

Deep Space Exploration Society 2017 Highlights



Summary:

The Deep Space Exploration Society (DSES) had a very successful 2017! The primary goals were to complete a number of Haswell site infrastructure projects, solve site power issues, create a radio astronomy certification program, offer a number of public outreach programs, provide an improved on site club station (KOPRT) and achieve the basic operational capability of a real radio observatory. The majority of these goals were achieved.

This year we had regular monthly technical meetings to plan and engineer all of the technical and infrastructure projects and regular monthly science meetings hosted by President Dr. Richard Russel focusing on what and how we want to achieve measurements and observations in Radio Astronomy. The organization grew from about 45 to over 54 members. A number of technical papers were submitted and published in the SARA and the western VHF conferences. Several local county outreach and educational programs were initiated including the Open House. We participated in several amateur radio events from the onsite club station, major infrastructure items were accomplished and we are in excellent position to launch more meaningful radio, radio astronomy and science educational projects for 2018.

New Official Mailing Address and WebSite

The Deep Space Exploration Society and its associated Club Station KOPRT has a new mailing address. To facilitate receiving official correspondence, annual dues payments, new memberships, and Amateur

Radio QSL cards the DSES Board agreed to change our address from the longtime Longmont, Colorado address for the organization and Dr. Russel's address for the club station mailing address to a Colorado Springs address. OUR NEW ADDRESS IS:

Deep Space Exploration Society
4164 Austin Bluffs Pkwy. #562
Colorado Springs, CO 80918-2928

A new DSES.Science web site was developed by Dan Martin <http://dses.science/> last year and content is now regularly added by Gary Agranat, leaving the old DESE.Org Website as an archive of previous work. The new DSES.Science web site is kept up to date with current meeting minutes, notices and on site trips.

March SARA Western Conference:



On March 17 to 19, 2017, Dave Molter, Dr. Richard Russel, Bill Miller, and Steve Plock pictured here from left to right attended and presented papers representing the DSES at the Western Regional Society of Amateur Radio Astronomers (SARA) Conference in Socorro, New Mexico. They also had a VIP tour of the Very Large Array of the National Radio Observatory as seen in the background.

In March Rich Russel did a presentation hosted by Ed Schade in the Colorado Springs Rotary Club on the organization and its STEM educational goals. Rich also presented a paper at the Eastern SARA conference at Green Bank, WV.

Member Radio Observation Tools:

In April an initiative was set to move the Radio Jove, SIDs, and Jupiter experiments back to local members to educate and collect data without having to go to the site. It was suggested that volunteers take on the experiments at home locations for a quarter at a time and post the data feed online. While this initiative is still underway Rich has done the most work on it installing a set of Yagis and a 12 ft dish in his yard with the SpectraCyber 1420 MHz spectrometer instrument.

2017 Open House and Science Expedition weekend:

The annual DSES Open House and Science Expedition was held on the weekend of August 11th thru the 13th with the main public event on August 12th to coincide with the Perseid Meteor shower. A number of local Southeastern Colorado residents came out and it was a great success in solar observation, optical telescope demonstration, and education on Radio Astronomy. Gary Agranat

provided an Amateur Radio demonstration on our new club station (K0PRT) and passed out QSO cards.



Open House Solar Observations



Dr. Richard Russel

Itty Bitty Telescope Demonstration

Dr. Richard Russel set up an extensive radio astronomy education and certification program for the DSES Members at the Open House.

Myron Babcock and Dave Molter provided a hotdog BBQ and all the trimmings for all who came out to the open house day as well as breakfast and dinner on the other days for DSES members. Unfortunately we were rained out on the main public observing night so didn't get to see many meteors but everyone still had a great time and hopefully learned a lot.

Community Outreach:

Gary Agranat provided a local outreach booth at the Haswell Bazaar in September and Gary and Bill Miller did the same at the Ead's Bazaar in November. Many community contacts were made and we made our organization and operations known to the community as a matter of education and community goodwill.



