

CITIZEN CATE 2024: DISTRIBUTED OBSERVATIONS OF THE 8 APRIL 2024 ECLIPSE WITH COMMUNITY VOLUNTEERS



Photo: Citizen CATE project

Corona captured with a polarizing CATE telescope during the April 20, 2023 eclipse in Australia reveals detailed structure and polarization of the Sun's visible corona. Pseudo-color shows the direction of polarization.

- Polarization yields 3D structure
- Multiple sites yield unique 1-hr view of the detailed evolving corona to resolve important solar science
- Citizen science helps a major NASA mission





80NSSC21K0798, 80NSSC23K0946
31658, (+ pending)

April 8, 2024



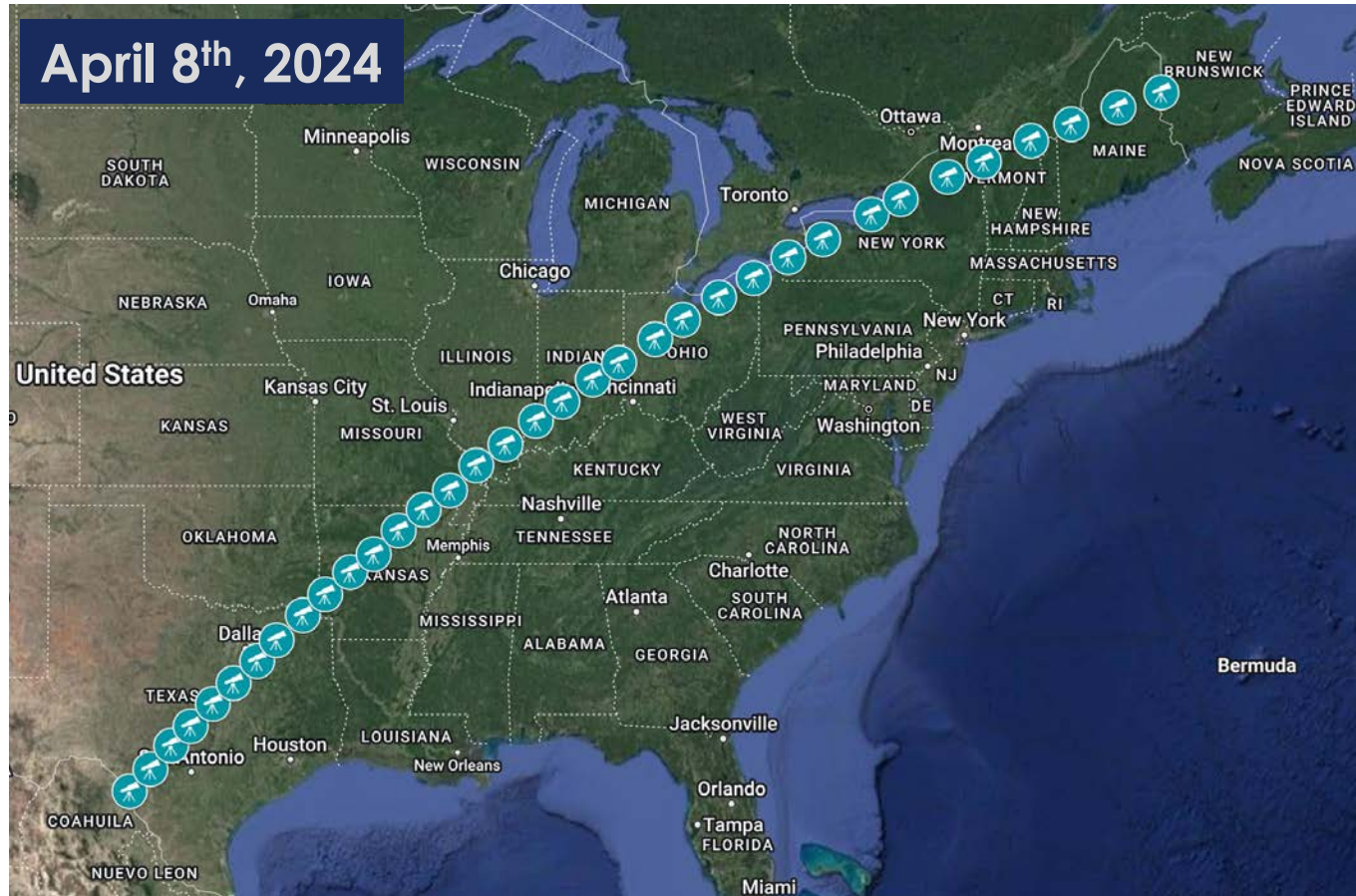
US Eclipse End (ME)
19:35 UT

Maximum duration of totality:
4 min 27 sec

Time scale of coronal changes:
~30-60 minutes

US Eclipse Start (TX)
18:30 UT

CITIZEN CATE 2024: MULTIPLE TELESCOPES FOR A LONGER “EFFECTIVE ECLIPSE”



