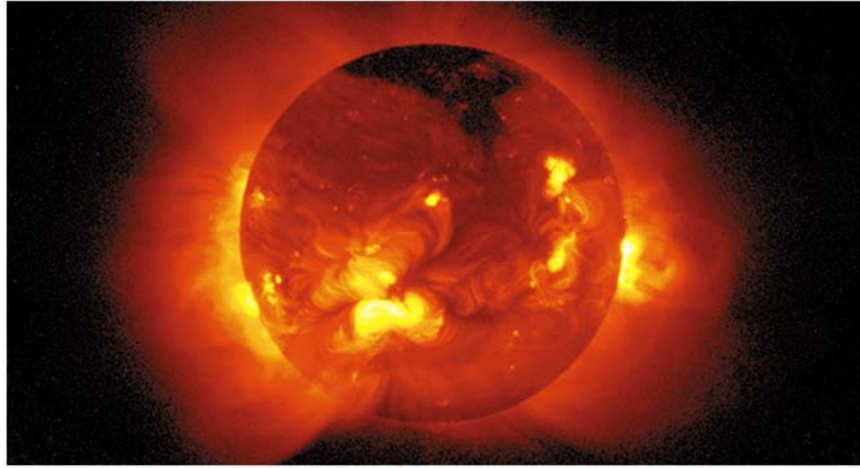


The Active Sun



Phenomena

Photosphere

Sunspots

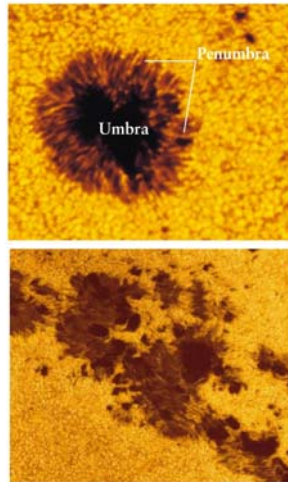
Chromosphere

Prominences

Corona

Flares, Coronal Holes

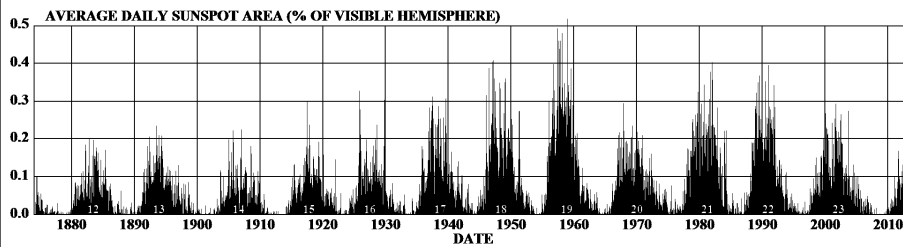
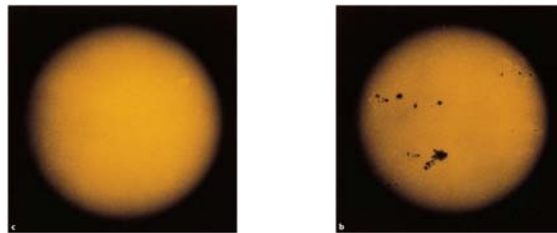
Sunspots



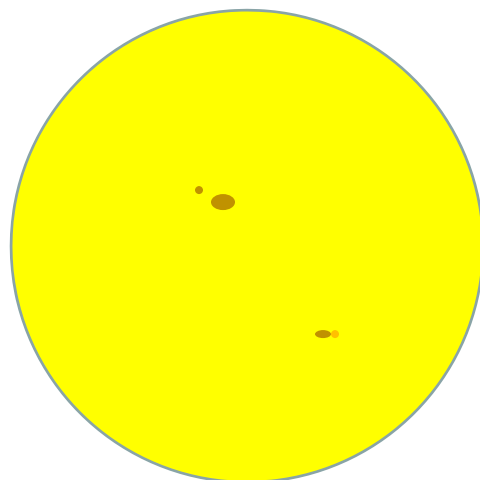
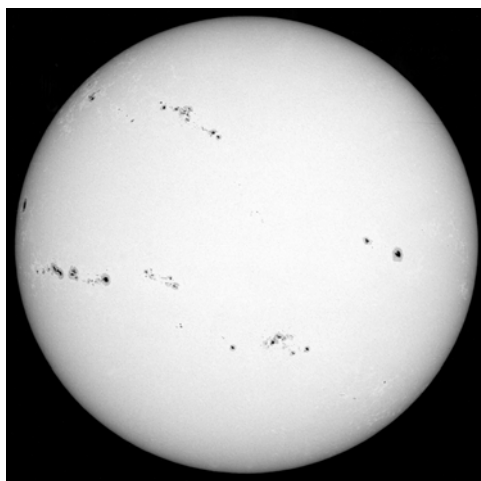
Characteristics

