

The Sun

What are the properties of our Sun and
how does it create its own energy?

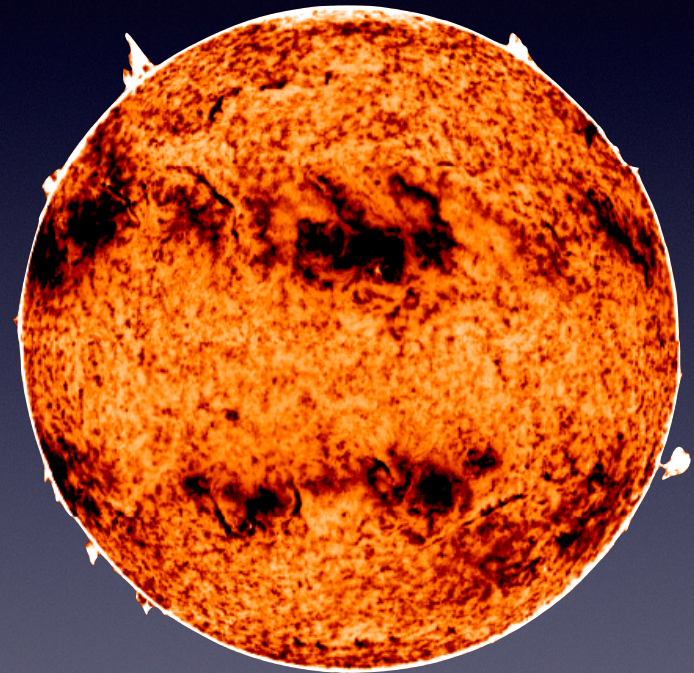


COURTESY NASA'S GODDARD SPACE FLIGHT CENTER

The Sun

The Sun

- Sun - the star around which the Earth orbits



The Sun

The Sun

- Properties of the Sun
 - The Sun makes up about 99% of the mass in our Solar System
 - The Sun is 109 times Earth's diameter and can hold 1,300,000 Earth's

Earth → 

 The Moon

THE SUN



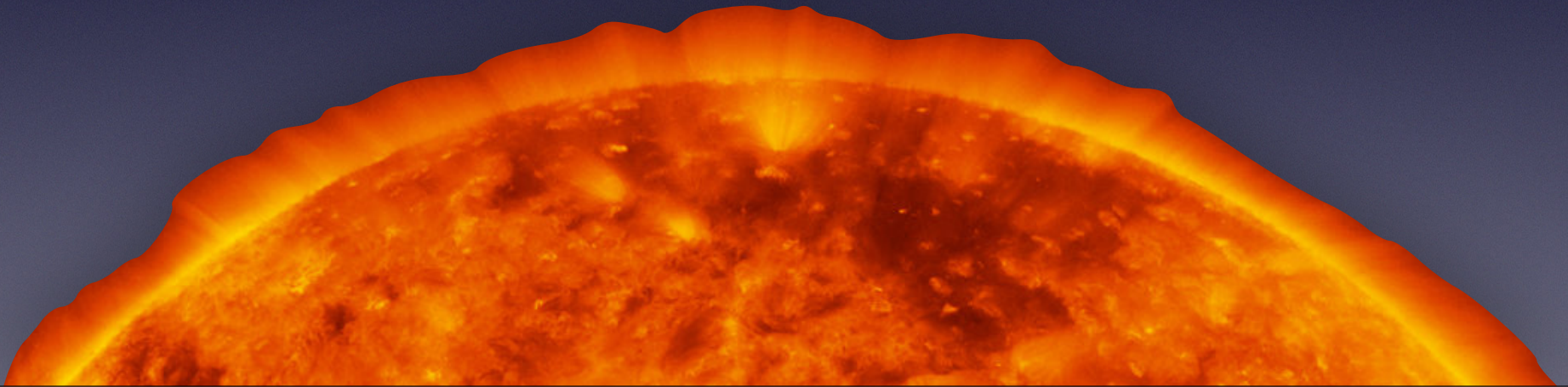
The Sun

- Properties of the Sun [continued]
 - The surface temperature is about $5,500^{\circ}\text{C}$
 - The interior temperature is about $15,000,000^{\circ}\text{C}$



