

Superflares from Sun-like Stars



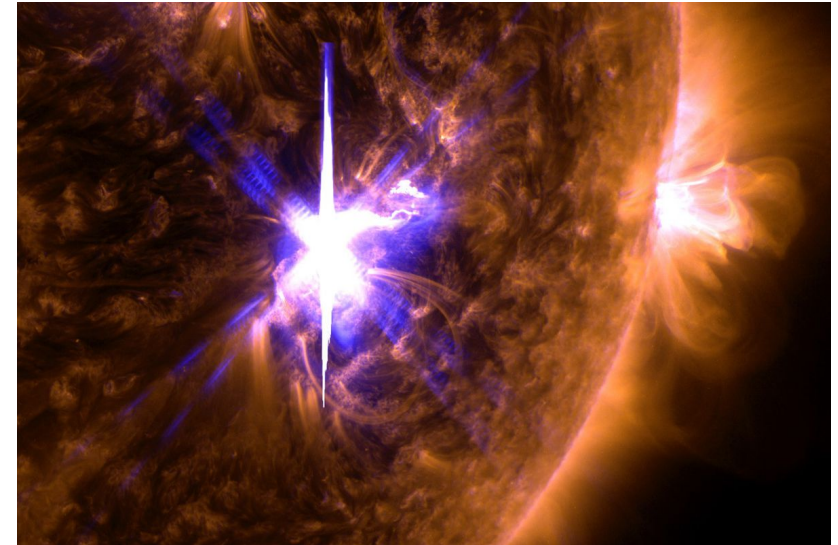
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What is the science question?

The Kepler mission has observed young, Sun-like stars generating powerful superflares. How do these stars generate such violent storms and what bearing may this have had on the early Sun and solar system?

What were your findings?

We demonstrated with first-principle numerical simulations that the young, sun-like star Kappa Ceti can host eruptive flares as energetic as the Sun's famous 1859 Carrington storm, solely within its background magnetic field (which was measured using the Zeeman-Doppler Imaging technique.) Observations indicate that superflares 10X stronger even than this have been generated by starspots on Kappa Ceti.



A solar flare observed by the Solar Dynamics Observatory (SDO) in extreme-ultraviolet light.

What was the impact?

Observations with NASA's Kepler mission indicate that very energetic stellar superflares are rather common on Sun-like dwarf stars elsewhere in our galaxy. The damaging EUV and X-ray radiation and the ejected clouds of magnetic field and gas from such flares can be highly detrimental to the existence and persistence of life on exoplanets circling the host stars.

Why does it matter?

A major goal of NASA science, and a major quest of humanity, is to determine whether life is present elsewhere in the universe. Understanding the origin and character of stellar storms and space weather that affect exoplanets guides our search for extraterrestrial life. In addition, a better understanding of extreme events on other stars informs us about the likelihood of future extreme events on our own star, the Sun.