Issue 7

January 1, 2018

Sierra Remote Observatories Newsletter

INSIDE THIS ISSUE:

Visit us at:
http://www.sierra-remote.com

Video of Planewave installing a 0.7 meter CDK for NARIT (National Astronomical Research Institute of Thailand) at SRO: https://www.youtube.com/watch?v=Q0bTLD_ci1A

Above: National Astronomical Research Institute of Thailand's (NARIT's) Planewave 0.7 meter CDK 700.

"Most of our new clients are involved in photometry and other forms of scientific data collection"
Geoff Stone
October 28th, 2017

Science at Sierra Remote Observatories

In 2007 when SRO was founded, the partners were searching for a site with excellent seeing in order to further their hobby of astrophotography. Essentially all the early SRO clients were engaged in astrophotography but this has changed. There are now many clients engaged in scientific research as well as corporate clients who are hosting their systems at SRO.

The shift began when Dr. Fred Ringwald, an astrophysicist from Fresno State University, built his observatory at SRO. He brought with him a wealth of knowledge, an army of graduate students, and ultimately produced a series of peer-reviewed papers on cataclysmic variable stars, among other subjects. Dr. Ringwald's work can be viewed here: http://zimmer.csufresno.edu/~fringwal/sropubs.html and http://zimmer.csufresno.edu/~fringwal/opps.html

Building 9 Getting Ready For Another Night Of Data Collection

This trend continued, and within a few years of first light, several "amateurs" were working with

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In the Spotlight: Dr. Fred Ringwald

It's an honor to introduce Dr. Fred Ringwald. Dr. Ringwald joined SRO just a few years after we opend our site in 2007. He placed a 16" DFM Ritchey-Chrétien telescope in one of our individual roll-off roof observatories and began photometric studies which have resulted in dozens of peer reviewed articles on cataclismic variable binary stars and related objects such as novae and black holes, their evolution and the physics of their accretion disks and outflows. Dr. Ringwald was the first astrophysicist to work at SRO and it's been an eye opening delight to have him at SRO. Here's Dr. Ringwald in his own words:

I am a professor in the Department of Physics at California State University, Fresno. I have observed with telescopes on every continent except Antarctica, as well as with Hubble Space Telescope and other NASA spacecraft. I am also the only professional astronomer based in the San Joaquin Valley, so I get all the U.F.O. calls.

I got my B.A. in physics and astronomy at Northwestern University in 1987, and gave shows at the Adler Planetarium in Chicago. I got my Ph.D. in physics at Dartmouth College in 1993. I went on to research jobs in England, Tucson, and at Penn State and taught at the Florida Institute of Technology and Kennedy Space Center before joining the faculty at Fresno State in 2000. My girlfriend thinks "The Big Bang Theory" is the funniest show on TV, because she thinks that's our physics department. It is sobering to admit she may be right.

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New Newsletter Format: Beginning June of 2018 the SRO Newsletter will have a more user friendly format. The newsletter will appear on your email as a single page, not as an attachment. You will have major articles immediately available and will be able to link to more detailed information.

Recent APODs from SRO:

Ngc 281 in Cassiopeia
By Eric Coles and Mel Helm
APOD September 30, 2017

Ngc 3628 in Leo
By Eric Coles and Mel Helm
APOD May 3, 2017

Sh2-155 (The Cave Nebula) in Cepheus
By Eric Coles and Mel Helm
APOD March 23, 2017

Sharpless 249 in Gemini
By Eric Coles
APOD January 7, 2017

Sh2-101 in Cygnus
By Martin Pugh
APOD October 20, 2016

Discovering Asteroids and Comets in Your Images: By Paul Mortfield

We at SRO have been honored to have Paul Mortfield as a client since shortly after first light in 2007. Paul Mortfield is an astronomer and computer scientist who returned to Canada after nearly 20 years in California. While there, he was involved in creating innovative education and public outreach activities with Stanford University's Solar Observatories Group, and their involvement in NASA's SOHO Solar spacecraft. He continues collaborations with NASA scientists on a variety of projects and is a member of NASA's Education Products Review team. Paul is chair of the Solar Division of the American Association of Variable Star Observers (AAVSO), a group that has been responsible for computing the American Relative Sunspot number for over 60 years.

