

10.10: The Dark Side of the Sun

The sun – and every star – is not a consistent, even-running object. The sun is a variable star; not as much variation or changes as most stars classified as variable. But the sun does go through sunspot cycles and sunspot activity extremes.

Both long- and short-term differences in solar activity are believed to affect the global climate, yet it has shown to be challenging to link the variation of the sun to Earth's climate. One school of thought is that these solar variations are due to sunspot cycle extreme minimums, which can make for a colder climate period. One hypothesis is that the Little Ice Age, which occurred between 1550 and 1850, was due to low solar activity. During the 1607-1608 winter, extreme frost was reported in Jamestown, Virginia. New York Harbor froze in the winter of 1780; very cold periods were well-documented throughout Europe and worldwide.

The release and outbursts of energy through solar flares and Coronal Mass Ejections can cause devastating effects on Earth. Solar flare X-Rays travel at the speed of light, 186,000 miles per second or 3×10^8 meters/second. Electrically charged particles, released from a CME, travel at around 1 to 2 million miles an hour; think of this as a cosmic tsunami. These are capable of taking down Earth's electric power grid and knocking out orbiting satellites, with catastrophic results. One such event occurred in Quebec, Canada due to a CME, March 1989. In 1859, enormous solar storms struck Earth. The Aurora were so bright at night people thought it was daylight. And these CMEs literally burned out that day's only electronic system: the telegraph.

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