diablo Moonwatch
Mount Diablo Astronomical Society

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How It's Made: The James Webb Space Telescope

MDAS April Meeting - Main Speaker

Marni Berendsen

Ever wonder just how those large, precise space telescopes are actually manufactured?
On April 27th, Tracy Peters of Tinsley Laboratories will tell us how they're made.

You may remember that Tinsley Labs manufactured the optics which corrected the errors in the Hubble Space Telescope. "I guess we were the only company in the world that came up with a solution," says Peters, "which is why we got the contract."

As the manufacturing equipment manager for the James Webb space telescope project at Tinsley, Tracy Peters is uniquely qualified to describe the fabrication of the optics for the telescope that is scheduled to replace Hubble in 2014: the James Webb Space Telescope.

Tinsley Laboratories specializes in designing and producing precision aspherical optical components for both military and commercial applications. "Basically, what that means is that we can make highly precise lenses in very strange shapes. Most lenses that you see are spherical. Most of ours are not….They're truncated, round or, like the ones we're working on for the James Webb Space Telescope, six sided, but not hexagonal."

Mark your calendar for Tuesday, April 27th and find out how space telescopes are made.

Meeting information: http://nightsky.jpl.nasa.gov/club/event-view.cfm?Event_ID=14584

Upcoming programs:
May 25: Dr. Delia Santiago: NASA Lunar Science Institute and the new citizen science project: Moon Zoo
June 22: Dr. Steven Beckwith, The Dawn of Creation: The First Two Billion Years

Tracy Peters checks out the installation of one of the super-high precision machines to make large critical components for the James Webb Space Telescope.

For more information:

Tinsley Laboratories
http://www.asphere.com/

The James Webb Space Telescope
http://www.jwst.nasa.gov/

Eyepieces: Sometimes Simple is Best!

MDAS April Meeting - What's Up?

Nick Tsakoyias

What kind of eyepieces should I buy? It's a question heard at every star party and whenever amateur astronomers just talk. There's no correct, nor single answer to this question and the only true test is in the seeing. If that's not enough choice also depends on what objects a person likes to observe. For example, if you like to study deep sky objects eyepiece choice depends on how large which dictates magnification, how much color which gets at the darkness of field and contrast. Then, there are other issues including telescope size, focal ratio and field of view. Other questions then come into the discussion including apparent field of view, and flatness of field.

We'll explore these and other questions relating to eyepiece selection. Of course price is another criterion that needs to be explored because most expensive isn't necessarily best for every application.

What does March 8th, International Women's Day and the Russian Lunokhod Rovers 1 and 2 have in common?

President's Corner

Liede-Marie Haitsma

An article in Universe Today, 3-19-10, had an article I found interesting. The United States Apollo missions in the 1970's dominated the world news, the Russian space travel was done mostly in secret not only to avoid publishing its disasters but also due to the Cold War that was going on between the US and Russia. Over the last few decades, because of the Soviet Union collapse, Russian space news has been brought out to the public. The Russians, too, had rovers that played an important role on the Moon.

Russian rovers Lunokhod 1 and Lunokhod 2 were sent to investigate the surface of the Moon but also to create "memorials" to women for International Women's Day March 8, 1973 by creating a figure eight (8) into the lunar regolith (regolith is a layer of material covering solid rock that was created over billions of years by constant meteorite impacts). International Women's Day is not celebrated in the United States but it is in Russia, the Baltic's, parts of Asia and Africa. It is still acknowledged today in Russia.

Lunokhod 1 traveled 10.5 km (6.5 miles) and returned more than 20,000 TV images and 206 high-resolution panoramas; it performed 25 soil analyses with its x-ray fluorescence spectrometer and used its penetrometer at 500 different locations. It landed on the Moon 11-17-70 and roved for 322 days.

