





# The Sun

- Fill out the worksheet

# The Sun      FACTS

- 1. The sun is a star
- 2. It is yellow and is middle aged.
- 3. It is 5 billion years old
- 4. It is 93 million miles away from the Earth.
- 5. The sun will die in about 5 billion years.



- 6. 1,300,000 Earth's can fit in the sun (that's 1.3 million!)

7. Rotation: 25 hours

8. Revolution: 230 million years to orbit the galaxy (galactic year)



# Hydrogen

- 9. Hydrogen is the most abundant element in the universe.
  - It has one proton and one electron.
  - All stars contain hydrogen.
  - On Earth, hydrogen is in a gaseous state.
10. Hydrogen is in a plasma state
11. 71% hydrogen, 29% helium



# Light and the Sun

12. Elements are created by a process called NUCLEAR FUSION

13. Light is composed of photons (a massless particle) It has no mass! That's why it can travel so fast!

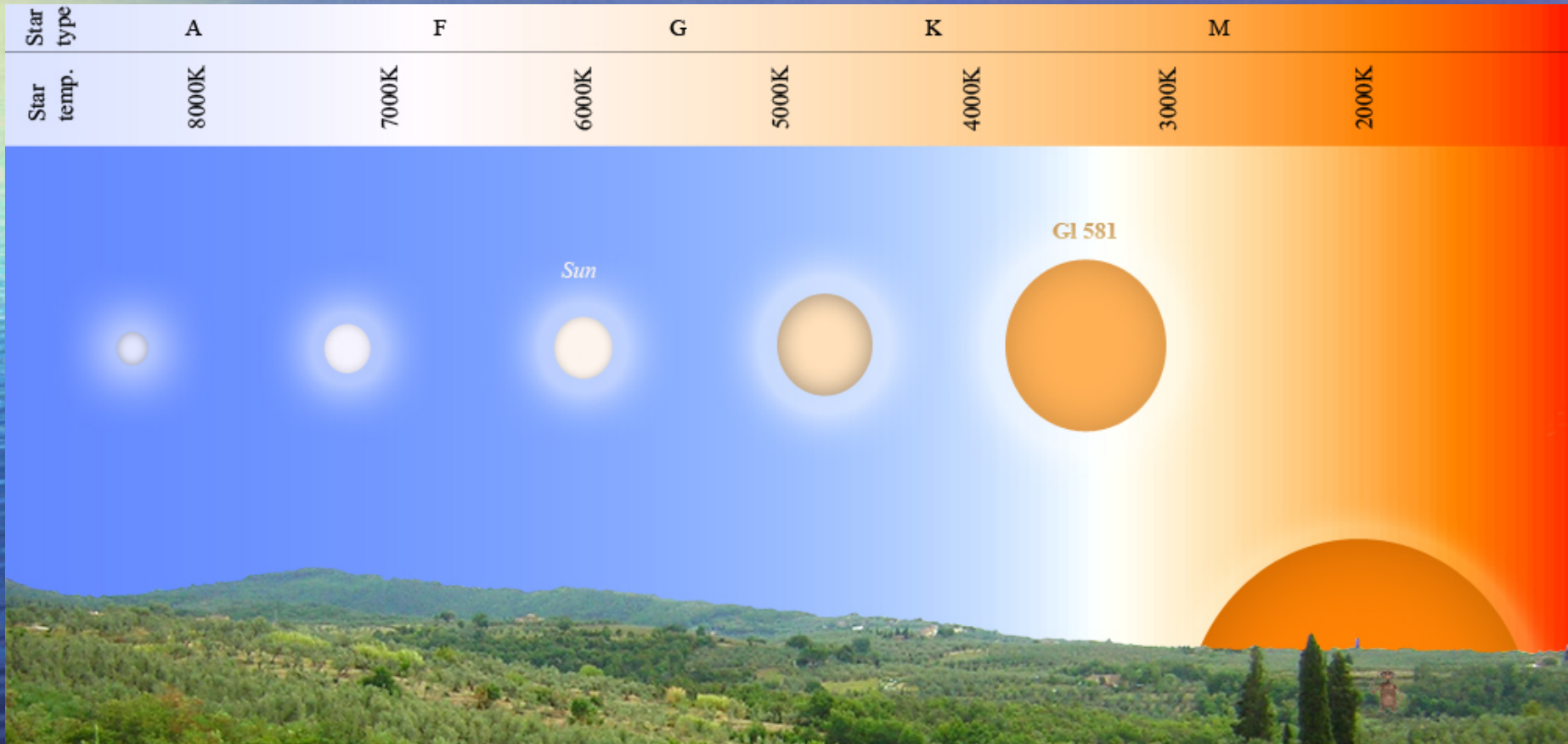
14. A Photon travels 186,000 miles per second.

15. It takes 500 seconds for a photon to travel from the sun to your eye.

- When you look at the sun, you are seeing it as it was 500 seconds ago. (500 seconds old).



# The color of a star is determined by its temperature





# Will the sun die?

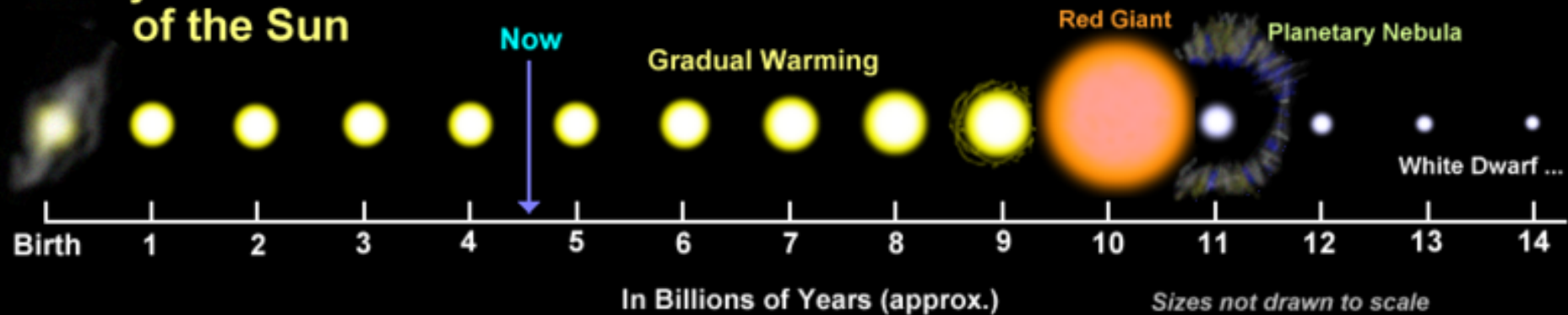
- The fuel for the sun is hydrogen, and eventually it will run out of fuel.
- It has enough fuel to last for about another 5 billion years.
- When it runs out of fuel, it will stop shining as a bright yellow star.
- The sun will become a red giant and grow so big that it will devour all the planets in our solar system.
- It will eventually become a white dwarf.