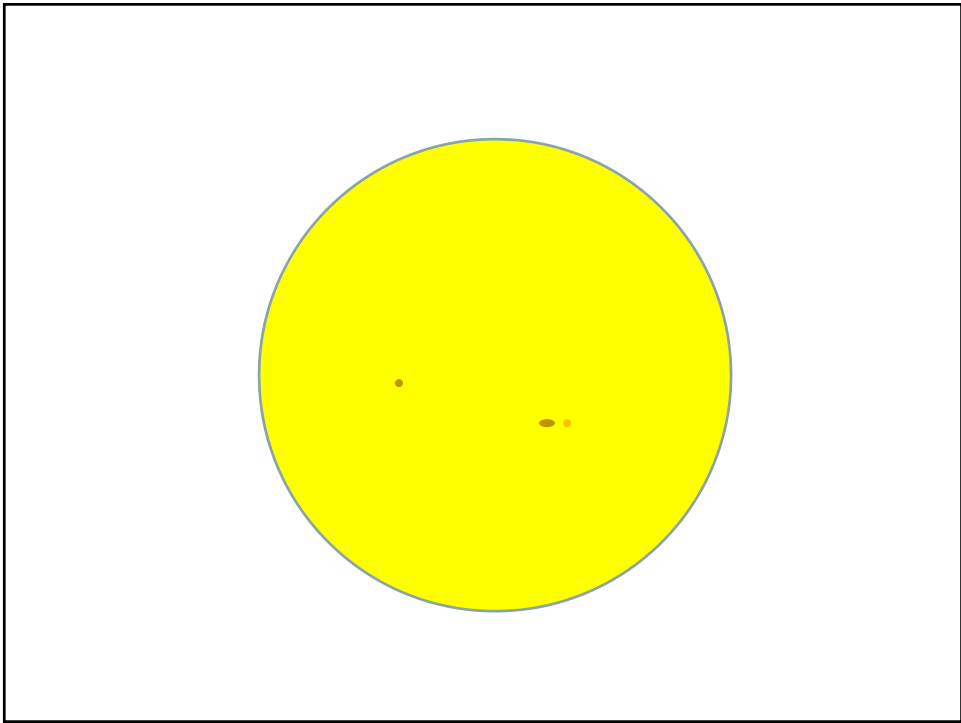
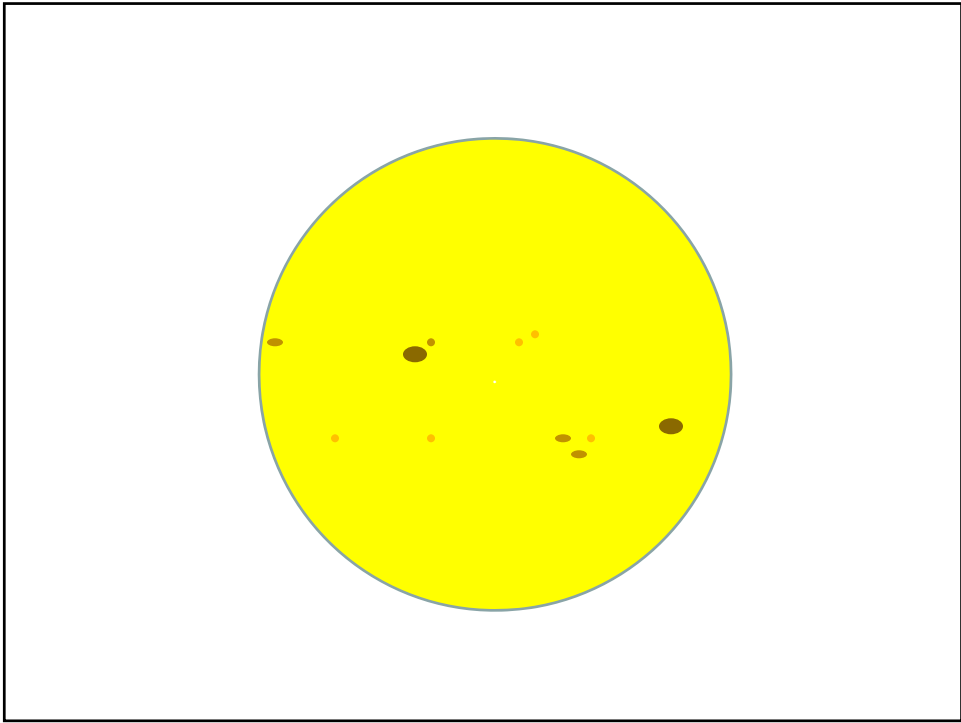
- 1500 K cooler than the surface
- Last for a couple of months
- Frequently in groups of 2-20 members
- Sizes are usually larger than the Earth

