

Long-range couplings between drivers of space weather

as observed with SDO's Atmospheric Imaging Assembly
and the STEREO spacecraft

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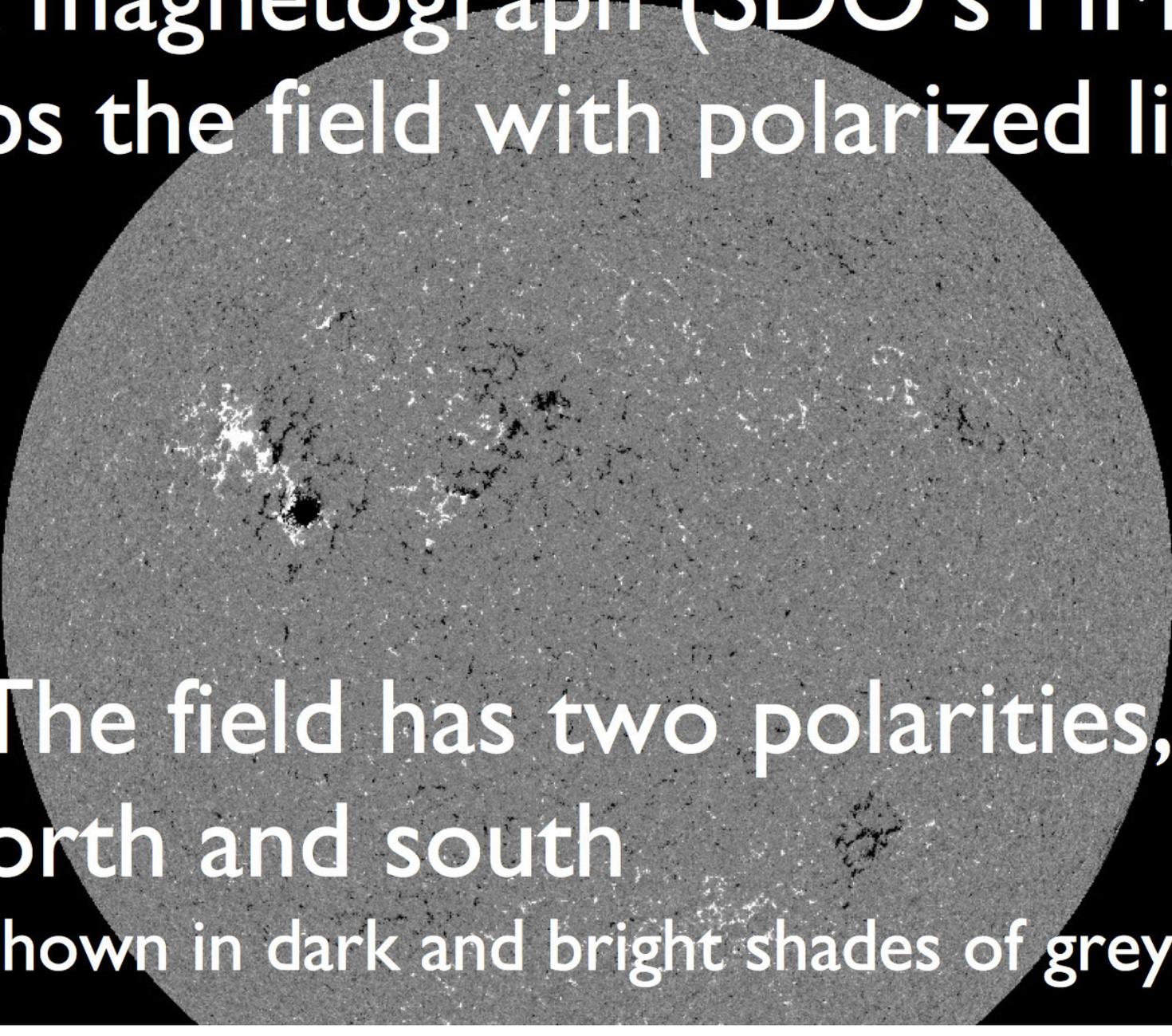
Lockheed Martin Advanced Technology Center, Palo Alto, Calif.

