Astronomy Club of Tulsa Observer

April 2012

Star Trails at Black Mesa, photo by Tamara Green

Inside This Edition:

A Message from your new Newsletter Editor:

Hello Everyone!

This is my very first attempt EVER at any newsletter. I hope that you will enjoy this edition and those to come. I did make a promise to Jerry that, even though I have no chance at all of my newsletters even coming close to the awesomeness of his, I will do the best I can to produce a good newsletter.

In this edition, I used a few of the articles from Jerry's last one, that was supposed to be the January/February edition. His page numbers are different from mine, so please ignore the page numbers. I was not able to edit his page numbers out, as his were already in pdf format and I do not have the software required to edit pdf documents. We have it where I work, but my boss would not appreciate me using work time to do it! Anyhoo, I wanted to use some of the articles from it, which he gave me permission to use, and that I thought were really good. So please enjoy them!

Thank you and Clear Skies!

Tamara

President's Message

By Ann Bruun

The temperatures are warming up nicely and are sure to lure out any fair weather astronomers who might have been avoiding the cold temperatures. Unfortunately the spring weather also brings clouds and storms, which lead to occasional star party cancellations. The week of heavy rain in March forced us to move the Messier Marathon from TUVA, which got soaked, to our observatory. I guess being amateur astronomers we are used to last minute changes because we had a nice turn-out for the event. In fact I have never seen the weather better for a Marathon. It stayed clear all night, there was no dew and it never even got that cold. Ron Wood at TUVA Observatory reported he had heavy dew there by midnight. He would like to designate the last minute change of location for the marathon as the "TUVA Mobile Marathon" and give out the TOE awards anyway. The TOE awards are given to anyone who participated in the marathon. Just report the number of objects you found during the marathon to me and I will pass it along to Ron.

We are still looking for a Group Director. The position involves communicating and coordinating with public groups that make requests to the club. The Group Director schedules scout groups, schools, and various organizations, which are too large to accommodate during a public star party. Please consider volunteering for this position. If you have any questions I can put you in touch with Teresa Davis who ran the groups for years and is still heavily involved in helping with groups. Chris, our Facilities Manager has been filling the position temporarily until we can find a volunteer to take over.

Jennifer Jones, the club Webmaster has been working on an update to our website. It will be a complete make over and promises to look fantastic. Stay tuned; the change will be coming soon.

Finally the laptop and projector have been purchased with the grant money provided by Scripps Howard Foundation. I will bring them to the May 4th meeting at TCC so everyone can have a look. We will be using them at the observatory this summer for groups and public star parties in addition to other events.

Ann Bruun
Astronomy Club of Tulsa President
act_pres@astrotulsa.com

Land's Tidbits

By John Land

Treasurer / Membership Report

The club has 112 members including 8 new memberships this year:

Richard Emery, James Taggart, Phillip & Lynda Jones, Sid Tryzbiak,

Roger Anderson, Kenneth Haack, Suzzan Dorey and Shelly Ingles.

In addition, we have had 56 people request information on the web-site's visitor section.

Checking Account $ 1,788.06 Savings Account $ 8,001.19

Investment accounts as of March 30 $ 16,217.08

Values will vary due to market values.

Next TCC Club Meeting Friday May 4th at 7:00 PM

Tulsa Community College, Northeast Campus, on Apache just East of Harvard Ave.

Program: Neta Apple - NASA Education Ambassador – Speaking on Extra-Solar Planets

http://xmm.sonoma.edu/ambassadors/neta.html

Land's Tidbits, Ct'd.

Regarding The Dark Sky Committee:

I visited the Bartlesville club on April 2nd.

They had about 50 people there to hear a lady telling Indian Sky Lore stories.

Afterward they did some observing in the parking lot.

I talked to Arden and they haven't done anything formal yet.

He did tell me that they have used a Girl Scout camp facility for some of their club observing nights.

But other than that wasn't much else said.

Brad Young would like for all members who have not done so yet to please fill out the Club's Dark Sky Survey at:

http://busoutoshi.net/act/darksky/

Thank you for your help in this matter. Answering the questions in this survey will not only take very little of your time, but it will also help us to locate a good dark sky site for all of us to enjoy.

Announcements from our Observing Chairs Owen and Tamara Green

We just wanted to give a big fat congratulations to Club member Clyde Glandon, who recently completed the requirements for his Binocular Messier Certificate and Award Pin. Clyde received them shortly after we sent his log work to John Goar, who is the new AL Chair for the Binocular Messier Club. Good Job Clyde!

AND DON'T FORGET-

The Venus Transit is June 5!

The last transit was in June of 2004, but this won't happen again until December 2117! This event happens only 4 times every 243 years! So this is the last time any of us will ever get to see something like this! Keep checking the Yahoo! Groups and this newsletter for forthcoming details. In the meantime, here is a link to a good article on it:

http://www.skyandtelescope.com/observing/home/Transit-of-Venus-February-2012-134332798.html

Photo: Venus transit, taken in 2004 by Steve Chapman.

OUR TUVA MOBILE MESSIER MARATHON!

Many thanks to all those who came out to our Messier Marathon on March 24! We had quite a turn-out, some great food and great times!

Here are some exciting results:

1st Place: Ann Bruun, 107 objects!!!!!!

2nd Place: Tamara Green, 105 objects!!

3rd Place: Cody Lawson, 101 objects!!

At the end of the night/beginning of the morning, Steve Chapman said he thought his score was in the 80's, but was not that sure. Good job everyone!