Paul is a sought-after guest speaker at scientific and educational conferences, including the National Science Teachers Association Convention, astronomy clubs, star parties and the Advanced Imaging Conference. He is also a regular television commentator on astronomy, having appeared on CBS-5 in San Francisco, CNN, the Discovery Channel and most notably, as the regular host of NASA-TV's educational broadcasts on solar astronomy.

A passionate astro-photographer, Paul's photographs have appeared in magazines, calendars, and NASA educational materials. They are on display in galleries and science centers in North America and Europe. He has also created software to guide telescopes in photographing fast moving comets. To date, Paul has discovered 4 asteroids.

In his hi-tech career, Paul successfully led software development and engineering teams in large scale projects. He is an expert in automated test systems design and QA processes and operations. He has taught computer science and astronomy courses at colleges in the United States and Canada.

In his free time, Paul plays blues piano and guitar. He uses his backyard and remote observatories for research projects, astrophotography and sharing the night sky with family and friends.

Here's Paul Mortfield in his own words:

We know that SRO has wonderful dark skies and superb seeing. Combine this with the exquisite equipment and sensitive CCD cameras users have, and we can often find faint interlopers in our exposures. Most of the time these turn out to be known asteroids, but unless you check, you won't know whether you might have a potential discovery. Also, given the limiting magnitude of deep exposures at SRO, you might discover a faint comet.

Before you stack your images, why not take a quick check of your frames. After you calibrate, stretch the frames then carefully blink them checking for anything moving. While you might encounter some false positives, the real interlopers will be moving in a straight line.

Continued on Page 4:

Current SRO Clients

Everyone from SRO is in contact through the Yahoo users group, but it's always great to see everyone's name in one list.

In the original 8 private observatories (building 1-8) we have
ExoAnalytic Solutions (in Building 1), ExoAnalytic Solutions (Building 3), Larry Van Vleet (Building 4), Sandy Barnes (Building 5),
Geoff Stone (Building 6),
Dr. Fred Ringwald at Fresno State University (Building 7),
R. Jay Gabany (Building 8).

In the multi-telescope Building 9 we have:
Mike Miller (Pier 2),
Samuel Lising (Pier 3),
John Kasianowicz+Rob Pfile+Daniele Malleo+Rick Stevenson+D. Ellison (Pier 4),
Paul Mortfield (Pier 5),
Dick Post (Pier 6),
Univ. of Stuttgart and Sophia (Pier 8), David Weiner and Steve Reilley (Pier 9),
iTelescope.Net (Pier 10),
Murray Kenney (Pier 11) and Mike Hankey (Pier 12),
Kevin Morefield (pier 13) and Qingshan Li (Pier 14).

In Building 10 we have :
Steven Cullen (Pier 1),
Keith Quattrocchi (Pier 2),
Jeff Lovelace (Pier 4),
NARIT (Pier 8), Jeff Lovelace (Pier 9),
Korean Astronomy and Space Science Inst. (KASI) (Pier 12),
Jeffery Lovelace (Pier 14), Mike Jeff Lovelace (Pier 17),
Michael Perron (Pier 18),
Planewave (Pier 19) and
Mel Helm (Pier 20).

We are are proud that at SRO you will recognize many important names from a diverse specturm of the astronomical community, including astrophysicists, advanced imagers, telescope manufacturers and clients involved in space industries.

Science At SRO: Continued From Page 1

professional astronomers who published papers based on data from SRO. Take R. Jay Gabany, an advanced astrophotographer and Advanced Imaging Conference (AIC) board member. Initially a skilled amateur astrophotographer, Gabany began to use pioneering techniques to reveal faint tidal streams and rings in the outer halos of large spiral galaxies that had been previously overlooked. As a result, R. Jay Gabany's images have helped scientists better understand how large galaxies such as our own Milky Way are built up through the collisions and mergers of many smaller galaxies. An example of Gabany's work can be found in Stellar Tidal Streams in External Galaxies, JI Carlin, RI Beaton, D Martinez-Delgado and RJ Gabany, astro-ph.GA, 2016.

