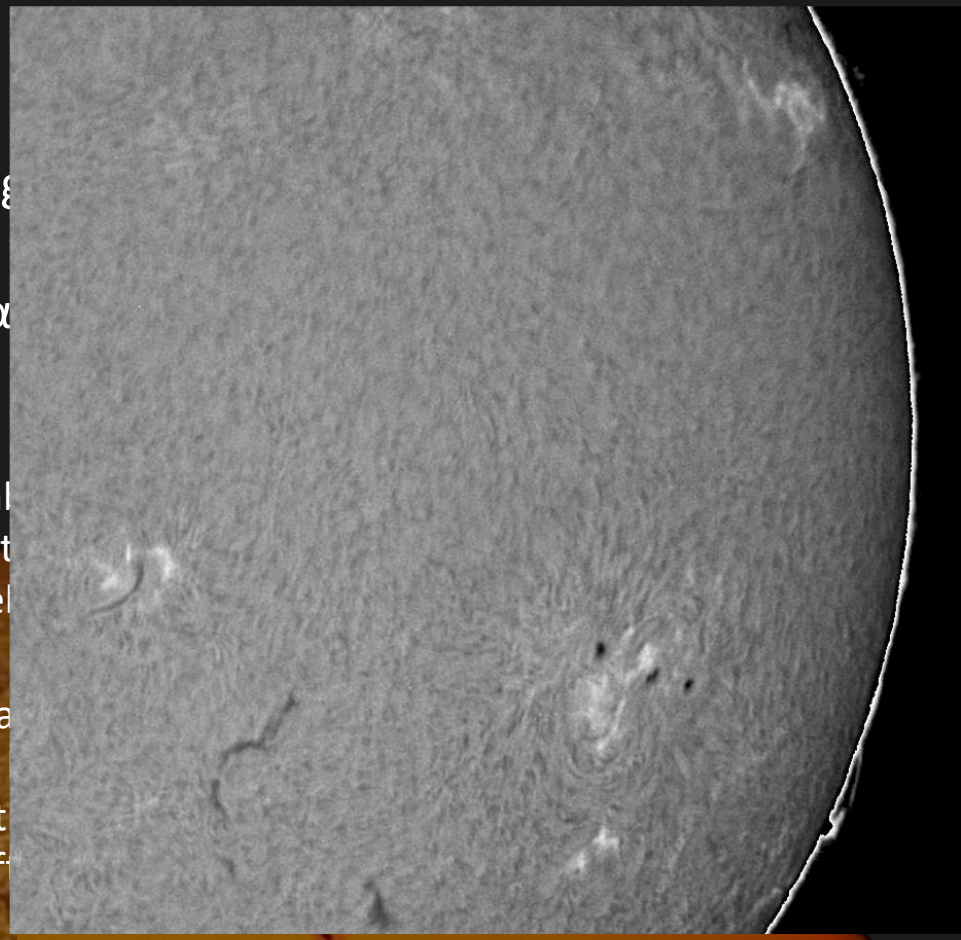


- Above the Photosphere.
- ~ 5,000 km thick but quite irre
- ~ 6,000 – 20,000 °C *increasing*
- Most prominently visible in Hα
- Visible features:
  - Spicules/Fibrils
    - Spicules projected above lim
    - Millions of chromospheric je
    - Sometimes described as "Fie
  - Prominence/Filaments
    - Dense chomospheric material suspended up into the corona on magnetic fields.
    - Prominences often appear a loop structures projected above limb.
    - Fibrils appear a dark linear structures when seen in front of the disk.
    - Erupting prominence that lifts off the disk is called a *Coronal Mass Ejection*.
  - Flares
    - Brightening due to eruptions of energy released from magnetic reconnections.
    - Typically seconds to minutes.