A Couple of Announcements

From our Fundraising Chair and our Facilities Manager

From our Fundraising Chair Catherine Kahbi:

Donations Needed!!! The First Annual Astronomy Club of Tulsa Garage Sale will be Friday, April 20 from 8:00 AM to 3:00 PM and on Saturday, April 21 from 8:00 AM to 11:00 AM. The sale will take place in conjunction (of course) with the Sun-gate Neighborhood-wide Garage Sale near 51st and Sheridan. Proceeds from this event will go towards purchasing equipment for the Radio Jove Project. ***Please donate ONLY standard garage-sale items, as the general public typically will not be interested in astronomy equipment.*** Please see the NASA website for information on this amazing radio astronomy project:

http://radiojove.gsfc.nasa.gov/ Purchasing Radio Jove equipment will allow the Astronomy Club of Tulsa to participate in a global project! Contact Catherine Kahbi at northern_lights@cox.net for information on where to drop off donations. Please email Catherine if you would like to help at the sale. The Astronomy Club of Tulsa Board thanks you in advance for helping the Club take its observing capabilities to a new level!

From our Facilities Manager Christopher Proctor:

There will be a work day at the Astronomy Club of Tulsa Observatory on Saturday, April 28, beginning at 9:00 AM, weather permitting. Plans include installing a gate in between the East side of our observing field and the AT&T building parking lot, repairs and painting on the stairs going up to the dome, general cleaning of the classroom, bathroom, dome, etc. and yard work. Volunteers are badly needed, so please contact Christopher at 918-810-6210 or at:

bishop@busoutoshi.net or act_maint@astrotulsa.com. Thank you!

FOR SALE:

ASTRO-PHYSICS 130mm f 6.3 Starfire EDF – 5.12" aperture with 2.7" Focuser(130EDFGT) http://www.astro-physics.com/index.htm?products/telescopes/130-gt/130-gt (Without Mount)

New Scope - still in shipping crate – This is a highly desirable EDF high resolution refractor for visual and photographic astronomy. Manufacture's website has a multiyear waiting list for new orders.

This one can be yours now! Must sell situation. Contact Don 918-949-8800 don@dchphoto.com

April 2012

Tulsa, Oklahoma

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1 Sunrise: 7:10am Sunset: 7:45pm Moonrise: 2:28pm Moonset: 3:37am	2 Sunrise: 7:08am Sunset: 7:46pm Moonrise: 3:32pm Moonset: 4:14am	3 Sunrise: 7:07am Sunset: 7:47pm Moonrise: 4:38pm Moonset: 4:49am	4 Sunrise: 7:06am Sunset: 7:48pm Moonrise: 5:47pm Moonset: 5:24am	5 Sunrise: 7:04am Sunset: 7:49pm Moonrise: 6:57pm Moonset: 5:59am	6 Sunrise: 7:03am Sunset: 7:49pm Moonrise: 8:09pm Moonset: 6:37am Full Moon: 1:20pm	7 Sunrise: 7:01am Sunset: 7:50pm Moonrise: 9:22pm Moonset: 7:17am
8 Sunrise: 7:00am Sunset: 7:51pm Moonrise: 10:34pm Moonset: 8:02am	9 Sunrise: 6:59am Sunset: 7:52pm Moonrise: 11:43pm Moonset: 8:53am	10 Sunrise: 6:57am Sunset: 7:53pm Moonrise: none Moonset: 9:50am	11 Sunrise: 6:56am Sunset: 7:54pm Moonrise: 12:44am Moonset: 10:52am	12 Sunrise: 6:54am Sunset: 7:55pm Moonrise: 1:38am Moonset: 11:56am	13 Public Star Party Sunrise: 6:53am Sunset: 7:55pm Moonrise: 2:24am Moonset: 1:00pm Last Qtr: 4:51am	14 Sunrise: 6:52am Sunset: 7:56pm Moonrise: 3:04am Moonset: 2:03pm
15 Sunrise: 6:50am Sunset: 7:57pm Moonrise: 3:39am Moonset: 3:03pm	16 Sunrise: 6:49am Sunset: 7:58pm Moonrise: 4:10am Moonset: 4:02pm	17 Sunrise: 6:48am Sunset: 7:59pm Moonrise: 4:40am Moonset: 4:59pm	18 Sunrise: 6:46am Sunset: 8:00pm Moonrise: 5:08am Moonset: 5:56pm	19 Sunrise: 6:45am Sunset: 8:00pm Moonrise: 5:37am Moonset: 6:52pm	20 M.O.O.N. Sunrise: 6:44am Sunset: 8:01pm Moonrise: 6:08am Moonset: 7:48pm	21 Sunrise: 6:43am Sunset: 8:02pm Moonrise: 6:41am Moonset: 8:43pm New Moon: 1:20am
22 Sunrise: 6:41am Sunset: 8:03pm Moonrise: 7:16am Moonset: 9:38pm	23 Sunrise: 6:40am Sunset: 8:04pm Moonrise: 7:56am Moonset: 10:32pm	24 Sunrise: 6:39am Sunset: 8:05pm Moonrise: 8:40am Moonset: 11:22pm	25 Sunrise: 6:38am Sunset: 8:06pm Moonrise: 9:28am Moonset: none	26 Sunrise: 6:37am Sunset: 8:06pm Moonrise: 10:21am Moonset: 12:10am	27 Sunrise: 6:35am Sunset: 8:07pm Moonrise: 11:17am Moonset: 12:54am	28 Sunrise: 6:34am Sunset: 8:08pm Moonrise: 12:16pm Moonset: 1:34am
29 Sunrise: 6:33am Sunset: 8:09pm Moonrise: 1:17pm Moonset: 2:11am First Qtr: 3:59am	30 Sunrise: 6:32am Sunset: 8:10pm Moonrise: 2:20pm Moonset: 2:46am					

Daylight Saving/Summer Time is in effect for the entire month.
Courtesy of www.sunrisesunset.com