# The Fate of the Sun

The fate of a star is determine by its mass

## Life Cycle of the Sun





☉ ← **Approx. size of Earth**

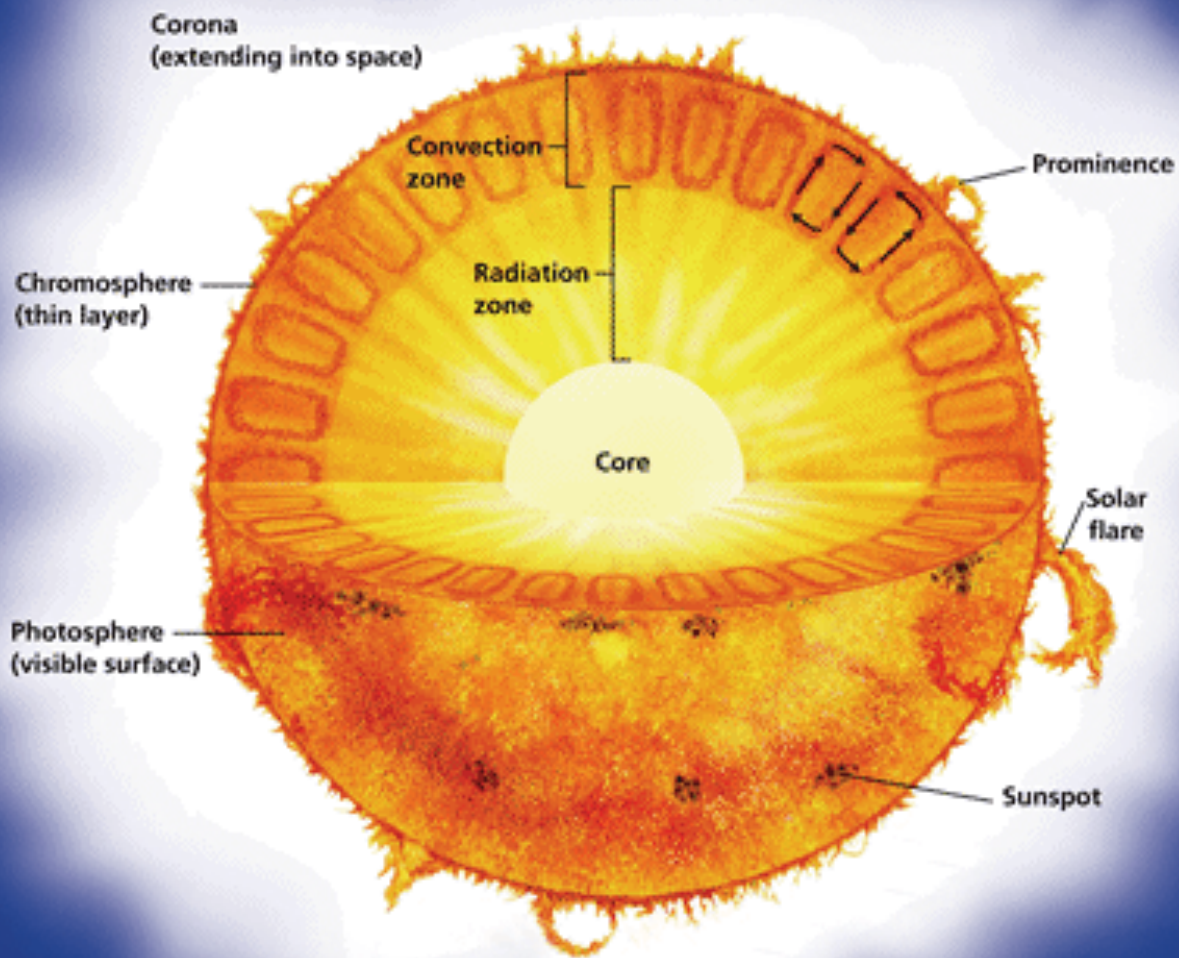


# The Regions of the Sun

- The Photosphere
- The Chromosphere
- The Corona
- The Solar Wind
- The Core
- The Radiative Zone
- The Convection Zone

Regions of  
atmosphere

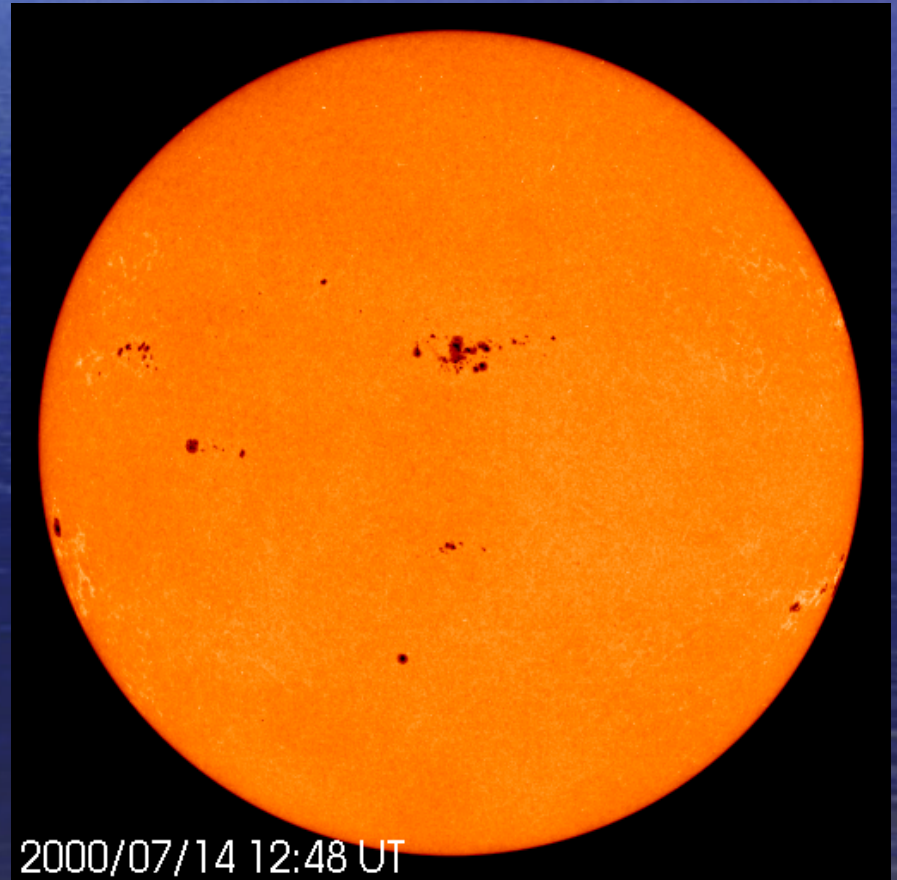
Solar interior





# The Photosphere

- The part of the Sun you see with your eye.
- Can have sunspots
- Yellow: 5,800 K (10,000°F)

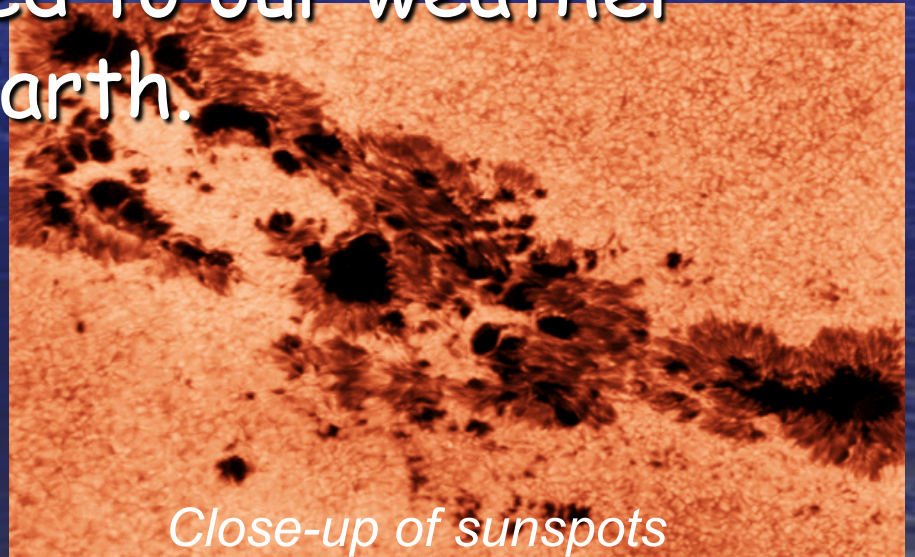
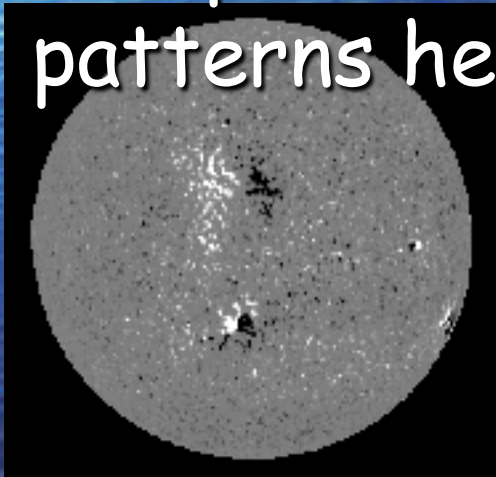


2000/07/14 12:48 UT



# Sun Spots

- 16. are darker, cooler areas.
- Sunspots are caused by an overlapping of the Sun's magnetic field
- Usually larger than the Earth.
- They have discovered that these sunspots are related to our weather patterns here on Earth.



