1

A Saros cycle is 18 years, 11 days, and 8 hours... meaning the eclipse repeats 1/3 of the way around the globe

2

Ancient people figured out the Saros cycle for centuries, tracked all 5 planets visible to the naked eye, Halley's comet and invented an early version of calculus

Cuneiform tablet: ephemeris of eclipses from at least S.E. 177 to 199 (?)

Seleucid

ca. 4th–2nd century BCE

The Met, metmuseum.org

You can help decipher ancient middle eastern math discoveries and learn to read cuneiform

Cuneiform Digital Library Initiative
https://cdli.mpiwg-berlin.mpg.de/

HISTORY OF SCIENCE

Ancient Babylonian astronomers calculated Jupiter's position from the area under a time-velocity graph

Mathieu Ossendrijver*

HELIOPHYSICS BIG YEAR

Join us **Oct. 2023 to Dec. 2024** for a global celebration of solar science and the Sun's influence on Earth and the entire solar system.
Visit **go.nasa.gov/HelioBigYear** to learn more!

History zine, E. MacDonald 3/20/24

Did you know

eclipse patterns were recorded by ancient Babylonian Chaldean peoples?

This image is not to scale as the Earth is 93 million miles away from the Sun. The sun is always sending us charged particles as well as light. Earth is protected from these particles by its magnetic field, which extends out into space.

Process within the Earth's magnetic field, called its magnetosphere, are complicated. Charge particles follow the Earth's magnetic field lines and can get trapped in donut shaped regions called the Van Allen Radiation Belts. NASA studies these regions in the field of Heliophysics and aims to understand this complex system to the point of predictability, protecting us from space weather. The aurora is caused by some of these trapped particles raining down on the upper atmosphere and lighting it up.

Auroras are the result of processes that start on the Sun and change all the time. If you want to see them, or report a sighting visit Aurorasaurus.org.

If you get to experience a total solar eclipse, you will see the rare opportunity to view the hot outer atmosphere of the Sun, its corona.

HELIOPHYSICS BIG YEAR

Join us **Oct. 2023 to Dec. 2024** for a global celebration of solar science and the Sun's influence on Earth and the entire solar system.
Visit **go.nasa.gov/HelioBigYear** to learn more!

E. MacDonald 3/20/24

FLYING CLOSE TO THE SUN IS HARD – AND EXTREMELY HOT.

PARKER SOLAR PROBE SURVIVES THIS VOYAGE BEHIND A SUPER-TOUGH HEAT SHIELD.

THE SHIELD DEFLECTS HEAT AND ENERGY, SO PARKER OPERATES AT NEAR-ROOM TEMPERATURE!

1700°F

80°F

THE THIN, LIGHT SHIELD IS CARBON COMPOSITE FOAM BETWEEN CARBON PLATES, TOPPED BY REFLECTIVE WHITE CERAMIC COATING.

IF YOU THINK OF SPACE AS A FOOTBALL FIELD, WITH THE SUN IN ONE END ZONE, AND EARTH IN THE OTHER, THE HEAT SHIELD ALLOWS PARKER TO GET TO THE 4-YARD LINE!

HAVE QUESTIONS ABOUT SPACE WEATHER AND THE PARKER SOLAR PROBE MISSION?
ASK PARKERBOT!

VISIT
PARKERSOLARPROBE.JHUAPL.EDU/PARKERBOT/

23-01859

Back Cover

PARKER SOLAR PROBE
— A MISSION TO TOUCH THE SUN —

HOW DOES PARKER SOLAR PROBE STAY COOL?

Front Cover

4

AND IT CAN ALSO KNOCK OUT POWER GRIDS, DISRUPT COMMUNICATIONS AND AFFECT IMPORTANT ACTIVITIES ON AND ABOVE OUR PLANET.

3

WHEN IT REACHES EARTH, SOLAR ACTIVITY CREATES SPACE WEATHER. IT CAN PRODUCE DAZZLING DISPLAYS IN THE SKY, LIKE THE NORTHERN AND SOUTHERN LIGHTS...