For American Geophysical Union, December 2010

The solar surface is
threaded by magnetic field

concentrated in a multitude of
small clusters and few

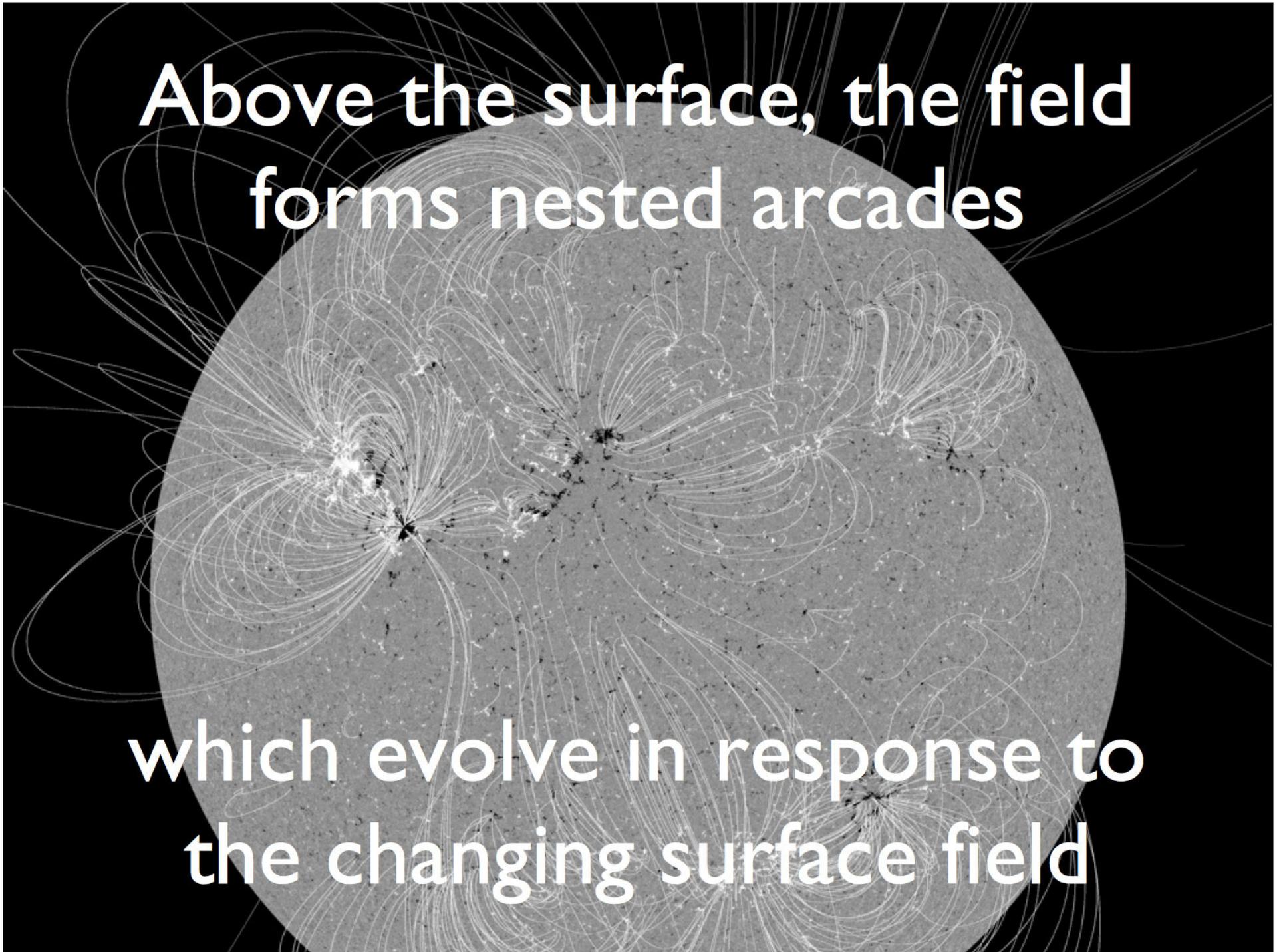
A magnetograph (SDO's HMI) maps the field with polarized light.