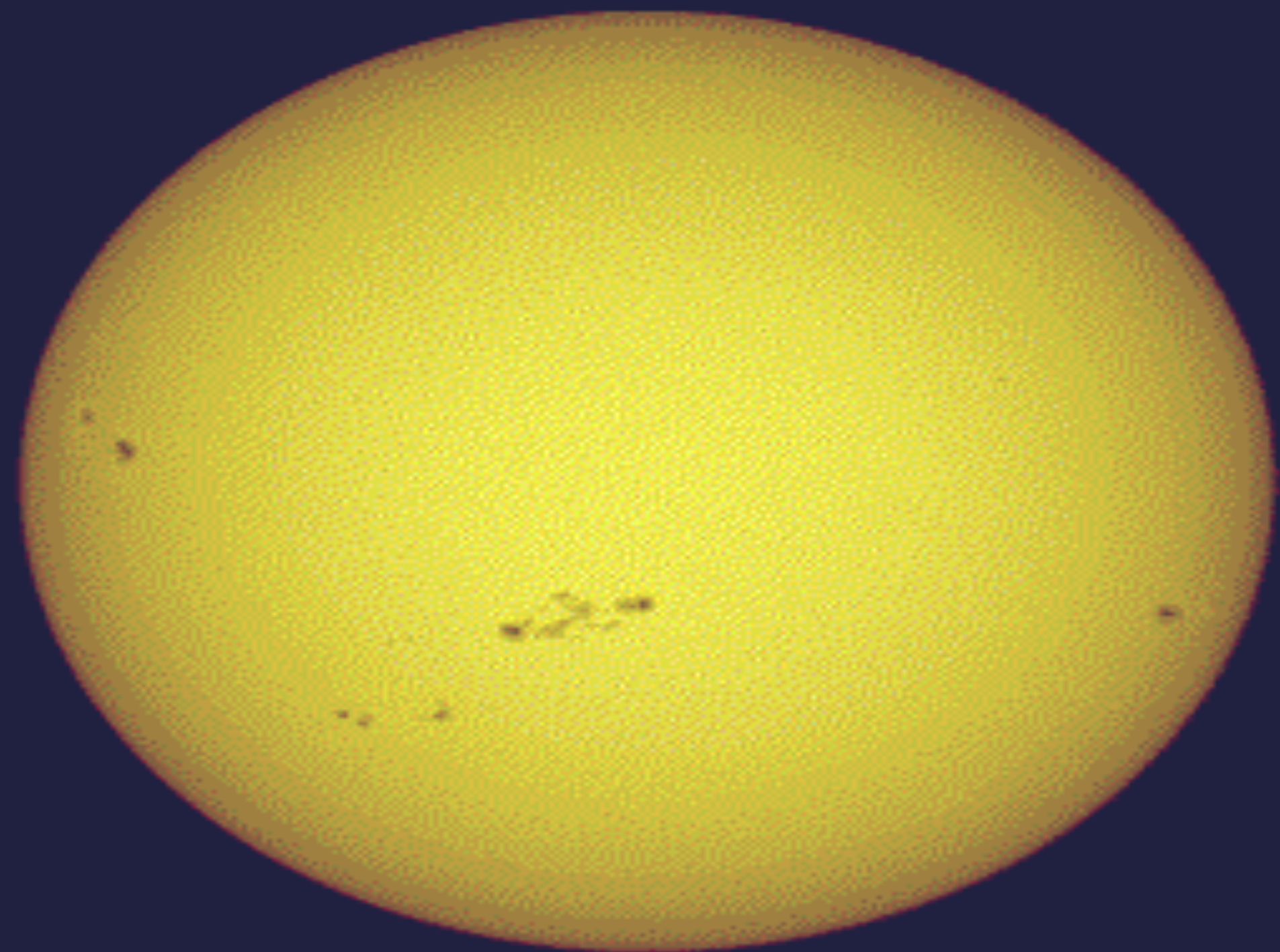
*Close-up of sunspots*





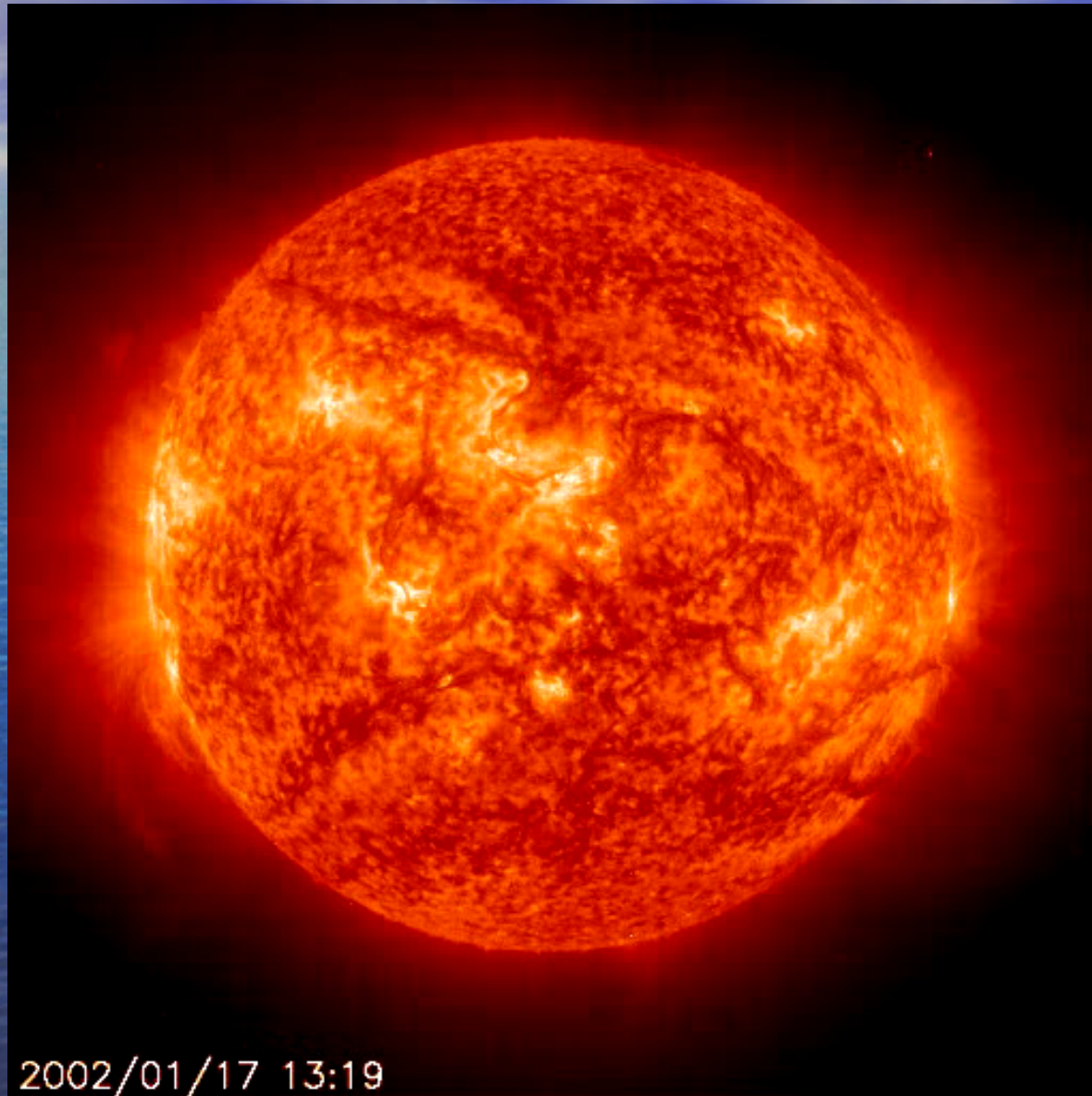
Notice the dark cooler sun spot







# The Chromosphere



2002/01/17 13:19

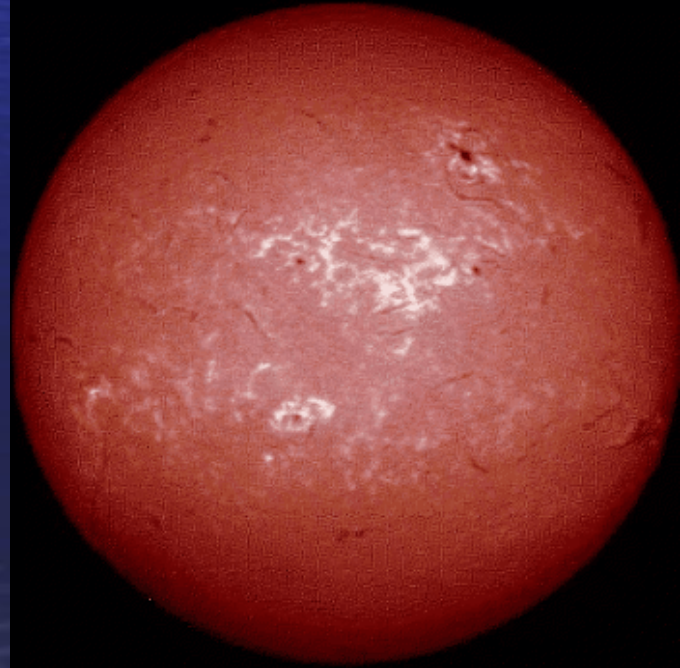
# The Chromosphere

- Very thin.... Visible during a total solar eclipse