2

THIS SUPER-FAST MATERIAL FLOWS LIKE GELESTIAL RAPIDS... AND WE LIVE IN THE GURRENT!

1

THE SUN GENERATES STREAMS OF ENERGETIC PARTICLES CALLED THE SOLAR WIND.

PARKER SOLAR PROBE IS FLYING CLOSE TO THE SUN TO STUDY THE SOLAR WIND WHERE IT BEGINS.

AND WHAT WE LEARN FROM THIS NASA MISSION WILL HELP US...

5

FORECAST AND FIGHT OFF THE POTENTIALLY HARMFUL EFFECTS OF SPACE WEATHER.

6

HAVE QUESTIONS ABOUT SPACE WEATHER AND THE PARKER SOLAR PROBE MISSION?

ASK PARKERBOT!

VISIT

PARKERSOLARPROBE.JHUAPL.EDU/PARKERBOT/

Back Cover

PARKER SOLAR PROBE

A MISSION TO TOUCH THE SUN

SPACE WEATHER

Front Cover

HamSCI

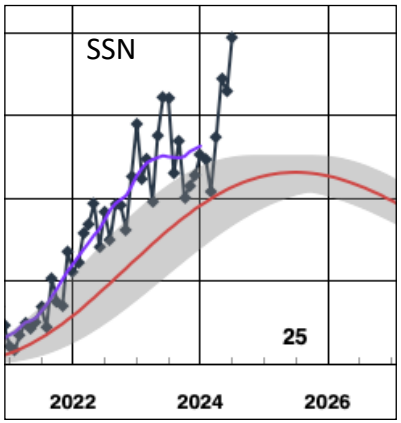
Ham Radio Science Citizen Investigation

Welcoming **ham radio operators** into the realm of **space physics research**

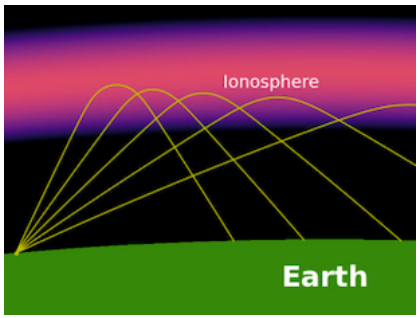
HELIOPHYSICS BIG YEAR

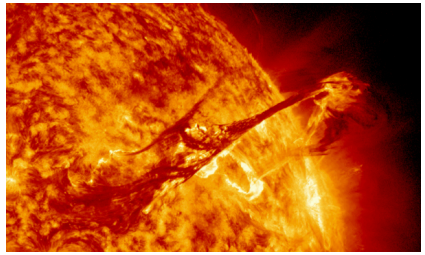
HamSCI and its members are excited to participate in the **Heliophysics Big Year** by promoting our Personal Space Weather Stations (PSWS): HF and VLF radio receivers, plus ground magnetometers. A PSWS can be hosted by almost anyone!

Stations in the PSWS network will be observing the passage of Cycle 25, the most active solar cycle in decades.



PSWS contain radio receivers which monitor skywave signals from precision transmitters, measuring the signals' frequency and amplitude as the ionosphere refracts the signals back to the Earth's surface.





PSWS frequently detect the impact of solar events, such as coronal mass ejections and solar flares. The data generated by each PSWS is visible to the station host and it is shared, via HamSCI servers, with researchers across the globe.

The simplest PSWS is the *Grape 1*. It is a user-built printed circuit board radio that is connected to the Web via a Raspberry Pi, allowing for data collection on a 24/7/365 basis.

More sophisticated versions of the PSWS are available - some can monitor the entire HF radio spectrum from a few hundred kHz to 50 MHz.

See hamsci.org/psws for details.

Summary

HamSCI's researchers have long utilized the skills of citizen scientist / volunteers to advance space physics knowledge. The HBY presents many more collaboration opportunities.

V2.0

NASA Partner

HamSCI welcomes the opportunity to work with educators, schools and clubs.