

# The High Desert Observer

The Bulletin of the Astronomical Society of Las Cruces

September, 2007

## President's Message

Work on repairing the 16-inch Meade has begun. Chuck Sterling has the instrument in his workshop and he has pulled it apart and believes that he has localized the problem to a burned-out right ascension drive motor. Purchasing a new motor is rather expensive, but Chuck believes that he has found another source for the motor. Hopefully, with the replacement motor, the 'scope will go operational. There is still much to be done on this project. Whatever your skill is, we will eventually need your help. We will soon be negotiating with the State of New Mexico and we can use some help if you are skilled in the legalities of the issues. If you know how to do grant writing, that would also be a great asset at this time. The observatory will need all of our skills, if not in the actual construction, then in the operation. I hope you plan to play a part in our project. See elsewhere in this issue for another report on the telescope/observatory project.



The Astronomical Society of Las Cruces is now an Alliance member of the Meade 4M. This will allow us to obtain the Coronado solar telescope at a reduced rate so we can use it in public outreach. We now need to have those who are doing outreach not only keep us informed on what is coming up, but also what we have scheduled in the future. All of this will be posted on the 4M site for all to see. This will also help us document our public outreach efforts. At the same time, we are also joining the NASA/JPL Night Sky network. When this is done, we will have access to a whole series of teaching aids that will help us educate the public on astronomy. One example is the model of the solar system that they help you build out of calculator tape. It helps you understand that Uranus is midway out in the solar system and that the four inner planets are bunched up together close to the Sun.

Even as all these outreach activities are occurring, there are Society members working on their own observing projects. With the end of the monsoon season, a whole group of members have been continuously improved their imaging skills, producing not only great deep-sky images, but a tremendously detailed image of our nearest neighbor, the Moon. In this issue of the HDO there is an article on this topic by Tony Gondola. These images are often shared on the ASLC-Imagers Yahoo group. If you can take big e-mails, please feel free to join in and enjoy the great astro-images. Variable star observations have begun again and I have discovered another asteroid.

Nominations for next year's officers will close at the September meeting. Vince has put together a slate that fills all the offices, but there are no contested positions. If you would like to run for one of these offices, please let Vince know as soon as possible. You can also nominate yourself (or have someone else do it) at the September meeting. The nomination will not be considered valid until Vince can verify that you will serve if elected. Next year's officers will be instrumental in leading the ASLC into the future. This is an exciting time for us, and we hope you will be a part of it! Clear and dark skies! - Bert

## Next Meeting

The next meeting will be held on September 28 (fourth Friday of the month), 2007, at the usual place and time (DABCC, room 77, 7:30pm). Bill Stein will complete his program from last month on Positional Astronomy with a talk on the impact of Geodesy on Celestial Mechanics.

The Imagers Group (contact: Rich Richins) will meet prior to the September meeting. The Astro Tidbits Group (contact: Nils Allen) will meet prior October at 7pm. Anyone is welcome to attend these special interest groups.

Other events planned for September include:

Dark Sky Observing at the Upham dark sky site, Saturday, October 13, dusk

ASLC MoonGaze, International Delights Cafe, Saturday, September 22, dusk

White Sands Star Party VIII, October 5-7, with public viewing October 6

Please see the ASLC website for further information (<http://www.aslc-nm.org>)

## White Sands Star Party VIII, October 5-7

A beautiful dark sky, glistening White Sand dunes, and visits to two outstanding national observatories await you at the Eighth Annual White Sands Star Party. Hosted by the New Mexico Museum of Space History, White Sands National Monument, and the Alamogordo Astronomy Club, the White Sands Star Party will provide its attendees ample chances to view the heavens, and take advantage of several astronomical opportunities in the Alamogordo - White Sands area.



The purpose of the White Sands Star Party is to raise funding for ProjectAstro New Mexico. The star party allows participants the special opportunity to take advantage of one the nation's premier national parks as well as share our passion of observational astronomy with the general public. Only registered participants of the White Sands Star Party are offered the opportunity to "camp" at White Sands National Monument.

Registered Star Party participants will have special access to keynote speakers, camping privileges, IMAX Theater, Workshops, tours, and a Pizza Party Saturday evening. Public programming will be a part of the overall schedule. Registered participants will be asked to share their telescopes during Saturday night, October 5, for public observing from Dusk to 11pm. In keeping with the spirit of this unique partnership a night of "Astronomers Only," observing is also offered Friday night, October 4 to participants.

