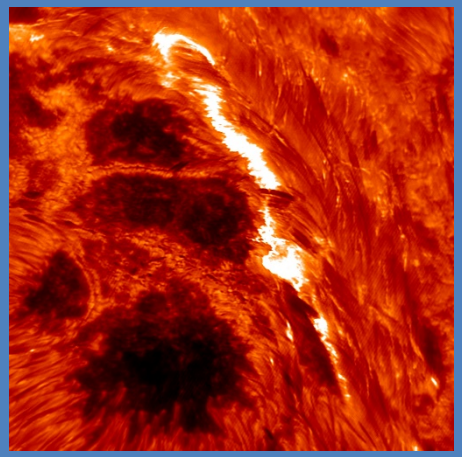
Unprecedented NASA solar data on *precursors* piece together part of the story on solar flare evolution

The 2017 total solar eclipse provided an opportunity to connect people with different studies and phenomena in space science. Solar dynamics is one of the science areas many people across the country learned more about during the eclipse and an area of research actively pursued by the NASA Heliophysics Division.

A key and dramatic manifestation of solar dynamics, solar flares, were once thought to be powered by energy stored in the sun's outer atmosphere, the corona. But the build up of coronal energy alone may be insufficient to trigger a flare erutpion. A paper published on the BBSO study through *Nature Astronomy* in March 2017 examines a possible mechanism, precursors, that potentially build up energy leading to a solar flare. *Precursors* are understood as "pre-solar flare brightenings" and are small scale energy releases observed in the lower corona.

Haimin Wang of the Big Bear Solar Observatory (BBSO) led a study that used data from NASA Heliophysics satellites (SDO, RHESSI, and Hinode) mission data in addition to groundbased data from BBSO. This data provides the first observations at smaller-scale resolutions of pre-solar flare data on magnetic reconnection in resolutions never seen before. By using observations at various wavelengths, they were able to identify the time and location of these precurors and provide evidence of low-atmospheric small-scale energy release that could be linked to the onset of the main flare.

Kanya Kusano of Nagoya University in Japan, a co-author of the paper, compared the BBSO observations with a numerical simulation of the triggering process of solar flares and found that the results were consistent with the observations. It seems that these magnetic reconnection events happen when the magnetic orientation of small bi-pole regions lower in the solar corona is opposite to that of the ambient polarities of that area.



Recent images captured by NJIT's 1.6-meter New Solar Telescope at BBSO have revealed the emergence of small-scale magnetic fields in the lower reaches of the corona the researchers say may be linked to the onset of a main flare. Credit: NJIT

The **NASA Heliophysics Parker Solar Probe,** scheduled for launch on July 31, 2017, will fly directly through the sun's corona. This mission will provide measurements of this intriguing and mysterious region of space and will help scientists better understand solar dynamics.

If you want to catch a glimpse of the Parker Solar Probe before it gets buttoned up in preparation for launch later this year, it'll be at NASA GSFC in October. Stay connected to the NASA and JHU/Applied Physics Laboratory's Parker Solar Probe websites and social media platforms to learn when it'll be in the area.