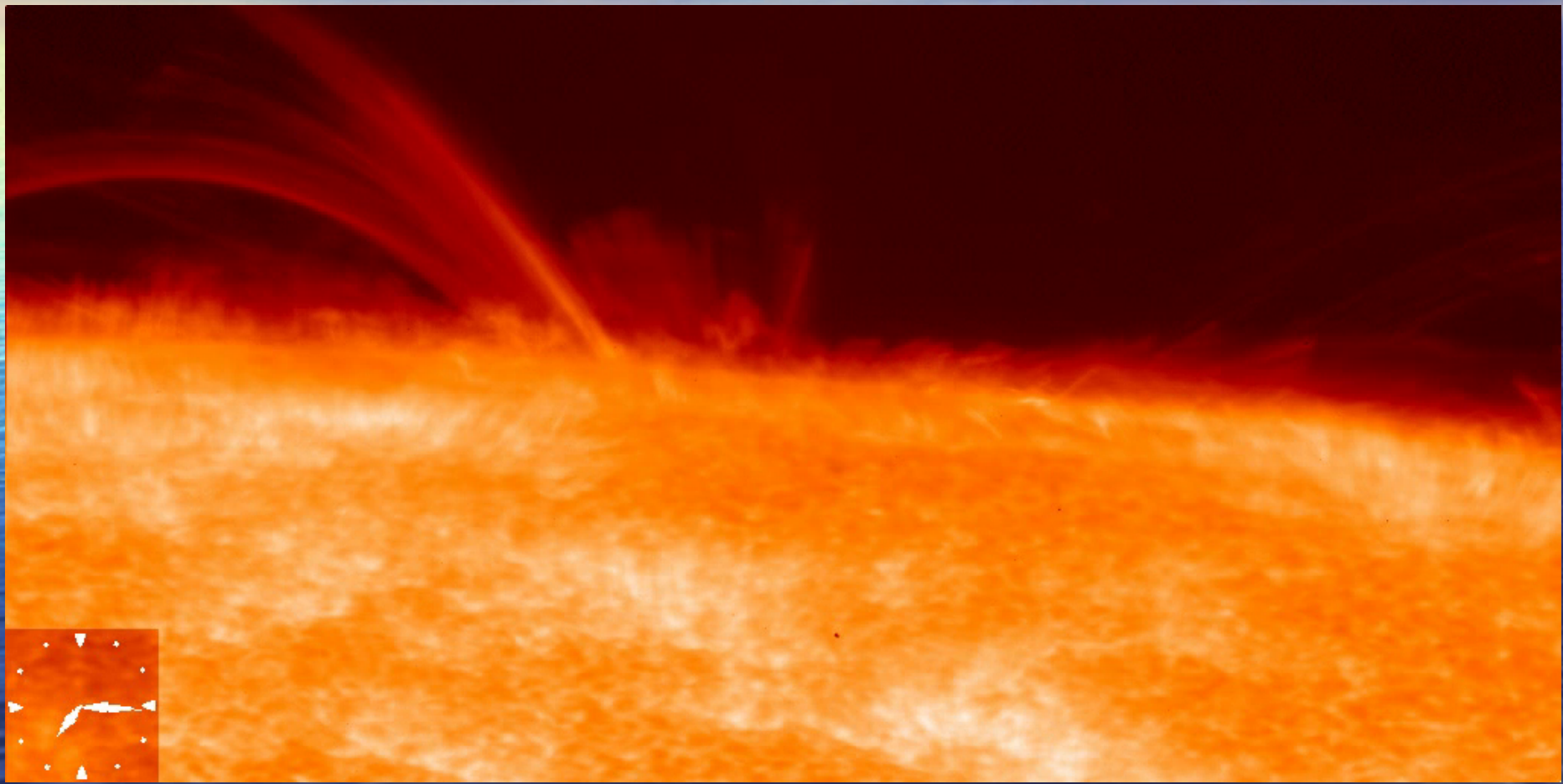


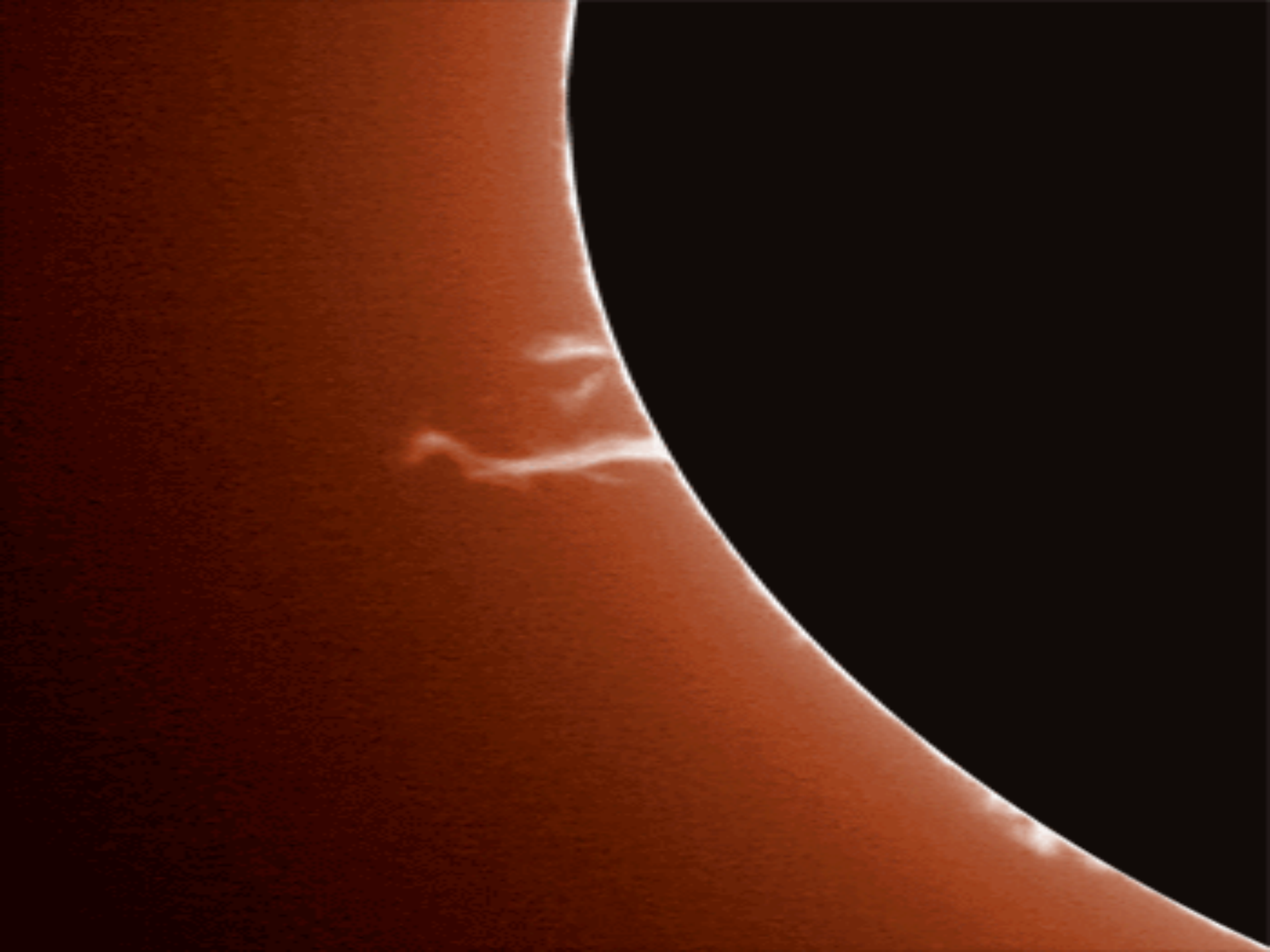
Temperature: 30,000 – 60,000 K

- Where Helium was first detected in 1868









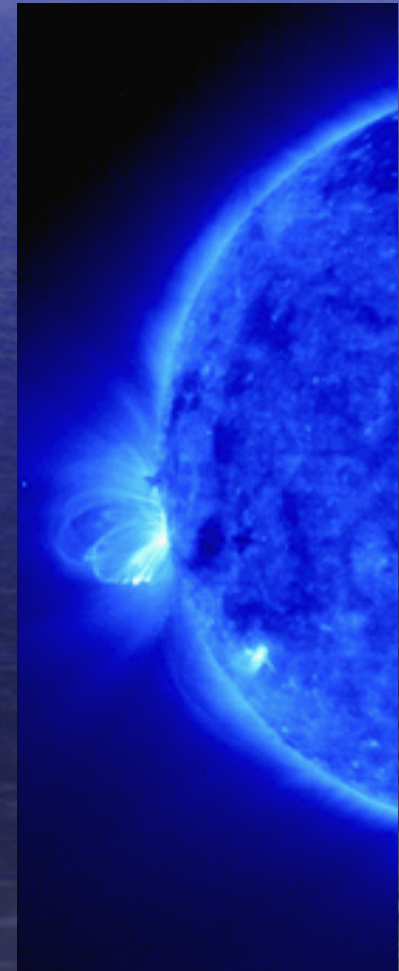


**Prominences:** arcs of gas extending millions of miles into the Corona..... they are not flames... the Sun is not burning !!!!