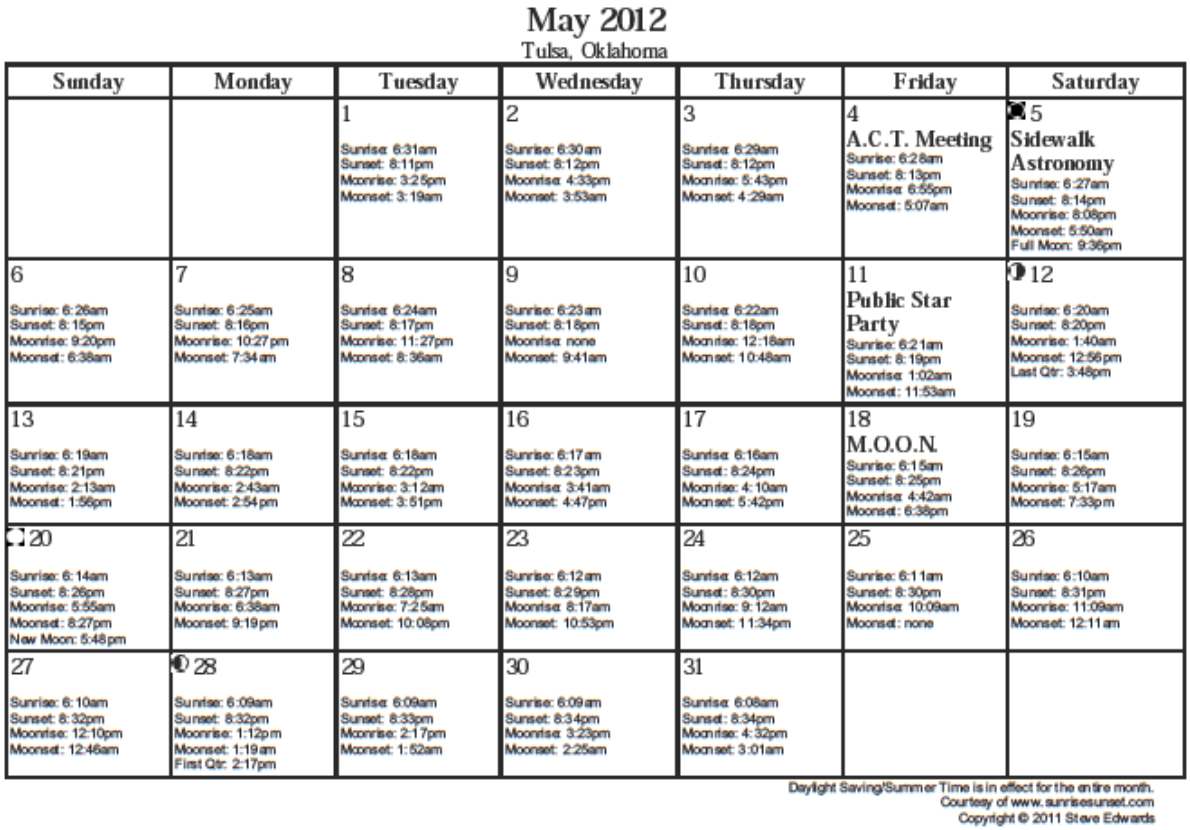
Events for April 2012

Public Star Party, Friday, April 13, 7:30 PM, ACT Observatory

Members' Night, Friday, April 20, 7:30 PM, ACT Observatory

Garage Sale to Benefit the Astronomy Club of Tulsa, Friday, April 20 from 8:00 AM to 3:00 PM and Saturday, April 21 from 8:00 AM to 11:00 AM, those interested please contact Catherine Kahbi at northern_lights@cox.net for details. Also see advertisement in this newsletter.

Work Day at the Observatory, Saturday, April 28, 9:00 AM. All interested please contact Facilities Manager Christopher Proctor at 918-810-6210 or at act_maint@astrotulsa.com or at bishop@busoutoshi.net. Also see advertisement in this newsletter.



May 2012

Tulsa, Oklahoma

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1 Sunrise: 6:31am Sunset: 8:11pm Moonrise: 3:25pm Moonset: 3:19am	2 Sunrise: 6:30am Sunset: 8:12pm Moonrise: 4:33pm Moonset: 3:53am	3 Sunrise: 6:29am Sunset: 8:12pm Moonrise: 5:43pm Moonset: 4:29am	4 **A.C.T. Meeting** Sunrise: 6:28am Sunset: 8:13pm Moonrise: 6:55pm Moonset: 5:07am	5 **Sidewalk Astronomy** Sunrise: 6:27am Sunset: 8:14pm Moonrise: 8:08pm Moonset: 5:50am Full Moon: 9:36pm
6 Sunrise: 6:26am Sunset: 8:15pm Moonrise: 9:20pm Moonset: 6:38am	7 Sunrise: 6:25am Sunset: 8:16pm Moonrise: 10:27pm Moonset: 7:34am	8 Sunrise: 6:24am Sunset: 8:17pm Moonrise: 11:27pm Moonset: 8:36am	9 Sunrise: 6:23am Sunset: 8:18pm Moonrise: none Moonset: 9:41am	10 Sunrise: 6:22am Sunset: 8:18pm Moonrise: 12:18am Moonset: 10:48am	11 **Public Star Party** Sunrise: 6:21am Sunset: 8:19pm Moonrise: 1:02am Moonset: 11:53am	12 Sunrise: 6:20am Sunset: 8:20pm Moonrise: 1:40am Moonset: 12:56pm Last Qtr: 3:48pm
13 Sunrise: 6:19am Sunset: 8:21pm Moonrise: 2:13am Moonset: 1:56pm	14 Sunrise: 6:18am Sunset: 8:22pm Moonrise: 2:43am Moonset: 2:54pm	15 Sunrise: 6:18am Sunset: 8:22pm Moonrise: 3:12am Moonset: 3:51pm	16 Sunrise: 6:17am Sunset: 8:23pm Moonrise: 3:41am Moonset: 4:47pm	17 Sunrise: 6:16am Sunset: 8:24pm Moonrise: 4:10am Moonset: 5:42pm	18 **M.O.O.N.** Sunrise: 6:15am Sunset: 8:25pm Moonrise: 4:42am Moonset: 6:38pm	19 Sunrise: 6:15am Sunset: 8:26pm Moonrise: 5:17am Moonset: 7:33pm
20 Sunrise: 6:14am Sunset: 8:26pm Moonrise: 5:55am Moonset: 8:27pm New Moon: 5:48pm	21 Sunrise: 6:13am Sunset: 8:27pm Moonrise: 6:38am Moonset: 9:19pm	22 Sunrise: 6:13am Sunset: 8:28pm Moonrise: 7:25am Moonset: 10:08pm	23 Sunrise: 6:12am Sunset: 8:29pm Moonrise: 8:17am Moonset: 10:53pm	24 Sunrise: 6:12am Sunset: 8:30pm Moonrise: 9:12am Moonset: 11:34pm	25 Sunrise: 6:11am Sunset: 8:30pm Moonrise: 10:09am Moonset: none	26 Sunrise: 6:10am Sunset: 8:31pm Moonrise: 11:09am Moonset: 12:11am
27 Sunrise: 6:10am Sunset: 8:32pm Moonrise: 12:10pm Moonset: 12:46am	28 Sunrise: 6:09am Sunset: 8:32pm Moonrise: 1:12pm Moonset: 1:19am First Qtr: 2:17pm	29 Sunrise: 6:09am Sunset: 8:33pm Moonrise: 2:17pm Moonset: 1:52am	30 Sunrise: 6:09am Sunset: 8:34pm Moonrise: 3:23pm Moonset: 2:25am	31 Sunrise: 6:08am Sunset: 8:34pm Moonrise: 4:32pm Moonset: 3:01am		