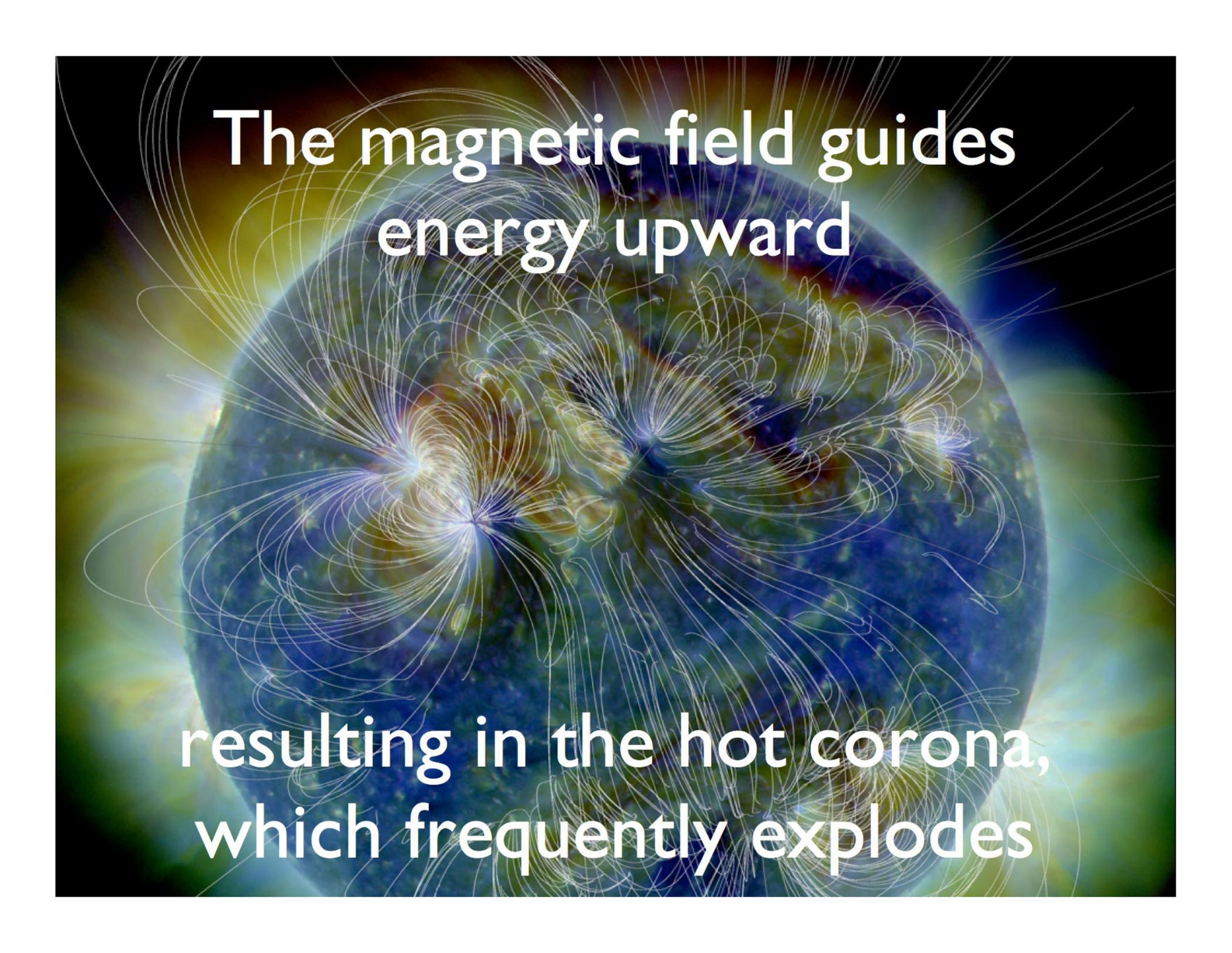


The field has two polarities,
north and south
(shown in dark and bright shades of grey)

**Above the surface, the field
forms nested arcades**

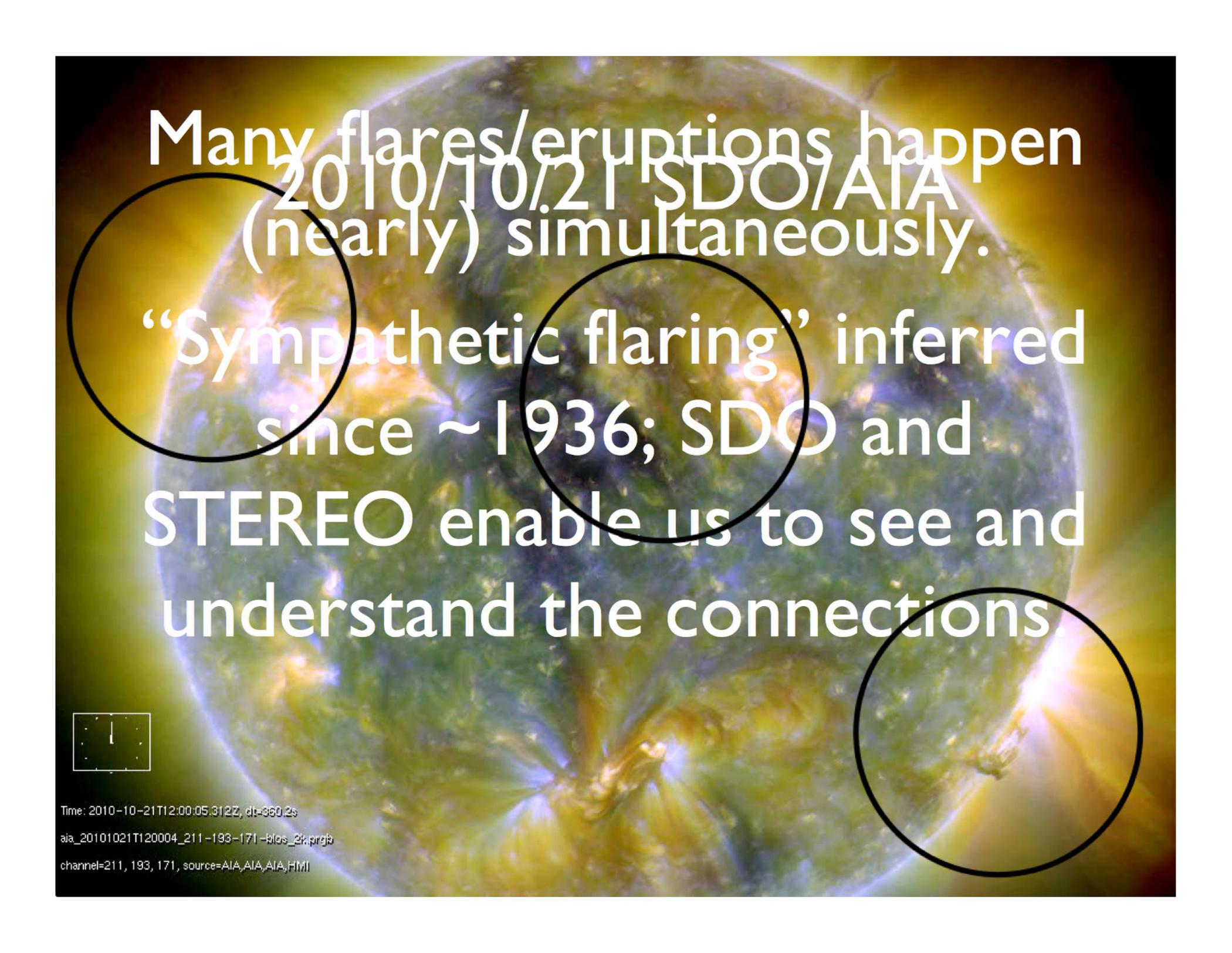
**which evolve in response to
the changing surface field**