Solar Cycle

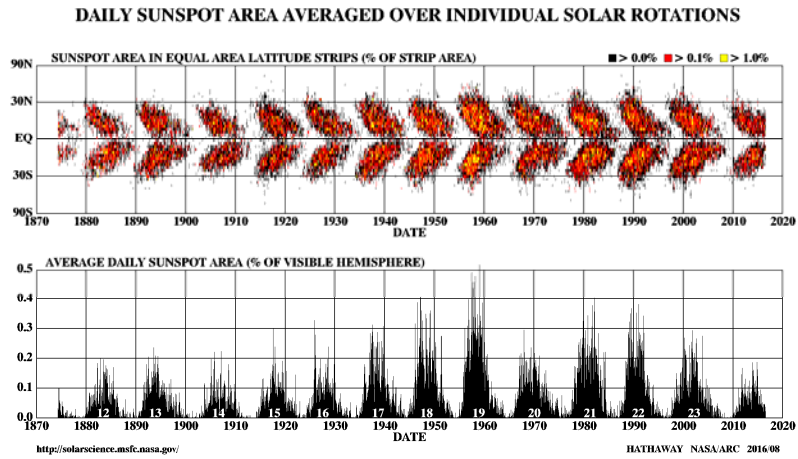


Sunspot Maximum

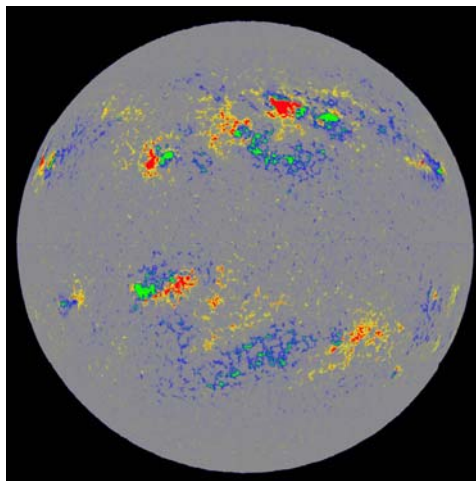




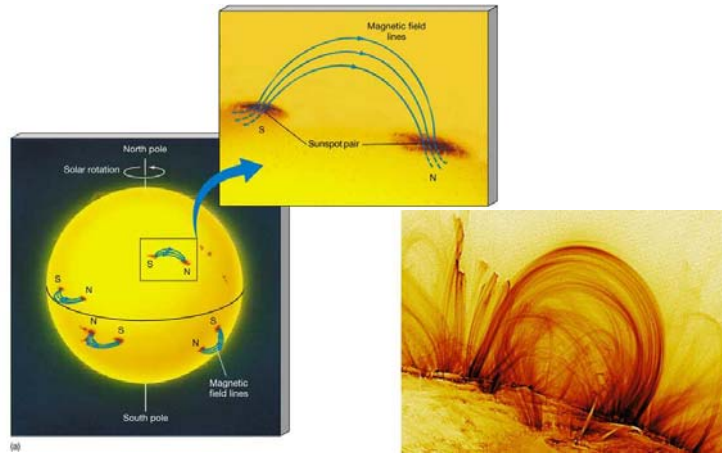
Solar Latitude Effect



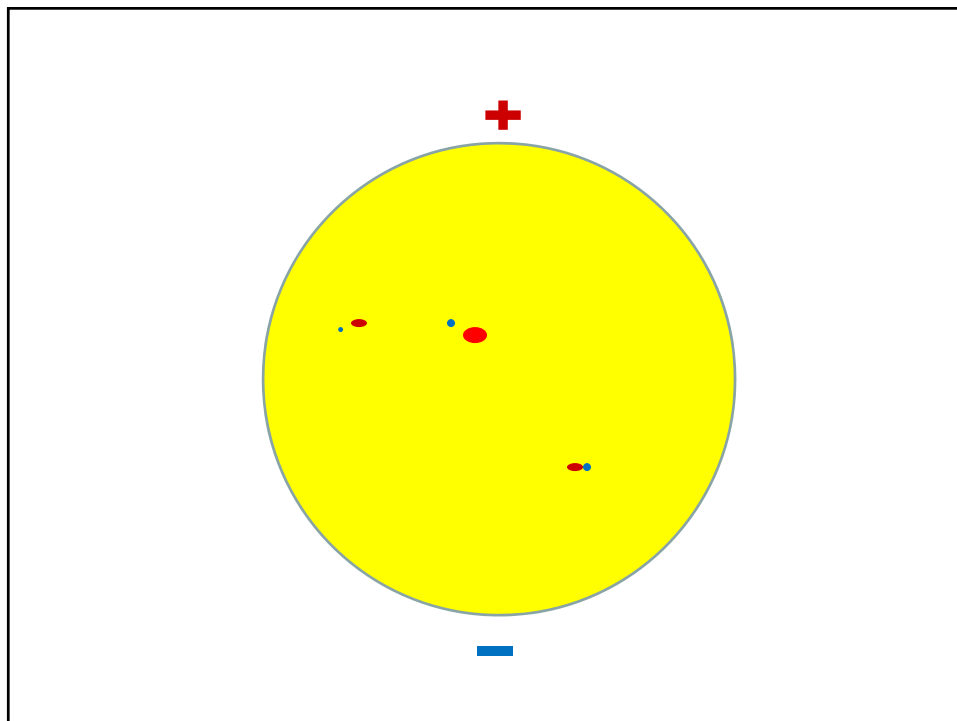
Magnetogram

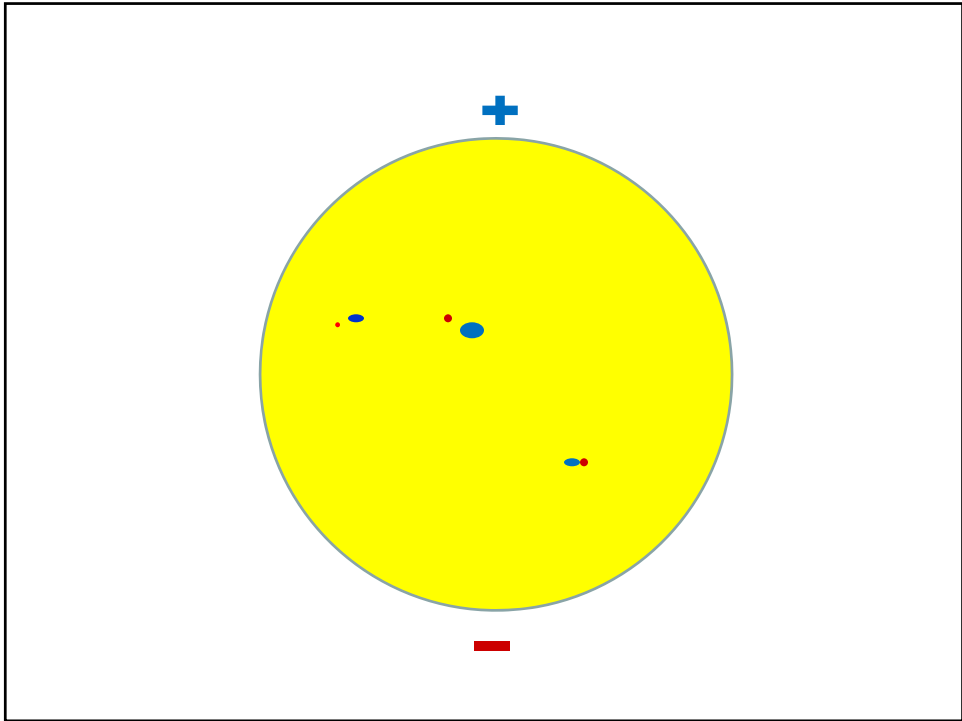


Magnetic Fields

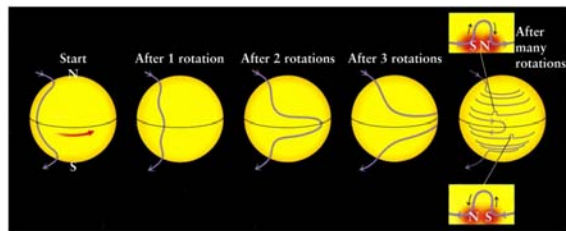


[Today's Sunspots and Magnetic Fields](#)



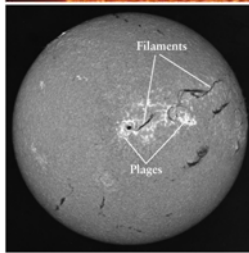


Magnetic Influence



Solar Magnetic Dynamo Theory

Prominences



Characteristics