Daylight Saving/Summer Time is in effect for the entire month.
Courtesy of www.sunrisesunset.com

Events for May 2012

ACT General Meeting, Friday, May 4, TCC NE Campus, 7:00 PM

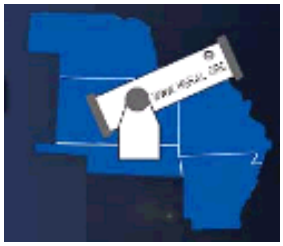
Sidewalk Astronomy, Saturday, May 5, Bass Pro Shops, Broken Arrow, 8:00 PM

Public Star Party, Friday, May 11, ACT Observatory, 8:00 PM

Members' Night, Friday, May 18, ACT Observatory, 8:00 PM

ANNULAR ECLIPSE, Sunday, May 20, ACT Observatory, Time TBA

Summer is the time Astronomers like to get away and visit dark skies or attend conventions with fellow star enthusiast from around the country. Here are some up coming events.



2012 MidStates Regional Convention.
June 1st to June 3rd in Kansas City
Our Tulsa club is a member of this 5 state region called Midstates
Early registration is Due by May 15th Details at.
http://msral.org/

ALCon2012

Celebrating 150 years of the
Astronomical League
National Convention **July 4 to July 7**
http://alcon2012.astroleague.org/

This year AlCon convenes in Chicago. In addition to great speakers and meeting fellow astronomers from all over the world. This years venue includes side trips to such iconic places a Yerkes observatory, Adler Planetarium and Fermilab

Star Bright – Star Light – Where shall I pitch my tent tonight?
Making plans for your summer travels. Here are a few places to pitch your tent. Actually several also have more comfortable lodgings on site or nearby.

29th Okie-Tex Star Party
Sept 8th to Sept 16th
http://www.okie-tex.com/
Details for registration and meals at website.

Dozens of our Tulsa members join with more than 300 fellow astronomers each fall to marvel at the dark skies in the tip of the Oklahoma Panhandle
Al Nagler of Tel-Vue optics proclaimed it as one of the darkest sites in America.
Get your registrations in early. Especially for the on site meals.
Since the nearest eating places are nearly 40 miles away.

Other regional Star parties include: This is by no means a complete listing.

RMSS

Rocky Mountain Star Stare June 13 to June 17
http://www.rmss.org/index.htm

Nebraska Star Party July 15th to July 20th

http://www.nebraskastarparty.org/index.html

Heart of America Star party near Butler, MO

Oct 10 to Oct 14 **http://www.hoasp.org/**

The Secretary's Stuff

By Tamara Green

ASTRONOMY CLUB OF TULSA – MINUTES – GENERAL MEETING FRI MAR 2, 2012

PRESENT:

Ann Bruun, President

Tamara Green, Secretary/Obs. Co-Chair

John Land, Treasurer

Stan Davis, Board

Catherine Kahbi, Board

Tim Davis, Board

Teresa Davis, Board/Group Director

Owen Green, Obs. Co-Chair

NOT PRESENT:

Tony White, Vice President

Tom McDonough, Board

Christopher Proctor, Facilities

Bill Goswick, Board

The meeting was held at Tulsa Community College, Northeast Campus.

WELCOME AND INTRODUCTION:

Ann called the meeting to order at 7:10 and welcomed all attendees. There were 30 attendees. She then introduced the guest speaker for the evening and turned the floor over to him.

PROGRAM:

John Land, Treasurer, "Observing the Sun and Sunspots". John gave a presentation on observing the sun and sunspots and how to make a solar filter.

OFFICERS'/STAFF REPORTS:

PRESIDENT- Ann has pamphlets for Nebraska Star Party if anyone is interested. It is near South Dakota, Jul 15-20.

VICE PRESIDENT- Tony not here. No report.

SECRETARY – Tamara read the minutes from the February General Meeting shortly after Ann called the meeting to order.

TREASURER – John reported that we have 2 new members, 38 web guests, He gave a gentle reminder that there are people who need to pay our dues. We still have money in the bank.

OBSERVING – Ann announced that since she is President now, she does not have time to do it, but Owen and Tamara Green will be the Observing Co-Chairs. Ann then announced the upcoming events.

GROUPS – Teresa mentioned the group from Feb 24 was a fun event. Everyone who attended had a good time. They gave donations as well. The next day, we had the Venture Crew who came out and did service projects, but instead of digging a site for pads, they cleared brush away along the fenceline. Some of the kids spray painted boulders that stuck out of the ground with flourescent paint to mark them. Teresa said that for March, she are making plans for scheduling groups, to make things a little more organized, she will touch more on this at the board meeting.

The Secretary's Stuff, Ct'd.