Individual Adult \$40.00, Couple (2 Adults) \$60.00, Childern Ages 7-18 \$12.00 per Child. Childern under 7 Free. Only amateur and professional astronomers and their families may camp in the Dunes. There is a Late Registration fee after September 14, 2007, see the Registration form on the website (<http://www.zianet.com/wssp/>).

Camping will be "dry camping"; water is not available within the camping area, but is available at the Visitor Center. Toilets are available at the camping area, and generators may be run between the hours of 12:30 and 3:00pm. Tents are welcome. Any size RV can be accommodated. For more information, contact us at [wssp@zianet.com](mailto:wssp@zianet.com), or call 505-437-2840 and ask for Leah Tookey.

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# ASLC Observatory Status Report

By Rich Richins, Chuck Sterling, and Jerry Gabors

The club observatory exploratory committee has been hard at work obtaining and evaluating the 16" LX 200 obtained on loan from NMSU, and brainstorming the design of the building that will house it at Leasburg State Park. The following information was contributed by Chuck Sterling (leading the telescope subcommittee), and Jerry Gabors (leading the building subcommittee) with a few comments thrown in by yours truly.

**Meade 16" Report:** Rich and I picked up the scope from NMSU and brought it to my home. No small task, as it weighs in at around 300 pounds, and barely fit in my van even with the third seat removed. We were melting. We left the pier for another day. The next day I hooked up a power supply and hand controller, applied power, and watched as the infamous "Meade" banner displayed... and nothing else happened. What should have occurred is the RA motor should have run until it found the home position on the RA worm gear, then the display should have changed to let me operate the scope. Since the motor did not run, and we had been told by NMSU that "the motors are burned out," I laid the scope on a few handy pillows and removed the base plate, exposing the electronics and RA drive. After measuring voltages, it was clear the motor had failed; power to run the motor was at its terminals, but it would not run. I confirmed the available power was sufficient to run the motor by plugging the DEC motor into the RA power jack, and the DEC motor ran.



*Meade 16" SCT on loan from NMSU Astronomy Department*

I removed the motor and partially disassembled it after confirming there was no continuity through its coils, and found a section of the commutator had separated from the armature and amputated a brush arm as it went by on its final pass. This sort of failure is permanent, at least if future reliability is an issue, and I started looking for a replacement motor. I checked with the motor manufacturer, who sent a quote for a replacement motor costing about \$600 in a quantity of one, slightly less if we buy two, and about \$215 each if we buy twenty or more. Well, since we need only one, I checked elsewhere. Meade has a repair program in which they supposedly charge a flat \$395 plus \$50 return shipping for any repair to the scope, but when their quote arrived it had another \$500 tacked on for the motor itself. By this time I had joined a Yahoo! group dedicated to 16" LX200 scopes, and had been asking if anyone had a shipping box they could lend us if we had to ship to Meade. One person asked what was wrong with the scope, and after a few emails mentioned he had a serviceable motor he would sell; I offered \$130 to cover the motor and shipping, and am awaiting its arrival as I prepare this report. Hopefully that is the only part needing replacement.

Beyond the failed motor, the scope appears to be in pretty good shape. There is a small dent in the OTA and a semi-camouflaged scratch leading to the dent, neither bad enough to affect the scope operation. I suspect the DEC drive could use adjustment with regard to worm engagement pressure; the spring appears to have been fiddled with, and may be too weak. That is a trivial item to repair if it proves to be a problem. The manual knob to adjust RA when the clutch is released is not adjusting anything. It may have been disabled through misuse or on purpose to prevent misuse; it also does not matter, since we normally would never use it anyway. The optics look good to my uncritical eye, but could probably stand a dusting. That's what I've noticed so far. And I have not attached a diagonal and eyepiece yet to actually look through the thing, but

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# High Resolution Lunar Image Processing: A step by step workflow process

By Tony Gondola

Photographing the moon sounds so simple, doesn't it? After all, Luna is the brightest object in the night sky and is often the first object observed and photographed by beginning amateur astronomers. As easy as it might seem, the truth is the lunar surface is extremely hard to image at the highest resolution your optics will deliver. Presented here is an outline of my own workflow that has proven to be a very effective approach. This is the result of research into basic methods and a lot of trial and error. It's certainly not the last word and much variation is possible. Much depends on aperture, seeing, optical design, and quality. This work is presented as a proven baseline through which others can perfect and expand their own imaging process.

## Hardware

While many types of cameras can serve for lunar imaging, the best choice is a video-based webcam or machine vision imager. This is because the key to high-resolution lunar imaging is stacking and to do that effectively you need to gather a lot of images. Only by stacking hundreds of frames can we reverse the effects of the atmosphere and create images at full optical resolution. This type of imager is also ideal because of the generally small pixel size. This is one case where covering a large field of view isn't an advantage, 640 x 480 is all you really need and it makes it possible to capture at high frame rates if the camera supports it. However, beware of low dynamic range video-based cameras that do not give you manual control over gain.