Eruptive and **quiescent** varieties

Curving loops are anchored by differing magnetic poles

Associated with sunspots

Some last for a few hours, others for a few months

Coronal Activity



Coronal Holes

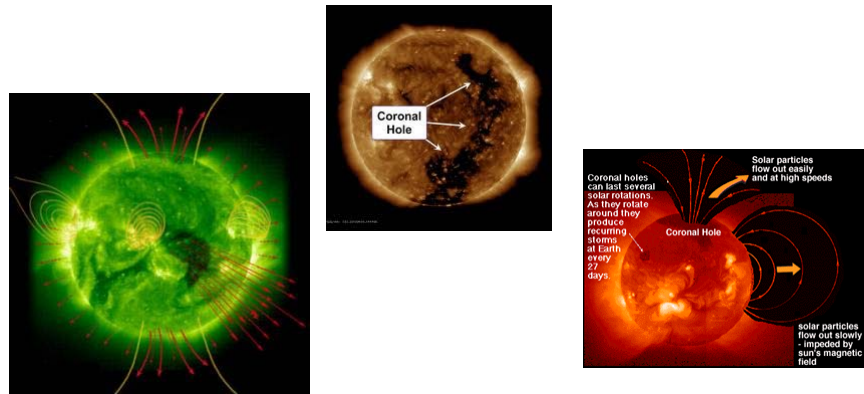
Best seen in X-rays



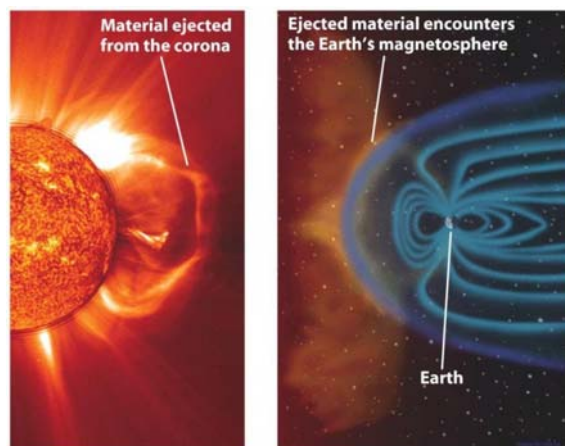
Flares

Millions of H Bombs

Show Coronal Hole Animations



Flares and Coronal Mass Ejections



(a) A coronal mass ejection

(b) Two to four days later

[Difference Between Flares and CMEs](#)

Solar-Terrestrial Interactions



Stream of charged particles, mainly protons. The solar wind exists because the gases in the corona are too hot to be confined by solar gravity. The speed of the solar wind near the Earth's orbit averages about 400 km/s, and its density is usually two to ten ions per cubic centimeter. But both are highly variable. The solar wind's interaction with the Earth's atmosphere creates **aurora**.

Exceptions!

Maunder Minimum

From 1645 to 1715 there were **No sunspots!!!!**

“Little Ice Age”