FACILITIES – Chris not here, but Ann relayed the message that we got the OK from Blake to put a gate in between the AT&T parking lot and our field.

PR/OUTREACH/SIDEWALK – Owen announced the Sidewalk Astronomy event at Bass Pro on Saturday, Mar 3 at 7:00 PM.

FUNDRAISING – We are still working on getting estimates for repairs.

OTHER BUSINESS: Catherine Kahbi announced that we were awarded the Scripps Howard Foundation Grant for $888.87! Ann Bruun adjourned the meeting at 8:50 PM. She announced that there will be a short board meeting following the general meeting, welcomed any members who wanted to attend to stay and attend the board meeting.

ASTRONOMY CLUB OF TULSA – MINUTES – GEN. MEETING FRI MAR 30, 2012

PRESENT:	**NOT PRESENT:**
Ann Bruun, President	Tony White, Vice President
Tamara Green, Secretary/Obs. Co-Chair/NL Editor	Bill Goswick. Board
John Land, Treasurer	Catherine Kahbi, Board
Teresa Davis, Board	Christopher Proctor, Facilities Manager
Tim Davis, Board	Owen Green, PR/OR/SW/Obs. Co-Chair
Stan Davis, Board	
Tom McDonough, Board	

The meeting was held at Tulsa Community College, Northeast Campus.

WELCOME AND INTRODUCTION:

Ann called the meeting to order at 7:03 and welcomed all attendees. There were around 30 attendees. She then introduced the guest speaker for the evening and turned the floor over to him. She welcomed a new member, Roger Anderson. She then introduced the guest speaker and turned the floor over to him.

PROGRAM:

Dr. William Caire, University of Central Oklahoma, Director of the Selman Living Laboratory and Observatory. Dr. Caire gave a nice presentation on the facility, how it came to be, and what they do.

OFFICERS'/STAFF REPORTS:

PRESIDENT- Ann announced that Ron Wood of TUVA was so disappointed that we did not get to have our marathon down there that he wanted to call it our TUVA mobile messier marathon. He wants to give out the awards. Four of us stayed at the observatory all night, several people left earlier, Ann wants everyone who participated to give her their totals. She plans to have him come and speak in May. Apr 28 is Astronomy Day, but TASM is having their Aviator Ball, so maybe we can have a Sidewalk Astronomy event somewhere.

Tom suggested hooking up with Oxley Nature Center. On May 20, there will be an evening eclipse. She suggested that it would look great for our observatory. She plans to have that event there. She then told everyone about InFlight Magazine, Ed Downs brought more copies. Jennifer Jones has been doing a really nice job updating our website, but Ann does not know when it will go online. Ann has NSP pamphlets still, for those who want them.

Ann announced that Chris Proctor will be acting as interim group director, until we can find someone who can take it over full time. Teresa has had too much going on to devote the time to it that she feels it deserves.

VICE PRESIDENT- Tony not here, no report.

SECRETARY – Tamara read the minutes from the March 2 General Meeting shortly after Ann called the meeting to order. She also announced that, at least in the meantime, she is taking over the Newsletter, at least until such a time comes when Jerry Mullenix feels that he can take it back over. She put out a call for articles, saying that the April edition should be out within a week or two.

TREASURER – 6 new members, 110 members in total now. Grant money is in the bank. He has the Baader film with him for those who ordered it.

OBSERVING – Tamara announced that club member Clyde Glandon completed the requirements for his Binocular Messier Certificate and Award Pin. His log with her letter was mailed to AL Bino Messier Chair John Goar on Mar 12 and emailed to him on Mar 13. Tamara received an email response from Mr. Goar on the 14th saying that he would get his award processed and out to him.

GROUPS – Chris not here, no report.

FACILITIES – Chris not here, but Ann told us about the go-ahead to install the gate, Tony is renting an auger.

PR/OUTREACH/SIDEWALK – Owen Green not here due to illness, Tamara announced that there will be Sidewalk Astronomy at Bass Pro tomorrow evening (Mar 31) at about 7 PM for those who want to go. She then advised everyone that she and Owen may or may not be there due to them both trying to get over illnesses.

FUNDRAISING – John did a little shopping, Ann and Catherine bought a laptop, and we have a new projector.

OTHER BUSINESS: Ann announced the upcoming events. Our May guest speaker will be Neta Apple. Steve announced that June 5 is the Venus Transit. Ann mentioned all the telescopes that are blocking the flat areas in the corners of the building. She said that several people need to take them home if they are theirs. Several of them belong to the Club. Teresa suggested checking them out like library books for those who don't have their own. Being no other business, Ann adjourned the meeting at 8:22 PM

Dark Mysteries on the Sun By John Land

Tabloids have made much ado about dire happens in the sky during 2012. But the scientific community is eagerly awaiting several long anticipated events concerning the Sun, Moon and planets.

PARITAL SOLAR ECLIPSE Sunday May 20, 2012 7:29 PM to 8:25 PM (sunset)

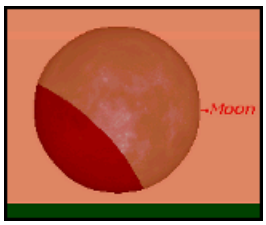
Caution: Never look at the sun without certified safe solar filters.

Permanent Irreversible eye damage can occur.

A number of Safe viewing techniques at http://www.mreclipse.com/Totality/TotalityCh11.html

Sunday evening May 20th ushers in the first of these events. The Sun will undergo an **Annular Eclipse** caused by the moon passing in between Earth and the Sun. For viewers along the central path in western USA the sun will form a bright ring (annulus) around the dark moon in its center. In this case the moon its near the far point of its orbit (apogee) and therefore appears slightly smaller than the sun. In a total solar eclipse the moon is near it closest point (perigee) and is able to completely hide the sun for a few minutes. For residents of the Tulsa area we will observe a partial solar eclipse that will start about **7:29 PM** when the sun is low in the Western sky. The sun will be about 80% covered when it sets at **8:25 PM.** To view the eclipse you'll need a location with a clear horizon to the NW.