Gary Agranat manning table at the November Ead's Bazaar

2017 Total Solar Eclipse:

On August 21st a number of Members traveled to Wyoming to observe the total solar eclipse. Bill made a video: <http://dses.science/2017/08>

Rich took SuperSids ionospheric reflection data posted to the DSES.Science web site.

<http://dses.science/wp-content/uploads/2017/07/Eclipse-SuperSID-Results.pdf> . Rich's observations were included in a research paper that he presented his prediction work at the [2017 Society of Amateur Radio Astronomers Annual Conference](#) at NRAO Greenbank, WV on July 25, 2017. His paper was titled, "Ionospheric Reflection Variation During Sunrise and Sunset and Predictions for the 2017 Total Eclipse".

Infrastructure Upkeep and Expendables:

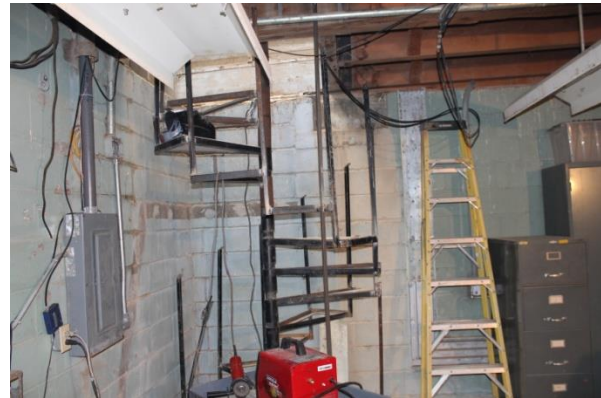
In August an additional \$985 of propane for the generator was delivered. The majority of the money for this was donated by Lauren Libby in the previous year. The propane will last about 3 years at current usage rates but with the installation of utility power at the end of the year, the propane will be recovered and sold back and the proceeds added to a utility cost fund.

In September the board approved that Michael Lowe purchase a Laptop to be loaded with DSES progress and photos presentations to be given to our property benefactor, Paul Plishner. Rich completed the presentation format and sent the Laptop to Lauren Libby who has volunteered to personally deliver the machine to Paul in New York.

Infrastructure projects were started or completed during the year:

Ed Corn and Steve Plock finished the fabrication of the spiral staircase as an emergency exit in the Bunker.

Ed and Steve also completed bunker, generator shack, comm. trailer and dish pedestal electrical wiring. Bill upgraded the trailer solar system and added a solar powered exhaust fan to reduce the summer temperatures in the comm. trailer. Ed and Steve provided additional batteries and solar charger for the generator shack.



Spiral Staircase in Bunker

In September Ed Corn, Steve Plock and Ray Uberecken recovered a second donated 15KW generator from Cheyenne Mountain .

Steve, Ed and Dave Molter began construction of a retaining wall to prevent mud from entering the bunker. All worked on a hurricane fence to reduce the tumble weed problem in the bunker ramp area. Ed and Steve made many additional trips and completed a number of additional site projects.



Work on the new retaining wall for the bunker ramp, by Ed Corn KC0TBE and Steve Plock KL7IZW and Dave Molter.

Dish control and receiver projects:

Ray Uberecken designed, built and supervised the group to install a 4 band feed and power integration instrument for the 60Ft dish. Ray took the multiband feed and made a presentation to the PPRA meeting for Feb 8th was well received.



Ray Uberecken and the 4 band Feed

Later the 4 band Feed was replaced with a cavity feed designed by Steve Plock for more sensitive for the 1420 MHz observations

Skip Crilly and Steve Plock installed Skip's receiver system to Steve's cavity feed and have achieved sub 100 Janskys sensitivity at 1420 MHz neutral hydrogen line frequencies.

Dave Molter and Glenn Davis designed and built a "System 1" dish position sensing system based on the Raspberry Pie and have used to point the 60 ft dish with good accuracy.



