The Anatomy of the Sun

Massive energy: *The **Sun** can be divided into three main layers: a core, a radiation zone, and a convective zone. The **Sun's** energy comes from thermonuclear reactions (converting hydrogen to helium) in the core, where temperature ranges from 15 to 25 million degrees. The energy radiates through the middle layer, then bubbles and boils to the surface in a process called convection. Charged particles, called the solar wind, stream out at a million miles an hour.*

Sunspots: *Magnetic fields within the **Sun** slow down the radiation of heat in some areas, causing sunspots, which are cool areas and appear as dark patches. **Sunspots** activity peaks every eleven years. During this so-called solar maximum, the **Sun** will bombard **Earth's** atmosphere with extra doses of solar radiation. The last peak, in 1989, caused power blackouts, knocked satellites out of orbit and disrupted radio communications. Though NASA scientists aren't predicting any record-setting space weather in our year 2000, the peak is expected to be above average. "It's like saying we're going to have a mild or cold winter," But as communications rely increasingly on satellites, there are more targets in the sky and more significant consequences to any or all disruptions. Furthermore, there may be more to **sunspots** than disrupted communications. An active **Sun,** known to heat the **Earth's** outer atmosphere, may also affect our climate. Scientists say a small ice age from 1645 to 1715 corresponded to a time of reduced solar activity, and currant rises in temperatures might be related to increased solar activity compounded by human induced activity of fossil-fuel & industrial greenhouse gases in **Global Warming.***

Solar Flares: *The **Sun** frequently spews plumes of energy, essentially bursts of solar wind. These solar flares contain Gamma-rays & X-rays, plus energy particles (Protons & Electrons). Energy equal to a billion megatons of TNT is released in a matter of minutes. Flare activity picks up as **sunspots** increase.*

Coronal Mass Ejections: *Without warning, the relatively calm solar atmosphere can be torn asunder by sudden outbursts of a scale unknown on our **planet Earth.** Catastrophic events of incredible energy stretch up to half way across the visible solar surface suddenly and unpredictably open up and expel contents, defying the **Sun's** enormous gravity. These catastrophic events are coronal Mass Ejections (CME's). Coronal Mass Ejections are explosions in the **Sun's** corona that spew out solar particles. A lot of material is thrown out into the solar wind. Coronal Mass Ejections can be dangerous when they hit the **Earth.** CME's can seriously disrupt the **Earth's** environment. Intense radiation from the **Sun,** which arrives only eight minutes after being released, can alter the **Earth's** atmosphere, disrupting long-distance radio communications. Very energetic particles pushed along by the shock wave of the CME can endanger astronauts or fry satellite electronics. These energetic particles arrive at the **Earth** (or **Moon**) about an hour later. The actual Coronal Mass Ejection arrives at the **Earth** one to four days after the initial eruption, resulting in strong geomagnetic storms, aurora and electrical power blackouts. Coronal Mass Ejections will become more and more frequent as we near solar maximum. CME's, not discovered until the 1970's, is difficult to detect. That is why we need satellites such as the ACE satellite which acts as a space-weather station while in orbit. ACE can provide a one-hour advance warning of any geomagnetic storms that would affect **Earth.***

Consider this, there are two lines of defense that block out the harmful dangerous damage that the Sun's solar-flared ultraviolet-radiation can cause and do to our planet Earth, our polar magnetic field which creates the Aurora effect; a luminous phenomenon of streamers or arches of light appearing in the upper atmosphere's Great Northern Lights and our Ozone in our Atmosphere. Both act as Barriers from reaching our Earth's surface. As a closing thought, you have to ask yourself why? All life is and exits shielded on our planet Earth.

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