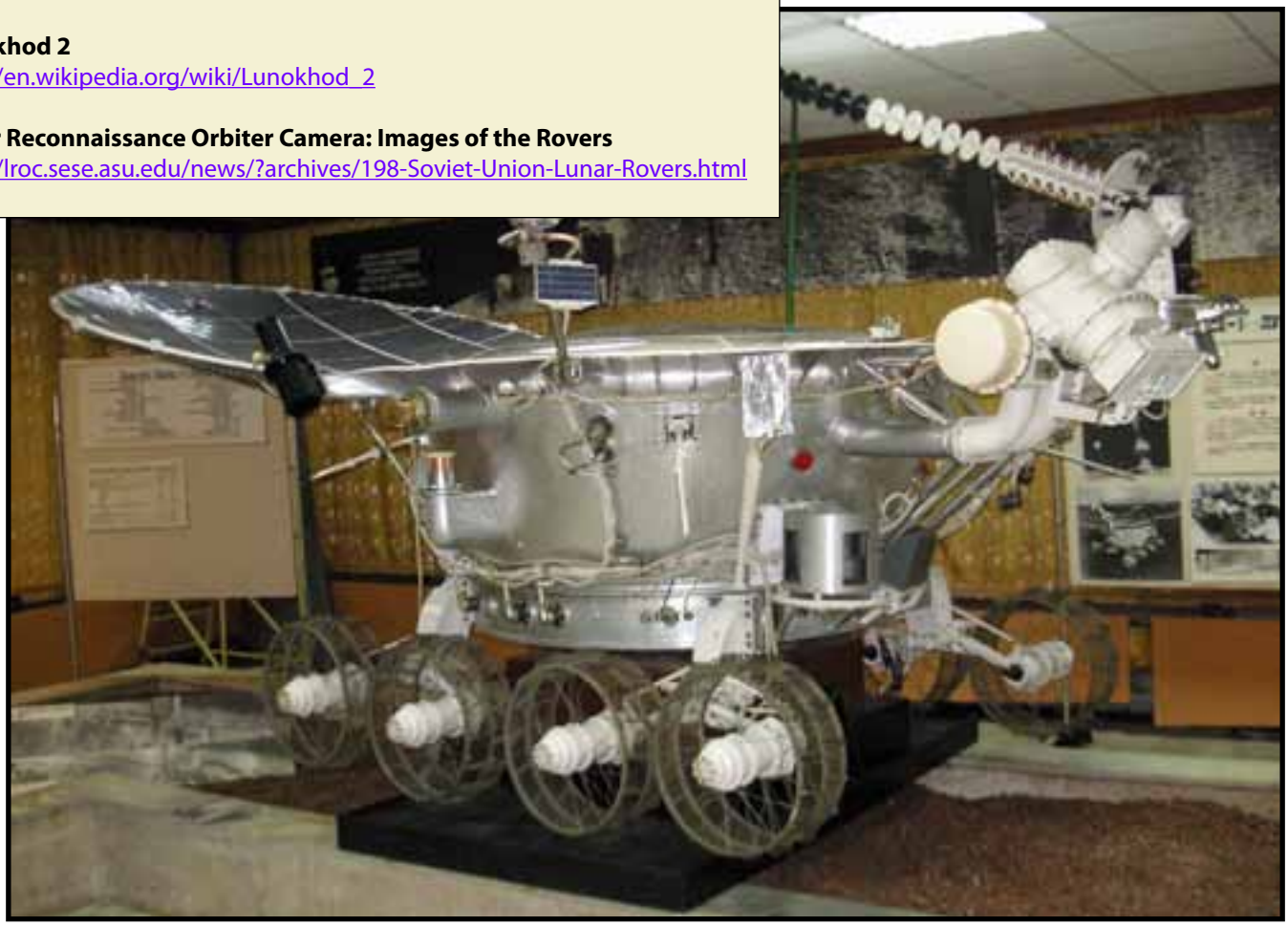
Lunokhod 2 covered 37 km (23 miles) of terrain; it sent back 86 panoramic images and over 80,000 TV images; many mechanical tests of the surface, laser ranging measurements, and other experiments were completed. It landed on 1-15-73 and roved for four months.