Partial Lunar Eclipse Monday June 4, 2012 5:03 AM to 6:10 AM (Moonset)



During the predawn hours of the full moon will slip into the upper edge of Earth's shadow called the Umbra. At maximum eclipse about 1/3 of the moon will be covered by the umbra. No special filters are needed to observe a Lunar eclipse. As the eclipse begins the moon will be only 10 degrees above the horizon in the southwestern sky. To look for the shadow imagine the moon as the face of a clock and look for the shadow to first appear about the 8 o'clock position. Binoculars or a small telescope will enhance the view but are not necessary.

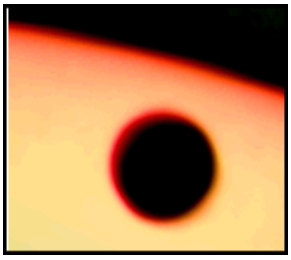
Transit of Venus Tuesday June 5, 2012 5:04 PM to 8:35 PM (Sunset)

Next Venus transit will be Dec. 10, 2117 - Next visible from USA will be Dec 8, 2125

5 minute video explaining the eclipse http://stargazersonline.org/episodes/1215.html

The planets Mercury and Venus lie closer to the sun than Earth. A transit occurs when one of these planets passes directly between the Earth and the Sun. During a transit the planet will appear as a tiny dark black dot slowly moving across the face of the sun. The transits of Venus in 1874 and 1882 were extremely important to astronomy as they provided the first opportunity to make accurate measurements of the distance from Earth to the Sun. Several articles are listed in the references links for you to learn more.

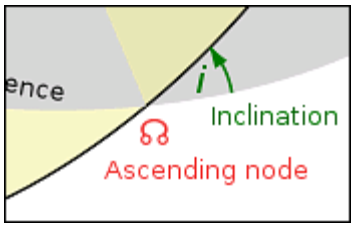
You will definitely need a telescope with a safe solar filter to observe the transit. At its largest Venus is only 1/30 the width of the sun (58 acrseconds) which is too small to detect without magnification.



The transit begins as Venus first touches the sun at 5:04 PM CDT. You'll want to start observing early. Look for the Venus to enter the sun's disk at about the 1:00 o'clock position. (Your telescope may invert or reverse the view so be aware of the orientation in your scope.) You'll want to use a higher magnification during these early moments. Look for the famous "Black Drop" effect and a bright rim around the planet revealing its atmosphere. This entrance phase of the transit lasts 19 minutes until 5:23 PM

Next you'll want to drop to a lower magnification and watch Venus slice almost straight down the face of the sun. Venus will be about halfway through the transit when the sun sets at 8:25 PM The whole transit lasts until 11:48 PM which will only be visible from the regions in the Pacific. Sunspot groups are likely to be visible on the sun also. Several live webcasts of the transit will be on the web.

Getting in the Know about Nodes



Planet transits only occur when the sun and a planet are near one of the **Nodes** of the planet's orbit. A node is the point in space at which the planet crosses the plain of Earth's orbit known as the **Ecliptic**. The orbits of all the planets orbit in almost the same plane but each is inclined at a different small angle to the ecliptic. Each planet has two nodes – an ascending node where it crosses moving above the ecliptic and a descending node where it drops below the ecliptic. Since these nodes reside in a specific direction in the sky it is possible to calculate when the planet and the Sun will both appear near node producing a transit. In most years the planet is somewhere else in its orbit when the Sun passes the region of its node.

Of course it is really the Earth that is revolving around the Sun that causes these alignments to occur.

The descending node for Venus lies in Taurus near the Hyades cluster. The Sun reaches that point in the sky each year in early June. The ascending node is in the foot of Ophiuchus where the sun is located in early December. Venus makes 13 orbits of the Sun in almost the same time that Earth makes 8 orbits. So Transits of Venus occur twice with an 8 year gap between them. On June 8, 2004 the eastern half of the USA got to see a Venus transit. This will be followed by this year's June 5, 2012 transit which can be seen farther west. The next set will occur 105.5 years from now in December 2117. Then a gap of 121.5 years until they again occur in June 2247. Making the whole cycle of 8 – 105.5 – 8 – 121.5 last 243 years. Mercury transits are more common. Mercury Transits occurs on May 9, 2016 – Nov 11, 2019 – Nov 23, 2032 and Nov 7, 2039. So you'll just have to wait 14 years to read more on that topic.

Resources:

Multiple resources http://www.astrosociety.org/tov/

Two card pamphlet http://www.astrosociety.org/tov/almanac2012-FINAL.pdf

Table of Transit dates http://eclipse.gsfc.nasa.gov/transit/catalog/VenusCatalog.html

Images of 2004 transit http://apod.nasa.gov/apod/ap040615.html

Mauna Kea Live Webcast http://sunearthday.nasa.gov/2012/transit/transitofvenus.php

Solar Filter material

http://astro-physics.biz/index.htm?products/accessories/solar_acc/astrosolar

Sky & Telescope January 2012 issue

Double Your Pleasure

By: Ron Wood

It seems to me that many beginning amateurs are slow to appreciate and enjoy the pleasures of binocular viewing; at least this was true in my own case. It took a very long time for me to realize how much could be seen with a decent pair of 7X35s or 10X50s and then a little longer to fully appreciate the views to be had with them. The Astronomical League website lists 76 Messier objects which can be seen with a $19 pair of 7X35 Tasco binoculars from Wal-Mart.

Photo by: Ron Wood

Photo by: Ron Wood

Forty-two of these objects are described as "easy." Andromeda notwithstanding, I have often seen people very surprised to learn that other galaxies can be seen with binoculars.

I went through several generations of telescopes before ever really looking at the sky with binoculars. When I finally did, I found it surprisingly enjoyable, and although I am no longer surprised I still find it very pleasurable. I enjoy the new perspective on old familiar objects. Needless to say M13 magnified 240X through my 24" scope, BART, looks totally different through my 10X50 binoculars, but it isn't "totally" different, it is still M13. The first view is not "better" than the second; the two complement each other, and I know M13 better for having seen it both ways.

