



SOS Ed Forum



Heliophysics Big Year
ELP-SOS Workshop
&
Valentine's Day 🧡

Feb 14, 2024



2024 Environmental Literacy Program and
Science on a Sphere Joint Workshop

GLOBAL TO LOCAL



Using Data and Visualizations to
Build Community Resilience

May 7-9, 2024
The Wild Center • Tupper Lake, NY



naaee



It's almost time to get together!



Updates to webinar recordings

Find webinar slides here: <https://sos.noaa.gov/education/education-forum/>

Contact me for a link to webinar recordings

Recordings are shared with the network for personal viewing only

If you have likeness or profile concerns, please keep your camera and microphone off and use chat for discussions

Agenda

Bryan Mendez & John Erickson, University of California Berkeley Planetarium at the Lawrence Hall of Science

- Solar Synoptic Map Building -
<https://sos.noaa.gov/catalog/datasets/solar-synoptic-map-building/>
- COFFIES - Consequences of Fields and Flows in the Interior and Exterior of the Sun - Drive Center
- Feedback on a magnetic field new dataset in production

ELP-SOS Workshop Q/A

SOS Datasets for HBY from COFFIES

SOS Educators' Forum, 2024.02.14

Bryan Mendez, Space Sciences Laboratory and The Lawrence Hall of Science, Berkeley

John Erickson, formerly of The Lawrence Hall of Science, Berkeley

Ellen Thompson, The Lawrence Hall of Science, Berkeley

Asia deGraw, The Lawrence Hall of Science, Berkeley

SOS: Science **O**n a **S**phere (You knew that.)

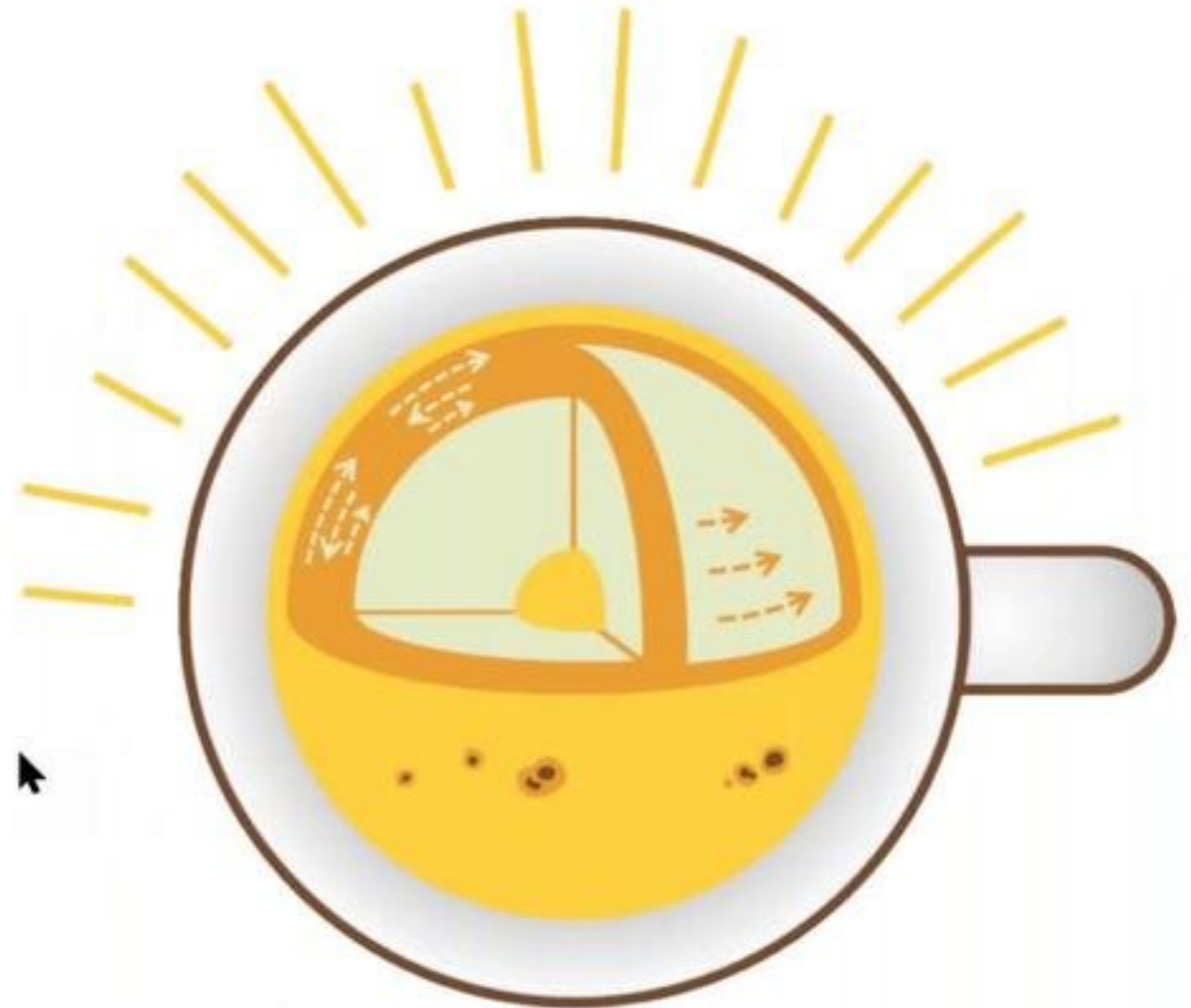
HBY: Heliophysics **B**ig **Y**ear (You probably knew that too.)

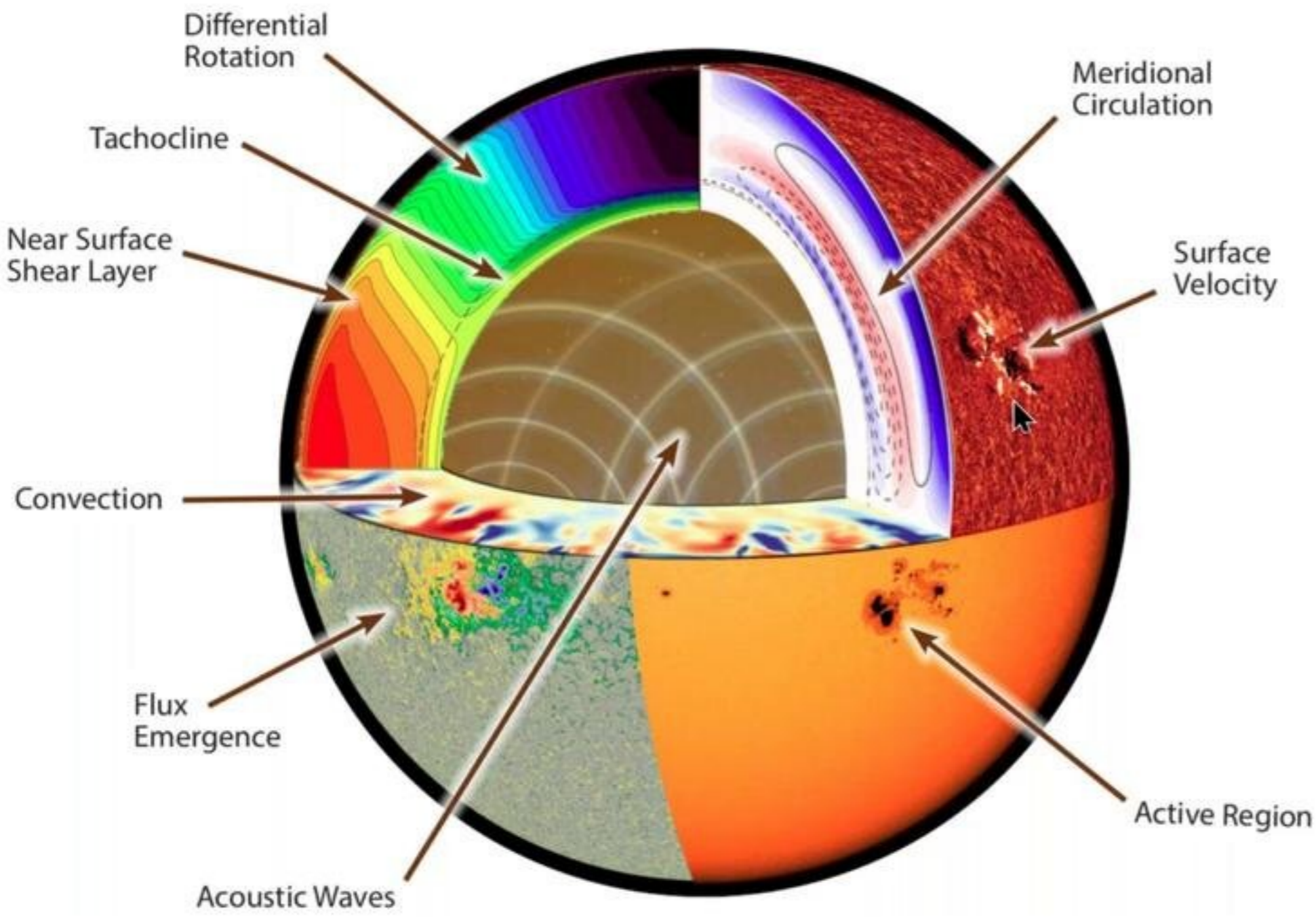
COFFIES: **C**onsequences **O**f **F**ields and **F**lows in the
Interior and **E**xterior of the **S**un (Now you know.)

