Want to turn off the internet? It could happen if a solar storm hits the Earth

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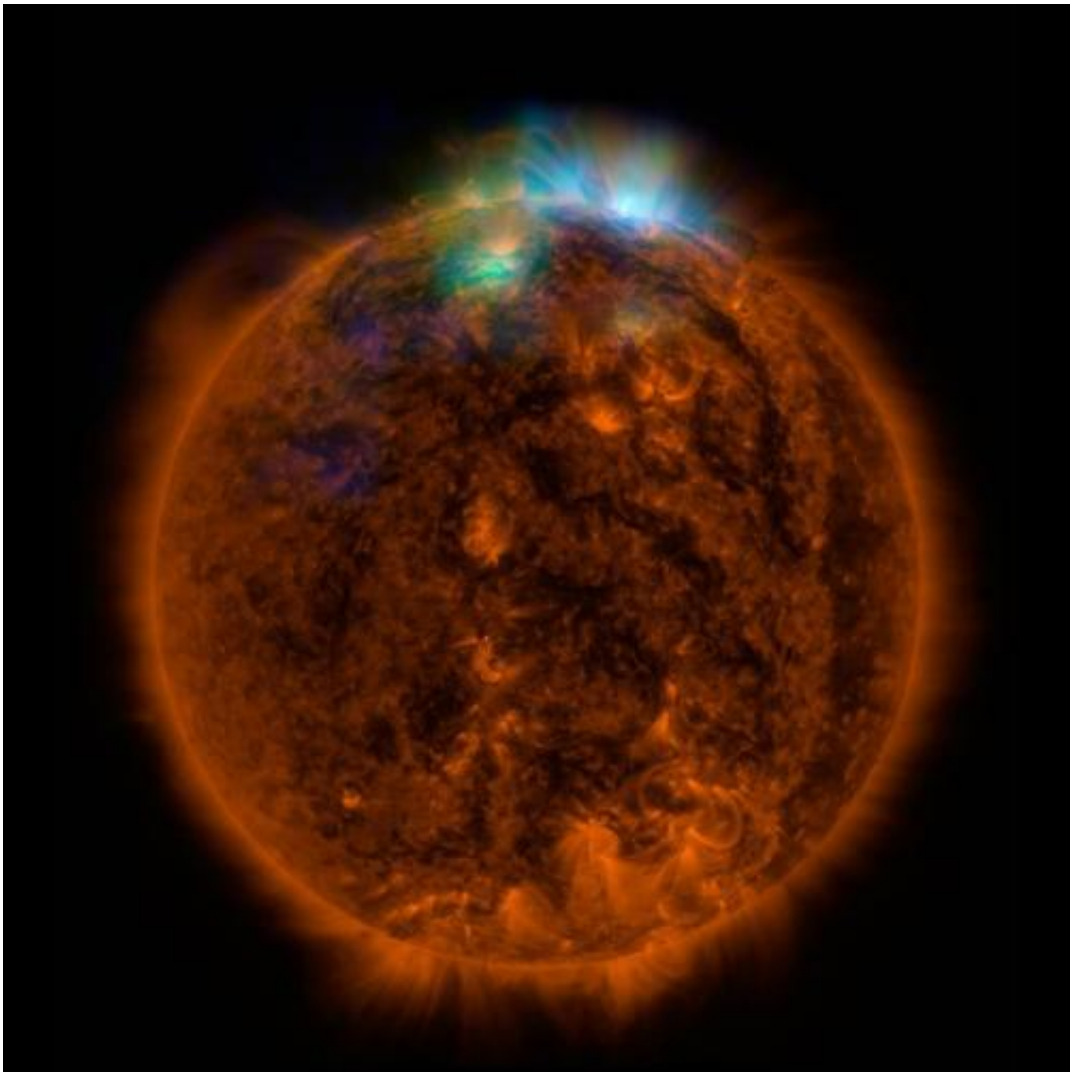

X-rays stream off the sun in this image showing observations from by NASA's Nuclear Spectroscopic Telescope Array, or NuSTAR, overlaid on a picture taken by NASA's Solar Dynamics Observatory (SDO). Credit: NASA

It's happened before and it could happen again.

Roughly 2,700 years ago, an unusually powerful solar storm swept past the Earth, scientists announced in a new study. Though it had little to no impact on people in that long ago, pre-industrial and pre-technological world, such an event today would cause widespread power outages along with potentially disastrous communication and navigation failures.

The solar storm, which was in 660 B.C., was about 10 times stronger than any known event in the past 70 years, study lead author Raimund Muscheler said.

A solar storm of that strength would be "a threat to modern society in terms of communication and navigation systems, space technologies and commercial aircraft operations," the study said.

Scientists studied ancient ice in Greenland to uncover clues about previous solar storms. Looking at an ice core that dated as far back as 100,000 years, researchers found radioactive isotopes that indicated a very powerful solar storm 2,700 years ago.

"If that solar storm had occurred today, it could have had severe effects on our high-tech society," said Muscheler, a geologist at Lund University in Sweden.

Two examples of recent severe solar storms that caused extensive power outages took place in Quebec, Canada, in 1989 and Malmö, Sweden in 2003.

Solar storms are made up of high-energy particles unleashed from the sun by explosions on the star's surface. These types of storms are part of what's known as space weather, when energy that blasts off from the sun interacts with the Earth's atmosphere and geomagnetic field. Separate

but related space phenomena are known as geomagnetic storms.

The only visible effect down here on Earth from space weather is typically the aurora borealis, or northern lights, across Canada and the northern U.S.

Scientists said this is the third known discovery of a massive solar storm in historical times. This indicates that while the storms are rare, they are a naturally recurring effect of solar activity.

"That's why we must increase society's protection against solar storms," Muscheler said. "Our research suggests that the risks are currently underestimated. We need to be better prepared."

The study was published Monday in the peer-reviewed journal *Proceedings of the National Academy of Sciences*.

More information: Paschal O'Hare el al., "Multiradionuclide evidence for an extreme solar proton event around 2,610 B.P. (~660 BC)," *PNAS* (2019). www.pnas.org/cgi/doi/10.1073/pnas.1815725116