For more information:

Lunokhod 1: The position of the first Soviet Rover
http://www.planetology.ru/lunokhod1position.php?language=english

Lunokhod 2
http://en.wikipedia.org/wiki/Lunokhod_2

Lunar Reconnaissance Orbiter Camera: Images of the Rovers
http://lroc.sese.asu.edu/news/?archives/198-Soviet-Union-Lunar-Rovers.html



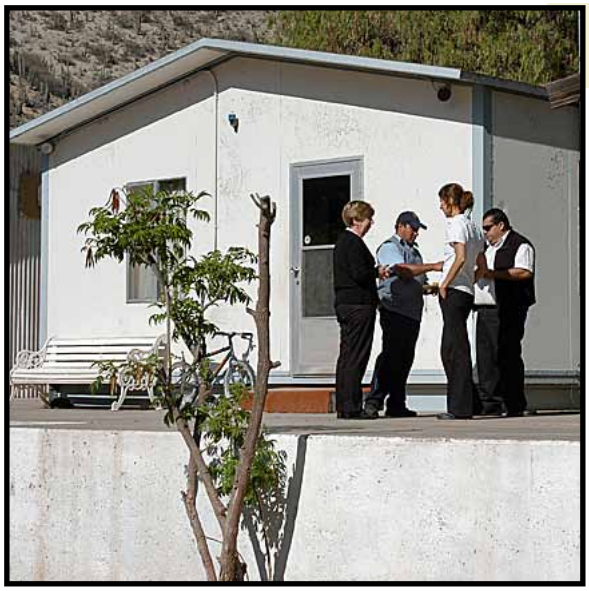
A Surprise and Memories Visiting Cerro Tololo Observatory

Jim Scala

Our bus left Coquimbo, Chile behind, suburbs slowly gave way to beautiful lush green countryside and the road slowly gained altitude. The route went alongside a modest river that flowed deeply and swiftly indicating the constant climb as the large hills soon transformed into dry arid mountains. In spite of the dry the countryside the crops; especially grapes appeared lush and green. Indeed, every valley we looked so green against the dry hills I couldn't resist asking our tour guide a question, "How do you maintain the water for these crops in such a dry climate?" Her answer surprised me.

We were surprised by the lush green crops lined the road as we approached Cerro Tololo Observatory. In a wet year this area receives 1.5 inches of rainfall. Not a drop of river water from high mountain snowmelt is wasted by a drip irrigation system designed by UC Davis scientists and implemented by Chilean Engineers. It's a marvel of modern agriculture. We were proud to be from California.

"Simple," she said, "Scientists from the University of California Davis designed the watering plan, so not a single drop is wasted." Then she pointed to a valley and added, "Every valley will become agricultural land as the water system is extended." The guide was correct, it was easy to see up a valley and the point at which the green stopped and brown began was as far as the engineers had extended the water system every plant is watered by drip irrigation carefully controlled by soil sensors. Now I know why the lush plump table grapes we buy during our winter in Lafayette supermarkets say "Product of Chile." We soon turned away from the river onto a dirt road as the tour guide said, "We'll soon be arriving at the gate and after that it's only about an hour's drive."



Gateway to the Cerro Tololo Observatory where visitors are verified and the road up the mountains begins. Our tour guide was the young lady on the right.

Our arrival at the gateway gave us a chance to stretch our legs after the two hour bus ride, and a chance to look at the countryside and sense the dry air. Once we started again the dirt road soon started winding steadily upwards. A dirt road in this dry climate isn't the same as a dirt road in a wetter climate because once cut into the mountainside it doesn't become eroded and simply needs annual grooming like any road. About 30 minutes and we could see the observatory dome shining in the bright sunlight on the hills as each curve in the many switchbacks kept bringing us ever higher. Soon it dominated our view as we rounded a curve and seemed to just hang on the enormous cliff. We had arrived.

A big dome housing the four meter F/2.8 telescope dominates any view in this arid land. Cerro Tololo observatory is part of the Inter-American Observatories and is the world's largest telescope with a Cer-Vit mirror. Cer-Vit is a material that pits the positive expansion coefficient of glass against the negative ceramic coefficient so the resulting mirror is completely temperature insensitivity.

