



MHAS-Observer

Newsletter of the McMath-Hulbert Astronomical Society, Lake Angelus, Michigan

Contents

President's Message	1
Corona Virus Update	1
History Corner—Jim Shedlowsky	2
Introduction to Radio Astronomy—The SuperSID Program; Part 2	2
MHAS Officers	5
MHAS Contact Information:	5
Scheduled Meetings	6
Space Pirates Radio!	6
Join MHAS	6

President's Message

Greetings all,

It's been another busy month for MHAS. Our last big event since the last newsletter was the Great Lakes Association of Astronomy Clubs (GLAAC) "Astronomy at the Beach" event on September 25 and 26. We have participated in this event for several years now. Normally the event is held at the Island Lake State Park near Brighton, MI, but this year the event had to be held virtually using the Zoom virtual meeting app with streaming for the public on YouTube. We did a presentation on radio astronomy using our 21 cm horn radio telescope with a demonstration on how to detect neutral hydrogen in the plane of the Milky Way galaxy. MHAS members Austin Sabatino, Tom Hagen and I put the presentation on. It was a live demonstration

with an included video showing a demonstration of how amateur radio astronomers can detect this emission at the wavelength of 21 cm.

A group of us is bringing our 12-inch nighttime telescope up to speed so that members can do evening observing and astrophotography. We successfully observed Mars at its opposition on October 14! Consider this another benefit for becoming a member.

I'm continuing on my list of items and projects that will need funding. Would anyone like to sponsor or adopt a specific project? This list will also give everyone an idea of just how much it will cost to make the observatory functional.

Unfortunately, we have had to suspend our monthly first Saturday open houses temporarily, but please watch for further updates.

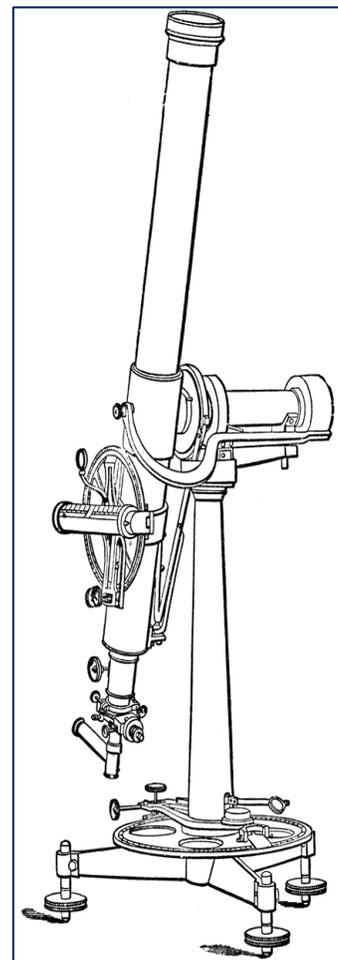
With your continued contributions and participation, we will move forward to make this facility into a valuable educational resource and historic landmark in Michigan.

Marty Kunz

Corona Virus Update

With the relaxation of social distancing restrictions, we can now allow our members back in to MHO. We can have up to ten people present at a time. And don't forget your mask and please maintain 6-foot social distancing.

Note that members may come out any Saturday at 10 AM.



History Corner—Jim Shedlowsky

Our MHAS historian, Jim Shedlowsky, had to have back surgery, so there's no History Corner this month. Please check back in the December issue of the MHAS-Observer!

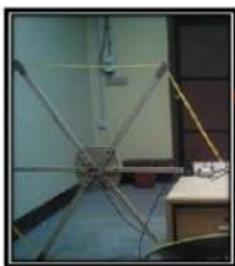
Introduction to Radio Astronomy—The SuperSID Program; Part 2

Last month we discussed the earth's ionosphere and how very low frequency (VLF) radio waves propagate around the earth by reflecting between the E- and F-layers of the ionosphere and the earth's surface. We also explained how a solar flare emits huge amounts of x-rays that further ionize the ionosphere

and increases the reflection of VLF radio waves because of increased ionization of the lowest or "D-layer" of the ionosphere. In this way, solar flares can be indirectly detected by their effect on VLF radio propagation.

The [SuperSID](#) program is a collaboration between the Stanford University Solar Science Center and the Society of Amateur Radio Astronomers (SARA) and is a network of amateur VLF monitoring stations scattered around the world. The purpose of this program is to detect and record the results of solar flares from many different locations and many different VLF stations around the world. Data from all the active monitoring stations are collected every 24 hours by automatic upload to the server at Stanford and are available to any interested person to view in graphical form. Continuous records go back to 2005.