Many objects which have relatively large angular diameters, such as the Andromeda galaxy, and some nebulae and open clusters are especially nice through binoculars. Keep in mind that a typical binocular field of view is 5 degrees compared to, say, a .5 degree field for a telescope. Some things up there are just too big to see all at once through a telescope.

So when I finally discovered the joys of binocular viewing I began to wonder why it had taken so long. I suspect that one reason was just the old "bigger is better" trap. Why bother with binoculars when you can see the same things and more with a telescope. Telescopes were just sexier than binoculars, more exotic and less common.

These reasons all seemed quite true, but I didn't feel I had gotten to the nub of the question until I realized what I think is a very important difference between binoculars and telescopes. In my experience almost every telescope I have encountered was on a mount and binoculars rarely were. I think this fact largely accounts for the trajectory of my relationship to binoculars.

It is very much harder to show someone something with an unmounted pair of binoculars than with a mounted telescope, especially if the person being shown is a beginner unfamiliar with such views. With a mounted telescope you put the object in the center of the field, and it is easily seen by all; but try to share a view with unmounted binoculars and it can be impossible.

Fortunately, since the time I was a beginner, binocular mounts have become quite common, and I am of the opinion that anyone with binoculars should have a mount. Unfortunately they can be quite pricey, but a very satisfactory mount can be built for almost nothing. The mount shown in the accompanying pictures, minus the tripod, was built for less than $5. I think that anyone who might want to build a similar mount can probably do so just by looking at these pictures, so I will forgo a tedious detailed description and just make a few comments which might be helpful.

I had an old Meade tripod so I needed a design that would mate easily with that. The threaded rod and knob holding the mount are visible and are standard parts of the Meade tripod. The wooden parts are all cut from common 3l4" di-

mension lumber except the piece of 2X4 seen at the bottom of the mount.

By loosening the knob the mount can be rotated in azimuth, but this is not often necessary because the carriage, which holds the binoculars, swivels about its own independent axis, which is the vertical 1/2" steel pipe seen beneath the carriage. This piece of pipe is an 8" threaded nipple and is a stock item at any plumbing supply. The pipe screws into a steel floor flange, also a stock item, which is screwed to the wooden carriage. The rotation of the pipe in the flange allows for movement in azimuth.

The four long wooden arms are fastened together with six 1/4" carriage bolts and wing nuts which make for easy adjustments. Two holes must be drilled through the steel pipe for the bolts, but this is not difficult even with a hand drill.

All pairs of holes are spaced 5" apart.

The four arms form a parallelogram which results in a surprising and very fortuitous consequence. It means that the binoculars can be raised and lowered for different observers without affecting the view or aiming point This is a huge advantage when working with children.

The binoculars are held by a piece of 4" thin wall PVC drain pipe. A piece of wood is wedged inside the PVC as shown and then part of one side of the PVC is cut away to form a platform for holding the binoculars. The PVC is nestled into the cradle formed by two pieces of wood joined at right angles.

Photo by: Ron Wood

A screw eye is put in each end of the wood inside the PVC and also in each end of the cradle at the apex of the right angle. A spring is stretched between the screw eyes at each end of the carriage. This pulls the PVC into the right angle but still allows it to rotate in altitude. The binoculars are held in place by a small bungee cord stretched over the binoculars and hooked in the screw eyes at the center of the PVC on each end. On the end of the arms opposite the binoculars a counterweight is hung from a screw hook. On my mount this is a small pail with an appropriate amount of waste bent nails.

This mount has served very well for many years and I haven't thought of

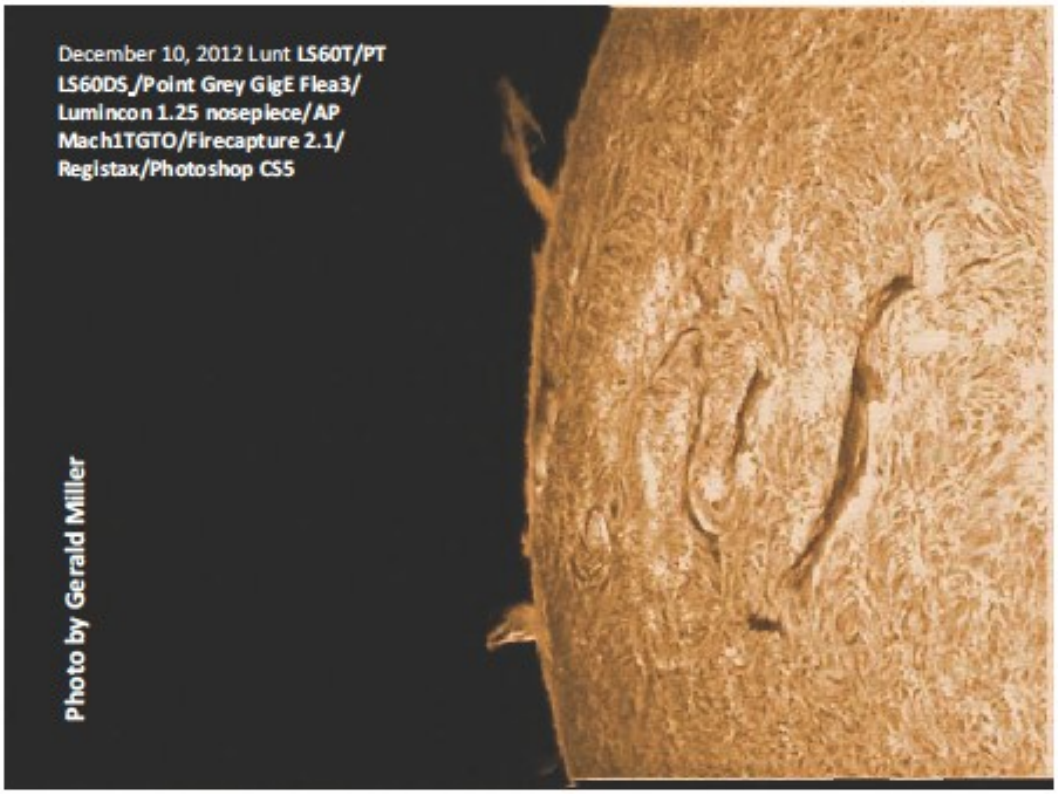
anything I would have done differently. Other builders will have different resources and skills and many changes could be made to suit your situation, but hopefully there are some ideas here that might prove useful.