About COFFIES

Consequences **O**f **F**ields and **F**lows in the **I**nterior and **E**xterior of the **S**un

- One of three NASA-funded Heliophysics Phase II DRIVE Science Centers (DSC)
- Based at Stanford, but includes heliophysics researchers across the country.
- Like all NASA projects, COFFIES has a 'Broader Impacts' component, including public outreach.
- <https://coffies.stanford.edu>





The Scope of COFFIES Research

All of this is happening in and on the Sun!

This year, 2024, it is happening especially actively, as it does about every 11 years.

About the Heliophysics Big Year (HBY)

- It's a big year—The peak of the 11-year solar cycle.
- It's a big year—15 months!
10/2023 through 12/2024
- Each month has a theme.
- <https://science.nasa.gov/sun/helio-big-year>



Themes for HBY

<https://www.nasa.gov/science-research/heliophysics/nasa-announces-monthly-themes-to-celebrate-the-heliophysics-big-year/>

October 2023 – Annular Eclipse

November 2023 – Mission Fleet

December 2023 – Citizen Science

January 2024 – The Sun Touches Everything

February 2024 – Fashion

March 2024 – Experiencing the Sun

April 2024 – Total Solar Eclipse

May 2024 – Visual Art

June 2024 – Performance Art

July 2024 – Physical and Mental Health

August 2024 – Back to School

September 2024 – Environment and Sustainability

October 2024 – Solar Cycle and Solar Max

November 2024 – Bonus Science

December 2024 – Parker's Perihelion

"We hope these themes will **get everyone excited about participating in the Heliophysics Big Year**, whether it's watching an eclipse, creating art inspired by our Sun, or any of the many activities in between," said Peg Luce, acting director of NASA's Heliophysics Division at NASA Headquarters in Washington.



Sun: Helium Wavelength (AIA 304)