SuperSID stations are operated by individuals, schools, astronomy clubs, and the like. The equipment is very simple, it consists of a large loop antenna and a preamplifier connected to the sound card of a personal computer. When the sound card is set to a sample rate of 96 kHz, VLF stations as high as 48 kHz can be received. There are no VLF stations operating above this frequency. The free SuperSID software program is used to operate the setup and signals from multiple transmitting stations can be simultaneously monitored for amplitude. The data from individual transmitting stations are automatically uploaded to the SuperSID site every 25 hours. The sample rate is once per 5 seconds on each transmitting station under observation.



Loop antenna



SID Amplifier
(Signal
Processor)

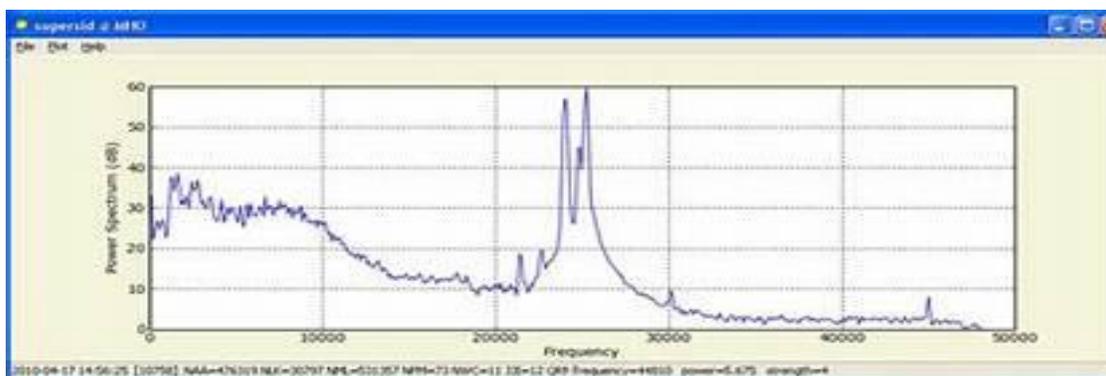


- Monitor
- Data acquisition
- Data storage



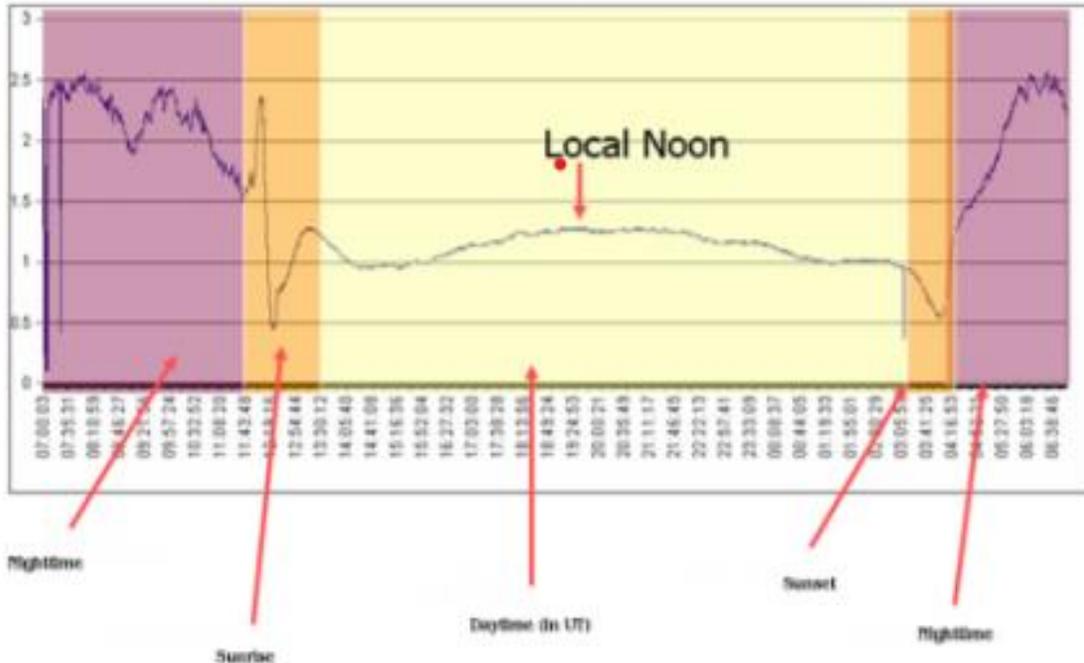
SuperSID Preamplifier

SuperSID Station Layout

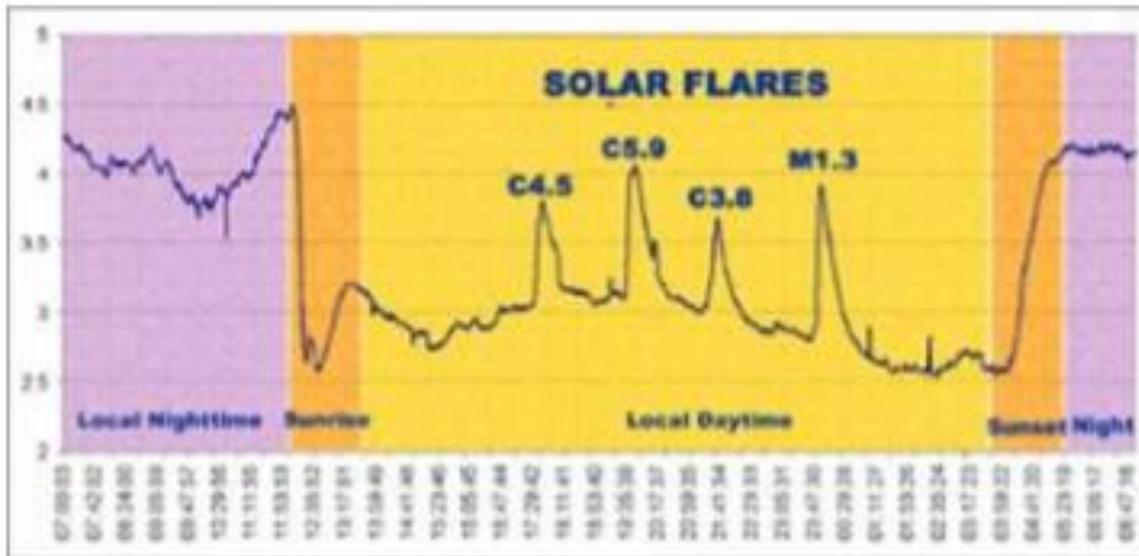


Frequency Domain SuperSID Display on PC Showing Stations at 24.0, 24.8, and 25.2 kHz

Normal 24 Hr. Day (No flares)



Normal Time Domain Plot of Signal Strength During the Day



Time Domain Plot of Signal Strength During the Day Showing the Effect of Solar Flares

So, what is the solar sunspot cycle? The sun has an 11-year sunspot cycle in which the number of solar flares fluctuate in numbers between the “solar minimum” and the “solar maximum”. Right now the sun is in

solar minimum and there are few sunspots visible. In fact, there have been weeks and weeks between any sightings recently! During solar max, there may be hundreds of sunspots visible on the surface of the sun. There

are on average about 11 years between solar minimum and maximum.

The frequency of solar flares increases with the number of sunspots. This is

because of the gigantic magnetic fields that loop out of sunspot pairs. There is energy stored in these magnetic loops and this energy can be violently released when the loop ends accidentally “short out” or literally touch and connect together. When this happens, there’s a sudden release of stored magnetic energy and a huge burst of X-rays is emitted from the site of the flare from the sun. Eight minutes later the X-rays reach our ionosphere, increase ionization, and received VLF waves become much stronger. This change is easily detected by the SuperSID setup and is recorded. A video explaining about solar flares is found [here](#).

There is another term you might have heard of and that is the *coronal mass ejection* (CME). A CME is just what it sounds like, i.e., it is matter that is blasted away from the sun. A solar

flare can sometimes result in a CME, but there are other causes of CME’s.

CME’s are directional and may hit the Earth because the matter in the CME is blown away in a certain direction from the sun depending on how the surface is pointed. X-rays from a solar flare can hit us no matter which way the flare is pointed. Here’s [NASA video on the difference between solar flares and CME’s](#).