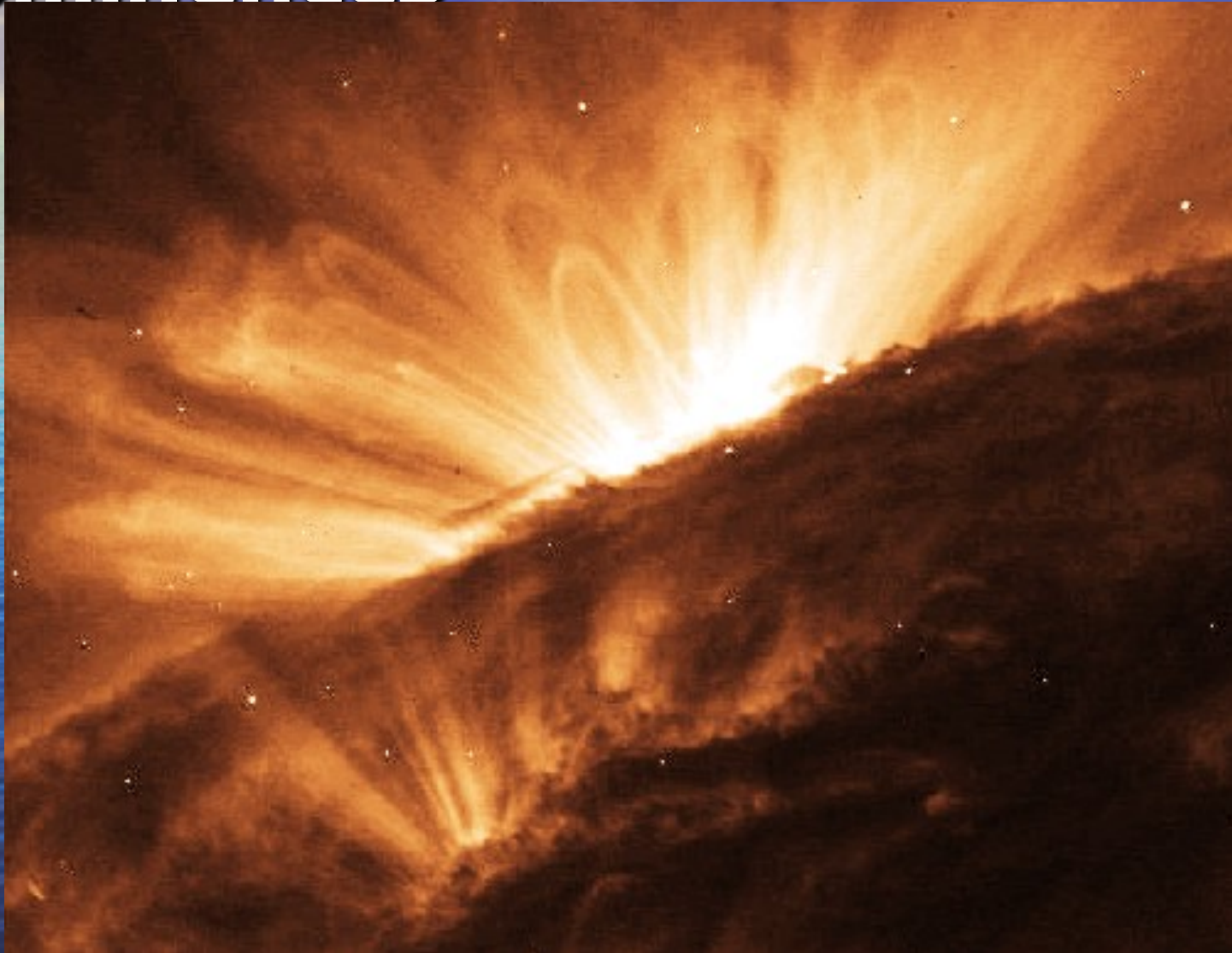


Digital Prominence Monitor  
MLSO / HAO  
Nov 19, 1995  
95d323 171407 ut

NORTH is straight up, EAST is to the left  
Images are \*not\* co-aligned



# Extreme UV shows “Loop” prominences

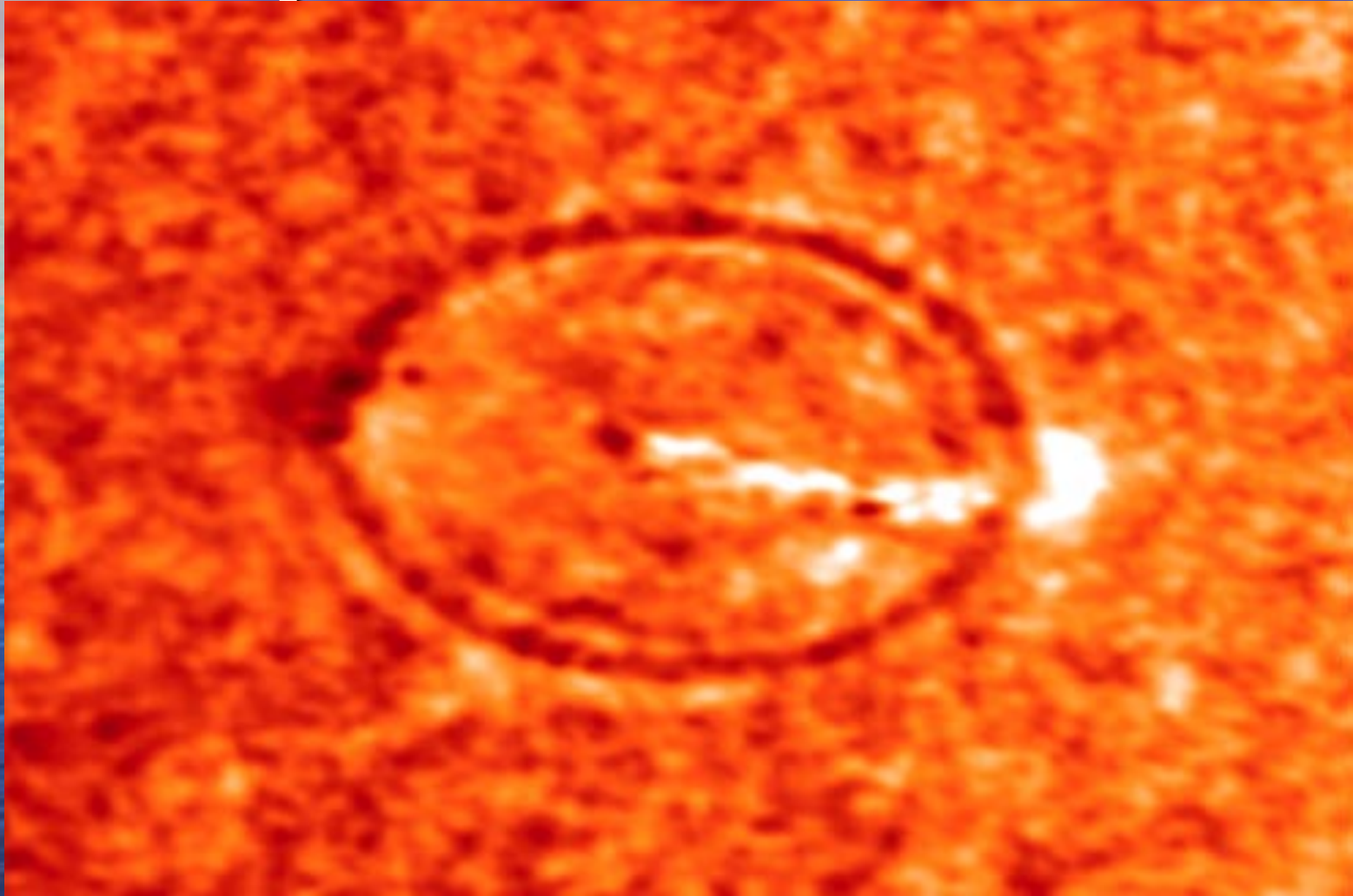




**Prominence photographed by the TRACE satellite.**



# An 11<sup>th</sup> Magnitude “Sunquake”





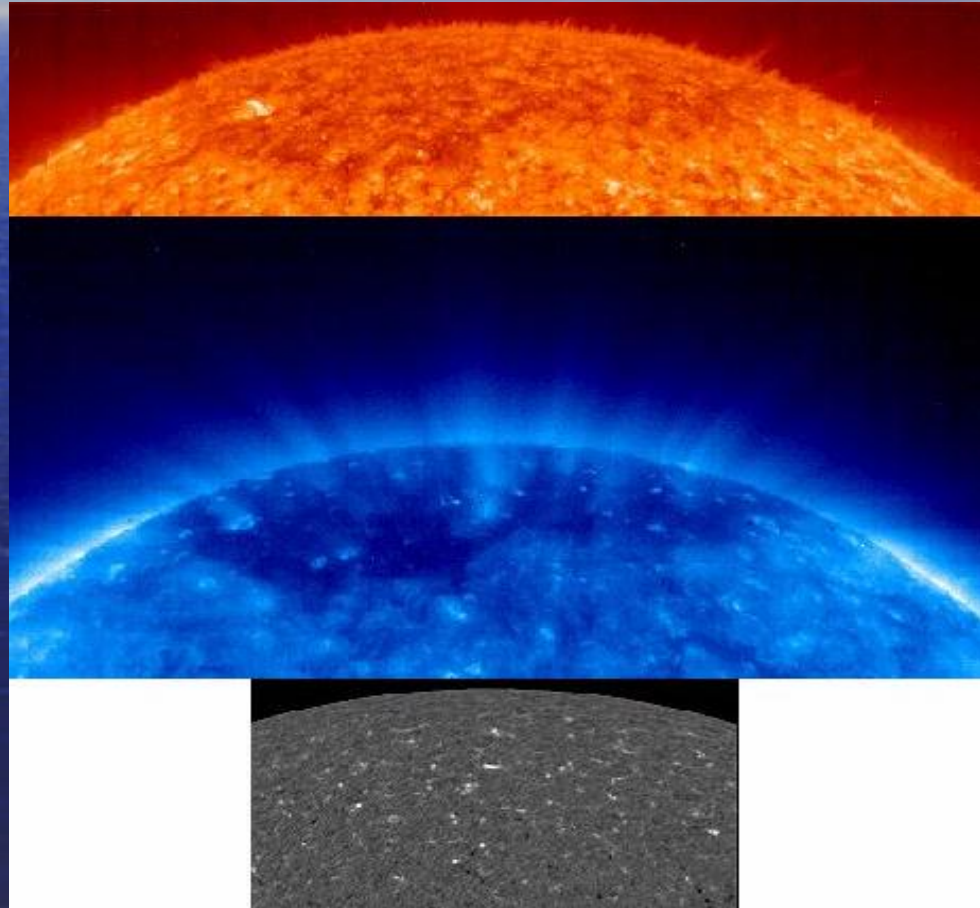
# Corona

- Extends million of miles