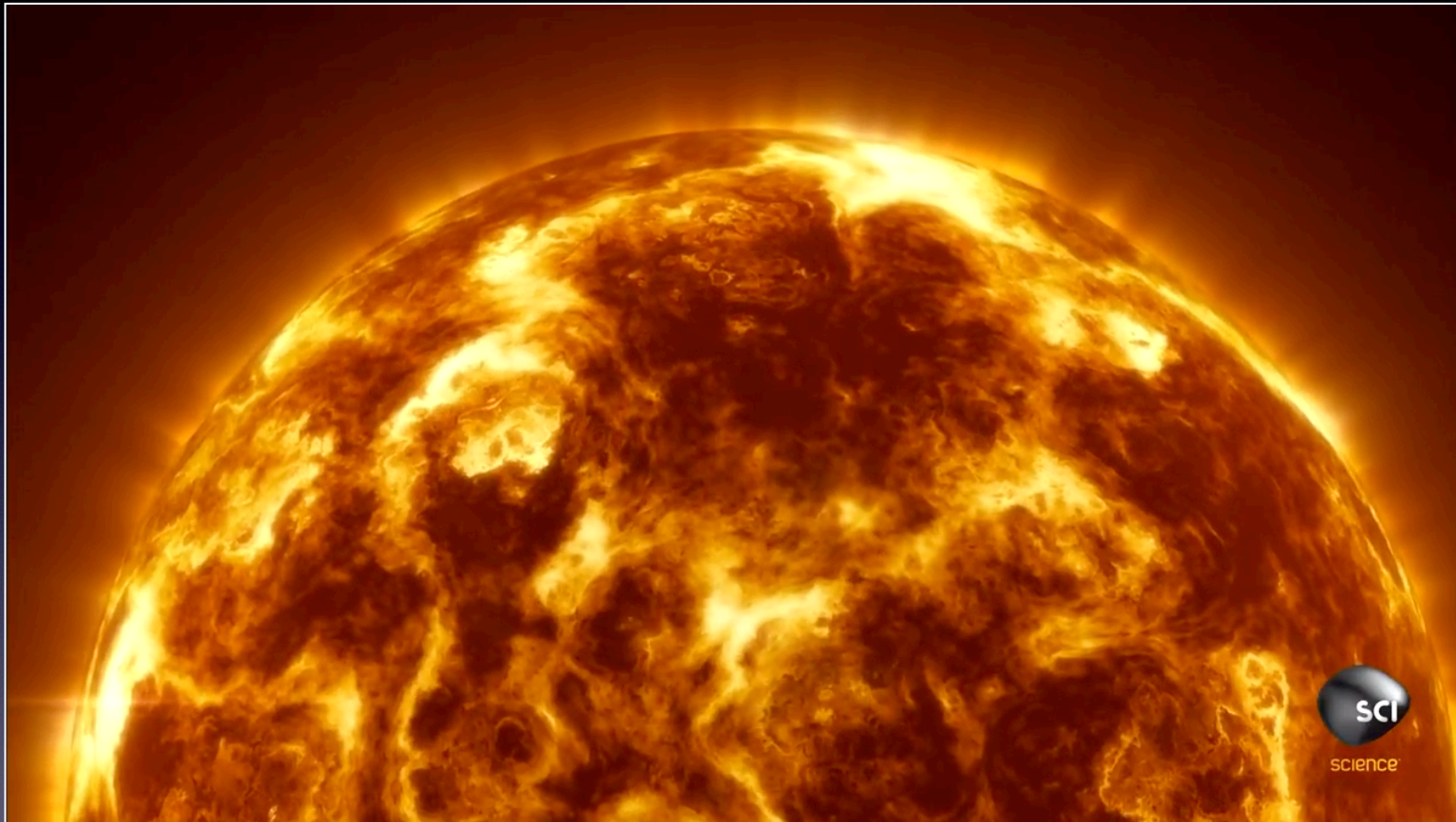
The Sun

- Fusion - the source of the Sun's energy where two light elements combine to a heavier element
 - Hydrogen converts to helium [simple]



The Sun

- Estimates indicate that about 4 million metric tons of matter are converted into energy every second, but the Sun is massive, this process can continue for another five billion years!