NSO/GONG/Cerro Tololo, Chile 2021/12/31

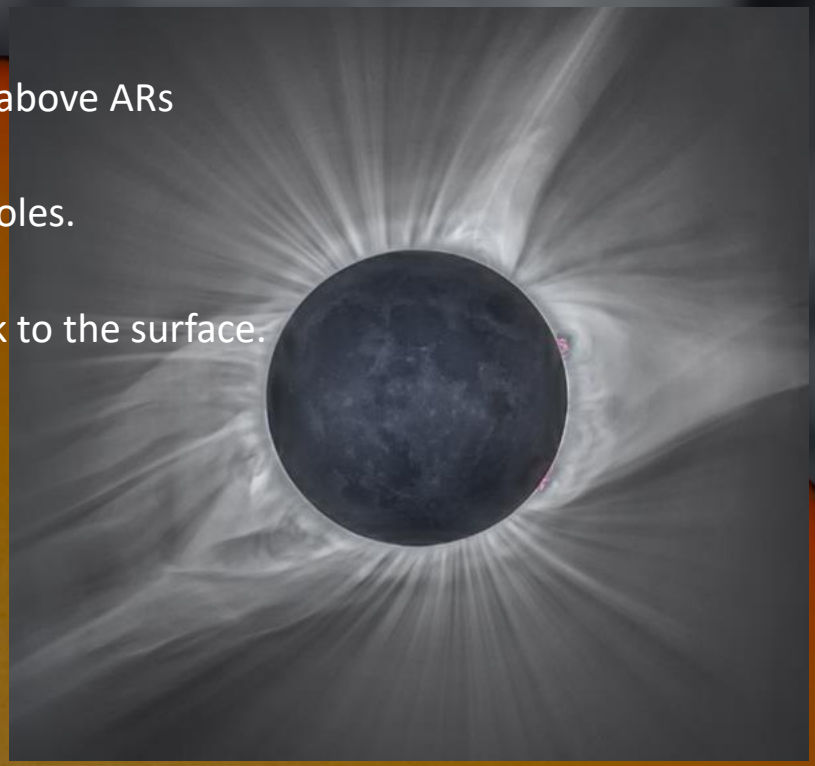
Chromosphere:

- Above the Photosphere.
- ~ 5,000 km thick but quite irreg
- ~ 6,000 – 20,000 °C *increasing*
- Most prominently visible in Hα
- Visible features:
  - Spicules/Fibrils
    - Spicules projected above liml
    - Millions of chromospheric jet
    - Sometimes described as "Fiel
  - Prominence/Filaments
    - Dense chomospheric materia
    - Prominences often appear a
    - Fibrils appear a dark linear st
    - Erupting prominence that lif
  - Flares
    - Brightening due to eruptions of energy released from magnetic reconnections.
    - Typically seconds to minutes.
  - Plage
    - -Bright regions around ARs that correspond closely to photospheric faculae.