Dick Post is an active member of the AAVSO, and installed a CDK24 at Sierra Remote Observatories. He has been studying "the ultimate variable star" – the supernova – working with the Puckett Supernova Search, and the ASAS-SN Group at Ohio State University. Several of the group's discoveries are being followed, and Dick is a co-author of several papers, including: The ASAS-SN Bright Supernova Catalog -- III. 2016 T.W.-S. Holoien, et al, astro-ph.HE, 2016 and Gaia17biu/SN 2017egm In NGC 3191: The closest Hydrogen-Poor Superluminous Supernova to date is in a "Normal", Massive Metal-Rich Spiral Galaxy, Subhash Boss, Subo Dong, et al., astro-ph.HE, 2017.

Soon, SRO welcomed astrophysicists like Dr. Jurgen Wolf, from the University of Stuttgart, who is associated with the U.S. and German SOFIA project. They placed the "Astronomical Telescope of the University of Stuttgart" (ATUS) at SRO, a 0.6-meter Ritchey-Chrétien telescope made by Officina Stellare (Italy). The ATUS Telescope has provided data used in the study of trans-Neptunian objects through stellar occultation and far-infrared photometry. The ATUS telescope also serves as test platform for hardware and software developed for SOFIA, and has conducted observations in parallel to SOFIA missions, such as extra-solar planet transits. An example of this work was published by Astronomy and Astrophysics: https://www.aanda.org/articles/aa/full_html/2017/04/aa28620-16/aa28620-16.html#T2 (in this article SRO is listed as "Alder Springs" in Table 2).

With the addition of Geoff Stone as a partner, SRO gained another active AAVSO member who also works with the All-Sky Automated Survey for Supernova (ASAS-SN) with The Ohio State University (http://www.astronomy.ohio-state.edu/asassn/index.shtml) and the Center for Backyard Astrophysics (CBA), a global network of small telescopes studying cataclysmic variables (http://cbastro.org/). Geoff is also a programmer and has worked with Bob Denny's ACP and with other companies who design CCD Cameras and software. He has contributed data included in a number of papers including: New candidate of long-period , WZ Sge-type dwarf nova. Y Wakamatsu et al., astro-ph.SR, 2017 and Return of the King: Time-Series Photometry of FO Aquarii's Initial Recovery from its Unprecedented 2016 Low State, arXiv:1609.01026 [astro-ph.SR], 2016 .

Other University and Institute clients include the National Astronomical Research Institute of Thailand (NARIT) operating a Planewave 0.7 meter CDK-700 and the Korea Astronomy and Space Science Institute (KASI) at https://www.kasi.re.kr/eng/index.

KASI uses their telescope to study the geology of the Moon using polarimetric speckle imaging. They are able to determine the mean size of the rock grains on the lunar surface, with the median grain size a measure of the degree of space weathering. They also plan to extend their targets to comets, asteroids, Mars, and the Martian moons in the near future.

Finally, over the past few years SRO has also added a number of corporate clients including iTelescope.Net and ExoAnalytics.

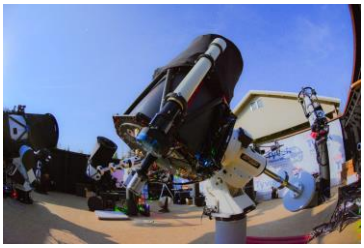
The iTelescope.Net T24 system hosted at SRO is a 24" Planewave CDK telescope with a FLI-PL09000 CCD camera. Time on this system is available through iTelescope.Net. You can see this scope at http://www.itelescope.net/telescope-t24/ and learn more about iTelescope.Net at http://www.itelescope.net/.

ExoAnalytic Solutions is involved in space situational awareness and has located a plethora of telescopes at SRO. You can learn more about them at https://exoanalytic.com/.

Today, the majority of our new clients are coming from the professional community, including astrophysicists, institutes, and space industries. We are excited about this trend at SRO, and take pride in supporting these myriad, groundbreaking, and important research efforts that will shape our future.