- Temperature: 3 million K (Not Hot)
- Visible during a Total Solar Eclipse



# The Solar Wind

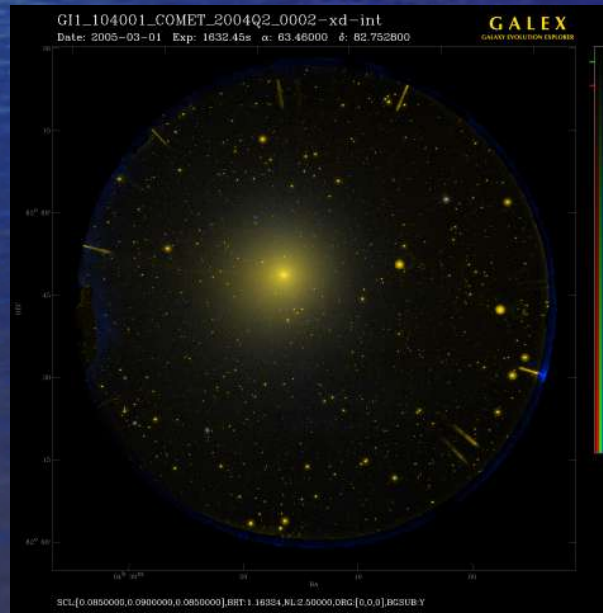
- High energy particles (electrons and protons) emitted from the Sun
- Extends out past Pluto (Voyager I 1997)
- Creates the tails of the comets





# Comets and the solar wind

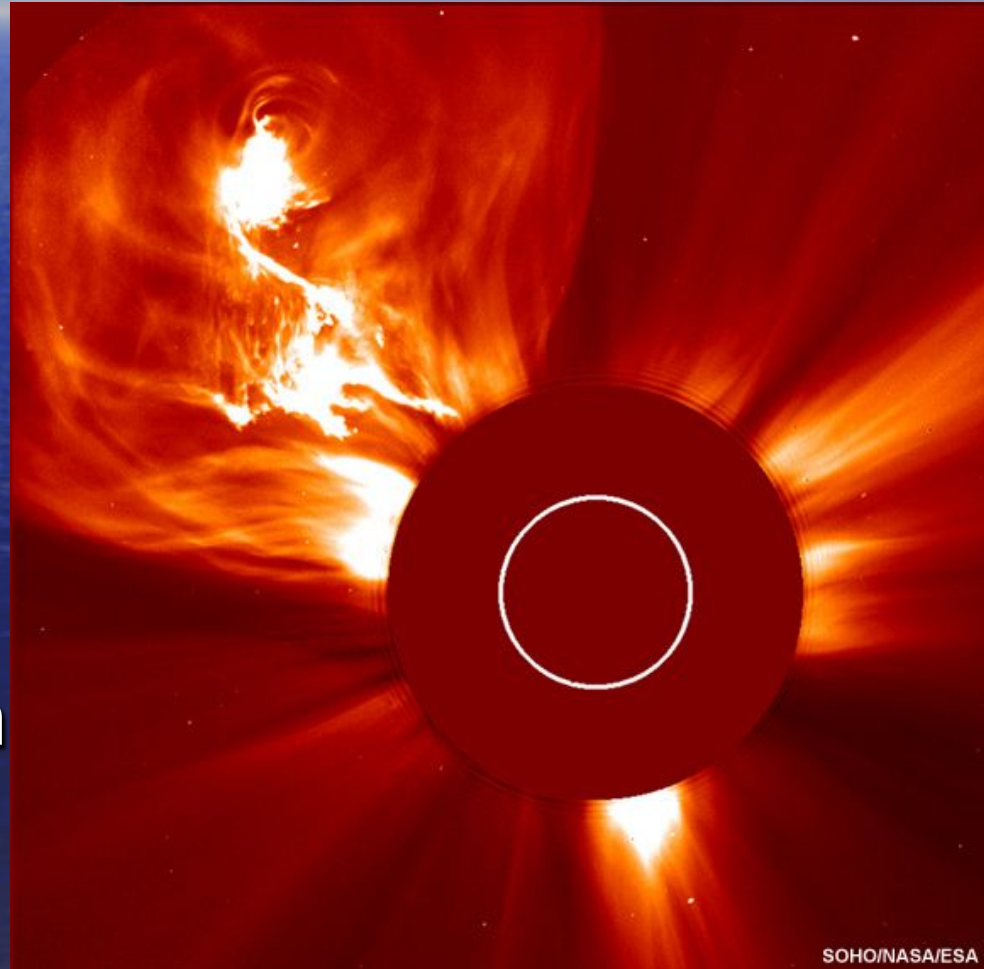
The tails of comets, are created as solar wind pushes ice and dust particles away from the head of the comet.