SOS

Explorer

Added on

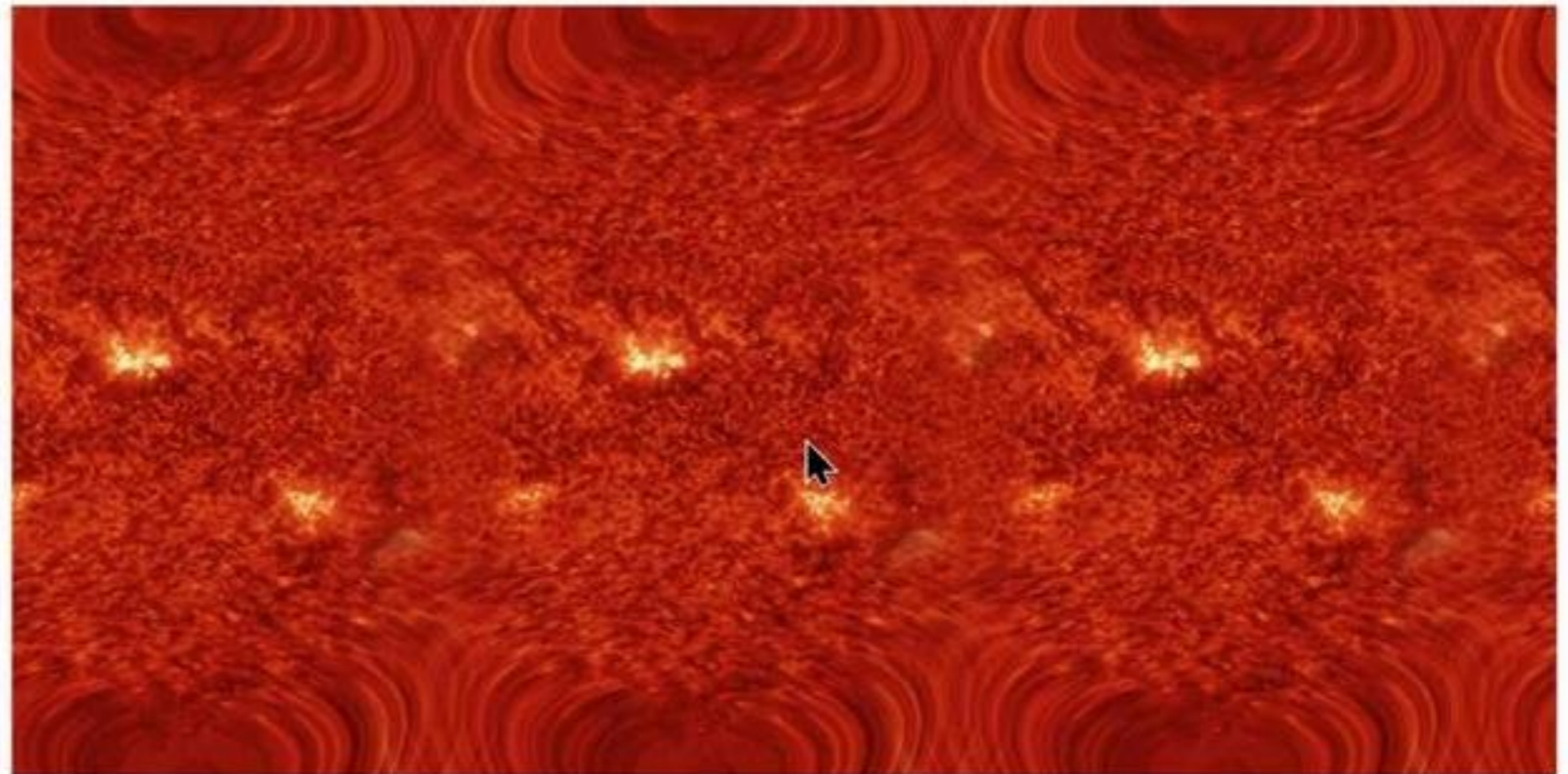
October 20, 2014

October 20, 2014

Add to Playlist



One way to make a full-sphere
image of the Sun

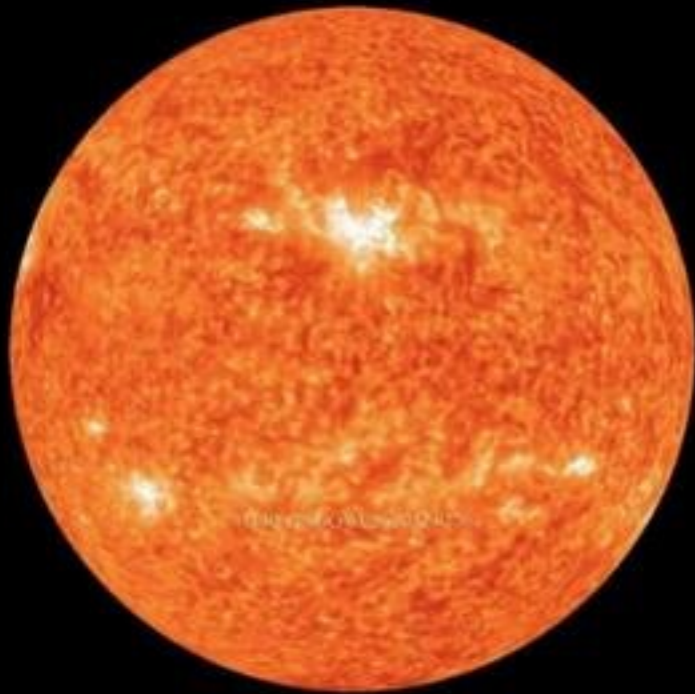


Sun: STEREO/SDO (ionized helium) - Real-time

SOS

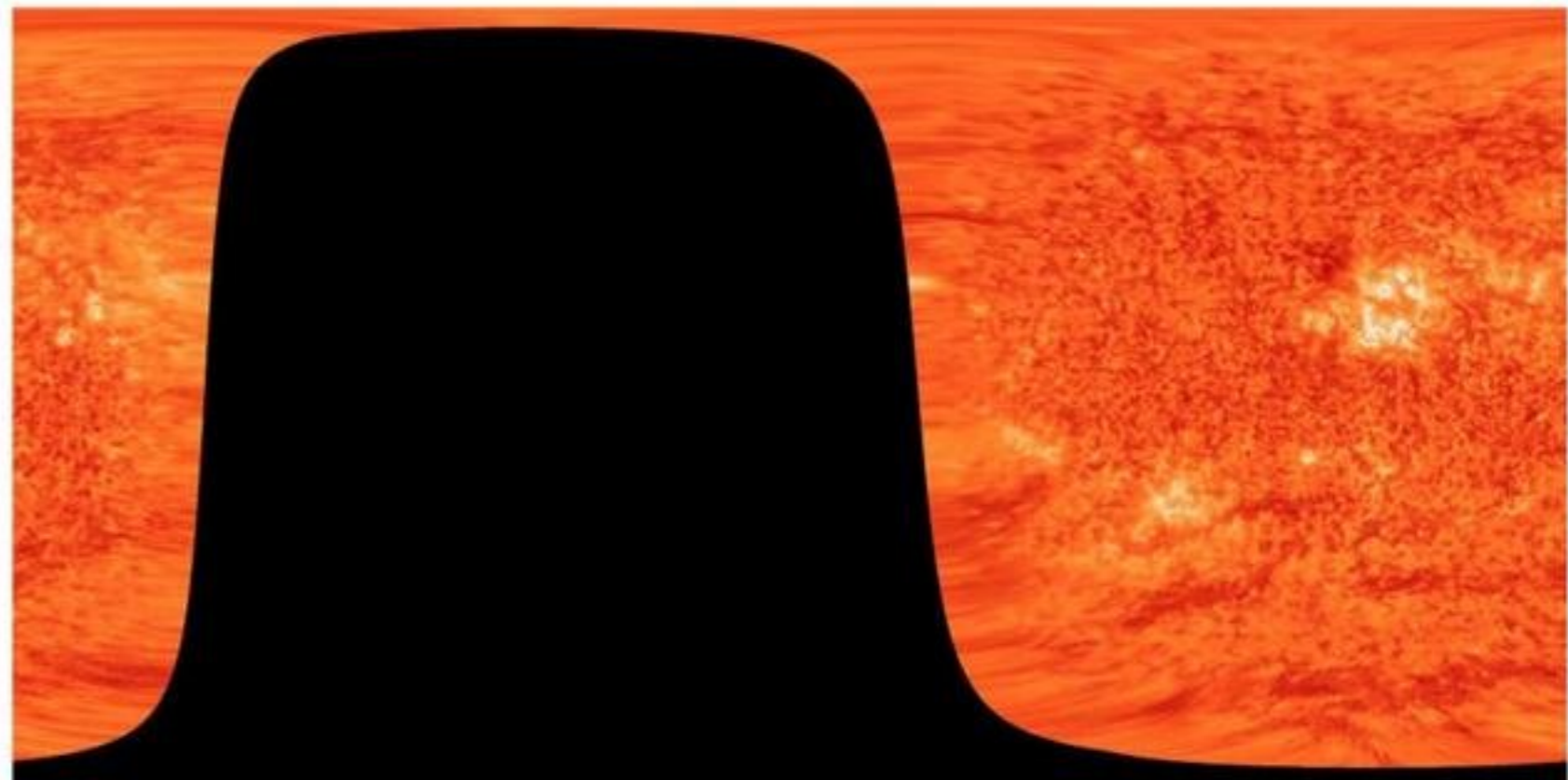
Added on
September 30, 2011

Add to Playlist



One way to maximize coverage of the sphere with real data

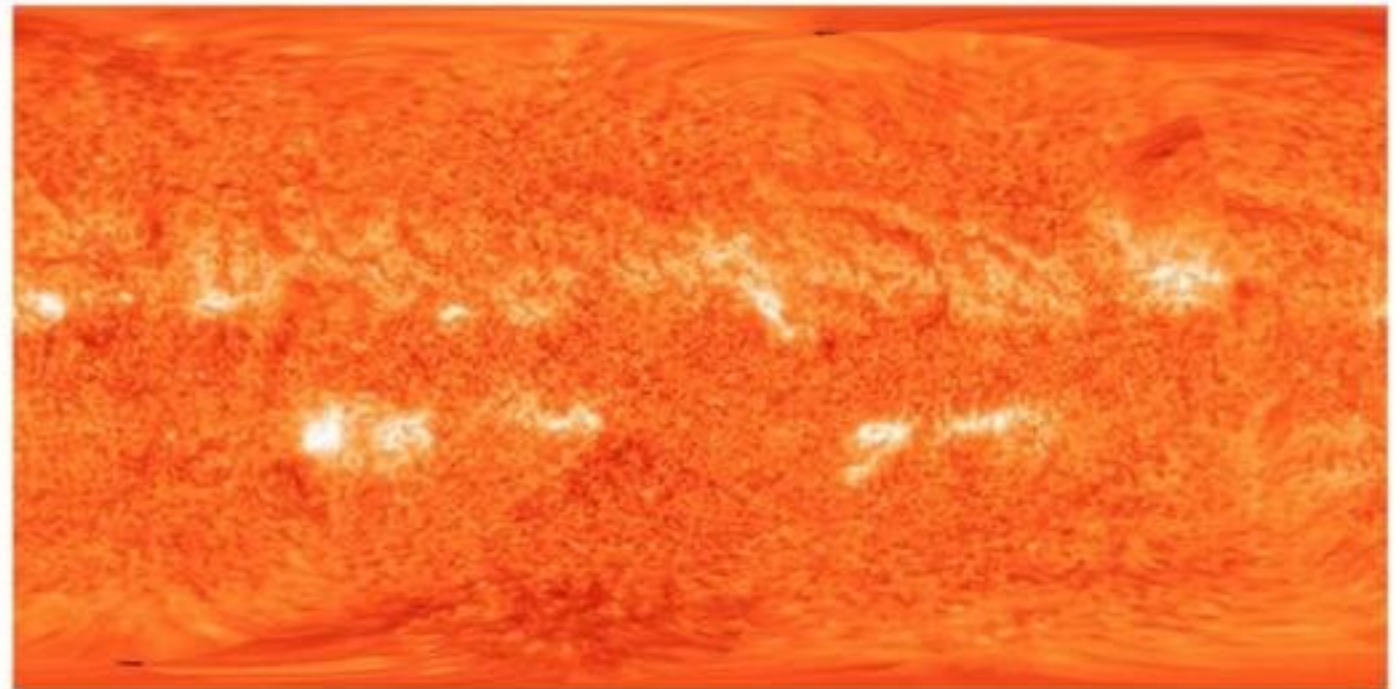
Combined images from Stereo A and SDO, 2022.11.11



Just an aside about the STEREO Mission and SOS

- STEREO-Ahead and STEREO-Behind were launched in 2006. They orbit the Sun.
- STEREO A has an orbital period of 347 days. STEREO B had an orbital period of 387 days.
- Combined images often reminded SOS viewers of Pac Man because of the missing data when the two were not on opposite sides of the Sun.
- STEREO B was always the problem child. It had many issues that were successfully worked through, until 2014 when we lost communication with it entirely
- Now the SOS dataset uses STEREO A, which orbits the Sun just a little faster than Earth, and SDO which is in Earth Orbit.