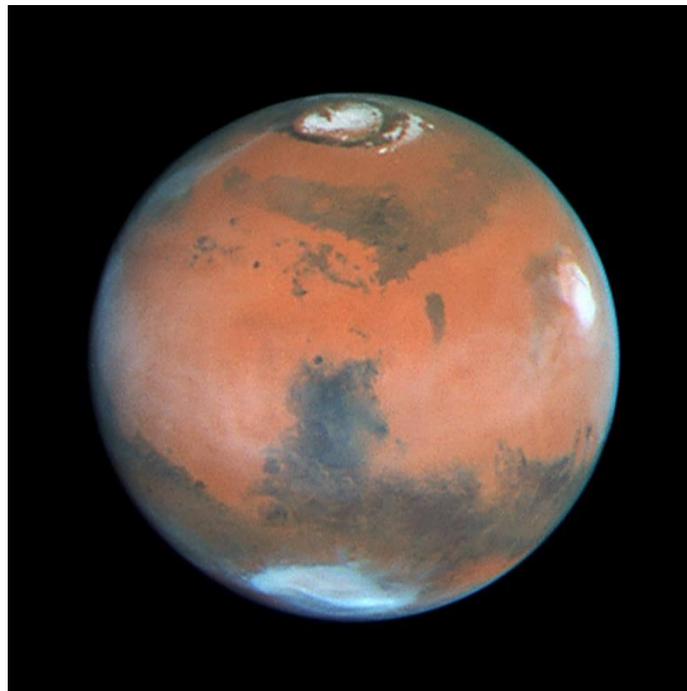
Since CME’s are made of matter, they cannot travel at the speed of light as X-rays do. So, when a CME is observed, it doesn’t reach the earth for 1 to 3 days or so, whereas X-rays from a flare have reached earth as soon as the flare is observed, or in just 8 minutes’ time at the speed of light.

Note also that terrestrial magnetic storms and aurora borealis are caused by CME’s and not by solar flares.

CME’s affect power grids and magnetic disturbances for example, but the flare’s main effects are on radio propagation.

Solar flares usually last for no more than minutes to hours while CME effects can last as long as several days. Also, solar flares can only be observed on the daylight side of the earth while the effects of CME’s on the earth’s magnetic field are observed both day and night.

Another effect of solar flares is the threat of the radiation hazard to astronauts. Precautions are taken on the International Space Station to protect personnel during flare events. Long manned missions to other planet and even people on future moon bases will have to be careful to avoid the bad effects of solar flares.



Mars Is at Opposition This Year: 38.6 Million Miles

Credit: Phil James (Univ. Toledo), Todd Clancy (Space Science Inst., Boulder, CO), Steve Lee (Univ. Colorado), and [NASA/ESA](#)

MHAS Contact Information:

MHAS Website

<http://www.mcmathhulbert.org/solar/>

MHAS Facebook Page

Click on the button below to get to the MHAS Facebook Page.



Address:

McMath-Hulbert Astronomical Society
895 N. Lake Angelus Rd.
Lake Angelus MI 48326

Email: info@mcmathhulbert.org

Phone: 248-494-8256 (Google Voice, leave message if nobody picks up)

MHAS Officers

President

Marty Kunz

Vice-President

Jim Shedlowsky

Secretary

Ken Redcap

Treasurer

Tom Hagen

Appointed Positions

Dir-Membership

Ken Redcap

Dir-Communications & Website

Tom Hagen

Dir-Educational Activities

Tom Hagen

Dir-Finance

TBD

Dir-MHO Preservation

TBD

Dir-Buildings Security

TBD

Dir-Social Activities

Marty Kunz

Dir-History

Jim Shedlowsky

ALCOR

Austin Sabatino

Scheduled Meetings

All MHAS members are welcome to join us on Saturday Work Days and Board of Directors Meetings. We are temporarily unable to hold Open Houses for the public.

MHAS Board Monthly Meetings / Teleconferences:

1st Sunday of Each Month @ 2 PM

The next board meeting is scheduled for November 1, 2020 and will be via teleconference. MHAS paid members are invited to participate in this meeting. For an invitation, email us at info@mcmathhubert.org.

Space Pirates Radio!

MHAS President Marty Kunz hosts an astronomy internet show called "Space Pirates Radio" on the website www.astronomy.fm. The show airs every Wednesday night at 9 PM Eastern and features current information about space mission developments, astronomy news, and a "what's in the sky today" report. Set your alarm today!

Join MHAS

Membership in MHAS is \$25/year. Join with us on our mission to preserve and promote the McMath-Hulbert Solar Observatory. Just drop us a line at info@mcmathhulbert.org and we'll get you signed up! Or use the application form on the next page, print it out, and return it to us via email or USPS.

McMath-Hulbert Astronomical Society

Membership/Donation Form

Name _____

Address _____

Email _____

Phone _____

Date _____

Dues _____ Donation _____

Annual membership is \$25. Checks should be made out to "MHAS" or "McMath-Hulbert Astronomical Society". You can also pay using PayPal on our website.

Bring to meeting or mail to:

MHAS

McMath-Hulbert Solar Observatory

895 N. Lake Angelus Rd.

Lake Angelus, Mi. 48326