

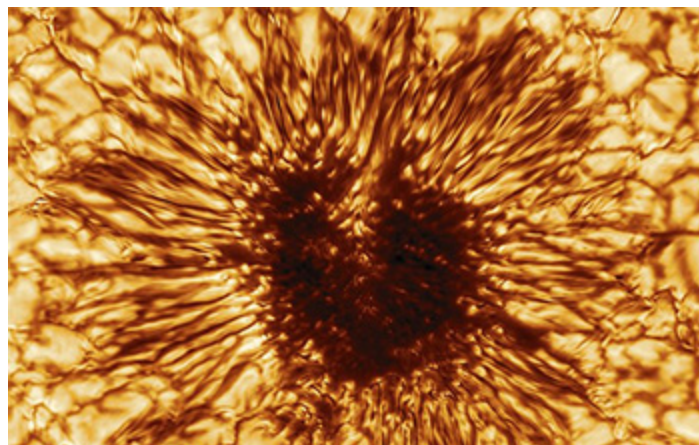


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Research News

# Inouye Solar Telescope releases its first image of a sunspot

Advanced optics capture structures as small as 20 kilometers on the surface of the sun



The sunspot image taken by NSF's Inouye Solar Telescope's Wave Front Correction context viewer.  
Credit and Larger Version ([/discoveries/disc\\_images.jsp?cntn\\_id=301786&org=NSF](/discoveries/disc_images.jsp?cntn_id=301786&org=NSF))

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The world's largest solar observatory, the [U.S. National Science Foundation](https://www.nsf.gov/awardsearch/showAward?AWD_ID=1400450&HistoricalAwards=false)  [<https://www.nsf.gov/awardsearch/showAward?AWD\\_ID=1400450&HistoricalAwards=false>](https://www.nsf.gov/awardsearch/showAward?AWD_ID=1400450&HistoricalAwards=false) 's [Daniel K. Inouye Solar Telescope](https://www.nsf.gov/awardsearch/showAward?AWD_ID=1400450&HistoricalAwards=false) ([/cgi-bin/good-bye?https://nso.edu/press-release/inouye-solar-telescope-releases-first-image-of-a-sunspot/?linkId=106286507](https://nso.edu/press-release/inouye-solar-telescope-releases-first-image-of-a-sunspot/?linkId=106286507)), has released its first image of a sunspot. Although the telescope is still in the final phases of completion, the image is an indication of how the telescope's advanced optics and 4-meter primary mirror will give scientists the best view of the sun from Earth throughout the next solar cycle.

The sunspot image accompanies a new paper by Thomas Rimmele and his team. Rimmele is the associate director at NSF's National Solar Observatory, the organization responsible for building and operating the Inouye Solar Telescope. The sunspot was captured by the Inouye Solar Telescope on January 28, 2020 and is not the same sunspot currently visible to the naked eye.

The paper is the first in a series of Inouye-related articles featured in [Solar Physics](https://link.springer.com/article/10.1007/s11207-020-01736-7) ([/cgi-bin/good-bye?https://link.springer.com/article/10.1007/s11207-020-01736-7](https://link.springer.com/article/10.1007/s11207-020-01736-7)). It details the optics, mechanical systems, instruments, operational plans and scientific objectives of the Inouye Solar Telescope. Solar Physics will publish the remaining papers in early 2021.

"The sunspot image achieves a spatial resolution about 2.5 times higher than ever previously achieved, showing magnetic structures as small as 20 kilometers on the surface of the sun," said Rimmele.

The image reveals striking details of the sunspot's structure as seen at the sun's surface. The streaky appearance of hot and cool gas spidering out from the darker center is the result of sculpting by a convergence of intense magnetic fields and hot gases boiling up from below.

The concentration of magnetic fields in this dark region suppresses heat within the sun from reaching the surface. Although the dark area of the sunspot is cooler than the surrounding area, it is still extremely hot, with a temperature of more than 7,500 degrees Fahrenheit.

The sunspot image, measuring about 10,000 miles across, is just a tiny part of the sun. However, the sunspot is large enough that Earth could comfortably fit inside.

"This image represents an early preview of the unprecedented capabilities this facility will bring to bear on our understanding of the sun," said David Boboltz, a program director in NSF's Division of Astronomical Sciences.

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