Heliographic map made with combined data from STEREO-Ahead and STEREO-Behind from Dec. 30, 2011 when the two spacecraft were nearly opposite the Sun.



Another aside about the “Pizza Sun”

PRO

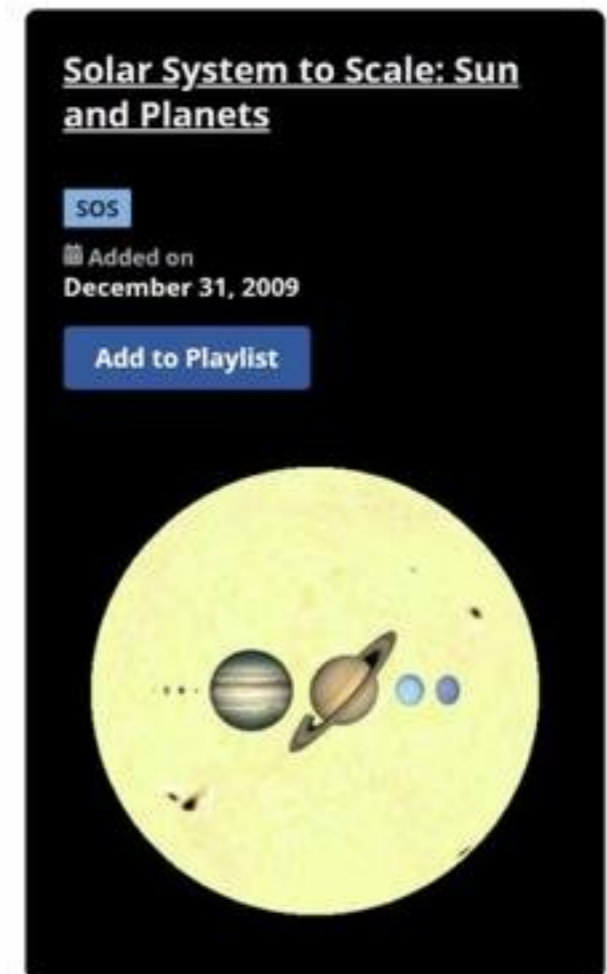
- Excitement and engagement,
- Shows the dynamism of the Sun,
- Opportunity to demonstrate how scientists learn from different areas of the EM spectrum.

CON

- Different from people’s actual experience of the Sun,
- Naive viewers (in the most positive sense of the word) may not even believe that our Sun is the topic of the image,
- Promotes misconception that the Sun is not white. (Our ‘yellow’ star is the essence of whiteness.)

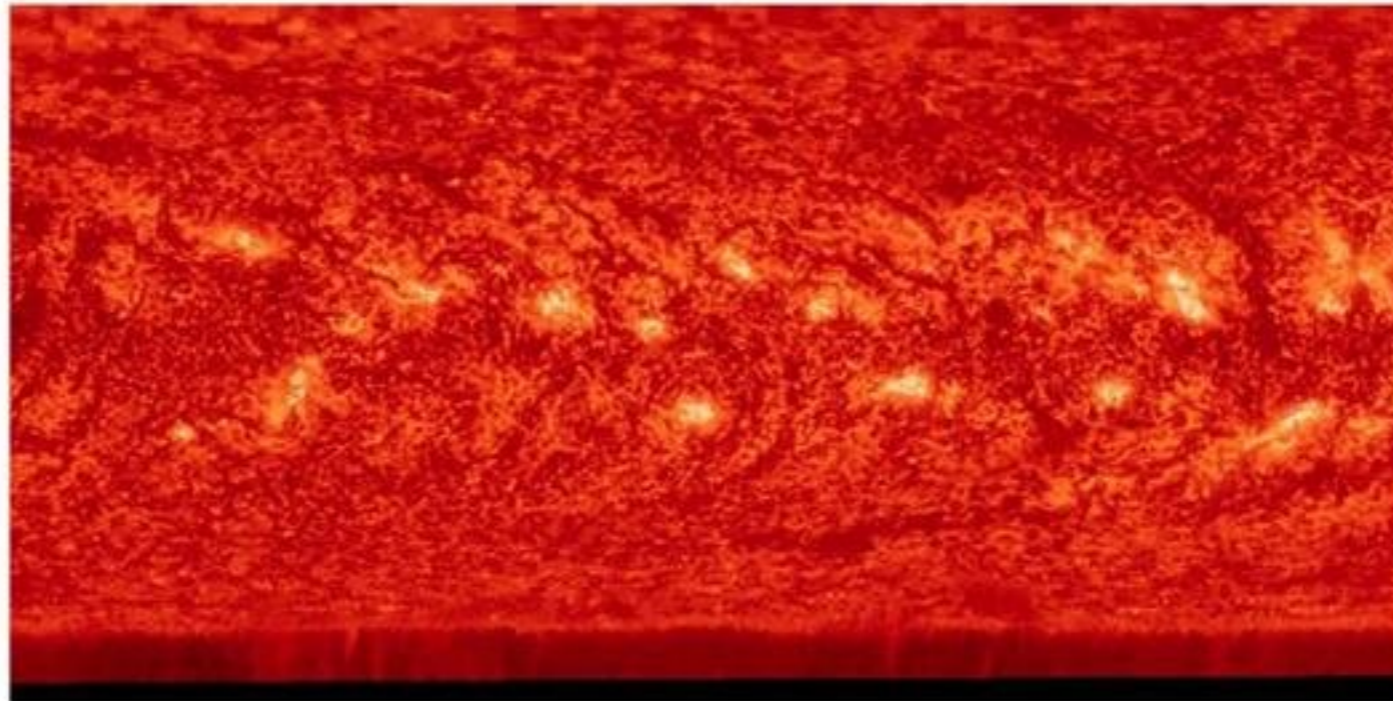


Pizza Sun is almost always the default representation.



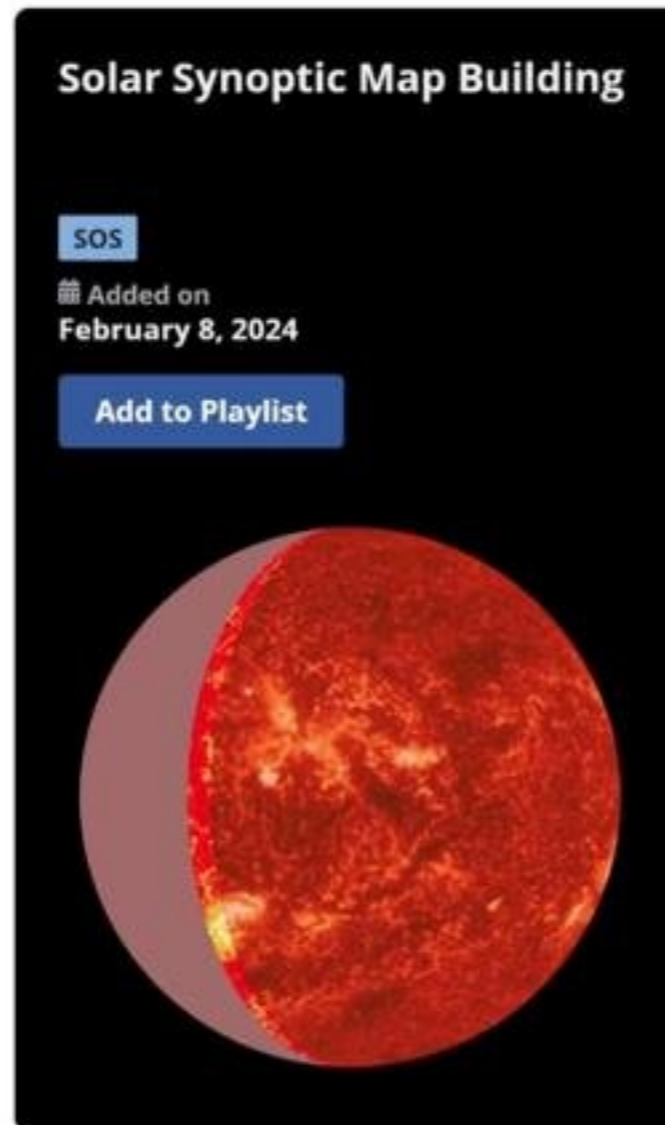
Closest thing I know of to a realistic visual Sun on SOS.