On the optical side virtually any telescope can be used for this work and apertures as small as 5 inches can be surprising effective. The most important qualities of a lunar imaging scope are optical quality in combination with a long focal length. The ideal imaging scope would have a long native focal length and a diffraction limited field that's large enough to fully cover the sensor used with a bit more to compensate for slight collimation or centering error. The reason long F ratios are an advantage is the requirement to image at a scale where the pixels in your camera are smaller than the diffraction limited spot size your optics can produce. This is called over sampling and is critical to capturing the finest possible detail. "2x" over sampling would be considered the minimum; however, some imagers are finding that going even further can yield benefits. Most common optics will require additional magnification via a barlow lens to achieve the needed minimum image scale. However at F ratios of F/5 or lower the barlow requirements become extreme (5x or more). You'll also start running into problems with the size of the diffraction-limited field at about the same point. That is not to say that good work can't be done below F/5, but the difficulty increases.

On mountings, any type with an RA drive will work, with an equatorial being first choice. It is possible to image with a driven Alt/Az mount; however, field rotation will limit how many frames you can collect as well as complicate the generation of mosaics. If your RA drive has a lot of PE, then you'll need guide rate correction control to keep the image from shifting too much during the course of exposure; however, there's no need for sub-arc second guiding. In fact, a bit of image shift (10% of frame or so) while capturing your data is actually beneficial to the process.

## Beating the odds

The first step before you even begin imaging is to stack the odds in your favor. Learn how to properly collimate your telescope and make sure it's perfect before every imaging session. Also make sure that all optical surfaces are clean, including filters if used. The second step is to pick your battles. Above all else,

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## Lunar Imaging, continued from page 4

seeing is the enemy that must be defeated here. There's no point in shooting yourself in the foot by trying to gather data when the moon is low in the sky. In general, shooting at elevations below 50 degrees above the horizon is a bad idea. Not only will the seeing be worse, but below that elevation other nasty effects such as chromatic dispersion come into play. Even when the moon is well placed, there will be some nights where the seeing is just so rough it's simply not worthwhile to image; this is especially noticeable with larger apertures. Pick your battles and learn your limits for getting good data.

### **Data collection**

Focus, focus, focus! This is one of the hardest aspects of shooting at long F ratios, but it's absolutely critical to get it right. We're not talking about getting close, but getting it perfect. This is especially critical with faster F ratio instruments with their extremely small focus zone. As an example, a 6" F/8 Newtonian has a 1/8th wave focusing tolerance of plus or minus 0.04mm or 0.0016". Reduce the focal ratio to F/5 and the tolerance shrinks to plus or minus 0.016mm or 0.00059". That's a very narrow range to hit consistently, especially with an average quality rack and pinion focuser. This is further complicated by the fact that unless you have a carbon fiber or Invar OTA, focus will change as the air temperature shifts. In some cases just a degree or two shift will require refocusing. Helical focusers are helpful, but the best solution I've found is to motorized focus and check it often. By giving repeatable movement and eliminating shake, it has made the actual act of focus just about a non-issue. The key is to center a high contrast area, make small adjustments, and then wait for a steady moment to judge the result. What you're looking for is the visibility of very fine detail that only becomes visible when focus is right on. With practice you'll soon learn exactly what that looks on your screen with your system.

Once perfect focus is locked down and your target is acquired, you can start recording your frames. The optimum number of frames you'll need for a good result will depend on the quality and nature of the seeing. A typical AVI capture for me runs about 2000 frames if the seeing is reasonable. Going longer will increase the chance of getting enough usable frames if the seeing isn't as good as it could be. Unlike planetary imaging where there's a time limit due to rotation, the moon imposes no such limit so you can let the imager run if you need to. Also keep in mind that the moon is a very high contrast object. Be sure and monitor your exposures to avoid blowing out the brighter areas. Using the live histogram function of your capture software is a must. Look for a highlight value of no more than 200 or so. If you're shooting near or on the terminator some clipping of sun facing crater rims is unavoidable, but try and keep it to a minimum. When in doubt, underexpose. If you're making mosaics, then expose for the brightest areas you'll be covering and let the terminator fall where it may.

### **Alignment and stacking**

My preferred program for alignment and stacking is Registax so my comments here will be specific to that program. The biggest reason to use Registax however is the newly added support for Multiple Alignment Points. This makes what was formally a very time consuming manual process into something that anyone can use to achieve world-class results. The implications and results for lunar imaging are nothing short of revolutionary.