A composite image of Earth showing magnetic field lines and solar wind. The Earth is depicted in the center, with a blue and green surface. Overlaid on the Earth are numerous white, glowing magnetic field lines that curve from the top and bottom poles towards the equator. The background is a dark space with a greenish-yellow glow, suggesting the solar wind or the corona. The text is overlaid on the image in white, bold, sans-serif font.

**The magnetic field guides
energy upward**

**resulting in the hot corona,
which frequently explodes**



Many flares/eruptions happen
2010/10/21 SDO/AIA
(nearly) simultaneously.

“Sympathetic flaring” inferred
since ~1936; SDO and
STEREO enable us to see and
understand the connections.

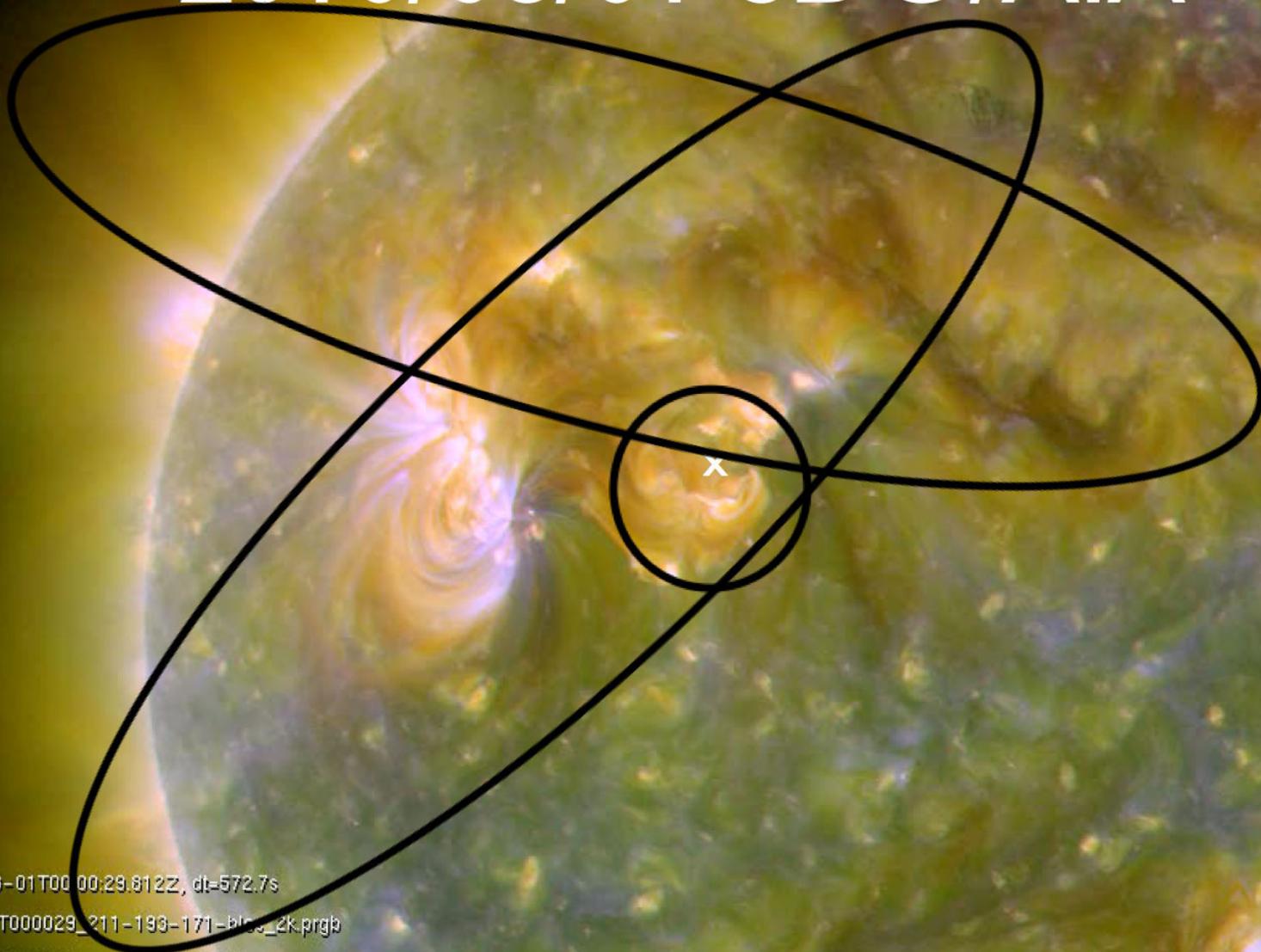


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2010/08/01 SDO/AIA



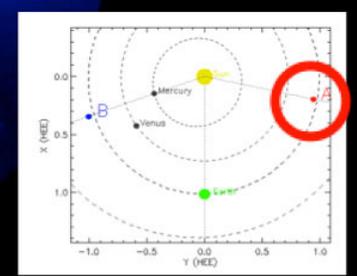
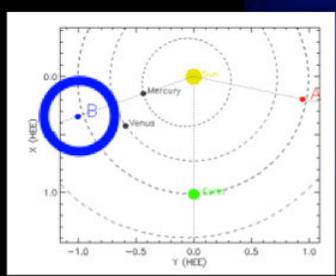
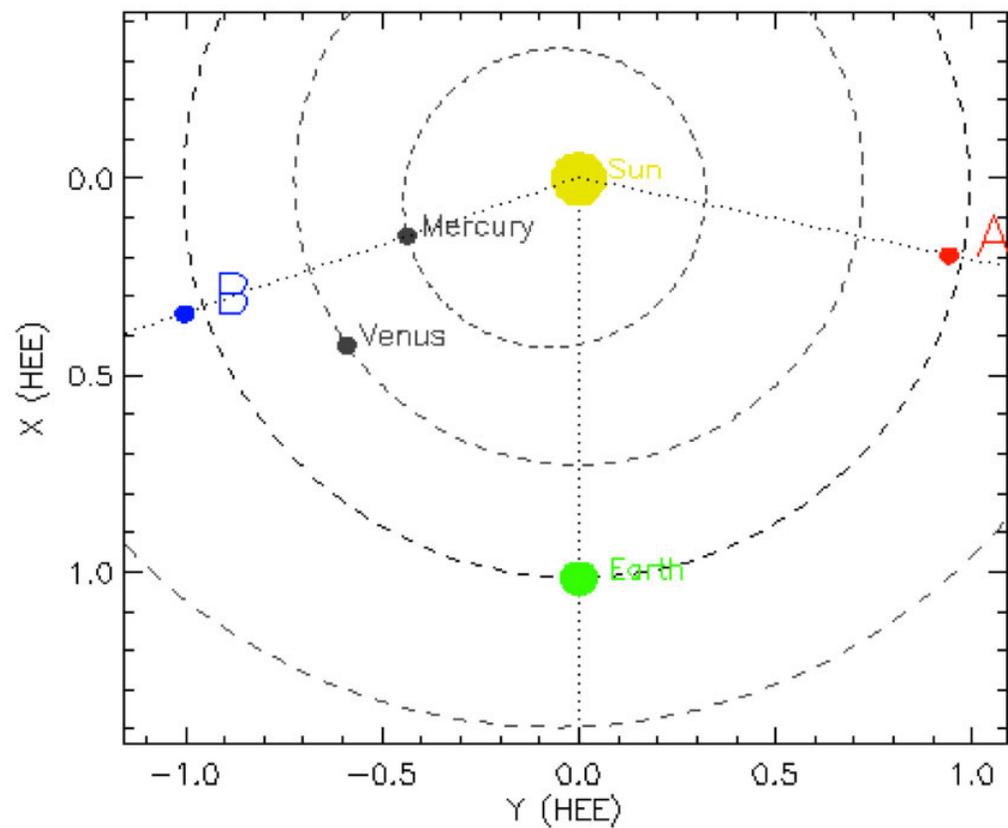
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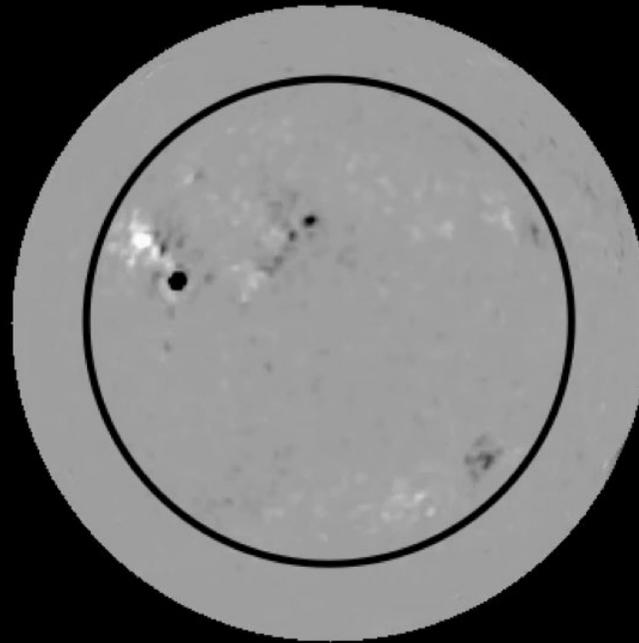
2010/08/01 STEREO A/B