Fusion in the Sun

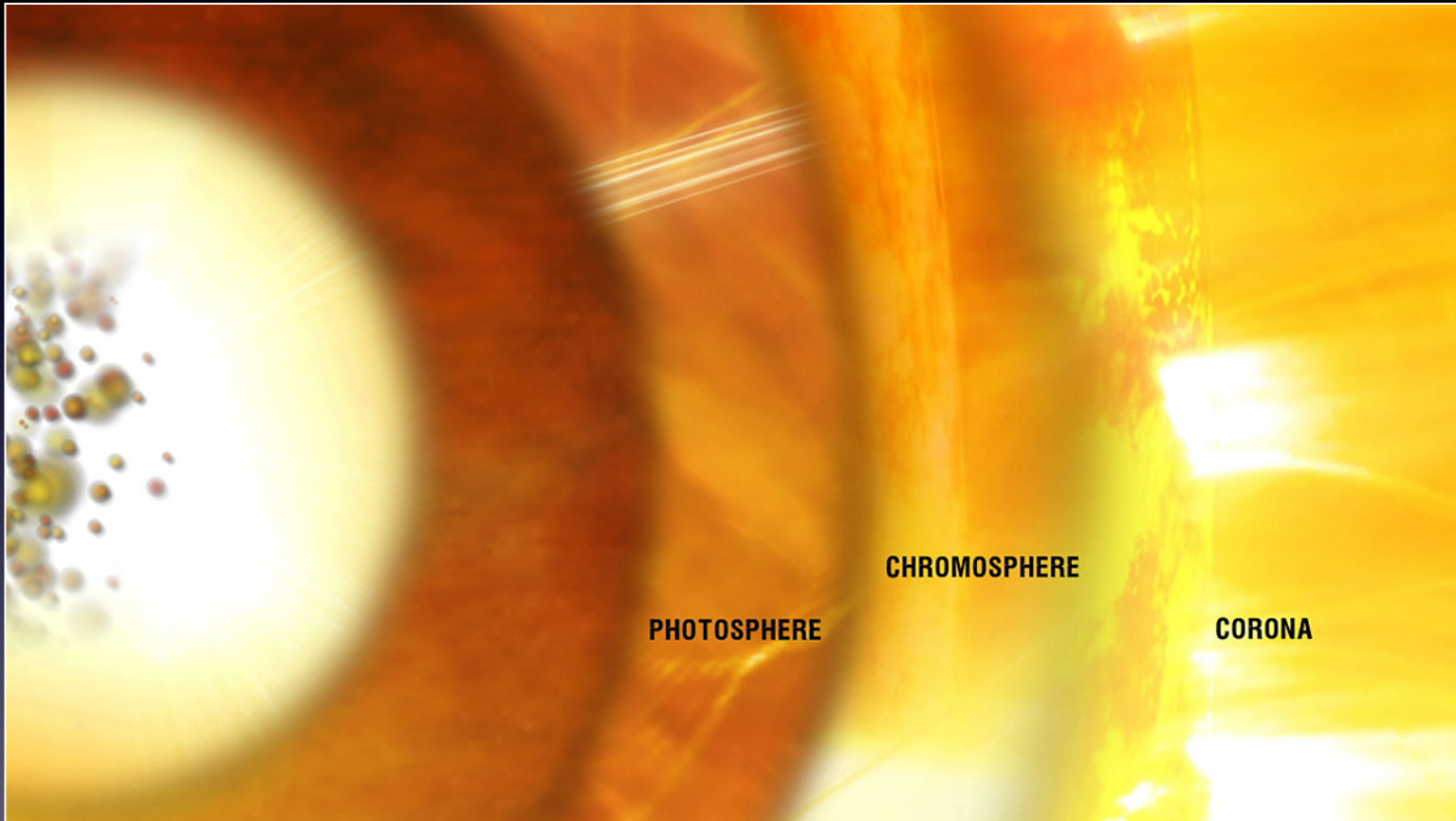
The Sun

- Photosphere - the luminous visible surface of the Sun
 - Less dense and lower portion of the atmosphere
 - Approximately 400 km thick
- Chromosphere - the reddish gaseous layer immediately above the photosphere of the Sun
 - Only seen during a solar eclipse

