

## THE BIG PICTURE

# Our Active Sun

The sun has an enormous impact on your enjoyment of amateur radio. Unless you operate at very low frequencies, such as our 630- or 2200-meter bands, or at frequencies above 144 MHz, the sun has a lot to say about how well you can communicate — and it is “speaking” 24/7!

**Solar Wind:** The sun is constantly spewing out various forms of radiation, along with a huge number of highly energetic subatomic particles. These particles comprise what is known as the *solar wind*, which is forever blowing through the solar system. Thanks to Earth’s magnetic field, however, most of the wind passes around us. If Earth lacked this magnetic protection, the solar wind would eventually destroy our atmosphere, just as it has done to Mars.



**Sunspots:** As the sun approaches the peaks of its 11-year activity cycles, it tends to produce an increasing number of dark areas on its surface that we call *sunspots*. These are the regions of reduced temperature caused by magnetic fields rising from below. While a sunspot is indeed “cooler,” this is only in a relative sense. The surface of the sun is about 10,000 °F, while a sunspot is “only” about 6,000 °F.

**Solar Flares:** The sun is interlaced with unbelievably powerful magnetic fields. These fields bend and twist, and then suddenly realign, blasting vast amounts of energy into space. We see these events as flashes of light known as *solar flares*. Flares can last a few minutes or several hours, and they contain tremendous amounts of energy. Traveling at the speed of light, it takes 8 minutes for the light from a solar flare to reach Earth. Some of the energy released in the flare also accelerates extremely high-energy particles that can reach Earth in tens of minutes. The electromagnetic radiation from a large flare can completely shut down the HF bands on the daylight side of the Earth.

**Coronal Mass Ejections:** Some magnetic explosions on the surface of the sun are a bit different. *Coronal mass ejections*, or *CMEs*, launch clouds of ultra-hot plasma at more than one million miles per hour! CMEs are somewhat focused, in that they are “aimed” in particular directions. That’s why you’ll sometimes hear a report of a CME “targeting” the Earth, or missing it entirely. CMEs are famous for causing spectacular displays of the Northern and Southern Lights over Earth’s poles. They can also seriously disrupt HF communications.