Another way to maximize coverage of the Sphere with real data: a Synoptic Map.



This image comes from a single spacecraft, the Solar Dynamics Observatory. How did SDO capture so much of the surface of the Sun?

Break here to watch and discuss videos of Synoptic Map dataset.





CREATING A SYNOPTIC MAP

From near Earth
we see only one
side of the Sun.

10/1
2023

Solar Dynamics Observatory

From near Earth
we see only one
side of the Sun.

(See other side.)

0:00:00

0:00:36

Synoptic_Map_2048



A synoptic map of the Sun, showing a vertical strip of solar activity. The strip is highlighted in a bright orange-red color, indicating a region of high solar activity. The background is a dark brownish-orange color, representing the rest of the Sun's surface. A mouse cursor is visible over the strip.

Here is a strip
from the center
of a solar image.

10/1
2023

Solar Dynamics Observatory

From near Earth
we see only one
side of the Sun.

(See other side.)

0:00:06

0:00:30

Synoptic_Map_2048





Here is a strip
from the center
of a solar image.

From near Earth
we see only one
side of the Sun.

(See other side.)

10/1
2023
Solar Dynamics Observatory



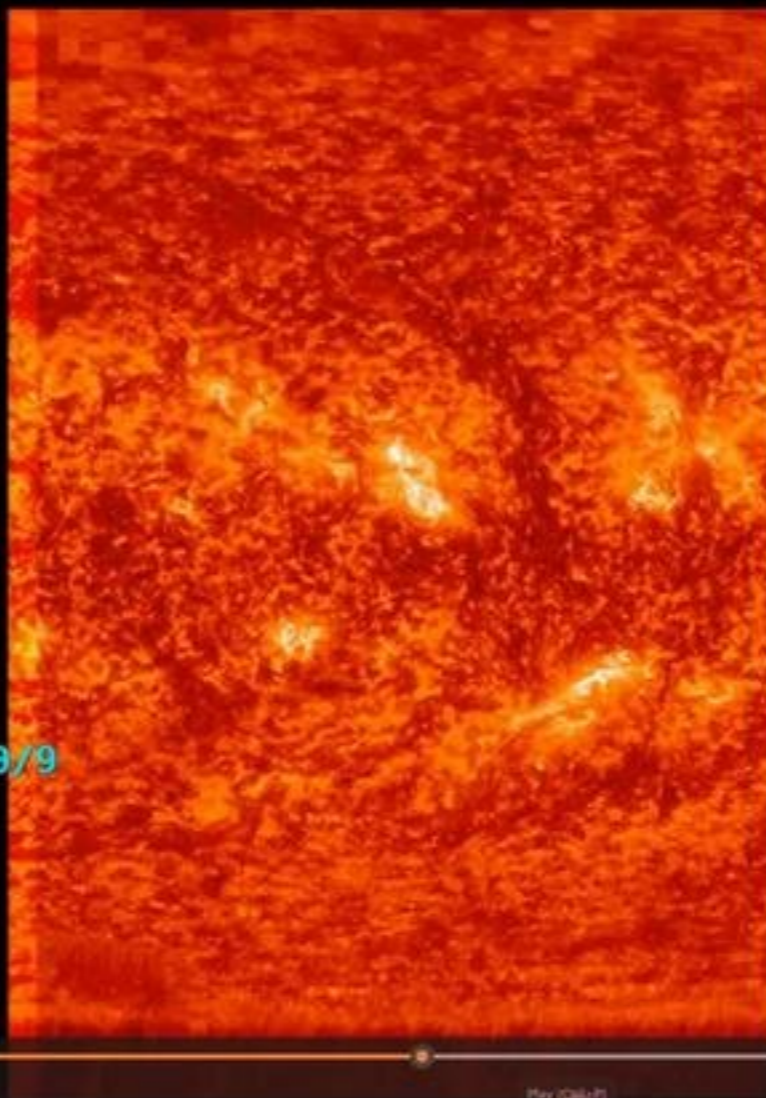
00:07 00:29

Synoptic_Map_2048



As the Sun slowly rotates, a new strip is recorded every six hours.

10/9



00:015

Synoptic_Map_2048



00:021



Here is a strip
from the center
of a solar image.

10/1

26
Solar Dynamics Observatory



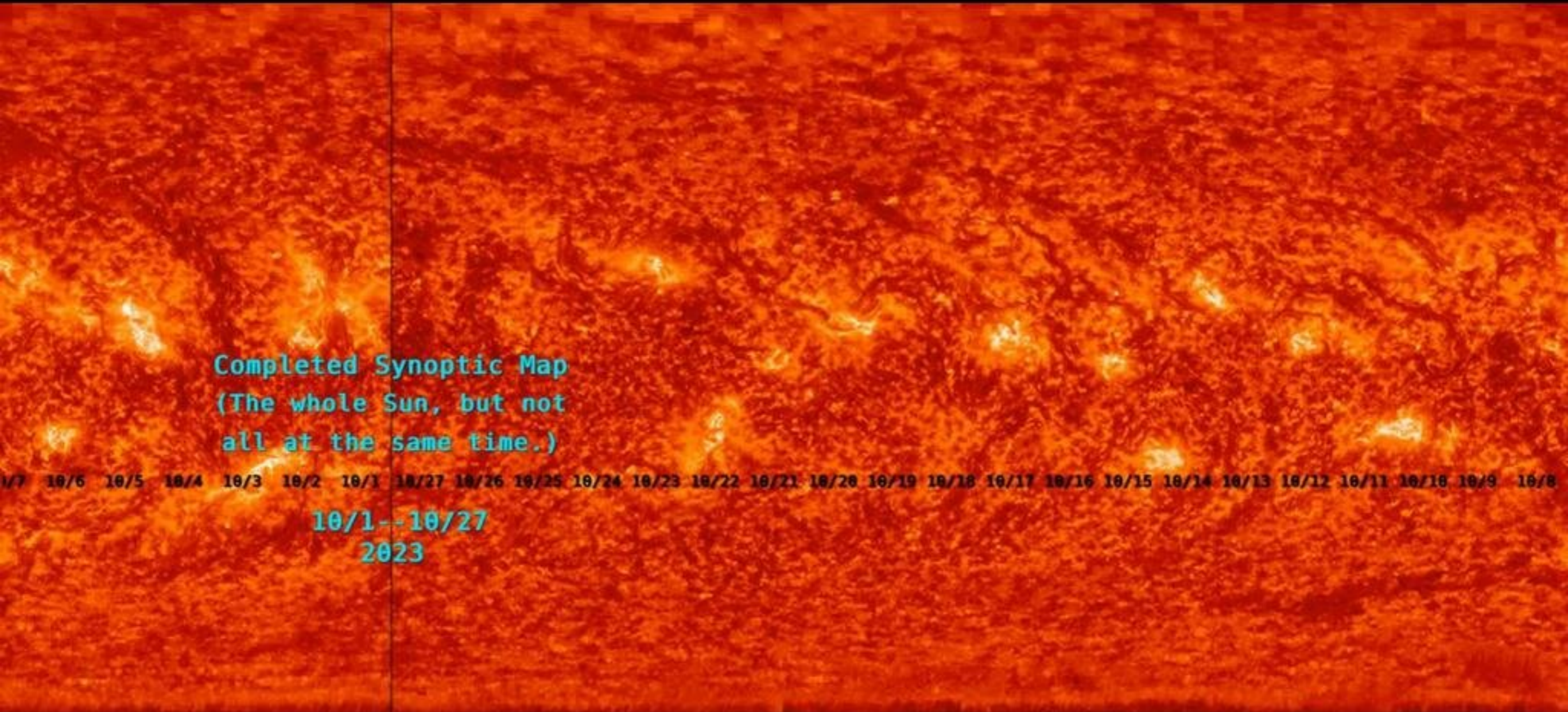
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Synoptic_Map_2048

⏪ ⏩ ⏮ ⏭ ⏯

⏮ ⏭ ⏯

⏮ ⏭ ⏯



Completed Synoptic Map
(The whole Sun, but not
all at the same time.)