The Sun

- Corona - the thin lower gaseous envelope of the Sun
 - Only seen during a total solar eclipse

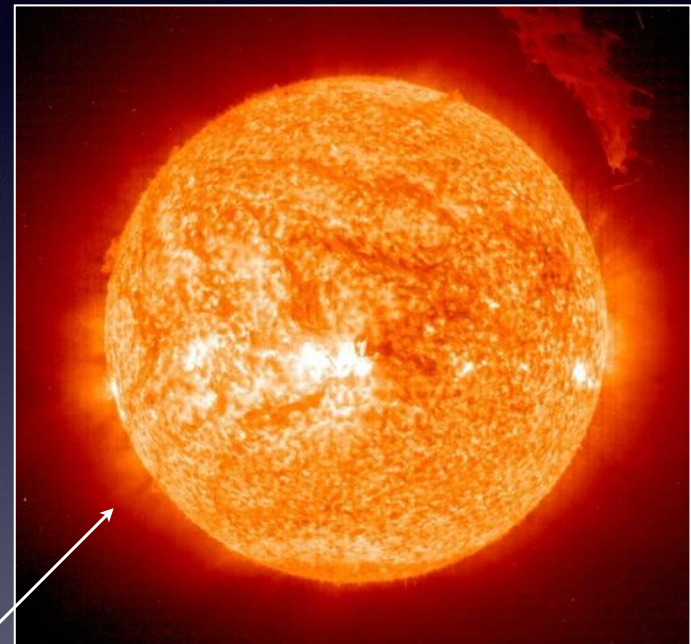




The Sun's Atmosphere

The Sun

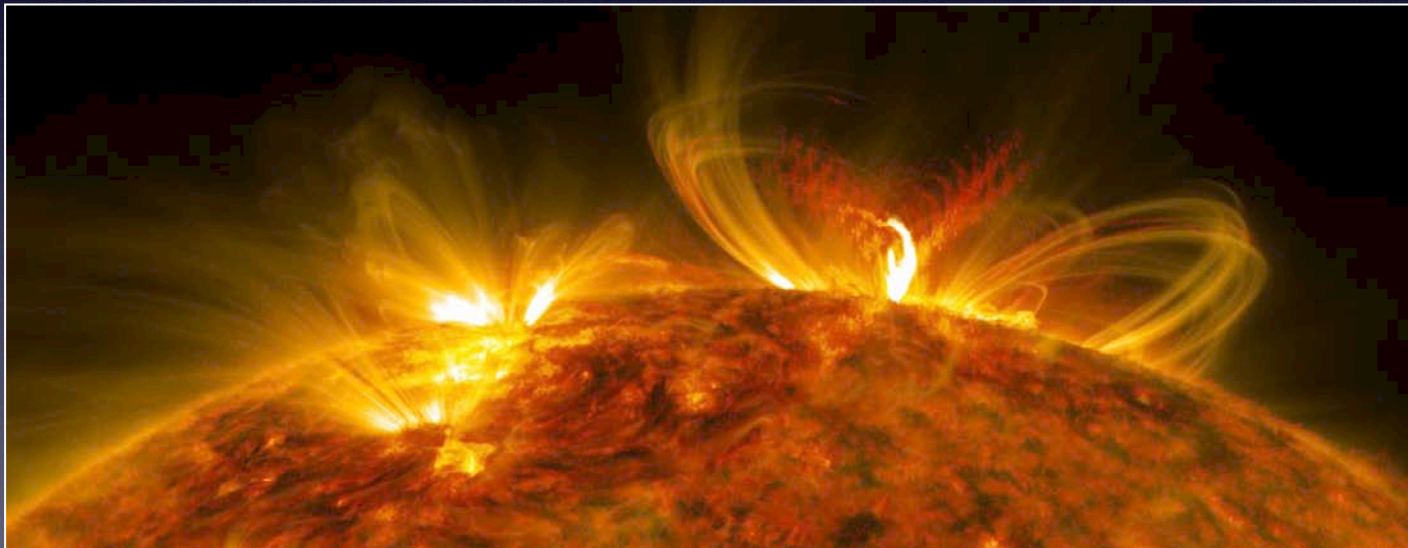
- Prominences - eruption of relatively cool, high-density gas from the chromosphere into the corona
 - May last for hours and can extend millions of kilometers about the photosphere

