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Powerful solar storm narrowly missed Earth in 2012

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Coronal mass ejections, or CMEs, are powerful eruptions from the surface of the Sun that can pose a risk to Earth-orbiting satellites and even our electronics and power grids here on the surface. NASA satellites keep a constant vigil on the Sun to detect these CMEs, and in mid-2012 they saw three of them that combined together to rival the most powerful solar storm ever recorded - the Carrington Event of Sept. 1859.

The Carrington Event was an infamous solar storm that impacted Earth on September 1-2, 1859, sparking off incredibly bright auroras that stretched far away from where they're usually visible, near polar regions, and caused havoc with telegraph systems throughout the United States and Europe. This storm was caused by one intense solar flare and the resulting coronal mass ejection that erupted from the Sun as a result, and is considered to be the most powerful one ever seen, as well as the first one ever seen as well (they were not directly observed before then). The current 'K-index' used to rate solar flares wasn't in use then, but studies have estimated the strength of the Carrington super flare at somewhere around X40 or higher, which is well off the maximum practical end of the scale (which only goes up to X9.9).

However, as it turns out, it doesn't take one of these scale-shattering solar flares to produce this kind of powerful CME, and this means that we could be at a higher risk from solar flares than we previously thought. The video below, produced by Science@NASA, goes into the details of an event just two years ago that caught us off guard, and had it erupted just one week earlier, could have fried Earth-orbiting satellites and caused widespread blackouts and failures of electronics here on the ground.

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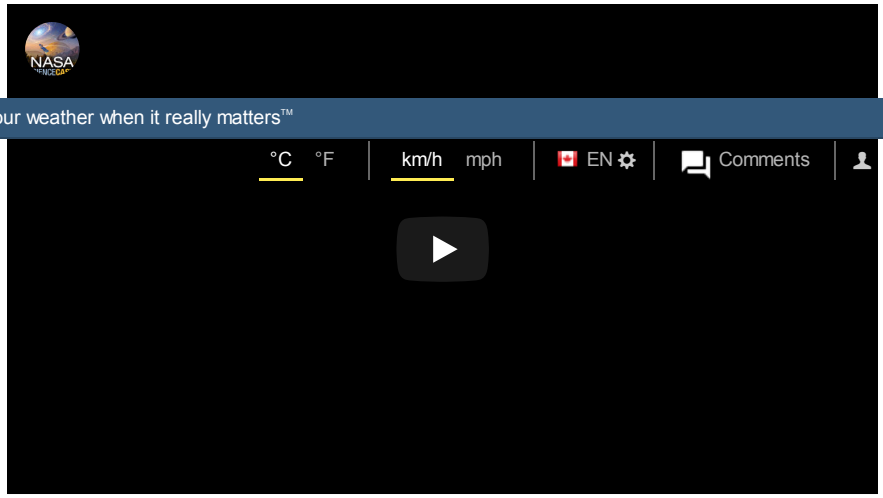

Given that this CME missed us by roughly 9 days, the use of the word 'narrowly' when describing how close it came to us may seem a bit excessive. However, when you look at those 9 days compared to the length of our year (the time it takes Earth to travel once around the Sun), the distance between us and the CME was only about 3 per cent of our orbital path. That's a *pretty narrow miss*.

The fact that these smaller flares were able to produce such a strong event is alarming, given that weaker flares are far more common than the powerful X-class or stronger ones. At the same time, though, it took a very specifically-timed combination of these three flares - one to sweep out the interplanetary medium so that the way was clear of particles that tend to slow down CMEs, and then two more in quick succession that happened right on top of one another, so that they merged together to produce the Carrington-level event. Thus, the specific combination of timing and solar flare strength that went into producing this event means that it will still be an uncommon event.

Even so, given the devastating effect that an event like this would have on current technologies, potentially putting us in the dark for months or years and costing us trillions of dollars worldwide, it definitely emphasizes the need to watch these weaker flares more closely.

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