10/1--10/27
2023

10/7 10/6 10/5 10/4 10/3 10/2 10/1 10/27 10/26 10/25 10/24 10/23 10/22 10/21 10/20 10/19 10/18 10/17 10/16 10/15 10/14 10/13 10/12 10/11 10/10 10/9 10/8

0:00:30

0:00:06

Synoptic_Map_2048

Play (Ctrl+P)



0:00:36

SynopticMapOnSOSatLHS



0:00:02



UC Berkeley x Insa.com/... x SOS Educat... x SOS Educat... x Sun's Carrin... x (1) Facebook x

https://docs.google.com/presentation/d/1aVLWkR0XB4IGM8T-dGwlpRC4gEab55-bLI7sGnU2HB/edit#slide=id.g...

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File Edit View Insert Format Slide Arrange Tools Extensions ...

Fit - Background Layout Theme Transition

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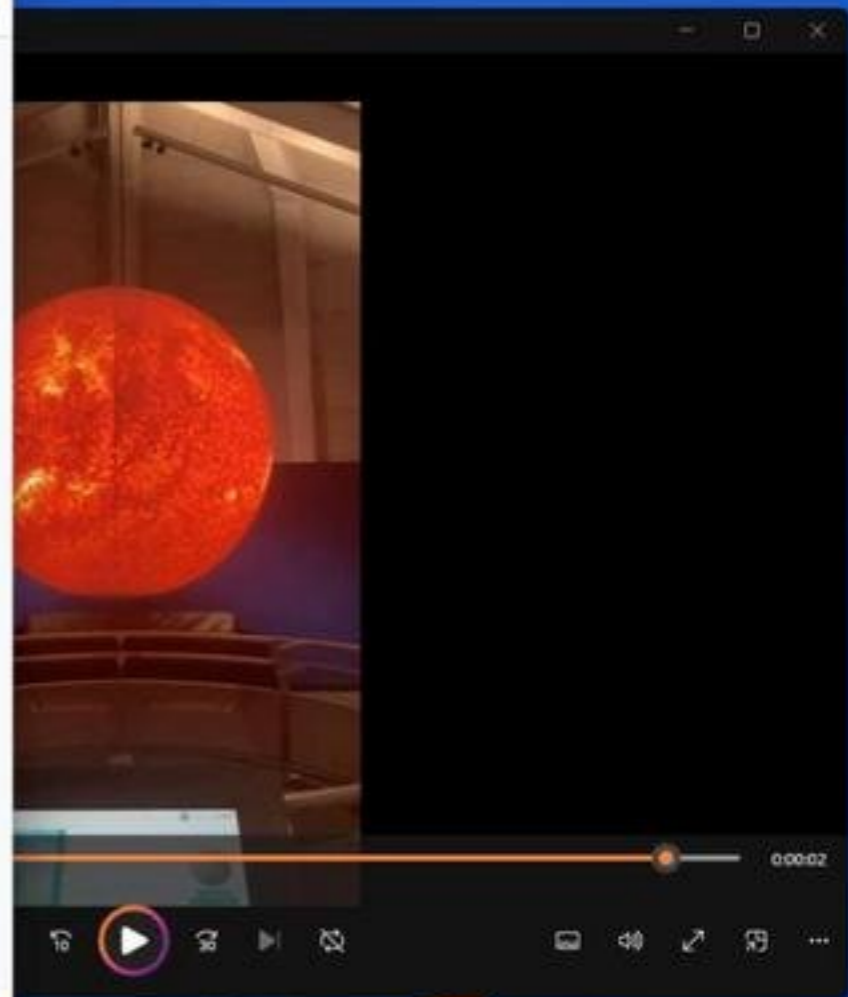
Break here to watch and discuss videos of Synoptic Map dataset.

