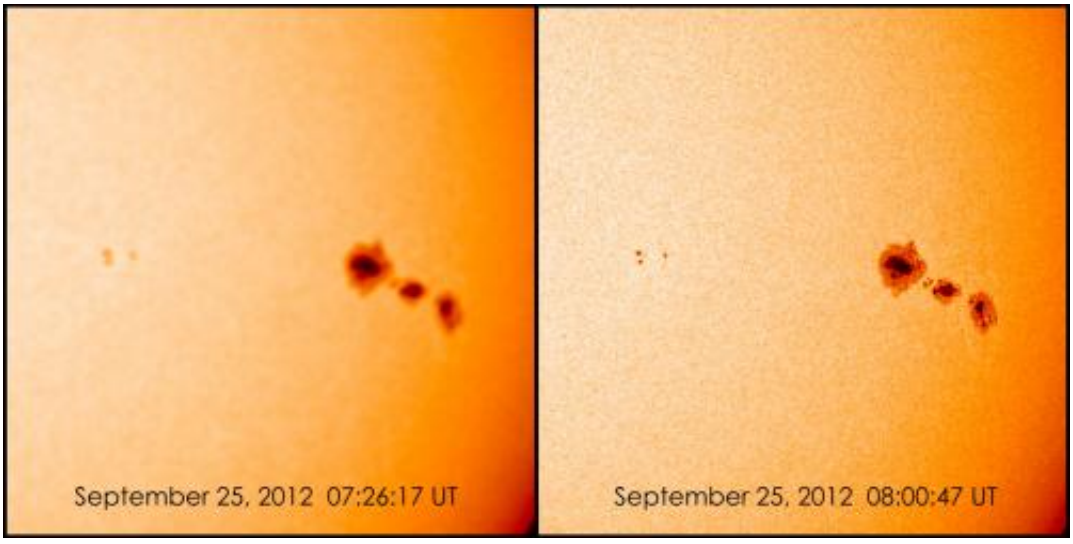
Getting Solar Dynamic Observatory into focus

October 6 2012



During an eclipse, lack of heat from the sun causes the window in front of SDO's Helioseismic and Magnetic Imager (HMI) to change shape. This causes a blurry image for about 45 minutes after Earth finishes its transit across the sun, as shown on the left. The right half shows HMI data at its usual high resolution, data which helps scientists observe sunspots and their magnetic characteristics. Credit: NASA/SDO/HMI

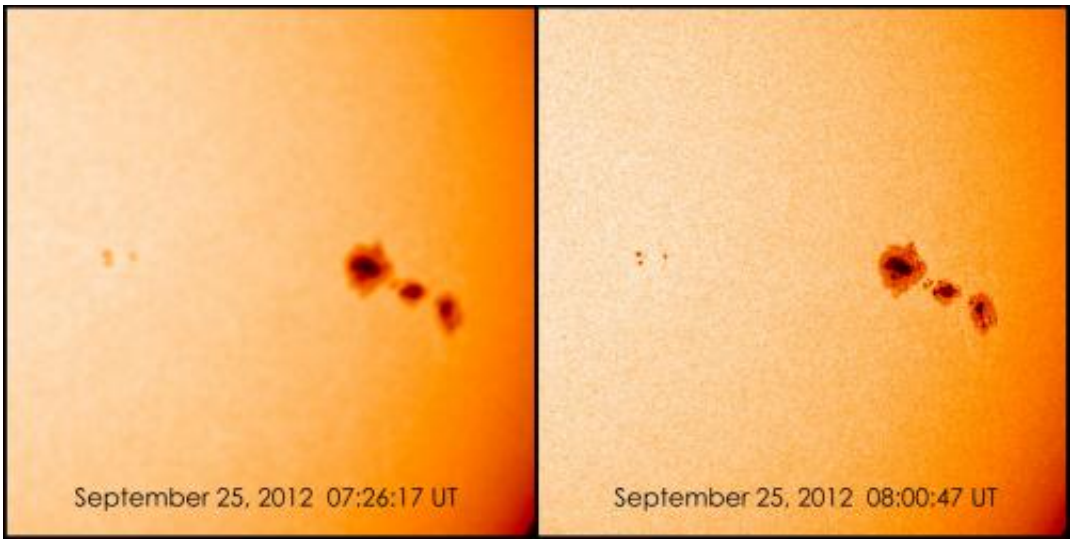
From Sept. 6 to Sept. 29, 2012, NASA's Solar Dynamic Observatory (SDO) moved into its semi-annual eclipse season, a time when Earth blocks the telescope's view of the sun for a period of time each day. Scientists choose orbits for solar telescopes to minimize eclipses as much as possible, but they are a fact of life -– one that comes with a

period of fuzzy imagery directly after the eclipse.

The Helioseismic and Magnetic Imager (HMI) on SDO observes the sun through a glass window. The window can change shape in response to temperature changes, and does so dramatically and quickly when it doesn't directly feel the sun's heat.

"You've got a piece of glass looking at the sun, and then suddenly it isn't," says Dean Pesnell, the project scientist for SDO at NASA's Goddard Space Flight Center in Greenbelt, Md. "The glass gets colder and flexes. It becomes like a lens. It's as if we put a set of eye glasses in front of the instrument, causing the observations to blur."

To counteract this effect, HMI was built with heaters to warm the window during an eclipse. By adjusting the timing and temperature of the heater, the HMI team has learned the best procedures for improving resolution quickly. Without adjusting the HMI front window heaters, it takes about two hours to return to optimal observing.



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Over the two years since SDO launched in 2010, the team has brought the time it takes to get a clear image down from 60 minutes to around 45 to 50 minutes after an eclipse. "We allocated an hour for these more blurry images," says Pesnell. "And we've learned to do a lot better than that. With 45 eclipses a year, the team gets a lot of practice."

SDO will enter its next eclipse season on March 3, 2013.

Provided by NASA's Goddard Space Flight Center