- 60-minute movie of totality
- 40+ identical observing setups
- Observations by qualified volunteers
- CATE project provides equipment (telescope, camera, software, etc.) and hands-on training
- Unparalleled time-resolved study of the lower to middle solar corona



Contact: Dr. Amir Caspi, cate@boulder.swri.edu

Citizen CATE 2024 will deploy 35+ identical stations run by community scientists to capture a 60-minute movie of the inner solar corona in polarized light



R. Baer



S. Davis



R. Baer

Participant communities keep their telescope setups after the eclipse!

Interested? Contact us!

cate@boulder.swri.edu



Polarimeter to UNify the Corona and Heliosphere (PUNCH)

What: Four small satellites will image the Sun's outer corona and the inner solar system ("heliosphere").

When: Spring 2025, from Vandenberg Space Force Base (California) on a Space-X Falcon 9 rocket.

Where: Polar orbit, 400 miles above the dawn/dusk line, for a continuous view of the Sun and heliosphere

Why: to understand how the Sun produces space weather and the solar wind.

How: PUNCH polarized movies of the corona measure the flow of solar wind and space weather – in 3D.

Who: PI is Craig DeForest, craig.deforest@swri.org.

PUNCH is a NASA Small Explorer, being built by Southwest Research Institute, the U.S. Naval Research Laboratory, and UK's Rutherford Appleton Laboratory.

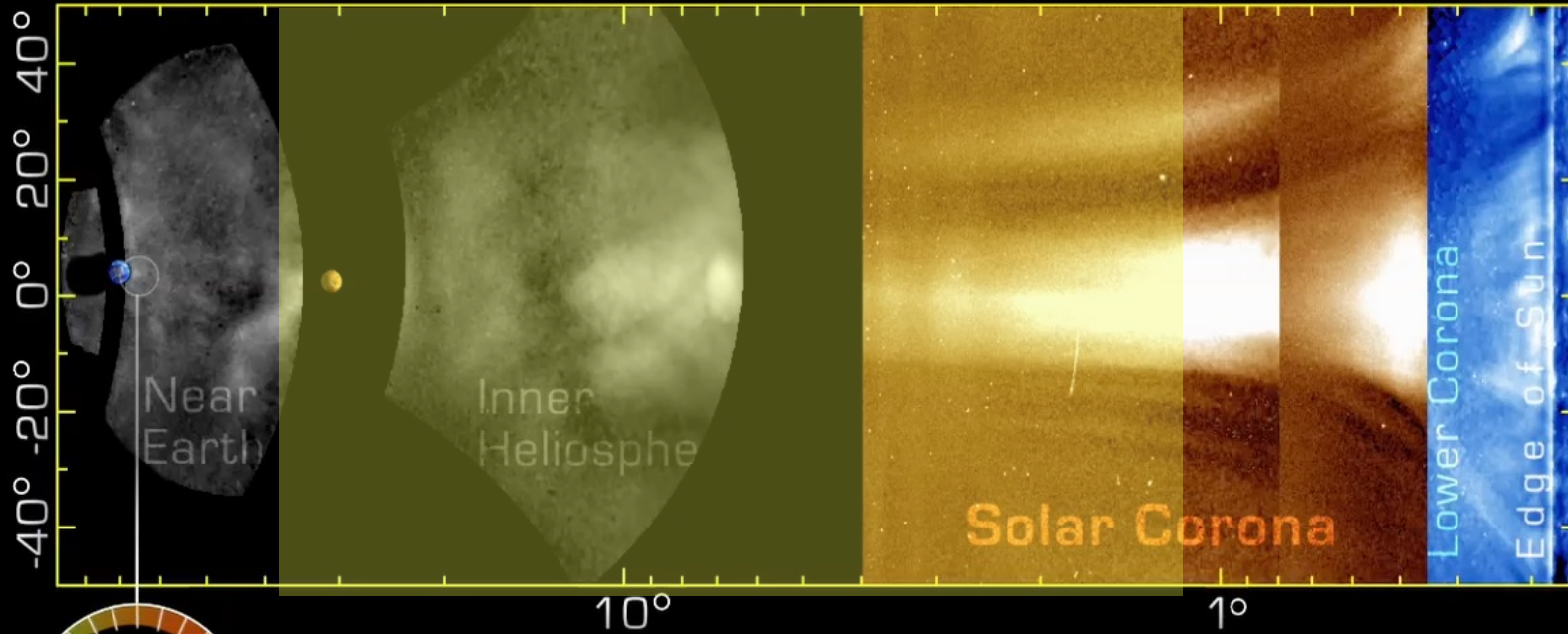




PUNCH will track space weather across the solar system -- beyond the naked-eye corona

