

Sierra Remote Observatories Newsletter

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Fun Link:	
Follow this link to our video page, which includes a drone overflight of SRO, as taken by Planewave while installing a 24" CDK (while the new observatory was in early construction).	

Visit us at:

<http://www.sierra-remote.com>



Above: Sierra Remote Observatories: Building 9

"If you guys are going to build observatories, add a few more and then see if you can rent them out"

*Anna Helm (Mel's wise wife),
November 2006*

SRO: Introducing Our New Partner: Geoff Stone

Six months ago Sierra Remote Observatories was extremely fortunate in being able to welcome Geoff Stone as its fourth partner. We'll first discuss the origins of SRO and then talk about Geoff's background (business and programming) and his interest in both astrophotography and photometry.

SRO had humble beginnings. It began with the original partners roaming around the mountains some 50 miles south of Yosemite, looking for a place to put their telescopes. At that time we had no ambitious plans beyond the hope of finding a piece of land where we could put up a few buildings and continue our beloved hobby of astrophotography. We found a site better than we had hoped for. We spot tested its seeing and found it hovering at 1 arc



From Left to Right: Dr Mel Helm, Geoff Stone, Larry Van Vleet and Dr. Keith Quattrocchi

second. We later collected 5 years of data. Summer intrinsic seeing FWHM measured 1.0 arc second with sky darkness running around 21.78 magnitudes/sq. arc second V band, which is very dark for

such close proximity to a major city. It had an extremely low incidence of thunderstorm activity, with no summer

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In the Spotlight: Daniele Malleo

For many the cost of a spot at SRO is a bit daunting, so many have teamed up with others and shared the use of their telescope. Here's some insights from Daniele Malleo who is part of a group of astrophotographers imaging in building 9 with a Ceravolo 300 f/4.9 using a FLI-16803 riding on an AP 1100 GT-AE. Members include Daniele Malleo at: www.theskyabove.net, Rick Stevenson at: www.astrorbin.com/users/RickS/ Jose Mtanous at: www.mtanous.wordpress.com. Scott Johnson at: www.starfirestudios.us.com and Bret Charles and John Kasianowicz,

Here is Daniele in his own words: "I first learned of SRO at AIC in 2013. I had just started the hobby of astrophotography and enjoyed the opportunity to travel 4 hours away from the city lights every

new moon weekend in order to spend one night or two under the stars.

Very soon though I had become weary of imaging just 1-2 nights a month and decided that a permanent observatory in a remote, dark-sky location, would improve my enjoyment of the hobby.

But - how to afford it? People share ownership of sailboats, planes and racing cars - so why not sharing the lease expense of a pier at SRO? With no objection from SRO's management, all that was needed was finding a handful of like-minded individuals.

So, how does our group deployment work? We have one member who is the sole owner of the hardware and control software. We then have 4-5 paying members of the

group, who are based all around the world. Everybody in the group contributes to the choice of desired objects. Every team member has equal and immediate access to the data via google drive.

I have been imaging at SRO for three years now and can say without reservations that access to a remotely deployed setup has immensely increased my enjoyment of the hobby and the continuous availability of lots of high-quality data has been key to improving my skills in processing astro images.

I, like all my other team members, still enjoy going out to dark sky sites, in the desert and on mountain tops, on new-moon weekends. But when I do, I still know that if the weather should turn for the worse or if some gear should malfunction, there is always the setup at SRO capturing photons every cloudless night".

Some of SRO's most recent APODs:

Sb2-101 in Cygnus
By Martin Pugh
APOD October 20, 2016



M8 (Lagoon Nebula) in Sagittarius
By Michael Miller and Jimmy Walker
APOD September 9, 2016



NGC 6888 in Cygnus
By Michael Miller and Jimmy Walker
APOD June 10016



NGC 2403 in Camelopardalis
By Eric Coles and Mel Helm
APOD: February 19, 2016



Astrophotography Tips: The Slow Path to Astrophotography by Samuel Lising

Like many crafts, astrophotography requires a tremendous amount of attention to detail and astro-imagers like all craftsmen, are obsessively in love with all the nuance and detail of the craft that slowly reveal the universe. Over the few years I've been imaging I've realized that like most crafts, nothing in astronomy comes quickly. From acquisition to image processing, the single most important ingredient to a beautiful image seems to be time.

