Space weather threatens our high-tech life on Earth

By Roger Dube, The Conversation, adapted by Newsela staff on 04.23.18
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Image 1. A coronal mass ejection erupts from the sun in 2012. Image from NASA.

One night in 1859, the sky above Colorado erupted in bright colors of red and green. Gold-rush miners woke up and started making breakfast. The brightness fooled them into thinking it was already dawn.

What happened in other places was even more puzzling. The event in the sky carries a warning for our wired, high-tech modern world.

Back then, telegraph systems worldwide went crazy. They clacked nonsense code and shot large sparks that ignited fires in nearby piles of paper. Telegraph operators suffered electrical burns. The wires themselves were carrying huge electrical currents, so unplugging them did not help.

The 19th century's modern technology was no match for a space weather storm from the sun, which was the largest ever recorded.

Today's electronics and satellites would be devastated should an event like that happen again. The world would be thrown back into the life of the early 1800s. Fixing it would take years.

A Solar Explosion

Space weather storms have taken place since the birth of the sun. They have hit Earth many times. They are caused by huge explosions on the surface of the sun. Each explosion sends a superheated ball out into space filled with billions of protons and electrons.

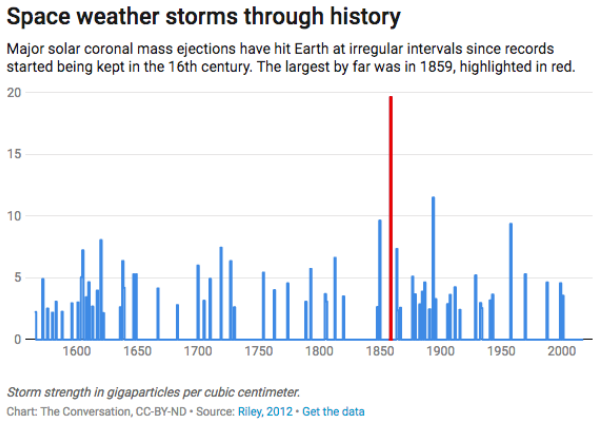
About 1 in every 20 of these explosions heads toward Earth's orbit. About three days later, our planet's magnetic field is disrupted. While these events are described using terms like "weather" and "storm," they do not affect what it is like outdoors on Earth.

Hitting Earth

When the explosion reaches Earth's atmosphere, it creates heat and light called an aurora. The electrical charges create a sudden electrical current in anything that can carry electricity. This can cause large currents on long wires on the ground.

On March 13, 1989, a storm much weaker than the 1859 event hit Earth. It left 6 million people without power for nine hours. Another one destroyed part of a New Jersey nuclear power plant. This took six months to repair.

Larger storms will cause more damage and take longer to put back to normal.



Wide-Reaching Effects

A space weather storm usually lasts for two or three days. A really bad storm would shut down power and communications worldwide.

After the storm passed, there would be no simple way to fix everything. Manufacturing plants would have no electricity. Trucks needed to deliver materials for repairs would not be able to get fuel. Pumps would soon dry up anyway, as electricity is needed to get oil from the ground and turn it into usable fuel. People would have no running water or refrigerated food, and no way to get anything transported from far away.

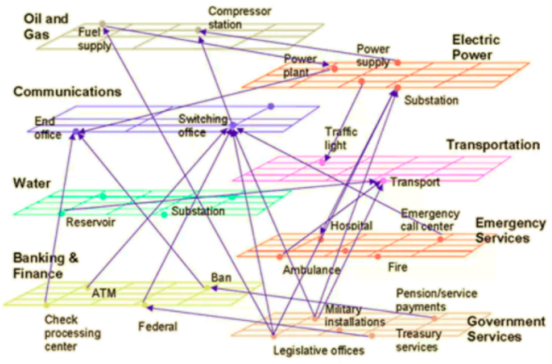
It could take up to 10 years to repair all the damage. In the meantime, people would need to grow their own food, find and clean water, and cook meals over fires.

Preparing And Protecting

Larger systems are in greater danger than small ones.

In 1859, the telegraph system was so heavily affected because it had wires stretching from city to city. Today, there are long runs of wires connecting power generators to homes and businesses. They would be in similar danger.

Today, our electricity is sent through a giant web of wires that goes across continents. We need to split it into much smaller parts. These parts can be connected to each other, but towns, neighborhoods and homes should be able to be disconnected quickly when a storm approaches. These are called microgrids. There would still be problems, but we would have a better chance of recovering easily.



Electricity, shown in the upper right, is integrated into every aspect of modern life. Federal Communications Commission

When Can We Expect Another Storm?

It's only a matter of time before there is another bad storm that strikes Earth. The most we will get is a three-day warning.

Scientists are studying the sun to better predict these storms. They have not yet provided a useful prediction. It improves each year, though.

The safest plan involves making microgrids that run on electricity sources that would not be disrupted, like solar panels or wind power. That would provide the best opportunity to keep up our high-tech lifestyle when these events happen.

Roger Dube is a professor at Rochester Institute of Technology in New York.

Quiz

1 Read the article's introduction [paragraphs 1-5] and the final section, "When Can We Expect Another Storm?"

What is the connection between those two sections?

(A) The introduction details the largest space weather storm in history, and the final section discusses preparation for the next space weather storm.

(B) The introduction emphasizes the role of 19th-century technology in causing the 1859 storm, and the final section shows how electricity has been improved.

(C) The introduction shows how Earth was damaged in the most recent space weather storm, and the final section explains how long it took to repair the damage.

(D) The introduction explains that scientists were confused by space weather storms, and the final section shows that scientists still do not know much about them.

2 If this article were organized in a cause and effect structure, which section would come first?

(A) Introduction [paragraphs 1-5]

(B) "A Solar Explosion"

(C) "Hitting Earth"

(D) "Wide-Reaching Effects"

3 Read the paragraph from the section "Wide-Reaching Effects."

> *It could take up to 10 years to repair all the damage. In the meantime, people would need to grow their own food, find and clean water, and cook meals over fires.*

What is the author's point of view about repairing the damage caused by space weather storms?

(A) He thinks that it would be impossible to accomplish.

(B) He thinks that it would force everyone to help out.

(C) He thinks that it would teach people valuable survival skills.

(D) He thinks that it would be a long and difficult process.

4 Read the section "Preparing And Protecting."

Which detail from the section BEST shows the author's point of view about the safest option for electric power sources?

(A) Larger systems are in greater danger than small ones.

(B) In 1859, the telegraph system was so heavily affected because it had wires stretching from city to city. Today, there are long runs of wires connecting power generators to homes and businesses.

(C) Today, our electricity is sent through a giant web of wires that goes across continents.

(D) These parts can be connected to each other, but towns, neighborhoods and homes should be able to be disconnected quickly when a storm approaches.