Earth Venus Mercury Mercury Earth



From three perspectives, experimenting with time

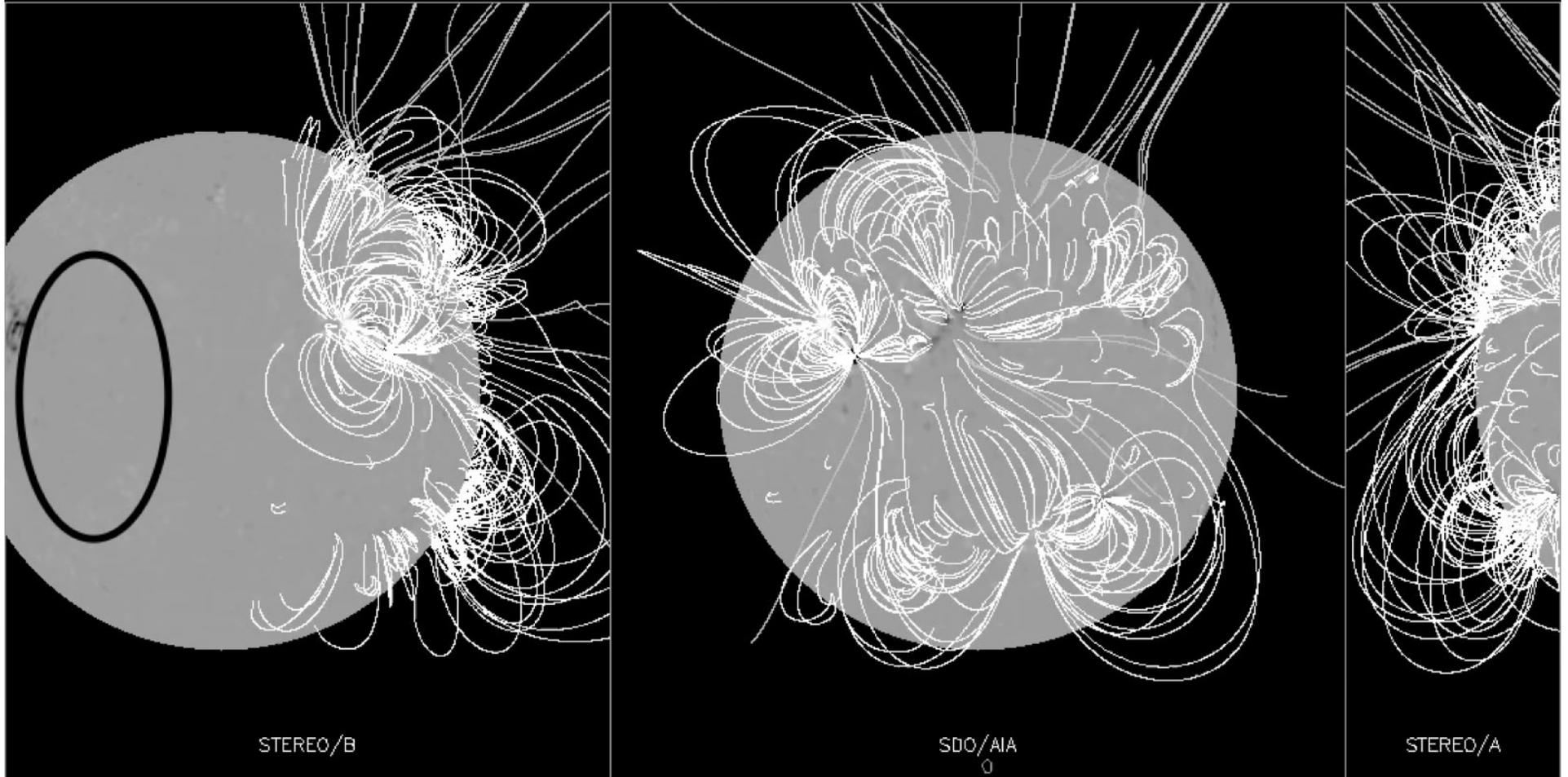
Central region of front
hemisphere from SDO's
Helioseismic and Magnetic Imager



