

SUNSPOTS HELP UNDERSTAND LIFE AROUND OTHER STARS

Relevant for: Geography | Topic: The Earth and the Solar System

A new study [published in The Astrophysical Journal](#) has shown how sunspots - which are relatively cooler and darker patches on the Sun - can help us understand more about conditions for life on exoplanets, planets that are outside the solar system.

As sunspots are precursors to solar flares, monitoring them can help decode how and why flares occur. On young stars, superflares happen almost daily, whereas, on more mature ones like our Sun, they may occur once in 1,000 years. A few flares may help in building RNA and DNA on planets whereas too many strong flares can damage the atmosphere, thus turning the planet uninhabitable.

High-resolution data of the Sun from NASA's Solar Dynamics Observatory and JAXA/NASA's Hinode mission was used for the study.

The team studied the different layers of the Sun using 14 different wavelengths including visible, ultraviolet (UV), and X-rays.

"We wanted to know what a sunspot region would look like if we couldn't resolve it in an image," said Shin Toriumi, lead author on the study and scientist at the Institute of Space and Astronautical Science at Japan Aerospace Exploration Agency in a release. "So, we used the solar data as if it came from a distant star to have a better connection between solar physics and stellar physics."

Putting all these data together, the team created a plot which they named light curves which showed how the light changed as the sunspot passed across the Sun's rotating face. This also shows what a passing sunspot would look like if it were many light-years away.

"The Sun is our closest star. Using solar observing satellites, we can resolve signatures on the surface 100 miles wide," said Vladimir Airapetian, a co-author of the study and astrophysicist at NASA's Goddard Space Flight Center in Greenbelt, Maryland. "On other stars, you might only get one pixel showing the entire surface, so we wanted to create a template to decode activity on other stars."

Studying stellar activity could also help explain the beginning of life on Earth four billion years ago. Many scientists have suggested that intense solar activity may have been a trigger.

"So far we've done the best-case scenarios, where there's only one sunspot visible," Toriumi said. "Next we are planning on doing some numerical modeling to understand what happens if we have multiple sunspots."

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