The first step before getting into MAP processing is to load up your raw AVI into Registax and do a preliminary alignment and frame rejection pass. Use the largest centered alignment box that will fit the frame, change the quality method to Compression and run the alignment. To find your initial frame limit, run the slider through the file starting at frame 1. Look for the point where the image quality begins to noticeably decrease. This will usually coincides with the 90% quality level on the graph. Set your limit at that point.

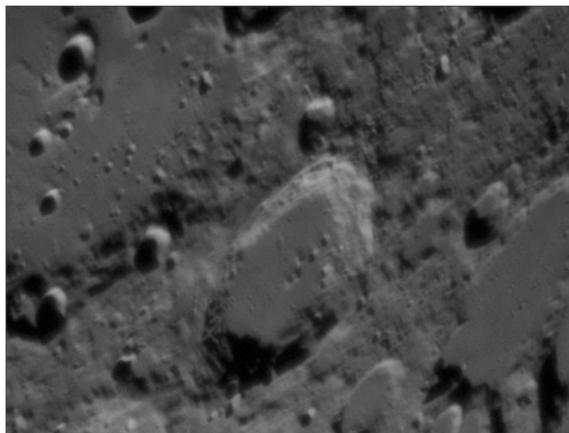
*Continued on page 6*

## Lunar Imaging, continued from page 5

Typically this will eliminate anywhere between 50% to 90% of your original frames leaving only the best for further processing. Click on the Stack tab and use the Registered AVI function to save your selected frames and write them to a new AVI file. The result will be a much smaller data set that's already fairly well aligned and contains only usable frames. Preprocessing the raw file in this way eliminates problems from tracking and wind and makes the rest of the process run a lot faster.

Now it's time to start beating the seeing using the MAP (Multiple Alignment Point) method. One would think that simply going in and aligning the whole frame with the largest alignment box would do the trick. This works to a point, but because of the nature of seeing effects this often will not deliver a sharp image across the full frame. This is because even though the imaging area is very small, seeing effects will still vary from place to place within the frame. If you watch your AVIs carefully, the effect is easy to see as some areas of the frame distort or blur while other areas are sharp. The only way to offset this is to break the frame up into sub-frames, align the sub-frames separately, and then reassemble everything back into a full frame. The new MAP method in Registax allows up to 99 separate alignment boxes of mixed sizes. Each box is aligned and optimized separately and then all the pieces are stacked and stitched to create a new full frame image. If you consider for a moment how much work and time that used to be involved in doing this by hand, separately aligning and cutting and pasting each box, you'll realize just how much of a step forward the new MAP processing method in Registax really is. A process that would have taken days is reduced to hours, much of it unattended.

For our demonstration I've selected a 2000 frame AVI of the Clavius area taken on the morning of August 5, 2007, in average seeing. Telescope used was a 9.5" F/7.6 Newtonian with a 3X barlow. Camera was a DMK 21AF04. On the right is a single unprocessed frame.

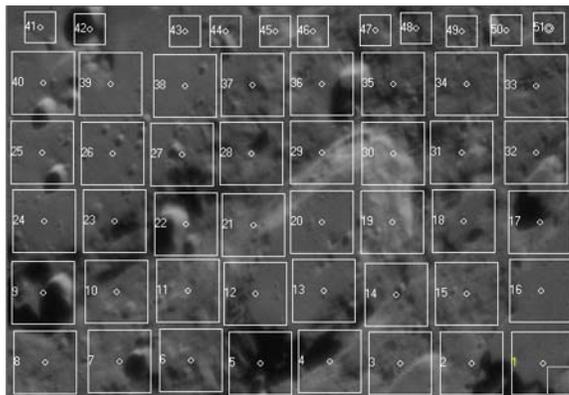


*Single raw frame*

### **Slice and dice, doing the MAP dance**

Once your AVI is loaded into Registax, click on the Multi Align button and select your alignment points. You can use any alignment box size you like and sizes can be mixed. The general rule to follow when selecting MAP points is, high contrast features and small alignment boxes give the most accurate results. Low contrast areas will require the use of larger alignment boxes, so a bit of trial and error will be necessary to get a feel for what works for your images. Here's the alignment box distribution for our test frame. Because we have detail everywhere, a regular arrangement works well.