A Few Of SRO's Telescopes Involved In Scientific Research:

iTelescope.Net's 24 inch Planewave CDK



SOFIA's 24 inch Officina Stellare on an Astro Physics GTO 3600

Korean Astronomy and Space Science Institute's (KASI's) 24" OGS

Dr. Fred Ringwald: From Page 1

Much of my research concerns cataclysmic variables. These are close binary stars, in which a low-mass star like the Sun spills onto a white dwarf, which is a burned-out cinder that used to be a low-mass star. The mass-losing star and the white dwarf can't be stationary, or else they'd fall into each other. They orbit each other, and in cataclysmic variables, the star and the white dwarf are so close, typical orbital periods are 3-4 hours. This means the astrophysics in cataclysmic variables occurs on human timescales, from seconds to days. This makes cataclysmic variables useful for student projects: a student can use our 16-inch telescope in SRO7 remotely from campus to get observations that show interesting physics in just a few nights and this data can be written up for publication within a semester or two. Fresno State doesn't have a Ph.D. program, so we can't allow student projects to drag out for 6-8 years: and fortunately cataclysmic variables make this unnecessary.

As the mass-losing star spills onto the white dwarf, it usually forms an accretion disk. Cataclysmic variables are among the best natural laboratories for learning accretion disk physics. The gas flow through the accretion disk can have sudden avalanches, known as dwarf nova outbursts. Gas that builds up on the white dwarf can detonate in a thermonuclear runaway, as these are classical nova eruptions. I also do research on X-ray binaries, in which the white dwarf is replaced by a neutron star or black hole, stellar magnetism and flare stars, nova shells and common envelope evolution, quasars and starburst galaxies, and of course exoplanets.

You can read more about Dr. Ringwalds career and research at: http://zimmer.csufresno.edu/~fringwal/ringwaldint.html and http://zimmer.csufresno.edu/~fringwal/opps.html

Paul Mortfield: Discovering Asteroids: From Page 2

Once you find an interloper, the next step is to identify the object. The easiest way to do this is using an online application from the Minor Planet Center (MPC) called MPChecker http://www.minorplanetcenter.net/cgi-bin/checkmp.cgi

Fill in the parameters by using the observation date and time from your .FIT file header. Provide the approximate RA/DEC of the center of your field. Set the search radius to cover your field and a limiting magnitude of 22 or 23 depending on your exposure's limiting magnitude. The default observatory code is "500" which is center of the Earth. However, you are welcome to use my observatory code "G80" which I set up for my scope and general SRO use in 2008. It'll give you more accurate results, especially for near earth objects. You can experiment with the other parameters and then click to generate a list of asteroids and comets that are present within your field.

Plate solve your image (MaximDL, Astrometry.Net) to compare coordinates of your findings. A really nice piece of software is Astrometrica (www.Astrometrica.at) which provides a wonderful overlay feature that plots all possible moving objects in your image's field of view. The software also generates the objects position in each frame and produces a properly formatted report for submitting to the Minor Planet Center. When you start looking carefully at your images, you'll be surprised how many asteroids might be there. A few years ago I found 17 asteroids appearing on a single 15 minute subframe. Turns out that all were known, but was an interesting exercise in confirming them and determining how faint an asteroid could be detected in a subframe.

So what if you do find something new? If you are fortunate to discover a comet, send the astrometric information to: mpc@cfa.harvard.edu. It is best to get another observer to confirm the comet with an additional set of positions before you submit.

If you do find a new asteroid, it can be reported to the Minor Planet Center using procedures linked below. Keep in mind that you will need to submit data from two nights to be in the running as the discoverer. The MPC has a defined format for reporting objects which requires a more detailed explanation than can be given here. That's why it's best to try this out with some known asteroids first, so you're familiar with the process before you scramble to report a discovery. Being first to spot something new is quite exciting. I've been fortunate to find four asteroids, three of which are now numbered and ready to be named: 249300=2008UY, 372656=2009WE52, 465710=2009UG20. An image of the latest one to be numbered can be seen here: http://www.backyardastronomer.com/asteroids/2009ug20_anim.gif

