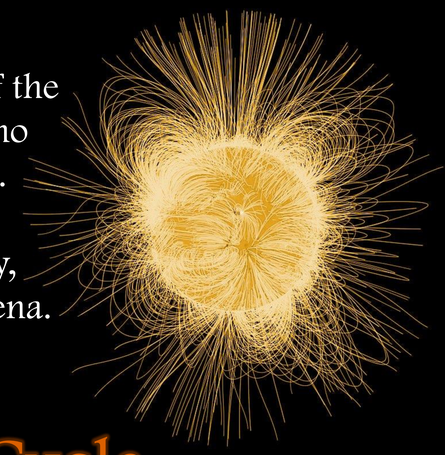
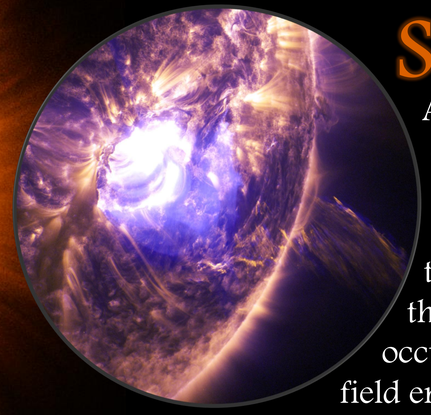
Solar Phenomena

Solar phenomena are the natural phenomena occurring within the magnetically heated outer atmospheres in the Sun. These phenomena take many forms, including solar wind, radio wave flux, energy bursts such as solar flares, coronal mass ejection(CME) or solar eruptions, coronal heating and sunspots.

Cause

These phenomena are generated by a helical dynamo near the center of the Sun's mass that generates strong magnetic fields and a chaotic dynamo near the surface that generates smaller magnetic field fluctuations. The highly conducting plasmas, on the surface, in which the magnetic topology is rearranged and magnetic energy is converted to kinetic energy, thermal energy, and particle acceleration giving rise to these phenomena.

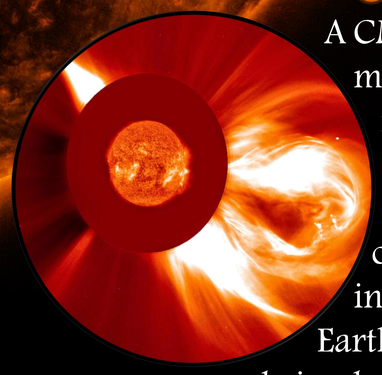




Solar Flare

A Flare is violent explosion on the surface of the Sun which releases energy up to 6×10^{25} joules. The flare ejects clouds of electrically charged particles along with the electromagnetic waves through the Sun's corona into outer space. Flares occur when considerable amounts of magnetic field energy are suddenly converted to heat and light because of Magnetic Reconnection.

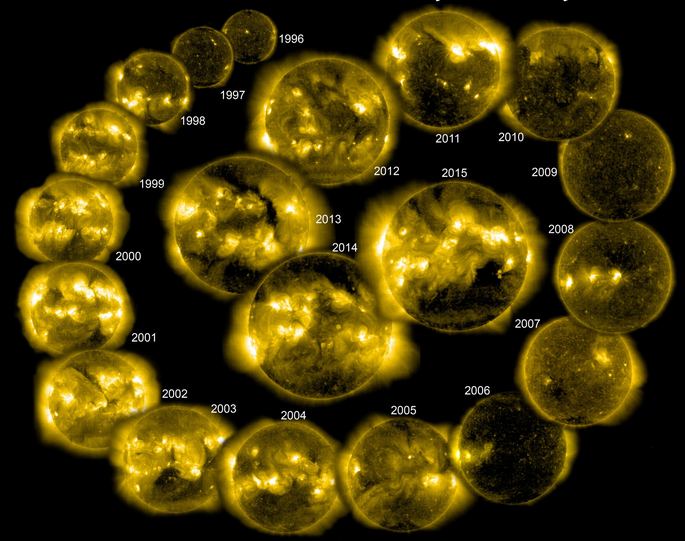
Coronal Mass Ejections(CMEs)



A CME is a massive burst of plasma, solar wind and magnetic fields rising above the solar corona. It occurs when magnetic forces overcome pressure and gravity in the solar corona due to energy released during Magnetic Reconnection. This lifts a huge mass of solar plasma from the corona and creates a shock wave that accelerates some of the solar wind's particles to extremely high energies and speeds. This in turn generates radiation in the form of energetic particles. If it impacts Earth then can cause strong Aurorae, Geomagnetic Storms and can even bring heavy damage to satellites and electrical transmission line facilities.

Solar Cycle

The solar cycle is the nearly periodic 11~year change in the Sun's activity and appearance. It is also half of the solar dynamo cycle.



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