Once you're happy with your alignment box distribution, select your quality estimate method (I suggest Compress) and begin the MAP alignment process by clicking on Start Alignment in the Multi-Alignment window. The program will then step through and run an alignment on each box you've selected. Once the process is finished, set the limit slider to the number of frames desired in the final stack and



*Alignment boxes*

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The Astronomical Society of Las Cruces (ASLC) is dedicated to expanding members and public awareness and understanding of the wonders of the universe. ASLC holds frequent observing sessions and star parties, and provides opportunities to work on club and public educational projects. Members receive *The High Desert Observer*, our monthly newsletter, membership in the Astronomical League, including AL's quarterly *A.L. Reflector*. Club dues are \$35 per year. Those opting to receive the ASLC newsletter electronically, receive a \$5 membership discount. Send dues, payable to A.S.L.C. with an application form or a note to: Treasurer ASLC, PO Box 921, Las Cruces, NM 88004

ASLC members are entitled to a \$10 discount on subscriptions to *Sky and Telescope* magazine. S&T subscribers MUST subscribe and renew through the Society Treasurer for the special club rate. To avoid a lapse in delivery, this must be done when S&T sends their reminder, 4 months in advance.

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## Minutes, August 2007 Meeting

Call to Order: Bert Stevens, President, Astronomical Society of Las Cruces (ASLC), called the meeting to order at 7:35 pm., 24 August 2007, Rm. 77, Dona Ana Community College.

Secretary's Report: The minutes of the July general meeting were presented as published in the *High Desert Observer* (HDO), the ASLC newsletter. Rich Richins moved that the minutes be accepted as submitted; Vince Dovydaitis seconded. The minutes were accepted by those present by voice vote. There was not an additional secretary's report.

Treasurer's Report: The treasurer reported the current balances of the Club's various accounts. There was not an additional treasurer's report.

Committee Reports:

Nominating Committee: Vince Dovydaitis, Chairman, Nominating Committee, reported that he has one (1) nominee committed to stand for each office for the 2008 calendar year. He would like sufficient volunteers from the membership to have at least two (2) candidates for each office. Officer nominations will close at next month's meeting.

Observatory Committee: Rich Richins, Chairman, Observatory Committee, reported that Jerry Gaber will lead the design and construction effort on the observatory currently to be sited at Leasburg Dam State Park (LDSP). Rich also reported that Dr. Jim Murphy, NMSU Astronomy Department, needs a letter stating the Club's intentions for the Meade 16" telescope, preferably at or before the time the Club picks up the scope. Bert Stevens responded that the letter is available and offered it for review by the membership. The signed copy was turned over to Rich for delivery to Dr. Murphy when the scope is picked up at a convenient time in the near future. Chuck Sterling will lead the effort to repair/restore the telescope and will coordinate the pickup with Rich.

Jerry Gaber stated that he had put out a request for volunteers via email to support the design and construction of the proposed observatory and had received a dozen or so responses so far. He is currently favoring a roll-off roof design for the observatory rather than use the Club's current dome, and is planning to investigate the observatory at City of Rocks State Park and the personal observatories of other Club members.

Old Business:

1. Coronado (or equivalent) PST: A Meade SolarMax solarscope with double stack filter is available for approximately \$3360. This discounted price is available if the Club joins and actively participates in the 4M Society (Meade's public outreach and education effort). Rich Richins submitted a motion that the Club join the 4M Society; Steve Smith

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seconded. The question was called and was passed by the members present. Bert Stevens volunteered to be the point of contact/liaison between the Club and the 4M Society. Steve Barkes will finalize and submit the order for the solarscope and obtain a suitable mount.

2. Renaissance Arts Faire: After some discussion regarding the direction of the Club's participation in the Arts Faire, Nils Allen volunteered to coordinate the Club's participation in this year's event. Steve Barkes and Chuck Sterling also volunteered to participate. Additional volunteers are needed and are encouraged to contact Nils to let him know of their willingness to help.

New Business: Bert Stevens gave a brief report from the Astronomical League Convention (ALCon). His primary focus was presenting information on the Night Sky Network, a NASA program directed by the Jet Propulsion Laboratory (JPL) to assist public outreach. The Network offers kits, "training" opportunities, and demonstrations to assist public education and outreach. The Club needs a volunteer to be the point of contact (POC) in order to officially participate in the Network. Based on the current dormancy of support for Project Astro in the Las Cruces area schools, Steve Barkes volunteered to be the POC.