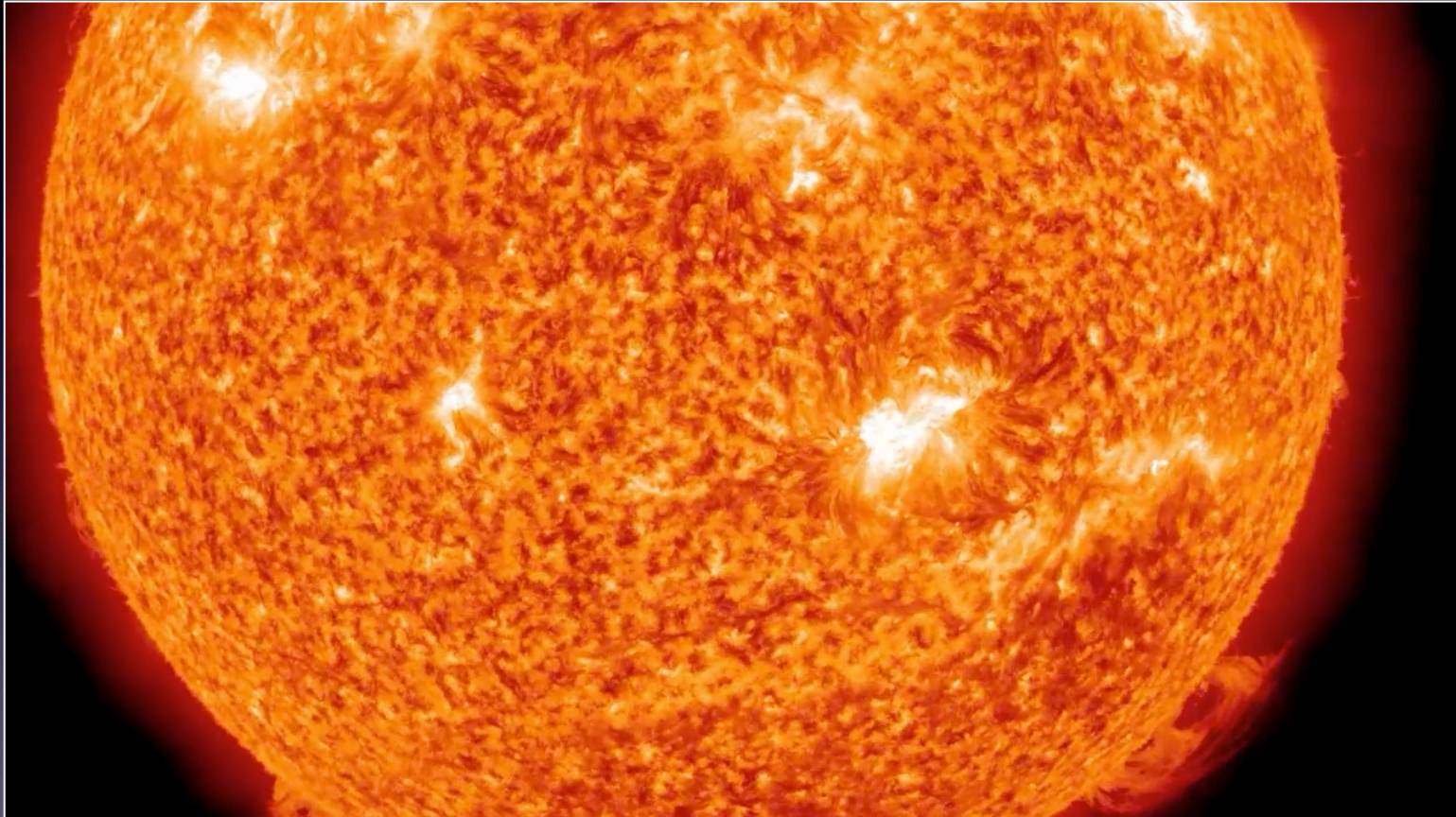


Prominence

The Sun

- Solar Flares - particles that are ejected from the Sun

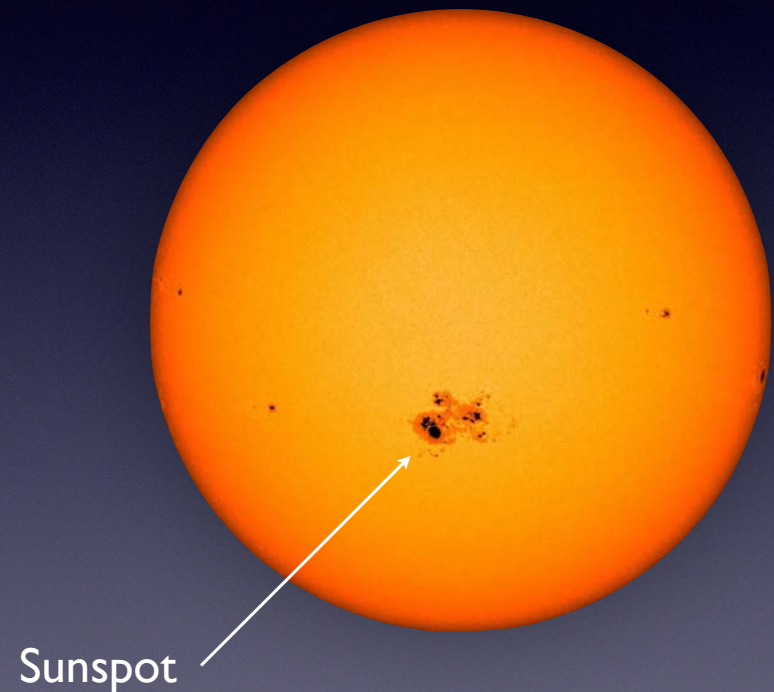


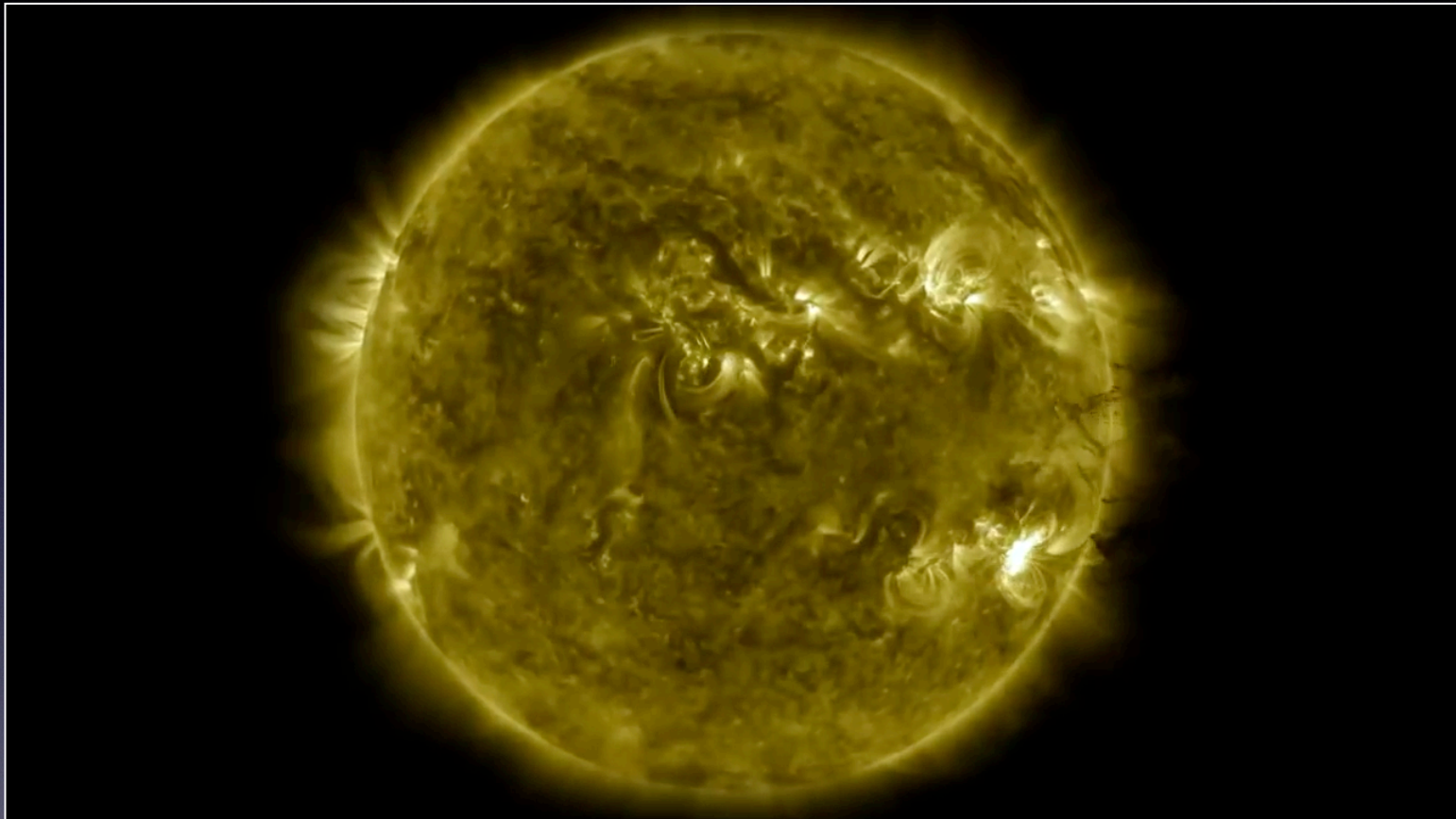


Solar Flares

The Sun

- Sunspot - dark spots on the photosphere, usually occurring in pairs due to magnetism, that are cooler than the surrounding surface
 - Cyclic phenomenon occurring approximately every 11 years





