Issue 3

January 1, 2016

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 August 2015

"Processing is so much easier with data from clear skies" Keith Quattrocchi May, 2015

NARIT and Our First PlaneWave CDK700

On December 15th, 2015 the National Astronomical Research Group of Thailand, known as NARIT, installed their first Planewave 0.7 meter corrected Dall-Kirkham, better known as the CDK700, at SRO.

NARIT is responsible for research in Astronomy and Astrophysics in Thailand. The Thai National Observatory (TNO) with their 2.4m Telescope, located on the highest mountain in Thailand, at 2450m above the mean sea level, serves as the main workhorse for the Thai astronomers as well as international collaborators. Apart from TNO, NARIT has been in the process of setting up a network of robotic telescopes worldwide at some of the best locations available. These includes 0.6-0.7 m telescopes at Cerro Tololo Inter-American Observatory in Chile, Gaomeigu Observatory in the People's Republic of China,

NARIT's 0.7 Meter Planewave CDK 700

Siding Spring Observatory in Australia and most recently at Sierra Remote Observatories in the USA. There will be a final telescope in a yet to be selected location in South Africa. This Thai Robotic Telescope Network (Thai Robonet) will provide schools, universities and research institutes in Thailand with opportunities to observe objects with time-variability, such as asteroids, 24 hours a day from both the Northern and Southern Hemisphere. The PlaneWave 0.7m telescope (CDK700) installed at SRO has now become part of this network.

Article continued on page 3

In the Spotlight: R. Jay Gabany

Jay Gabany has been at SRO since 2010 and currently he and his partners have at SRO a half-meter Officina Stellar PRO RC 500 telescope equipped with an Apogee U16M-HC camera that rides on a Software Bisque Paramount Mount.

By profession, Jay is an eCommerce product manager working in California's Silicon Valley and the recipient of five patents for innovations in his field. Over the last decade he has earned a reputation as an amateur astronomer and astrophotographer whose work has been recognized internationally. He is also known for his collaboration with an international team of astrophysicists led by Dr. David Martínez-Delgado (University of Heidelberg). GaBany helped pioneer the use of modest sized telescopes and off the shelf CCD-cameras to produce long exposure images that revealed ancient galactic merger remnants in the form of star streams surrounding nearby galaxies that were previously undetected.

GaBany has coauthored over 14 significant scientific papers on the subject and has several more in the works. For his contributions at the professional level he was given the 2010 Chambliss Award by the American Astronomical Society. Jay's pictures produced at SRO have been seen on the cover and inside of numerous books, magazines, on television programs and the APOD web site. Among his other accomplishments, Jay's image of NGC 3521 was selected as the backdrop for the official crew portrait of Expedition 30 to the International Space Station. In 2012 and again in 2013, he was selected by the editors of Time magazine as one of "The 25 Most Influential People in Space."

Jay has also written numerous articles, blogs, and reviews for a variety of popular astronomy magazines such as Sky & Telescope, Universe Today, and Astronomy Now. His first book, "Breakthrough! 100 Astronomical Images that Changed the World" was published in November 2015. Co-authored with noted astrophotographer Dr. Robert Gendler, the book explores the history of astrophotography through the lens of 100 ground breaking images that altered humanity's perception of its place in the universe.

We are honored that R. Jay Gabany has chosen SRO as the site of his Blackbird Observatory.

See Jay's website at http://www.cosmotography.com

Some of Jay Gabany's's APODs from SRO:

Star Streams and the Whale Galaxy
By R. Jay Gabany
APOD: December 19, 2015

The Umbrella Galaxy
By R. Jay Gabany and C. Foster, H Lux, A. Romanowsky and D. Martinez-Delgado
APOD: July 2, 2014

NGC 3521: Galaxy in a Bubble
By R. Jay Gabani and D. Martinez-Delgado
APOD: September 11, 2011

Astrophotography Tips by Martin Pugh

In the first issue we discussed a method of "hiding" stars during image processing, as a way of avoiding saturated and bloated stars. In the second issue we discussed another approach, and one some would argue a better one, to differentially process (in this example contrast) portions of your image and avoid the processing of stars.

In this issue Martin Pugh has kindly discussed SNR filaments (bringing out faint details) and star processing. He has lectured on these and other techniques at a variety of meetings, including the 2015 AIC and is well known for his expertise at image acquisition and processing. Remarkably, some of this information has not been previously published.