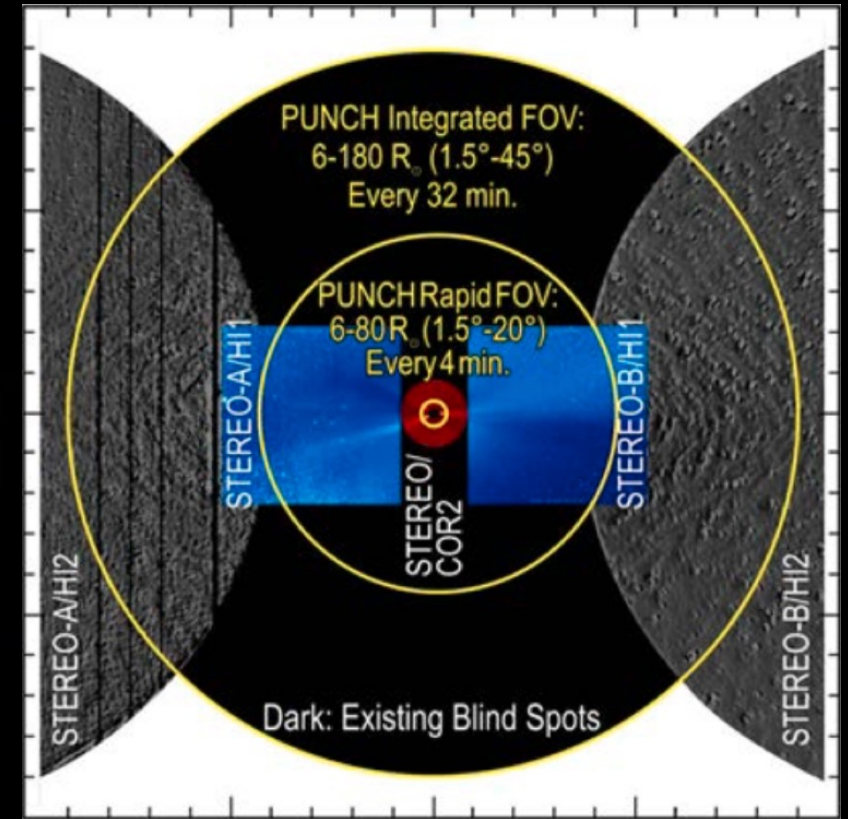


PUNCH FOV



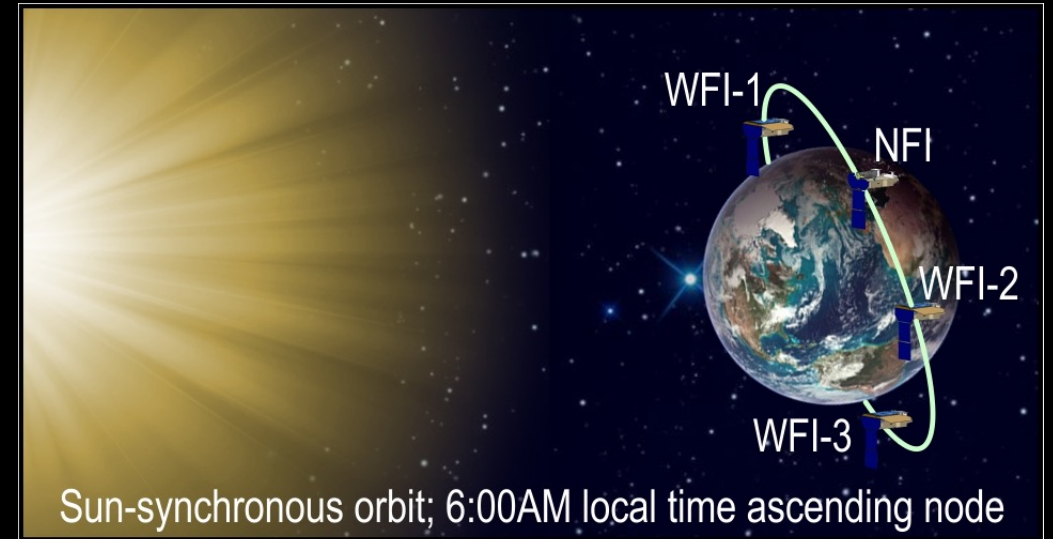
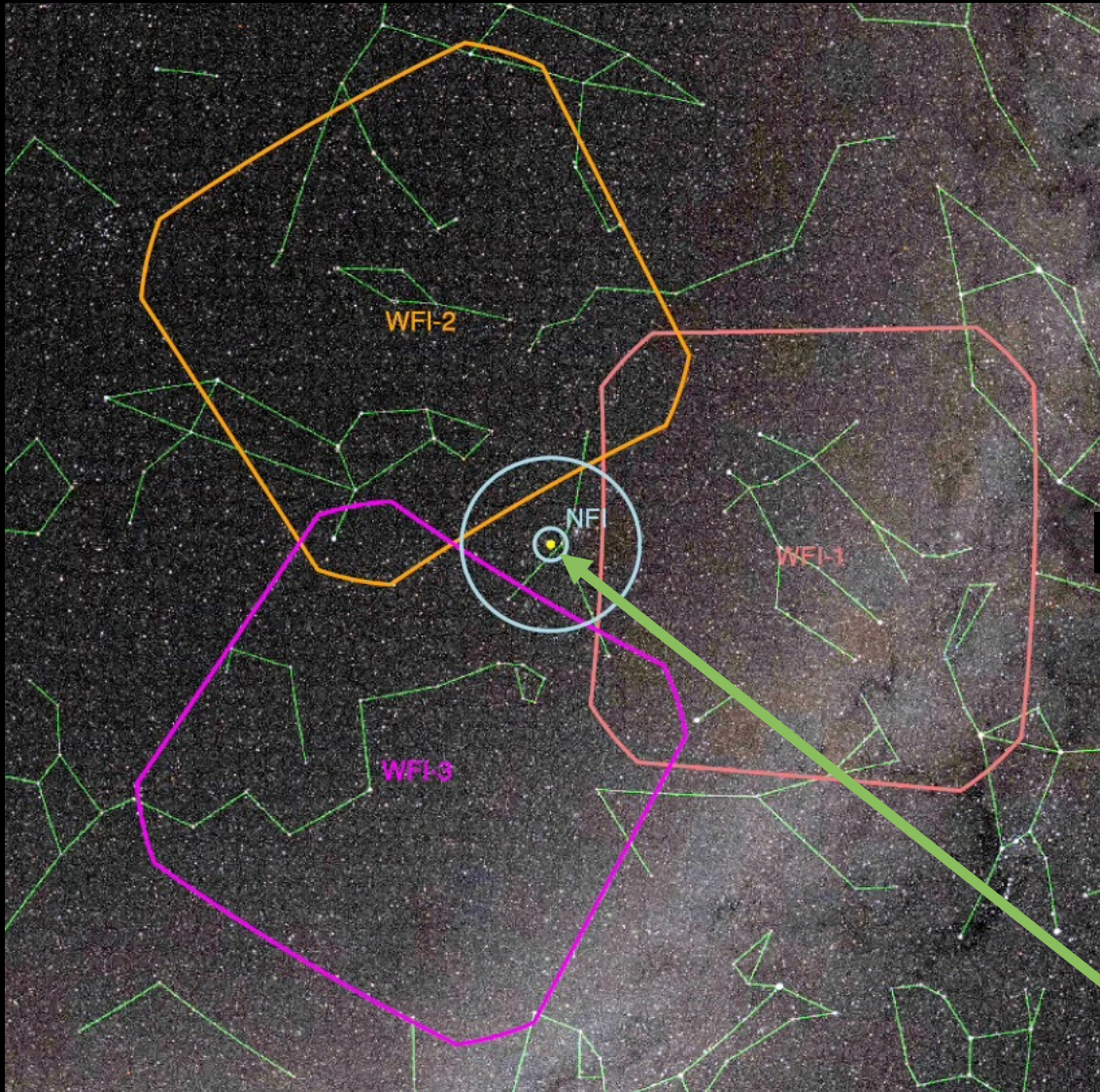
STEREO-A: 12/11/08 12:40:00 AM

PUNCH FOV: 1.5° to 45° from the Sun, full circle; polarized images every 4 minutes



HOW DOES PUNCH WORK?

PUNCH MERGES IMAGES TO CREATE A SINGLE LARGE FOV



- Entire constellation is synchronized to ~1 sec.
- Exposures are combined on the ground.
- CATE demonstrates seamless image merging.

Sun



M. Druckmuller, P. Aniol, S. Habbal (2017)



*Eclipse of
August 21, 2017
Salem, OR*

*Photo:
Dr. Emil Kepko*



- PUNCH will image the corona and surrounding solar wind every four minutes ... for two years.
- PUNCH field of view is huge – 90° across.
- PUNCH launches in 2025.
- PUNCH-CATE synergy:
 - citizen science helps develop PUNCH
 - CATE science is relevant to PUNCH
- PUNCH Outreach Program is actively supporting eclipse events.

PUNCH Total Field of View

*PUNCH/WFI-1
Field of View*

*PUNCH/WFI-2
Field of View*

PUNCH Rapid Field of View

*PUNCH NFI
Field of Vlew*

*PUNCH/WFI-3
Field of View*

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