At 2200 meters or 7,333 feet there is no lack of domes greeting you when you step into the warm dry air. Memories flooded because I was present at the casting of this mirror in 1969. The mirror, when cast weighed in at 57,000 pounds and is the last, large mirror casting ever done. Since then mirrors have been of

ribbed construction and the reflecting surface is relatively thin. However, since Cer-Vit material is zero expansion it was simple to simply cast it a large disk. I recall vividly the incredible heat as the molten material filled the enormous mold. I never realized I was witness to the first and only large mirror made this way.

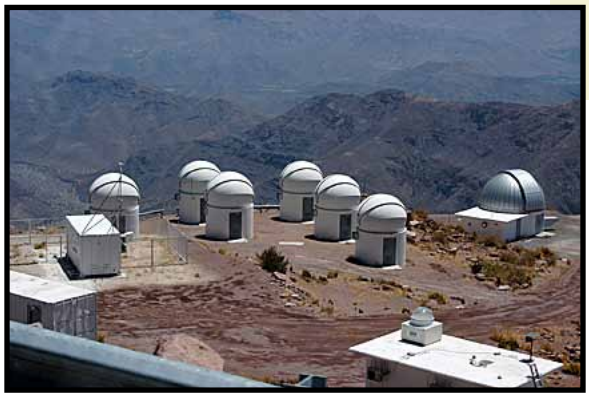
The four meter Cerro Tololo Telescope looking out through the big dome. Like all modern telescopes they are never used visually any longer and the business end is usually a maze of wires and electronic devices.

Standing outside the large dome, I was amazed at the number of large telescopes and domes on the main plateau of Cerro Tololo; the telescopes range in size from 2.5 meters to a second four meter.

Standing on Tololo's main plateau anyone would be impressed by the many domes and the very clean appearance of the grounds.

Anyone would be surprised by the main plateau of Cerro Tololo with all the telescopes housed there. The air is so clear that the telescopes can be usually be used over 350 nights. The grounds are well kept and the visitor's center has a nice video presentation featuring Professor Alex Filippenko of UC Berkeley.

A second level of the Tololo plateau has housing for the astronomers and another array of domes that house more telescopes. By the time a visitors has explored the observatory he's no longer impressed by domes.



Domes and more domes housing telescopes of the Inter American Observatory. Although there are observatories at higher elevations, the incredibly good seeing makes Cerro Tololo on of the worlds best observatories.

Gemini South houses an eight meter telescope that we could not visit. However, as I stood on the Tololo plateau I couldn't help but notice its dome on the next mountain. Can you imagine the curve of an eight meter F/1,8 mirror that is figured to about 1/20th a wavelength of light. It dominated our view on the buss ride down the mountain.

Gemini South's dome housing the eight meter telescope. Not surprising, a tunnel and bridge were modified, so the mirror could be transported to the observatory.

As I returned to Coquimbo, I thought about what I had seen. An agricultural system designed by UCD scientists, a mirror that I saw cast in 1969 and a video featuring a professor I see quite often. In addition, I had visited one of the driest places on planet earth. And about 10 days before I was in the Antarctic which is the coldest dry place on planet earth..

For more information:

Cerro Tololo Inter-American Observatory
http://www.ctio.noao.edu/

Wikipedia
http://en.wikipedia.org/wiki/Cerro_Tololo_Inter-American_Observatory

Time's Running Out! Renew Your Membership Now

Marni Berendsen

NEW! Renew your MDAS membership and your magazines online!

ANNUAL MEMBERSHIP DUES OF $25 ARE WERE DUE APRIL 1, 2010. Renew by April 30th to ensure you remain a member in good standing of MDAS.

TWO WAYS TO RENEW! To renew your club membership, you may either:

- Renew online using Paypal or your credit card at http://mdas.net/membership/paypalreg.htm and select the option for "Membership Renewal"
- Or mail a check for $25 made payable the M.D.A.S. to this address:
  Mount Diablo Astronomical Society
  P.O. Box 4889
  Walnut Creek, CA 94596

Remember your annual dues of $25 cover all members of your household.

NEW! Renew Your Magazines Online!

Marni Berendsen

Now all **Sky & Telescope** and **Astronomy** magazine subscriptions renewals will be handled online – AT THE CLUB DISCOUNT RATE!