Part I: Enhancing SNR filaments (bring out faint signals like tidal tails in galaxies or faint filaments in nebulas).

The purpose of technique is to accentuate delicate SNR filaments specifically on a layer being used in luminosity blend mode. As a luminosity layer emphasizes detail and brightness in a color image, this technique produces enhancements that can be fully adjusted and even applied to a specific color channel to achieve the desired result.

In Photoshop, apply this technique to your luminance layer (synthetic or otherwise).

1. Duplicate then invert this layer.
2. Clip an Exposure Adjustment Layer (EAL) to the duplicated layer.
3. Set the blend mode of the EAL to Linear Burn, then modify as follows:
4. Exposure = 0, Offset = -0.1035 or thereabouts, Gamma = 0.7
Basically, the blacker it is on the inverted layer, the brighter it will be when re-inverted at Step 6 below.
5. Lower opacity of the EAL to about 70%, and merge down to the inverted layer.
6. Re-invert the merged layer, adjusting opacity to taste.
7. Your reinverted layer is now sitting above your original luminance layer. Apply a 'Hide all' Layer mask to your reinverted layer.
8. Set the flow rate/opacity of your brush to 50% and blend mode to Linear Dodge (Add). Brush in (reveal) the elements you want. Repeated application of the brush will make the filaments brighter and brighter.
9. Now lower the opacity of this layer to taste, merging down to your luminosity layer to achieve the final result.

Part II: Reducing Star Glare and Reducing Star Size (making your stars "pop").

With regards to star processing, a combination of a Minimum Filter, Unsharp Mask, and an artificial background produces 3 noticeable adjustments on the star population within your image to great effect.

In Photoshop, apply this technique to a duplicate of your luminance layer (synthetic or otherwise)

1. Using your preferred method, create a star selection on the luminance layer. Expand this selection by 2-3 pixels. If you have really bright stars in your image, you may need to use the elliptical marquee tool to select these stars. No feathering is required at this stage.
2. Under the 'Filter' menu, invoke the 'Other – Minimum' filter with the 'Roundness' option selection. The pixel radius should be about 0.3 or so.
3. Invoke the 'Unsharp Mask' dialogue. Put the Amount to 60%, Radius to 5 pixels, and Threshold to 12.
4. Merge this layer down to the Luminance layer below. Now duplicate it into a new layer.
5. Create a new layer above the duplicated luminance layer and fill it with a selection of your image background. Clip this to the (luminance) layer below.
6. Put this fill layer to Overlay blend mode and lower the opacity to about 20-30%. Merge this layer down.
7. For the final stage, you can lower the opacity of this topmost layer to taste.

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
Mel Helm (Building 1),
Keith Quattrocchi (Building 2),
Eco-Analytics (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+Leonardo Prazi+Rob Pfile+Rick Stevenson+Jerry Yesavage (Pier 4),
Paul Mortfield (Pier 5),
Dick Post (Pier 6), Rick Hendrick (Pier 7),
Sofia/University of Stuttgart (Pier 8),
David Weiner (Pier 9),
Brad Moore (Pier 10),
Murray Kenney (Pier 11),
Mike Hankey (Pier 12),
Tom Carrico (Pier 13) and
Martin Pugh (Pier 14).

In the multi-telescope building 10 we have Saran Poshyachinda of NARIT. In this building we also house our experimental planetary telescope.

We are proud to note you will recognize some important names from a diverse spectrum of astrophotography, from Astrophysicists to telescope manufacturers and high end astrophotographers.

NARIT/CDK700 Article Continued:

Dr. Saran Poshyachinda, Deputy Director of NARIT, noted: "It is expected that the magnificent facilities and staff support provided by SRO will help our observations to be as productive as possible during our presence there for years to come". We are honored that NARIT choose SRO as one of their select astronomical observatories.

This article would not be complete without discussing the telescope they placed, the remarkable Planewave 0.7 meter CDK700. In addition to the excellent optics of the Corrected Dall-Kirkham design there are a number of excellent design choices and innovations.

The design is an Alt-Az mount with a de-rotator. The CDK700 has high resolution encoders and direct drive motors with zero backlash, zero periodic error and no meridian flip. It has proprietary 'PointXP' mount modeling software and a field de-rotator. The Nasmyth Focus design means there is no flexure and no counterbalances are required.

This system is method of choice for professional astronomers.