### Announcements:

1. White Sands Star Party (WSSP) 2007: WSSP 2007 is scheduled for 05-07 October. More information and registration forms are available on-line.
2. A *Las Cruces Sun-News* reporter contacted Nils Allen regarding the total lunar eclipse on 26 August and wanted to know if the Club was planning any special event or activity. He said he pointed out the timing of the eclipse (early morning, mid-week) and told her the Club was not planning a special event.
3. Dave Dockery reminded members that the Aurigids meteor storm would occur early on 01 September. He reminded those present that a radio tuned between broadcast frequencies would pick up the signal of the ion trail left by a meteor entering the earth's atmosphere. He also noted that the NMSU Physics Department has an all-sky camera that might observe the storm and that a web feed might be available.
4. Steve Henderson is visiting from Tucson, AZ, and is considering relocating to Las Cruces. He has been active with the Tucson area club in their public outreach/education and IDA efforts.

Vince Dovydaitis offered a motion to adjourn and Joseph Mancilla seconded. The business portion of the meeting was adjourned by acclamation of those present.

General Announcements: There were no general announcements presented.

Observations: There were no observational reports.

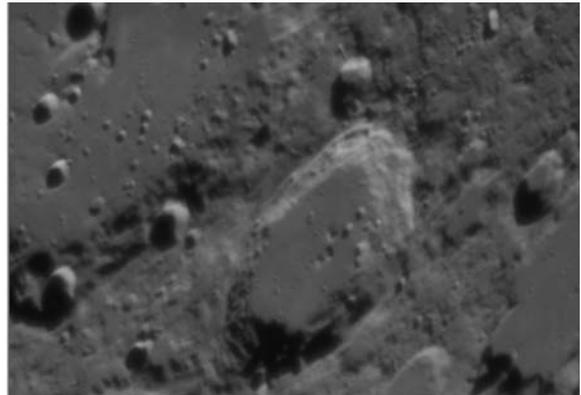
Presentation: The program for the August meeting was presented by William L. (Bill) Stein, PhD, a member of the Club. Bill's topic was: "Applied Astronomy – A Berkeley and IU Astronomer in the DoD World." Bill gave a brief overview of his training - BA in astronomy, UC Berkeley, 1965; Masters and PhD astronomy, Indiana University, 1973, 1976, respectively. He described his career working for the United States Navy and several incarnations of the mapping agency of the US Department of Defense. His career involved precise determinations of timing and location in space, particularly for orbiting sensing platforms. This was Part 1 of his presentation; Part 2 describing his involvement with the Global Positioning System (GPS) will be presented at a later date. This presentation was not recorded for playback via the Internet. Other meeting presentations can also be seen on the web at <http://www.aics-research.com/lectures/aslcnm/>.

The monthly meeting concluded at 8:40pm. Respectfully submitted by John McCullough, Secretary

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click the Limit button. Keep in mind that because you've preprocessed the original AVI to eliminate bad frames in step one, chances are you'll use 100% of the available frames at this point. Click the Multi-Optimize button and Registax will then refine the alignments for all selected frames. This process can take a while on large images and slow machines, so be patient. At the end of the optimizing run, click on the Stack tab, set feather to 6 pixels, take the rest of the settings at default, and click on the Stack button. The program will reassemble and stack all of the separate tiles back into the final raw image; below is the result.

A first glance this doesn't look a lot better than our single raw frame, but in truth, a lot has changed. By stacking so many frames noise has been reduced and bit depth has increased. In addition, the MAP processing has eliminated all of the seeing-induced 2D distortion, giving us a good starting point for detail recovery.



*Raw map result*

### Image enhancement

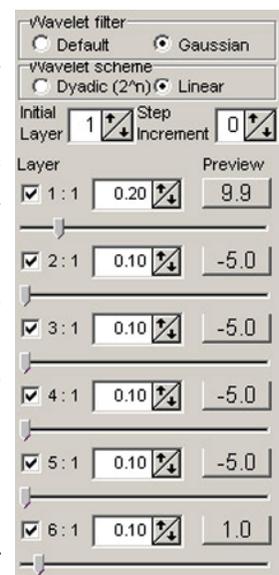
Our image alignment processes have gone a long way towards removing the negative effects of seeing, but at the cost of a slightly soft image. Now the job is to bring out the fine detail that's actually there. The first step in this process is the application of a general wavelet sharpening process in Registax. Before we do that however I need to make an important point. The time to apply wavelets is within Registax right after MAP alignment and stacking. If you must do it later, then make sure to save the image as TIF or FITS. Do not save as a BMP or other 8 bit format and then try to apply wavelets at a later time. If you do, the generated noise levels will be very high.

My standard wavelet application is made using the linear gaussian filter mode with the wavelet layer set as shown here.

The 1:1 layer is for fine detail enhancement and the rest with the exception of 6:1 are all set to negative values for noise reduction. The result is shown on the next page (Wavelet pass image).