More information from the Minor Planet Center, can be found at:https://www.minorplanetcenter.net/iau/info/TechInfo.html

If you want to get involved in doing some astrometry, check out this link:

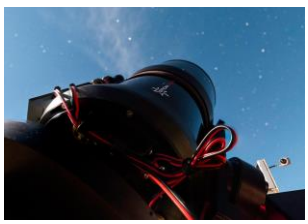
https://www.minorplanetcenter.net/iau/info/Astrometry.html

A Few of SRO's Telescopes Involved in Scientific Research Continued:

Building 9 and 10 at SRO

Dr. Fred Ringwalds' 16" DFM Ritchey-Chretien Telescope

Building 9 at full capacity



Astonomical Telescope of the University of Stuttgart (ATUS), a 24" Officina Stellare Ritchey-Chretien Telescope

NARITs 0.7 meter PlaneWave CDK 700

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A BRIEF SUMMARY OF SIERRA REMOTE OBSERVATORIES

Sierra Remote Observatories (SRO) is a dedicated site for state-of-the-art robotic/remote astronomical data acquisition and imaging. We are uniquely located in the center of California's Sierra Nevada Mountains, about 50 miles south of Yosemite National Park. In addition to having excellent darkness and seeing, SRO's location is unique in being within an hour of a major metropolitan area and international airport, making access to the facility and to expert personnel unusually easy. At nearly 5000 feet, on top of Bald Mountain, the site was chosen for its excellent seeing conditions and accessibility. Average summer seeing quality FWHM measures 1.0 arcsecond. The site is very dark at 21.78 magnitudes/sq arcsecond, V band. With excellent seeing, an extremely low incidence of thunderstorm activity, average wind speeds of only 1 mph, maximum wind gusts averaging only 10 mph, no summer monsoons, on-site services, an average of 237 clear nights each year and easy access, Sierra Remote Observatories offers the professional scientist and amateur imager an excellent site for data collection and imaging. Since first light in May of 2007, SRO has continuously operated multiple observatories for both professional research and amateur astrophotography.

There are 8 individual roll-off roof observatories which each house one or two telescopes and larger observatories (two completed and full, a third to be constructed this year) which each containing 14 telescopes of various sizes, ranging from a 0.7 meter PlaneWave CDK700, to smaller refractors. The larger roll-off roof observatories are uniquely designed with 9 foot ceilings, making any contact of the ceiling and telescope virtually impossible, regardless of the position of the telescope. The operation of the roof in each building is automated and will close under any adverse weather conditions and reopen when the weather improves. Custom roll-off roof or dome observatories for 1 meter class telescopes can be constructed on site. Machine shop services and on-site technical personnel for repairs are available.

An Updated Word From the Owners

We hope you enjoyed this 7th biannual newsletter from SRO.

In the future there will be a new format for the newsletters. They will arrive as a single page and without attachments. The page will summarize events, updates and changes at SRO, with links for additional information.

We also wish to welcome Evan Comelson, who will be replacing Sam Miller as the full time technician at SRO. Sam will be returnimg to college to complete his studies in engineering. He did a remarkable job at SRO and we will miss him. Evan comes to us with a background in computer programing and hardware and we are confident he will be a great addition to SRO.

As we discussed in our lead article in this issue, many of our early clients and the majority of our newest clients are using their telescopes at SRO as a platform for science. This includes astrophysicists, busineses (such as those involved in satellite surveilance) and even amateurs who partner with scientists through organizations like the AAVSO and ASAS-SN.

As the owners of SRO we are thrilled to see this evolution take place. Though as owners, we are essentially amateurs, we are also all steeped in the pursuit of science, with eclectic backgrounds in computer programming, medicine the biological and physical scineces. Additionally, some of us are partnered in varying degrees with programs like the AAVSO and ASAS-SN. As such, we will continue to support the endeavors of scientists, institutes and businesses at SRO. We will also continue to maintain our robust infrastructure and our commitment to providing prompt and expert support. Most of all we want it to remain a friendly and collegial site known for its 1 arc-second seeing, clear and dark skies.