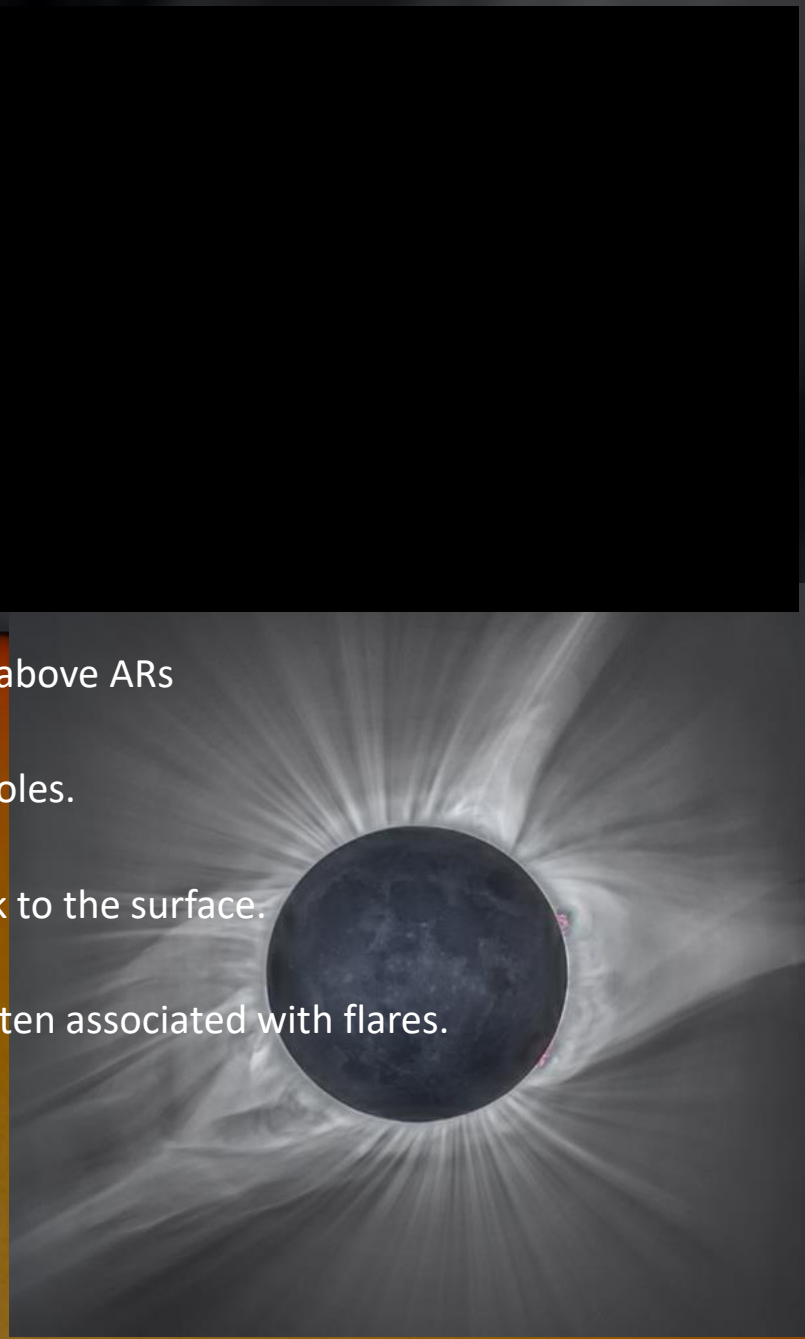
Corona:

- Extremely tenuous uppermost region of solar atmosphere.
- Plasma at a Million °C *and up!*
- Seen during total solar eclipses or from space.
- White light corona is photospheric light scattering off free electrons.
- ~ 1,000,000x dimmer than photosphere.
- Visible features:
  - Helmet Streamers
    Large pointy features typically found above ARs
  - Polar Plumes
    Thin Streamers projecting from the poles.
  - Coronal Loops
    Tracing magnetic fields that loop back to the surface.



Corona:

- Extremely tenuous uppermost regior
- Plasma at a Million °C *and up!*
- Seen during total solar eclipses or fro
- White light corona is photospheric lig
- ~ 1,000,000x dimmer than photosph
- Visible features:
  - Helmet Streamers
    Large pointy features typically found above ARs
  - Polar Plumes
    Thin Streamers projecting from the poles.
  - Coronal Loops
    Tracing magnetic fields that loop back to the surface.
  - Coronal Mass Ejections
    Large explosive release of material often associated with flares.



Corona:

- Extremely tenuous uppermost region of solar atmosphere.
- Plasma at a Million °C *and up!*
- Seen during total solar eclipses or from space.
- White light corona is photospheric light scattering off free electrons.
- ~ 1,000,000x dimmer than photosphere.
- Visible features:
  - Helmet Streamers
    Large pointy features typically found above ARs
  - Polar Plumes
    Thin Streamers projecting from the poles.
  - Coronal Loops
    Tracing magnetic fields that loop back to the surface.
  - Coronal Mass Ejections
    Large explosive release of material often associated with flares.