Effects of the solar wind

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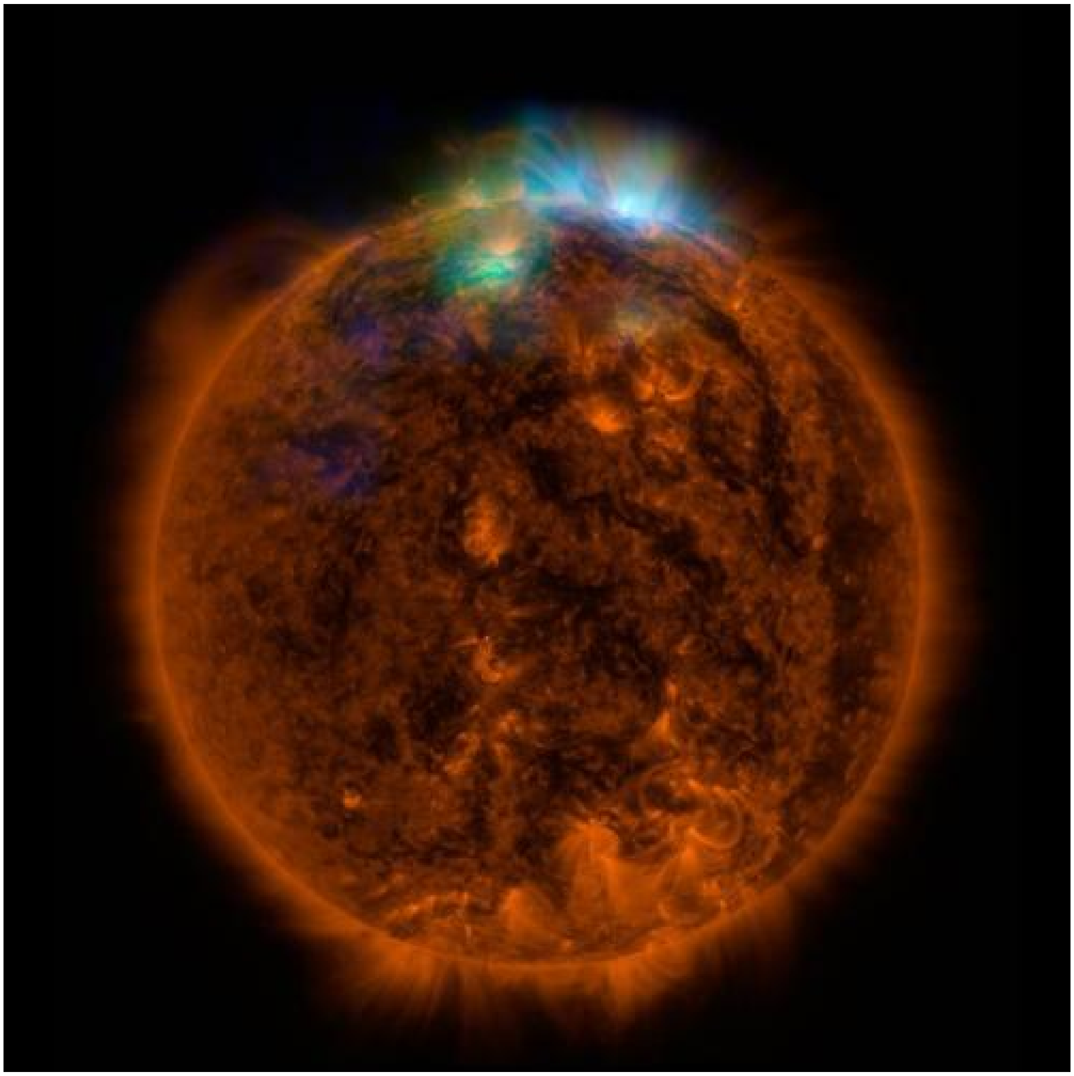

X-rays stream off the sun in this image showing observations from by NASA's Nuclear Spectroscopic Telescope Array, or NuSTAR, overlaid on a picture taken by NASA's Solar Dynamics Observatory (SDO). Credit: NASA

The wind speed of a devastating Category 5 hurricane can top over 150 miles per hour (241km/hour.) Now imagine another kind of wind with an average speed of 0.87 million miles per hour (1.4 million km/hour.) Welcome to the wind that begins in our sun and doesn't stop until after it reaches the edge of the heliosphere: the solar wind.

The corona is the sun's inner atmosphere—the brightness that can be seen surrounding an eclipsed sun—and home to the continually expanding solar wind. Right now, the Parker Solar Probe—a NASA mission launched in 2018, is orbiting the sun and will get as close as 3.83 million miles (6.16 million km) of the sun's surface. Parker is gathering new data about the solar particles and magnetic fields that comprise the solar wind. More specifically, two of its main goals are to examine the energy that heats the corona and speeds up the solar wind, and determine the structure of the wind's magnetic fields.

While many theories describe the solar wind's history, this is what we do know: The solar wind impacting Earth's magnetosphere is responsible for triggering those majestic auroras typically seen at locations close to our north and south poles. In some cases it can also set off space weather storms that disrupt everything from our satellites in space, to ship communications on our oceans, to power grids on land.

Nicky Fox is the division director for heliophysics at NASA Headquarters. She explains in more detail how the solar wind disrupts our magnetosphere: "As the wind flows toward Earth, it carries with it the sun's magnetic field. It moves very fast, then smacks right into Earth's magnetic field. The blow causes a shock to our magnetic protection, which can result in turbulence."

NASA also has another reason to study the solar wind and its properties—the solar wind is part of a larger space weather system that can affect astronauts and technology. As Fox notes: "We not only have to ensure our astronauts are protected from the harmful effects of radiation. We have to protect our equipment too. So, we've already found aluminum to be a good shield to protect our crafts from many energetic particles. But there are also faster particles that travel at 80% of the speed of light, which can cause havoc with parts of a spacecraft. They can smash into and damage solar panels, disrupt electronics, or affect electric currents that flow along power grids. So, we're currently conducting tests with small pieces of technology to study how well they can survive in intense radiation areas."

Knowing more about the effects of the solar wind is not only important to those of us who live on Earth. It will be critical to know how to mitigate its effects once our astronauts travel back to the Moon and beyond for extended periods of time.

Fox concludes: "My feeling is—if the sun sneezes, Earth catches a cold, because we always feel the impact of what happens on the sun thanks to the solar wind."

Provided by NASA

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