However, I have found during image preparation, (calibration, registration and integration, etc) it is tempting to take shortcuts because we are so eager to "see" the results of the days, months or years of our data collection. In this article, I thought I would share some (time consuming) tips that I have found to be helpful in extracting fine detail in my images. Attention to these steps is important

before more global processing such as color and contrast.

Subframe selection and weighting: Even with the excellent conditions at SRO, there can be quite a bit of variation between sub-frames in terms of SNR, FWHM, Eccentricity, etc. Using the "Subframe Selector" script in Pixinsight is a great way to not only select the the best frames to integrate, but also to create a weighted value that can be used during the integration procedure. As an example, the equation "SNRWeight / FWHM^2" will weight your subframes based on both the quality of SNR and FWHM. The script can add a weighted value as a keyword to the FITS header and the "Integration" script can use the keyword to scale the importance of each subframe. This allows the highest weighted subframes to be more relevant than the lower weighted ones and helps

to achieve a sharper image with a higher SNR.

In Pixinsight there is a script called Cosmetic Correction. In other apps it might be called something like bad pixel rejection. Whatever it's called, basically it removes hot and cold pixel that were not removed during calibration. I recommend using this script on each subframe to allow the use of higher pixel rejection thresholds during integration. This means that pixel rejection will only look for outliers that are far out from the average value of each pixel meaning less pixels need to be rejected and a higher SNR is achievable.

Gradient removal: Accurate flats are a necessity to remove optical inaccuracies, but what is more difficult to remove accurately are sky gradients.

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Current SRO Members

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 (Building 1),
Keith Quattrocchi (Building 2),
ExoAnalytic Solutions (Building 3),
Larry Van Vleet (Building 4),
Sandy Barnes (Building 5),
Geoff Stone (Building 6),
Dr. Fred Ringwald (Building 7),
R. Jay Gabany (Building 8).

In the multi-telescope building 9 we have:

Mike Miller (Pier 2),
Samuel Kong Yue Lising (Pier 3),
John Kasianowicz+Daniele Malleo+Rick Stevenson+Jose Mtanous+Scott Johnson+Bret Charles (Pier 4),
Paul Mortfield (Pier 5),
Dick Post (Pier 6),
Rick Hendrick (Pier 7),
Sofia/University of Stuttgart (Pier 8),
Steve Reilley (Pier 9),
Brad Moore and Pete Poulos with iTelescope.net (Pier 10),
Murray Kenney (Pier 11) and
Mike Hankey (Pier 12),
Kevin Morefield (Pier 13) and
Qingshan Li (Pier 14).

In the multi-telescope building.10 we have Jeff Lovelace (Pier 4), NARIT (Pier 8), Martin Pugh (Pier 9), Korean Astronomy and Space Science Institute (KASSI) (Pier 11), Jeffery Lovelace (Pier 14), SRO's experimental planetary telescope (Pier 17), Mike Perron (Pier 17), Michael Perron (Pier 18) and Mel Helm (Pier 19). All but 2 spots have been spoken for in the new building.

We are proud to note you will recognize some important names from a diverse spectrum of astrophotography and astrophysics, from advanced imagers to telescope manufacturers and space industries.

SRO and Geoff Stone: Continued from Page 1:

monsoons and average maximum wind gusts of only 10 mph with 237 photometric nights per year.

Four years ago Larry Van Vleet joined SRO. Larry works with cybersecurity at VISA and has a broad background in business, networking and programming. He immediately improved and streamlined the business end of SRO. He improved our networking and security. The original two partners, Dr. Mel Helm and Dr. Keith Quattrocchi, continue to work on infrastructure and marketing, respectively. Most recently Mel added the professional Cyclops Seeing Monitor to SRO. We have

again found we have 1 arc second summer seeing.

Geoff joined us in 2016. His professional background is in embedded systems and systems engineering. He spent many years leading engineering teams in developing high-performance networking products. He was the chief engineer for a major defense contractor, and currently works for Dell EMC doing strategic planning and business development work.

Geoff's primary astronomy interest is photometry of variable stars, particularly cataclysmic variables, which he observes nearly every night. He is also highly skilled with astrophotography.

He is an active member of and contributes data to the AAVSO, the Center for Backyard Astrophysics, and the VSNET project at Kyoto University. He has been listed as a co-author on a number of papers on variable stars.