Dave Molter & Glenn Davis's System 1 Controller Ray Uberecken & Ed Johnson's System 2 Controller

Ed Johnson and Ray Uberecken designed and built a "System 2" dish position control and tracking system in hardware and software. Bill is working with Ed to complete the installation and calibration of this system. Both of these systems attach the 60Ft dish position encoders and can drive the variable frequency motor drives for azimuth and elevation. Dish pointing is now a reality with these systems and dish tracking is within reach in the coming quarter.

Site Utility Power Donation and Coordinated Observations with Green Bank, WV site:

Skip Crilly who works with SETI on a 10 Meter Dish located at the National Radio Observatory in Green Bank, West Virginia joined the society in August and in September made a very generously \$37K donation to DSES to install utility power at the Plishner site. Skip



Skip Crilly and Ed Corn at Open House

also came out and worked with Steve Plock to install a large complement of Skip's donated instrumentation to make coordinated and time coherent observations with the Green Bank site. This has provided a very long baseline capability and has already yielded synchronous data from neutral hydrogen radio sources proving the concept of coordination with Green Bank. Work is under way to correlate signals from 40 Eridani A as extraterrestrial since receiving signals at the same time on the same object at 1300 miles observation site separation would eliminate terrestrial sources.

Utility Power Installation:

Steve Plock coordinated with the Southeast Power Association in Haswell and on Saturday, December 9, Steve Plock, Ed Corn, and Glenn Davis spent the day assisting local resident, Mark Nelson, from Haswell, CO in the trenching of approximately 600 feet of ground from the transformer pole area to the Southwest corner of the bunker area. Number 4/0 3 wire URD/with reduced neutral wire is now in the trench and once inspected by a Southeast Power Association representative the trench will be filled back in. Ed Corn has the necessary supplies for final connection to the bunker power panel.

<http://dses.science/dses-commercial-power-installation-update>

Once completed DSES will have 220 VAC 100 amp service in the communications trailer and 220 VAC 100 amp service in the bunker. The Utility power will obsolete the generator which will be sold and will save a great deal of labor and time used in keeping the generator running, allowing more time for other observation and infrastructure endeavors. The propane will be reclaimed and sold to add funding to the utility expense account. The solar systems will be kept for now as operational and instrumentation backup but will probably be obsolete as batteries age.

Treasures Summary:

Bank Account Statements

Two year trend:

Started Jan 1, 2016

Checking: \$206.00

Savings: \$2879.99

As of Jan 1, 2017

Checking: \$2282.87

Savings: \$2876.33

As of Dec 22, 2017

Checking: \$965.37

Savings: \$6729.26

Upcoming Board Elections:

Current 2017 Board Members : - Rich Russel - President, Steve Plock - Vice President, Myron Babcock-Treasure, Floyd Glick - Board Member, Dave Molter - Board Member Lauren Libby- Board Member and Bill Miller - Secretary.

Positions are for two years and this year four positions come up for retention or replacement. Those are: Rich Russel - President, Steve Plock – Vice President, Myron Babcock-Treasure and Bill Miller - Secretary.

Please submit open nominations for replacing these positions to the Secretary or other board members for an election in January. An additional notice will be sent on the procedure for the election.

In Summary:

Future projects abound as usual, only limited by our member participation and the number of onsite man hours we can muster. However, if you look back a year the 12 or so active project participating members have made tremendous progress in getting the site operational and building the basic infrastructure to support it. Thanks to everyone who came out and gave time and money to the site build up. Think what would be possible with twice the member participation. All of these activities are open to all members and potential members. I would have to say that the comradery and sense of accomplishment in helping to make this unusual site operational and what we have learned along the way has been well worth the effort. We would invite everyone to come out and experience this for themselves.

In summary, as the sun sets on 2017, the DSES has had a very successful year in expansion of our infrastructure, educational efforts, and observational capabilities and **a great year is ahead in 2018.**

Merry Christmas, 73s and keep

looking up until next year!



Bill Miller

KCOFHN

DSES Secretary