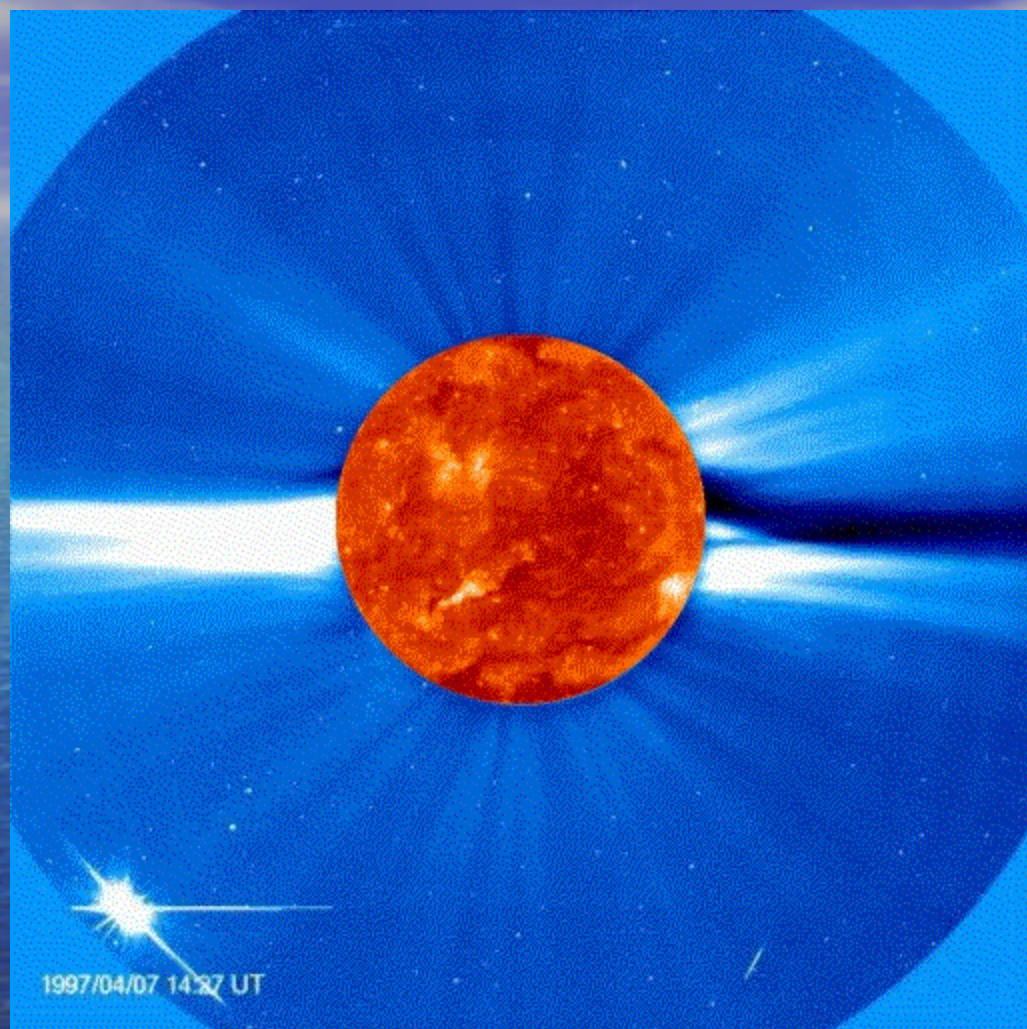
↓ *Hale-Bopp*  
**Sun**

# Coronal Mass Ejections (CME's)

- Energy of 1 billion Hydrogen bombs released at speeds up to 5 million mph
- Release 10 billion tons of plasma
- Extends 50 million km from the sun

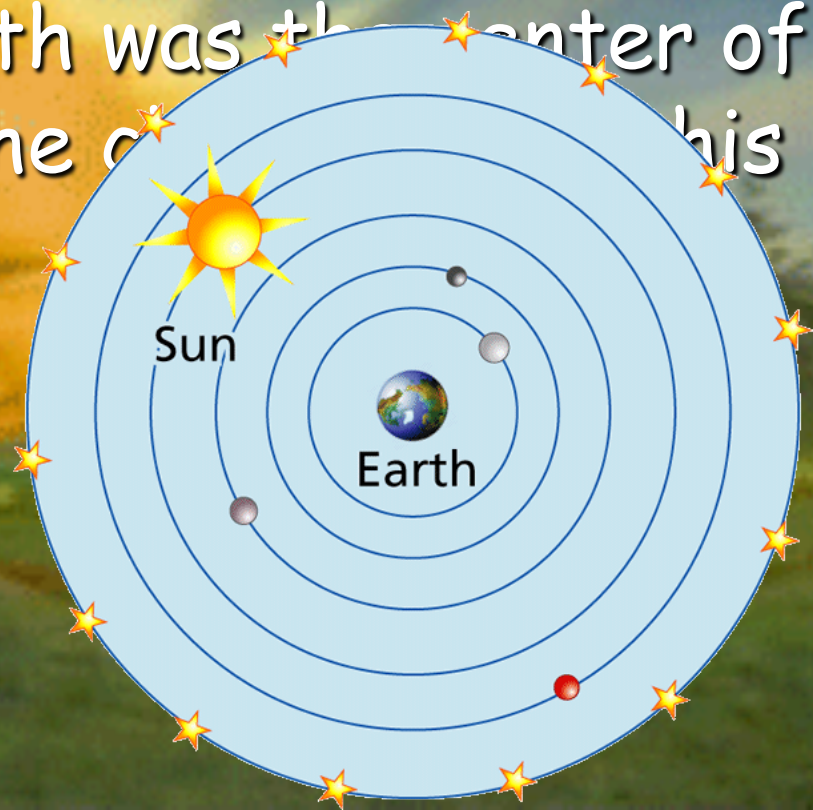






# Earlier views of the sun

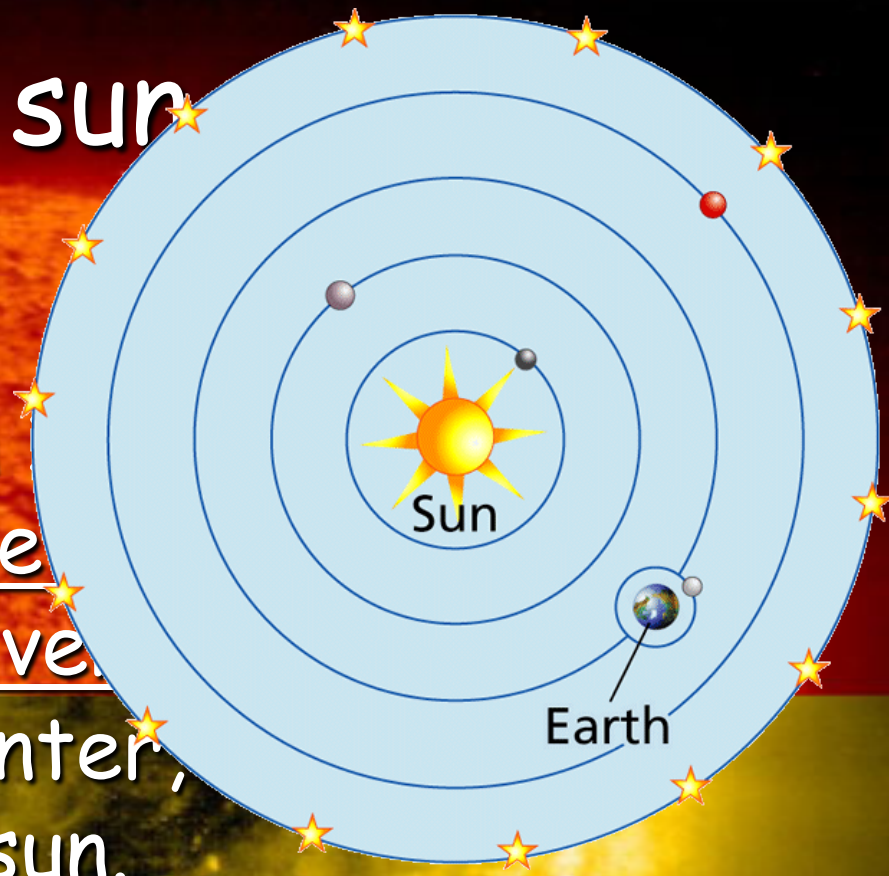
- 150 A.D. Ptolemy created the belief that the Earth was the center of the Universe. The Earth was the center of the heavens and the origin of this idea.