You can read more about NARIT at: http://www.narit.or.th/en/

and read more about the Planewave CDK700 at http://planewave.com/products-page/cdk700/0-7m-cdk-telescope-system/

What's New at SRO

For SRO this is clearly a time of rapid growth. At the same time we have endeavored to maintain our commitment to friendly service and on-site support.

The second multi-telescope building, number 10, is now fully functional. The first telescope in the building is a PlaneWave 0.7 meter CDK700 placed by NARIT (National Astronomical Research Institute of Thailand). We are excited to see the research and images produced by this remarkable telescope.

Networking Updagte from Larry Van Vleet: Construction of building 10 brought much more than just some needed additional space for SRO. It also allowed us to create an expanded area to place all of our site networking gear. We now have an environmentally protected equipment enclosure in building 10 which has been directly integrated with the site cabling infrastructure and is directly connected to the other buildings and network distribution points via optical fiber cables. We also used the opportunity to upgrade the capacity of all of our Cisco switches to provide more speed and operational flexibility for everyone using the network.

This was a long and involved project which took a lot of planning and coordination on the part of our network partner Valley Networking Systems. Thanks to their competent work, however, everything was successfully migrated and transitioned in early December and is now fully operational.

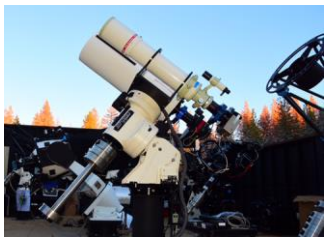
Weather Station Update from Mel Helm: Over the years we have had difficulty integrating precision humidity measurements with cloud and rain detection. Recently, we have installed a RainwiseMK-III-LR weather station along with an AAG cloud and rain detector. Although still in a testing phase, this hardware is now integrated using AAG WeatherCenter software. With this, a single "Boltwood" file is made, even though the data comes from separate sources. Now, when the roof closes because of high humidity, you can go to the new weather section of the SRO web site and find out what happened. This same data is used with our custom roof automation software (again, still in a testing phase). If you are interested in historical data, you can see the RainWise data at the following sites:

www.rainwise.net/weather/sro
and
http://www.wunderground.com/q/zmw:93602.1.99999?sp=KCAAUBER13

Other Updates:
We have submitted plans for our new warm room to the county. This will be a small room with a small kitchenette and bathroom and small central room. It will be in the northeast corner of the observatory and has been designed as not to have a detrimental effect on the seeing conditions at SRO. This will allow those working at night the ability to escape from the cold. We will be placing gravel along the circular driveway and in front of building 9 and 10, to solve the problem of mud collecting in early winter and spring.

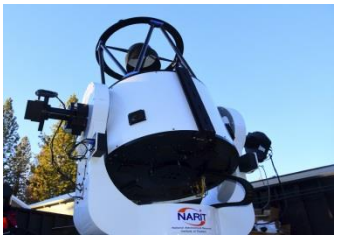
In both of the multi-telescope buildings (Building 9 and 10) large fans have been placed around the base to circulate air and speed up the thermal equalization which occurs after opening the roof.

A few of SRO's telescopes:

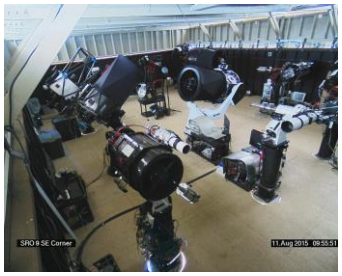


David Wiener's 12" RC and Takahashi

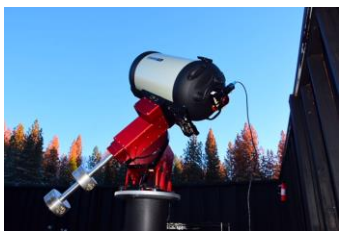
Samuel Lising's Starfire 130



NARIT's PlaneWave 0.7 meter CDK700



Building 9 at full Capacity



SRO's Experimental Remote Planetary Imaging System

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We're on the Web!

www.sierra-remote.com

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. 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 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.

A Word From the Owners

We hope you've enjoyed SRO's third newsletter. They will be coming out every 6 months (biannual), giving us a chance to update everyone on what's new at SRO. The three of us (Keith Quattrocchi, Mel Helm and Larry Van Vleet) 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. 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 Larry adding a great deal of expertise in the area of programming and networking. Mel has upgraded our roof motors and has everything backed up on virtual computers. I have spent a lot of time with marketing issues. Sam, our 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.