Solar Synoptic Map Building

Added on February 8, 2024

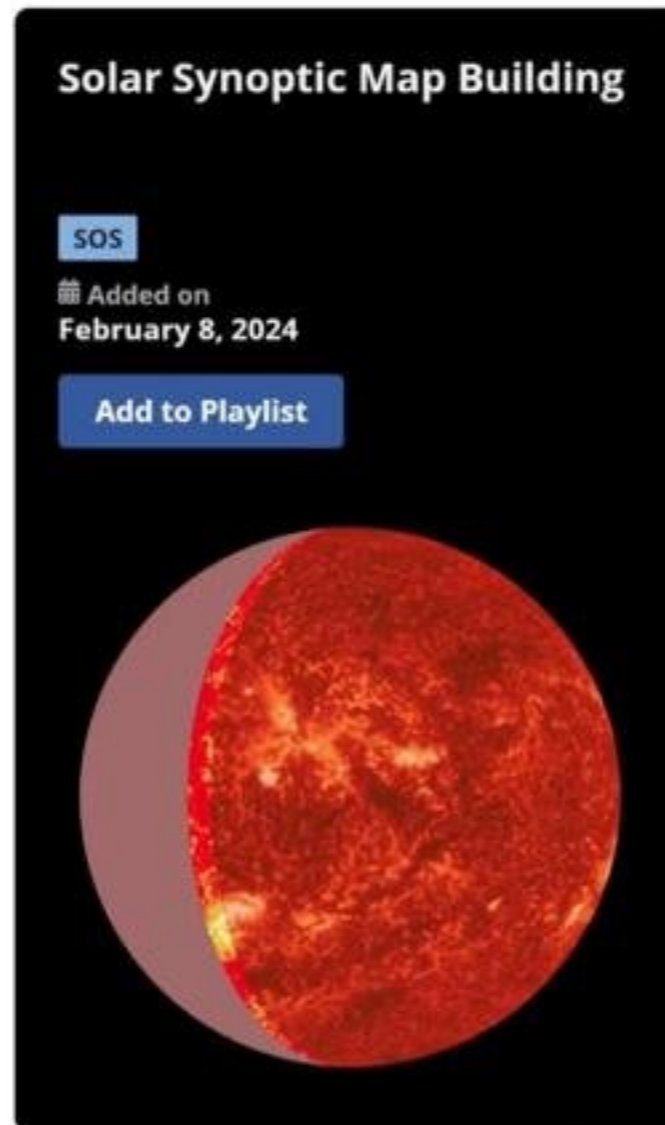
Add to Playlist

Click to add speaker notes

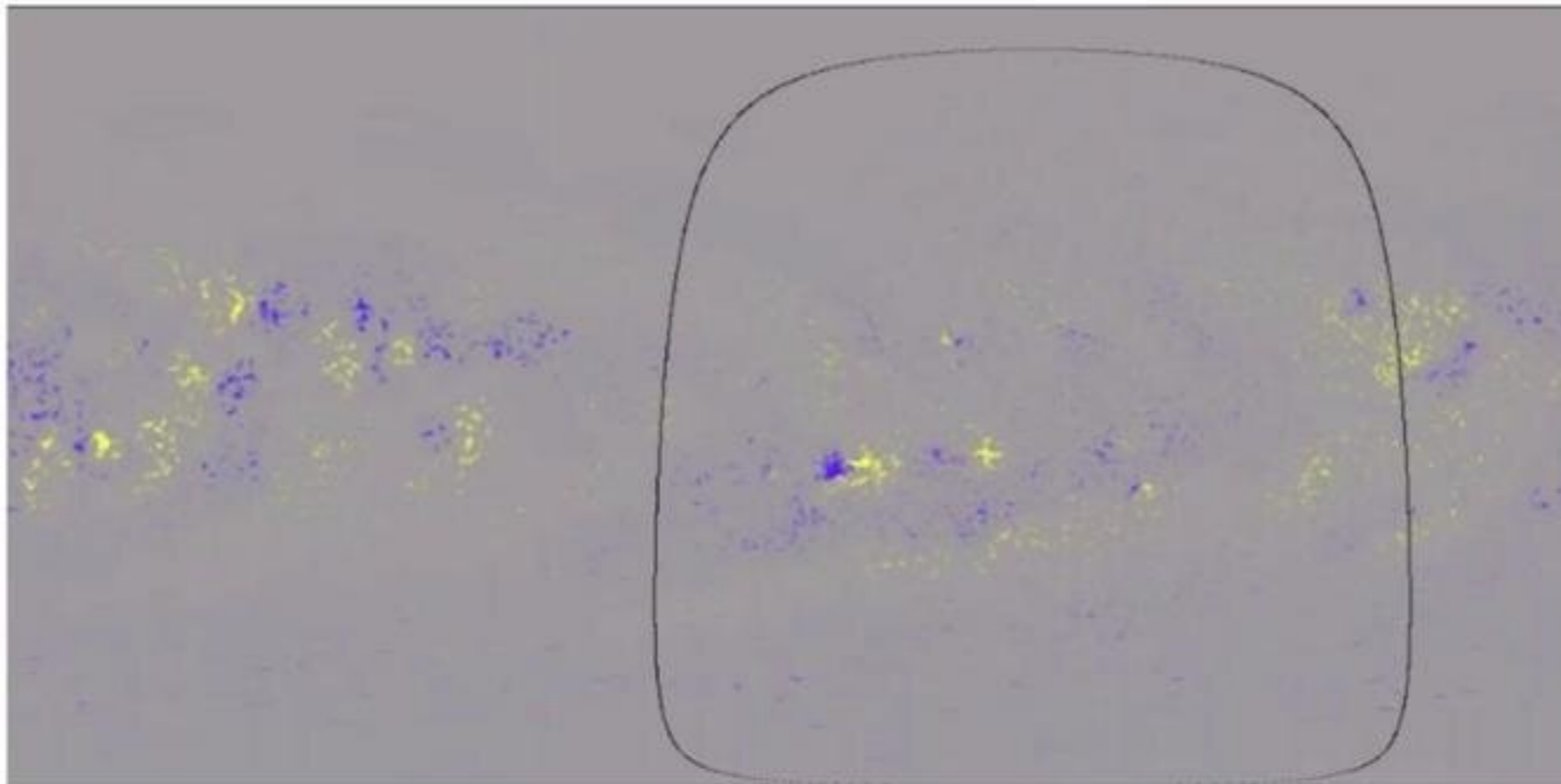


Press **Esc** to exit full screen

Break here to watch and discuss videos of Synoptic Map dataset.



Another way to maximize coverage of the Sphere:
Modeling



Observed magnetic data for the Earth-facing side of the Sun,
combined with data modeled from helioseismological data.



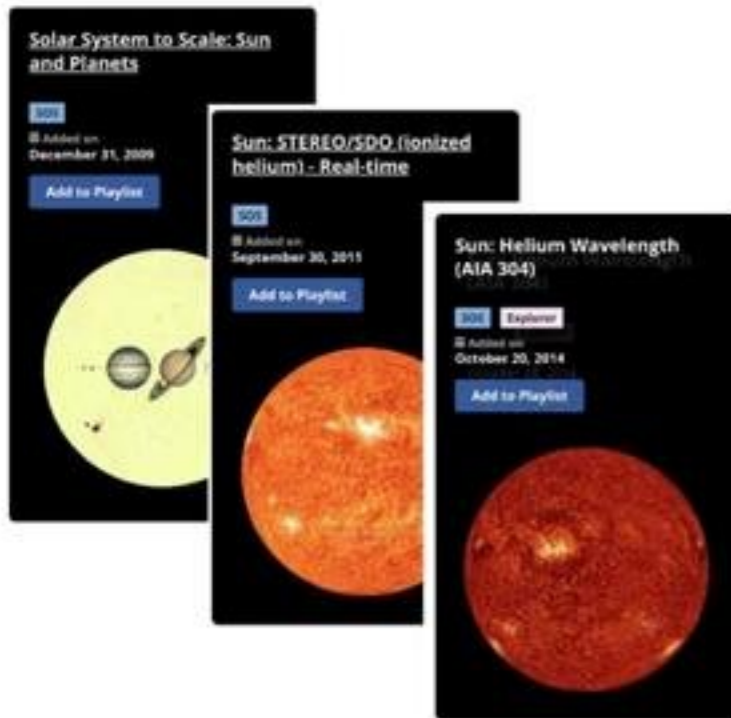
Break here to watch videos of Magnetic Sun datasets to be developed.

- What changes, patterns, or other interesting things do you observe during an 11 year solar cycle?
- What concepts could be illustrated by all or part of this data?
- How could all or part of this data be used to:
 - Simply inspire curiosity and engagement?
 - Tell a story that illustrates a specific concept?
 - Be an asset for a facilitator who uses it as part of a story in a presentation.

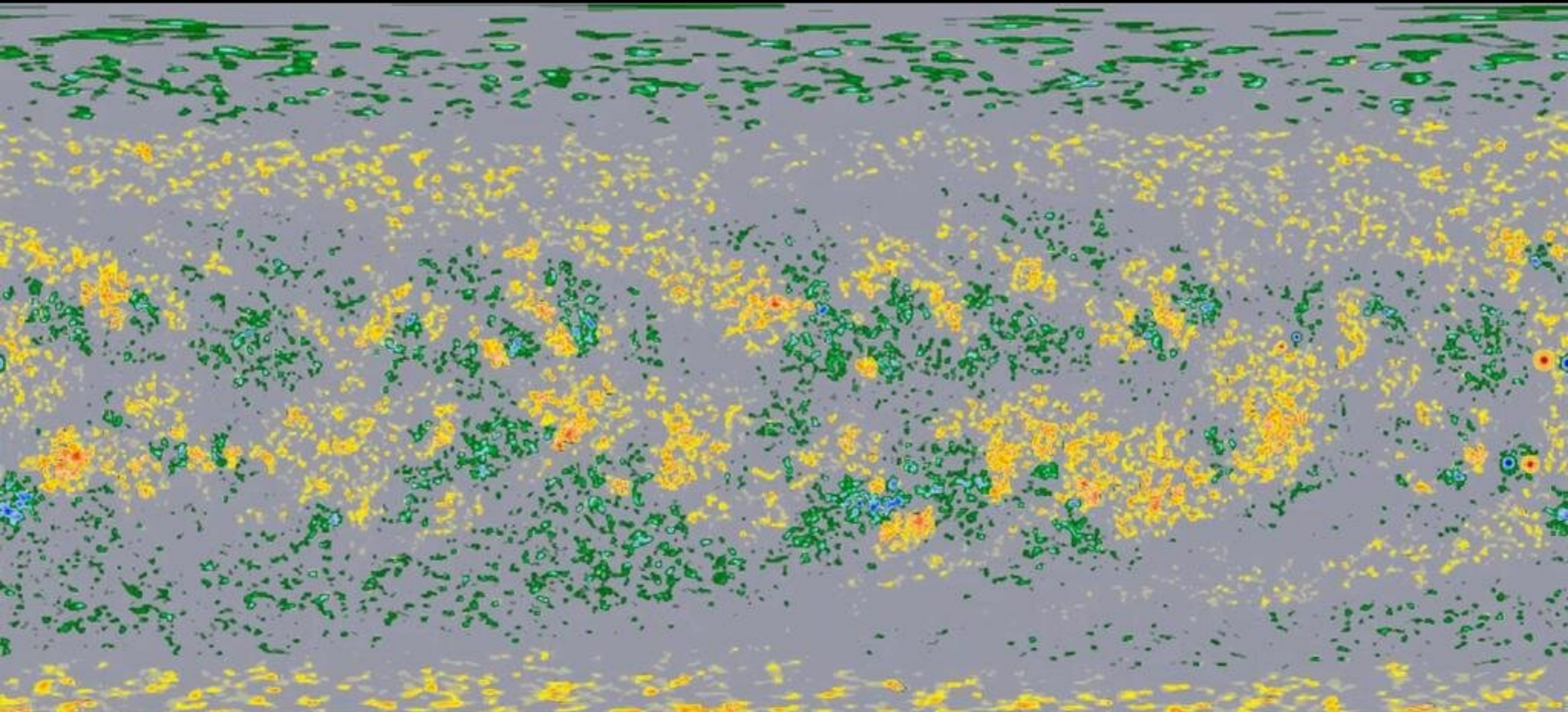
Dataset Spectrum

Pretty Picture
(curiosity and engagement)

Full Story
(deep dive into concepts)



[Live Programs](#)



00:58

00:58

cycle19 (1)



UC Berkeley | lmsa.com | SOS Educat... | SOS Educat... | Suni Carrin... | (1) Facebook

https://docs.google.com/presentation/d/1aVLWkR0XB4IGMBT-dGwlpRC4gEab55-bLITsGnU2HB/edit#slide=id.g...