Sunspot Cycle

The Sun

Celestial Object	Mean Distance from Sun (million km)	Period of Revolution (d=days) (y=years)	Period of Rotation at Equator	Eccentricity of Orbit	Equatorial Diameter (km)	Mass (Earth = 1)	Density (g/cm ³)
SUN	—	—	27 d	—	1,392,000	333,000.00	1.4
MERCURY	57.9	88 d	59 d	0.206	4,879	0.06	5.4
VENUS	108.2	224.7 d	243 d	0.007	12,104	0.82	5.2
EARTH	149.6	365.26 d	23 h 56 min 4 s	0.017	12,756	1.00	5.5
MARS	227.9	687 d	24 h 37 min 23 s	0.093	6,794	0.11	3.9
JUPITER	778.4	11.9 y	9 h 50 min 30 s	0.048	142,984	317.83	1.3
SATURN	1,426.7	29.5 y	10 h 14 min	0.054	120,536	95.16	0.7
URANUS	2,871.0	84.0 y	17 h 14 min	0.047	51,118	14.54	1.3
NEPTUNE	4,498.3	164.8 y	16 h	0.009	49,528	17.15	1.8
EARTH'S MOON	149.6 (0.386 from Earth)	27.3 d	27.3 d	0.055	3,476	0.01	3.3