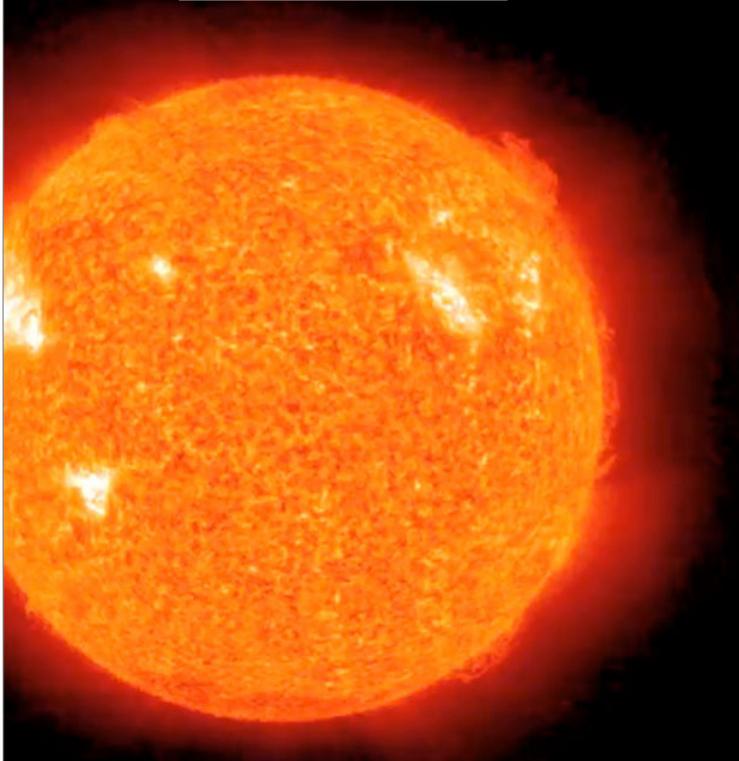
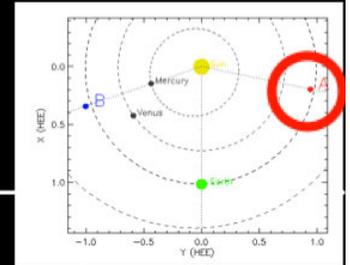
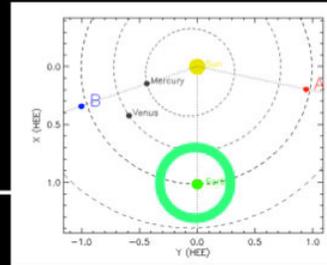
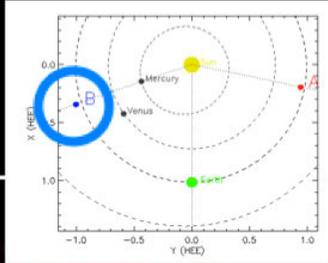
Magnetic maps from full-sphere assimilation model

SDO/AIA
0

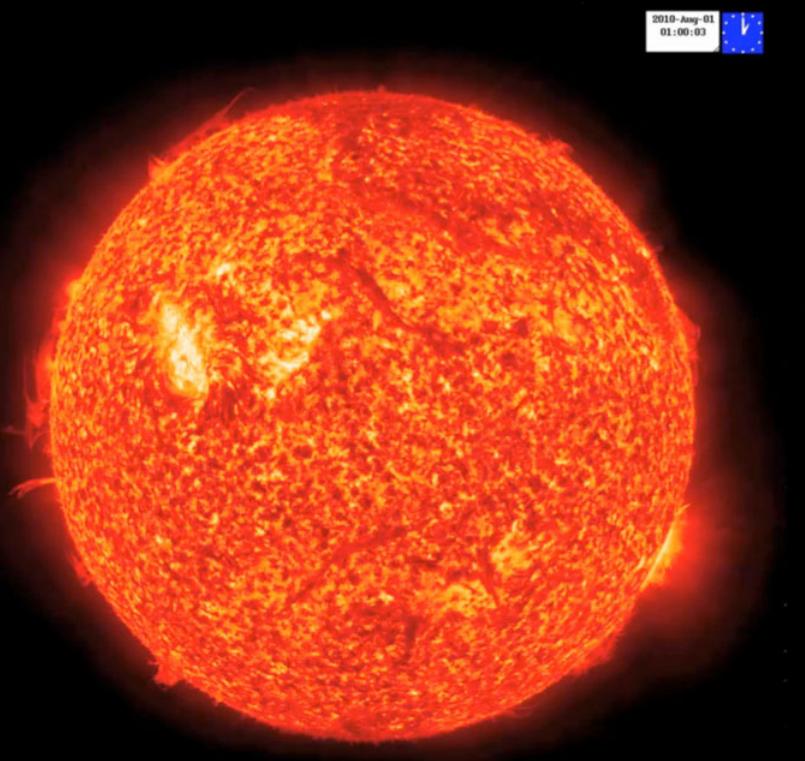
Computer model of the coronal magnetic field