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File Edit View Insert Format Slide Arrange Tools Extensions Help

Fit Background Layout Theme Transition

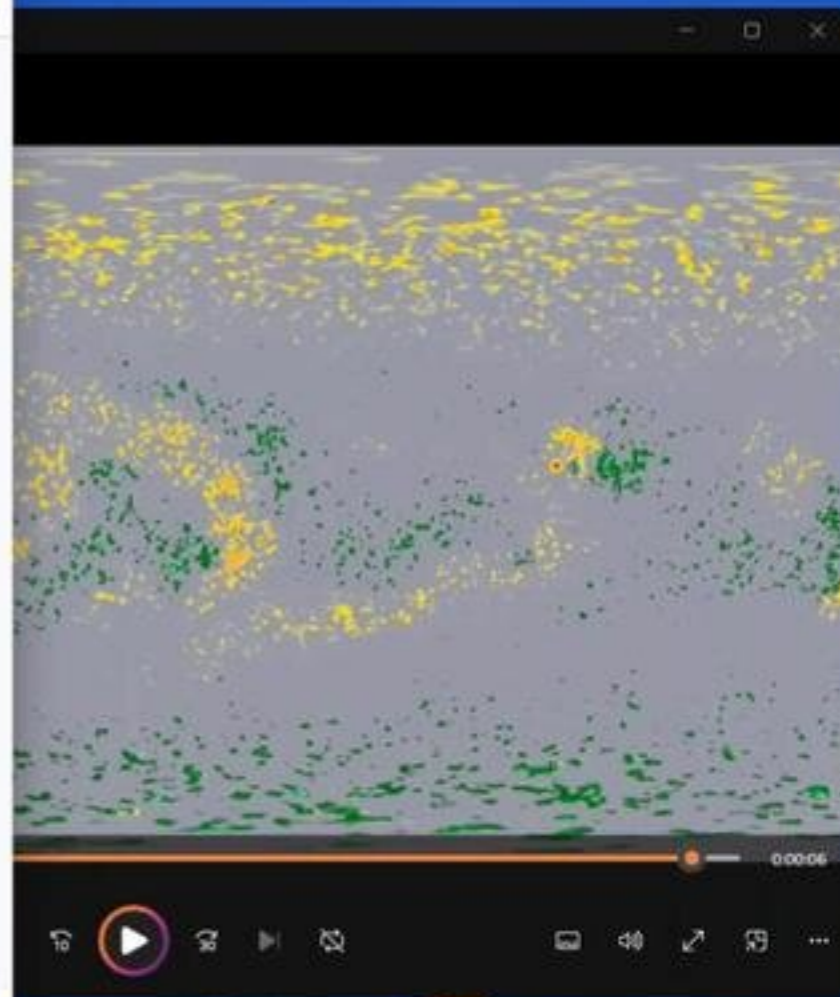
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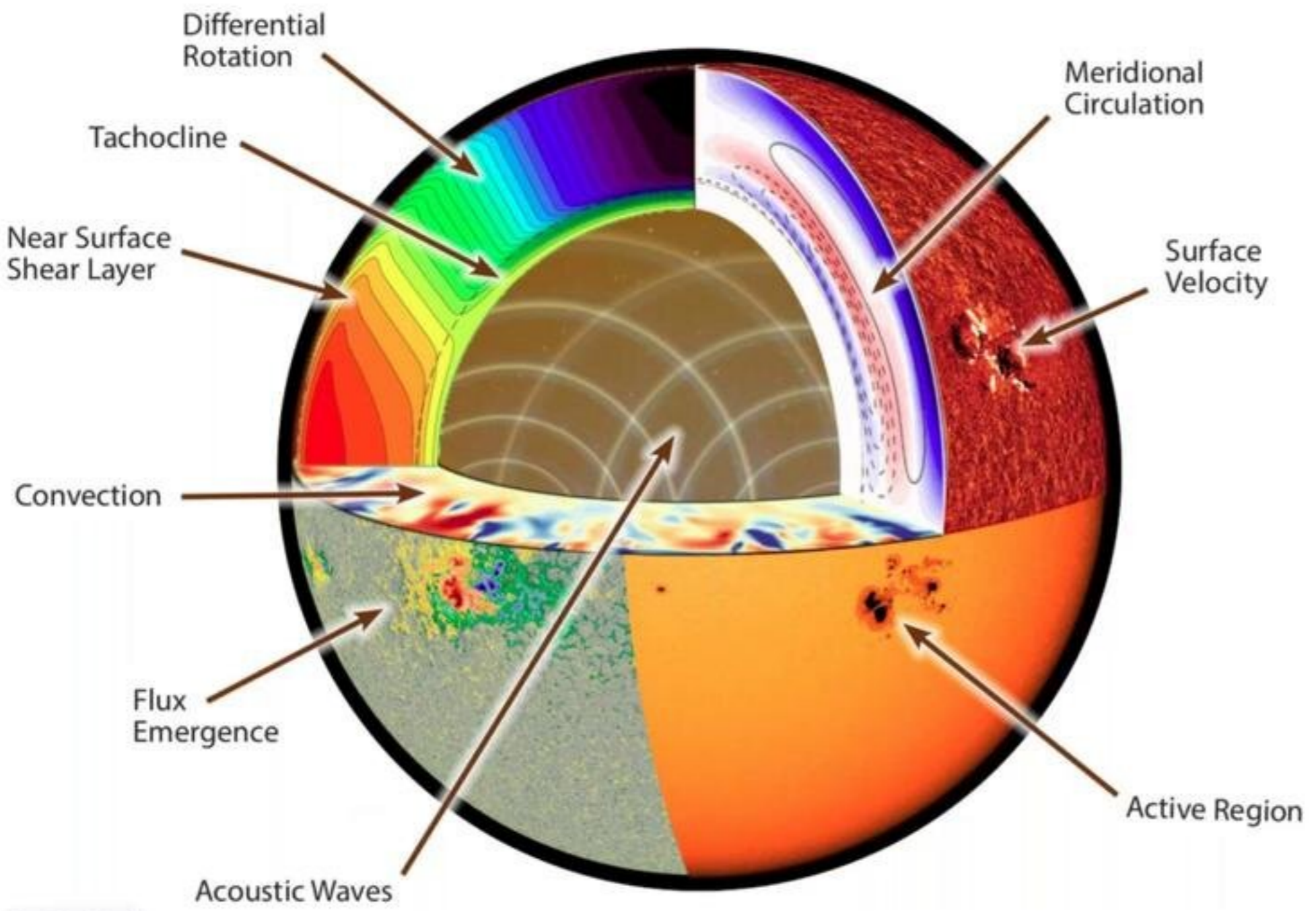


Click to add speaker notes



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- Videos
- ConvectionN
- Birds
- Synoptic Map
- Educators for
- COFFIES thin
- Creative Clou
- This PC
- OS (C:)
- Network

17 items 1 item selected 26.4 MB



All of this is happening in and on the Sun!

This year, 2024, it is happening especially actively, as it does about every 11 years.



An Invitation:

Scientists in COFFIES are working in many areas of heliophysics research.

Is there a heliophysics dataset that you would like to see?
Let us know! Maybe we can make it for you.

jerick@berkeley.edu

bmendez@ssl.berkeley.edu