# New view of the sun

- Nicolas Copernicus (in 1543) created the belief that the sun was the center of the universe. Earth was not the center, it revolved around the sun.
- The church hated this idea and wanted to kill Copernicus and any one else who believed this crazy idea!!



# Today's views

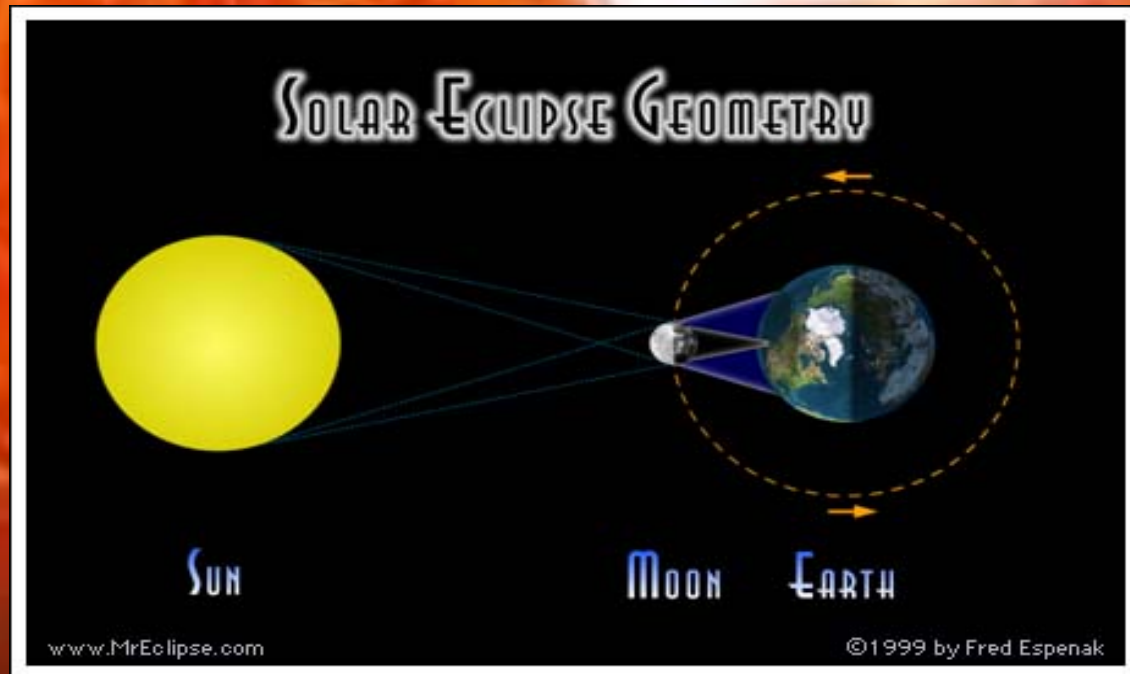
- Galileo Galilee proved that the sun was the center of the universe, and that the Earth circled around the sun by predicting certain events with the stars and the sun and the moon in the 1600's.
- Science disproved religion. Ouch!!



# Solar Eclipse

- A solar eclipse is when you look at the sun and see the NEW moon blocking the light of the sun.
- In order: sun, NEW moon, and Earth.

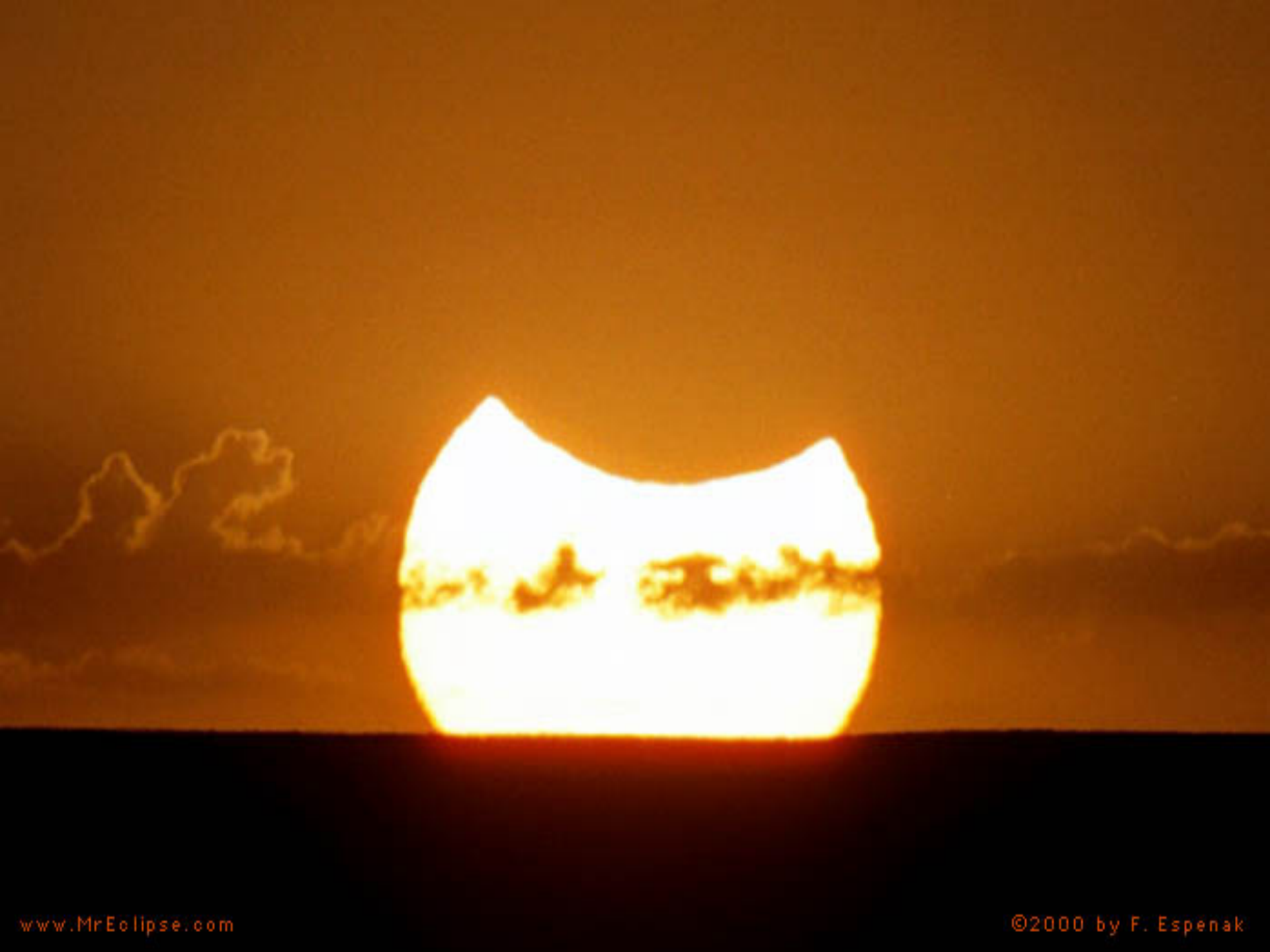
Draw this













A satellite image of Europe and North Africa at night. The landmasses are dark, with city lights visible as small white and yellow dots. The surrounding oceans are a deep blue. A bright, circular spotlight effect is centered on the Strait of Gibraltar, where the Iberian Peninsula meets North Africa. The text 'THE END' is overlaid in the bottom left corner.

*THE END*