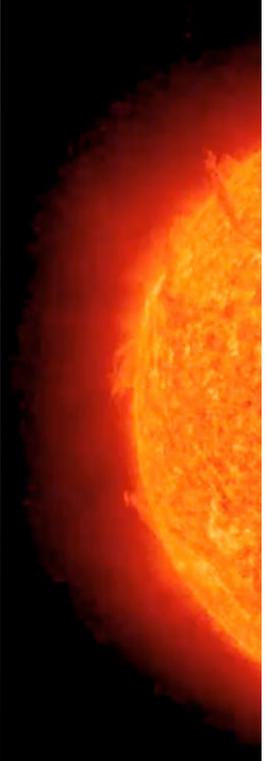
From three perspectives



STEREO Behind

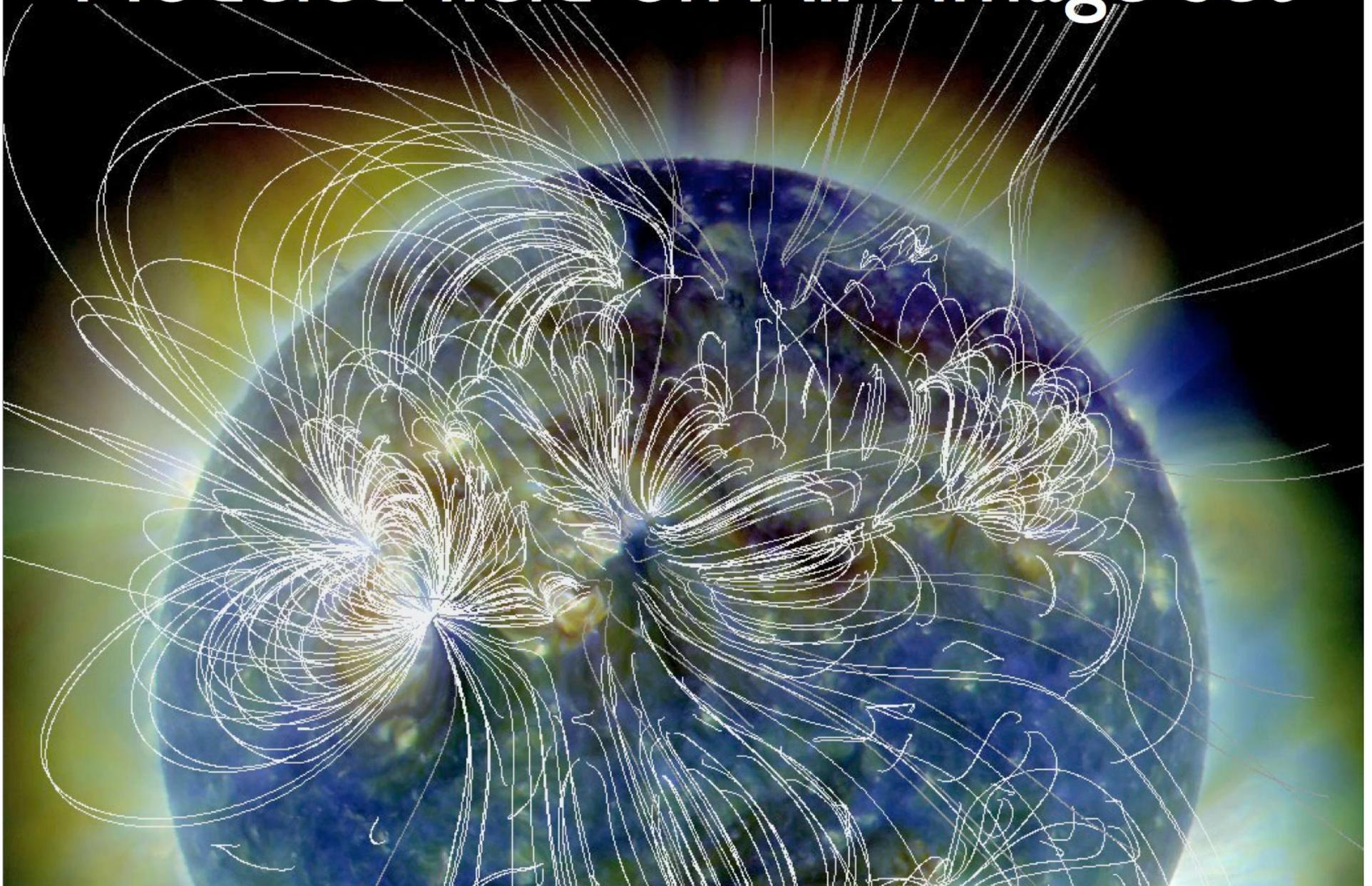


SDO/AIA 304A



STEREO Ahead

Modeled field on AIA image set



Eruptions and flares: *frequently coupled across large distances*