Here are the steps to subscribe to magazines:

1. Log into the Night Sky Network using the username and password emailed to you. http://nightsky.jpl.nasa.gov/login.cfm
2. Select the Links page from the third column. https://nightsky.jpl.nasa.gov/club/links.cfm
3. Select the "New and Renewal Subscriptions" link. http://www.astrosociety.org/magazine/
4. Select the magazine to which you wish to subscribe and follow the instructions on the form.

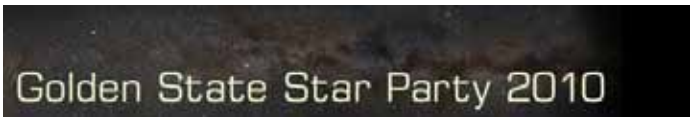
If you don't have access to a computer, any MDAS member can help you renew your subscription through the same link.

No more delays or uncertainties about getting your renewals in on time!

Other Astro Events

RTMC links
http://www.rtmcastronomyexpo.org/general.html
general info
http://www.rtmcastronomyexpo.org/detailed.htm
detailed info
http://www.rtmcastronomyexpo.org/registration.html
registration
http://www.rtmcastronomyexpo.org/vendors.htm
vendor info

GSSP links
http://www.goldenstatestarparty.org/
general info
http://www.goldenstatestarparty.org/home/2009-registration
registration
http://www.goldenstatestarparty.org/home/rules-guidelines
rules & guidelines
http://www.goldenstatestarparty.org/events-schedule
event schedule



Astro Classifieds

I have a **Konusmotor 114** (4.5", 900mm, f/8) equatorial reflector telescope with tripod available for sale. I got it in August 2008, but have never set it up or used it.

After attending some star parties, I realized rather quickly that I was more interested in stargazing with the naked eye.

I wonder if anyone might be interested in purchasing it.

Thanks for your help.

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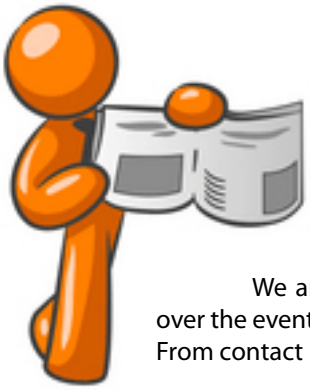
Meetings are held:
Fourth Tuesday every month, except on the third Tuesday in November and December.
Refreshments and conversations are at 6:45pm.
Meetings begin at 7:15pm.
Where:
Concord Police Association Facility
5060 Avila Road, top of the hill.
Take Avila Road from Willow Pass Road.
Directions to facility:
http://nightsky.jpl.nasa.gov/club-view-directions.cfm?Address_ID=18



MDAS Meetings and Viewing Events in April 2010

We are utilizing the calendar of club events generated by the Night Sky Network. Simply run your mouse over the event (calendar entry) and click. Your computer will take you to more information about that particular event. From contact information, location maps to Clear Sky Clocks. We hope that you find this useful.

< April 2010 >

Sunday	Monday	Tuesday	Wednesday	Thursday
28	29	30	31	1
4	5	6	7	8
11	12 7:30 PM Board Meeting	13 9:00 AM Project Astro presentatio	14	15
18	19 ASTRONOMY WEEK	20 ASTRONOMY WEEK 7:00 PM Windemere Ranch Middle Sc	21 ASTRONOMY WEEK	22 ASTRONOMY WEEK
25 ASTRONOMY WEEK	26	27 7:15 PM Gen Mtg:JamesWebb Scope	28	29

Friday	Saturday
2	3 Sunset: 7:34 PM
9 Yuri's Night	10 Yuri's Night 7:00 PM NEIGHBOR PLANETS Sunset: 7:40 PM
16 7:00 PM BSA Jamboree MDAS helpers 7:00 PM Boy Scout Jamboree	17 4 events: Click here to view Sunset: 7:47 PM
23 **ASTRONOMY WEEK** 7:30 PM Parkmead Stargazing	24 **ASTRONOMY WEEK** **ASTRONOMY DAY** Sunset: 7:53 PM
30	1

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