Geoff also works with the All-Sky Automated Survey for Super Novae (ASAS-SN) team at The Ohio State University, performing follow-up observations of candidate super novae and has been credited as a co-discoverer of numerous super novae.

Mr. Stone lives with his wife, Gail, in the Sierra Nevada mountains, just a few miles from Sierra Remote Observatories.

A few of SRO's telescopes:



Daniele Malleo and his group's Ceravolo (see article on page 1)



Samuel Lising's Starfire 130

Sam Lising: Continued from Page 2:

Sky gradients are a bit more elusive and I have found that when removing gradient from an integrated image, the results can be inaccurate and irregular with dark halos seen around some objects and loss of extremely faint background structures. A solution is to remove gradients from each individual subframe before integration. In Pixinsight, use Auto Background Extractor with the parameter "Function Degree" set to 1 or 2. This setting is important and will allow the gradient model to have less oscillation, only modeling sky gradients and ignoring structure gradients

Noise removal in each subframe: This is just an experiment, but after some comparison work I have found applying MURE Denoise to each

subframe to be quite effective. Although it is suggested that this Pixinsight script only be used on integrated images, I have found that applying MURE Denoise to each subframe can help in reducing gaussian noise, retaining sharpness and allowing noise reduction to be applied even when using drizzle integration. When applying MURE denoise to each subframe, reduce the "variance-scale" to 50% - 75% of what you would normally use on an integrated image and set the combination count to 0. By doing this to all subframes prior to integration, I've found denoising looks more natural than when applying after integration.

Drizzle integration with scaling: I've realized that drizzle integration with a "Scale" setting of at least 2 is just an all around

good idea. Even if your intended pixel resolution might be smaller and for screen use only, if you scale up, process your image and then scale back down, you will benefit from sharper image detail and less visible noise. It also allows you to future proof your image a bit by allowing you to have masters at a higher resolution so you won't have to reprocess all over again if you want a higher resolution in the future.

There's a lot of detail missing here but hopefully it's enough to get started with. If you'd like to discuss any of these tips just send me an email: samlising@me.com



Qingshan Li's Televue 101



Building 9 at full Capacity



Korean Astronomy and Space Science Institute's 24" OGS

A BRIEF SUMMARY OF SIERRA REMOTE OBSERVATORIES

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We're on the Web!

www.sierra-remote.com



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. Summer intrinsic 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 photometric nights each year and easy access, Sierra Remote Observatories offers the professional scientist and amateur imager an excellent imaging location. Since first light in May of 2007, SRO has continuously operated multiple observatories for both professional research and amateur imaging.

There are 8 individual observatories which each house one or two telescopes and larger observatories (two completed and full, a third to be constructed this year) which each contain 14 telescopes of various sizes, ranging from a 0.7 meter [PlaneWave](#) CDK700, to smaller refractors. The larger 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 [AstroHaven](#) clamshell dome observatories for 1 meter class telescopes have been designed and can be made available within 3-6 months. Machine shop services and on-site technical personnel for repairs are available.

An Updated Word From the Owners

We hope you've enjoyed SRO's fifth newsletter. They will be coming out every 6 months (biannual), giving us a chance to update everyone on what's new at SRO. The four of us (Keith Quattrocchi, Mel Helm, Larry Van Vleet and Geoff Stone) appreciate the many kind words and great work that has come out of SRO. We never imagined that APODs would be weekly events. And we never thought that serious peer reviewed studies would emerge from SRO from our many professional astrophysicists. What we did hope was we'd find a

quiet, dark and clear place to image. That we found, and much more.

One of the most rewarding aspects of our work at SRO is getting to know all the members and seeing the remarkable work they produce. With clear skies it seems everyone becomes an advanced imager and most far surpass any skills we (the owners) might collectively have. It is equally rewarding to see the incredible research produced at SRO by our professional astrophysicists.

We have focused on perfecting our infrastructure and getting

the word out regarding what we offer. We have spent a lot of time with roof control, with Geoff and Larry adding a great deal of expertise in the area of programming and networking. Mel has focused on infrastructure and upgraded our roof motors, weather detection systems and has everything backed up on virtual computers. He recently installed a Cyclops seeing monitor. I have spent a lot of time with marketing issues. Sam Miller, our full time on-site technical expert, has done a lot to help those who need it, and is on-site whenever he's needed. Together we hope to make SRO better and better as time goes by. Most of all we want it to remain a friendly and collegial site known for its clear and dark skies.