That's a substantial improvement, but there's still more to do. My next move is to bring the image into PixInsight and resample the image by a factor of 2X using the b-spline function. This can also be done in Iris. Once resampled, I bring the image into Photoshop and apply the Focus Magic plug in to bring up that last bit of detail that's lurking in the image. Once that's done, the image is resampled back down to its original size (see resize FM pass image on page 10).

To finish up, make any final tonal adjustments using curves or levels as needed. Our image is a little dark and flat; here's the final result after adjusting that to a better overall tonal balance (see tonal balance image on page 10).



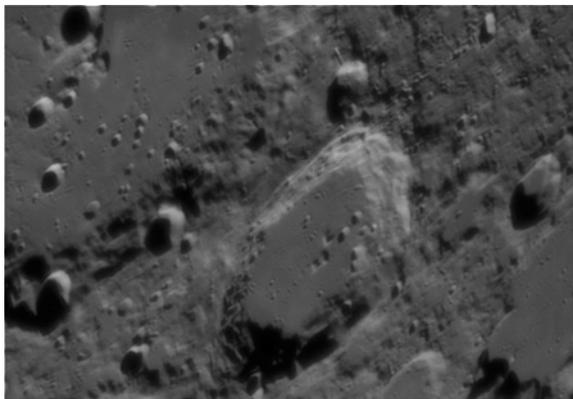
*Standard wavelet settings*

### Recap

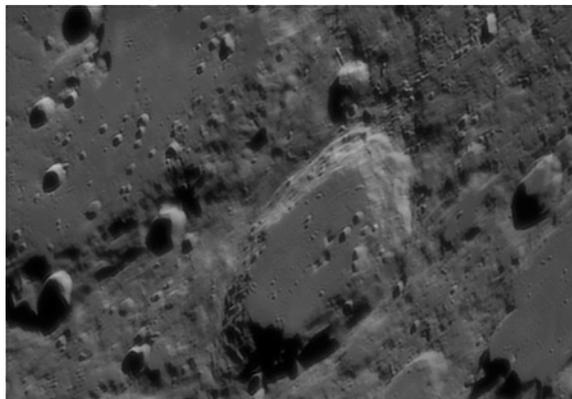
That's it; as the following example shows we've come a long way from our original collection of fuzzy single AVI frames. To recap, here are the steps again in workflow order: Collect good data by optimizing

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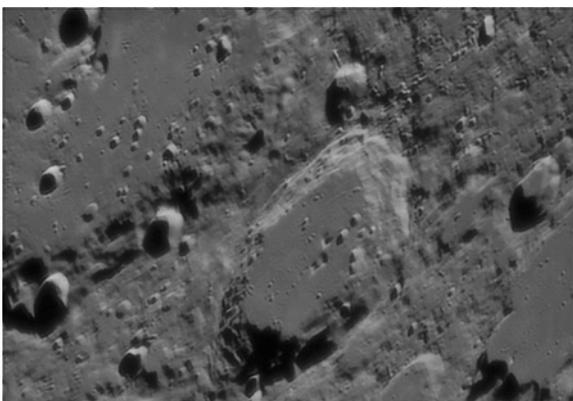
## Lunar Imaging, continued from page 9



*Wavelet pass*



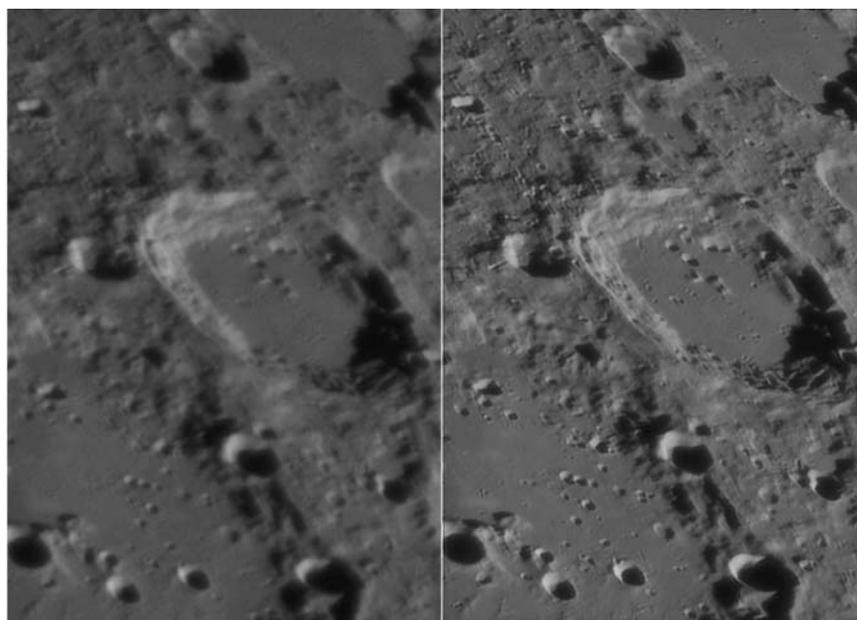
*Resize FM pass*



*Tonal adjustment*

optics, methods and conditions; align and stack using Registax MAP function; sharpen with wavelets and Focus Magic; balance tones using levels and curves. As a last comment, please remember that this is a work in progress. The workflow presented here is presently the best I've currently found for my combination of optics, camera, and conditions. Yours may very well be different in many respects, so feel free to experiment. I don't believe any raw lunar image has yet given up 100% of the data it contains. I would encourage anyone reviewing this process to continue the search for better methods and results.

**Resources:** Registax: <http://registax.astronomy.net/>; Focus Magic: <http://www.focusmagic.com/>; PixInsight: <http://pleiades-astrophoto.com/pixinsight/>; Iris: <http://www.astrosurf.com/buil/us/iris/iris.htm>



*Before and after*

## Meade 16"/Observatory Report, continued from page 3

will do so. The sky view from my shed door is not optimal. So, as they say on TV, more news at ten....

**Building Report:** About ten people have joined the building subcommittee. Jerry reported earlier on the condition of the club dome (it's not in very good shape), so we've been leaning strongly toward a roll-off roof design. Jerry and Rich met at City of Rocks SP on September 8 to have a good look at the roll-off observatory there. It's around 12 x 16 feet and easily houses the park's 14" scope. There's a workbench along one wall with red lighting. The observatory has double doors (a must), and is run by solar power (not necessary for Leasburg SP since electricity is readily available).

Four members met at Jerry's home on September 13 to discuss building designs. The group is thinking of a slightly larger observatory for Leasburg SP - something on the order of 14 x 20 feet. In that way, a second telescope could be placed in the building for public star parties. The orientation of the building and doors hasn't yet been decided. We'd also request a few concrete pads be installed that could be used for additional telescopes when needed for star parties. The height of the structure would be 6 to 6.5 feet depending on the height required by the scope and pier. The committee prefers a gable wood framed metal roof (rails/roller design still needs to be decided on). They're also recommending an electric opening/closing mechanism. Space would be set aside for storage, and for a "warm room." Jerry is willing to donate a computer that would live in the observatory permanently. We're currently planning to use the pier that came with the scope.

Building materials would be either cinder block or wood frame, and we plan to do the bulk of the construction ourselves to save money. The park requires that the structure 'blend' in with the natural surroundings as much as possible. Stucco or cinder block should conform (the exterior color will be "desert sand"). Jerry is looking to obtain some building plans which could serve as a guide in our final design. This should help us establish a cost for the structure.

Once we settle on a design, and get club approval to spend funds, we'll submit our plan to the park which must get approval from Santa Fe. A State Archeologist will need to excavate the site to check for artifacts. Only then can we break ground. With luck, that could be early in 2008. The park will use prisoner labor to dig and pour the foundation. We're responsible for materials and construction of the building itself, although the park may be able to help with the exterior surface. Additional meetings are planned as well as regular reports to the club.

## October Issue of the HDO

Articles for the October issue should be sent to me by Saturday, October 12. Material should be sent as email (GMHLCNM@msn.com) or as an attached Microsoft Word document. If you have any questions about submitting something to the HDO, please don't hesitate to contact me (532-5648 or via email). Thanks in advance! George Hatfield, Editor, ASLC Newsletter.

## The North American and Pelican Nebulae

By Bob Long

At a distance of 1,800 light years, these two nebulae (NGC 7000 and IC 5070) are among the largest nebulae of the summer sky. This image (covering almost 6 square degrees) doesn't quite capture the entire pair. The obvious shapes suggest the popular names given to these nebulae. While these two nebulae appear as two separate objects, they are part of one gaseous structure. The dust component of the cloud hides the massive star, which illuminates the nebulas, and causes them to fluoresce. The star (2MASS

*Continued on page 12*

## The North American and Pelican Nebulae, continued from page 11

J205551.25+435224.6) is a giant class O-type star and is hidden from our optical view behind the thick obscuring foreground dust of the region, but is visible to infrared telescopes.



To capture this large a section of the sky I used a 135mm Canon FD lens (\$15, bought on eBay) and a SBIG ST7-XEI camera mounted on a Losmandy G-11 mount. This image is 12, five minute exposures through an Astronomics 13nm Ha filter. This was from the second trip to the Blue Mesa DSO site on August 13, 2007.

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