Finally I would say that this mount has made all the difference in showing the binocular sky to visitors here at TUVA, especially children who often have trouble reaching a telescope eyepiece. The mount holds a steady view as different observers take their turn and move the binoculars up and down with the tip of a finger.

If you should decide to build a binocular mount and would like to ask a question about this one you can e-mail me at

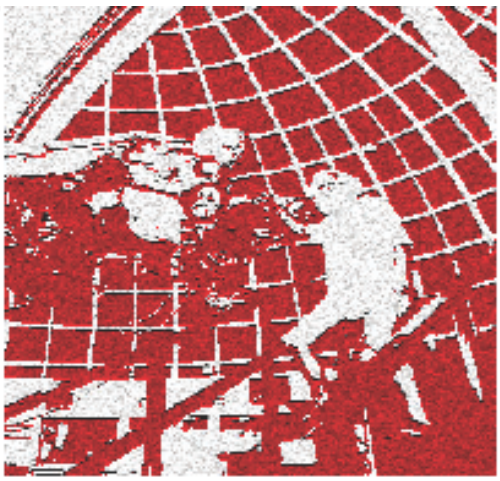
ron.ronwood.wpod@gmail.com.

I would like to personally thank Gerald Miller for these shots of our nearest star we have peppered throughout this issue. What a fantastic job he has done with these and I encourage you to visit his website as there is one I did not use because it is animated but you can see it at http://www.tuvaclub.org/Sol/solar1.htm



Mira Costa High School
60th All-Class Reunion
July 23-24, 2010

By: Jack Eastman



View toward Mt. San Antonio, "Old Baldy" from where Michelson measured the speed of light in 1926 (Picture by Judy Cleland Bergen)

What happened after this terrific All-Class reunion, was an all-day expedition to the historic Mt. Wilson Observatory..

Marilyn Hancock, one of my classmates from the class of 1957, had e-mailed me about the possibility of a trip up to Mt. Wilson sometime during the big reunion. I e-mailed ***Carla Johns***, and we got everybody more or less connected.

Carla was able to get the Monday after the reunion weekend off and agreed to host our bunch at Mt. Wilson. Marilyn agreed to pick me up at the hotel and pick up a couple others, ***Ernie Woods*** *and* ***Judy Cleland***. We met up with Carla at the historic Bob's Big Boy hamburger joint in Burbank, had lunch and headed out.

I didn't recognize much, but we were heading up from Burbank, not the route from Pasadena that I was used to. It still seemed like we were lost, we should have at least seen evidence of JPL, as the route, Highway 2, Angeles Crest, starts out only a mile or two from JPL. We turned down a tiny neighborhood street for several blocks which turned out to be Big Tujunga Canyon road. The short of it was from here the trip was probably three times as long as Angeles Crest.

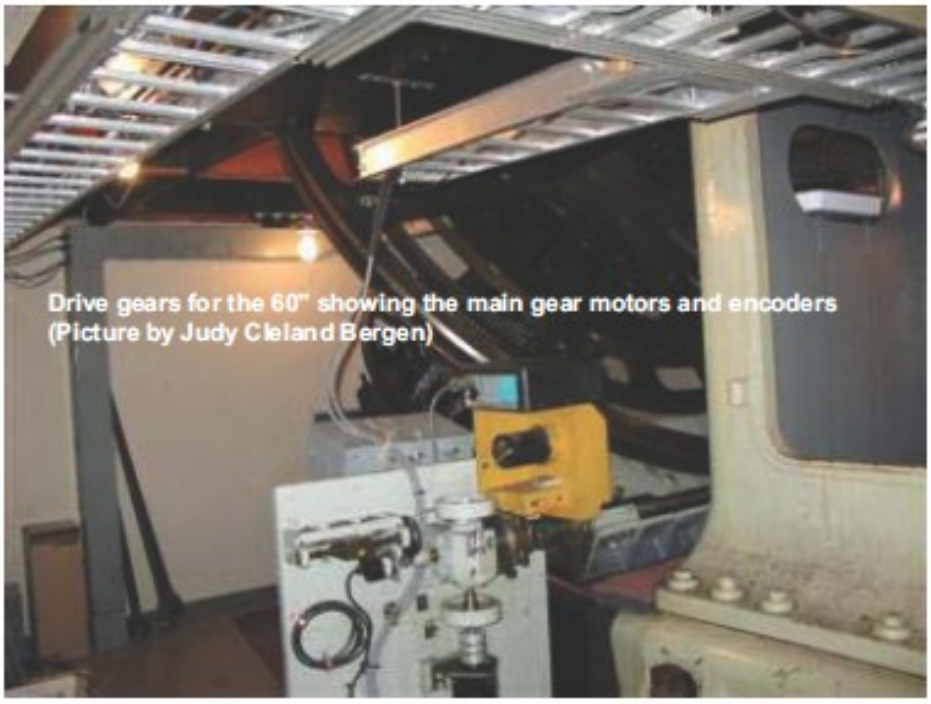
Angeles Crest was still closed all the way from La Canada to the turnoff to Mt. Wilson due to heavy damage from that huge fire last Fall. The countryside was truly devastated, looking like the surface of the moon. It reminded me of Mt. St. Helens several years after it blew it's top, nothing but bare ground. This was the scene most of the way to the observatory.

We finally arrived at Mt. Wilson. Carla's plan was first, an in depth visit at the 60-inch reflector, then a walk around the grounds, and the grand finale, the 100-inch.

We went in the dome, and among other things, Carla and Todd

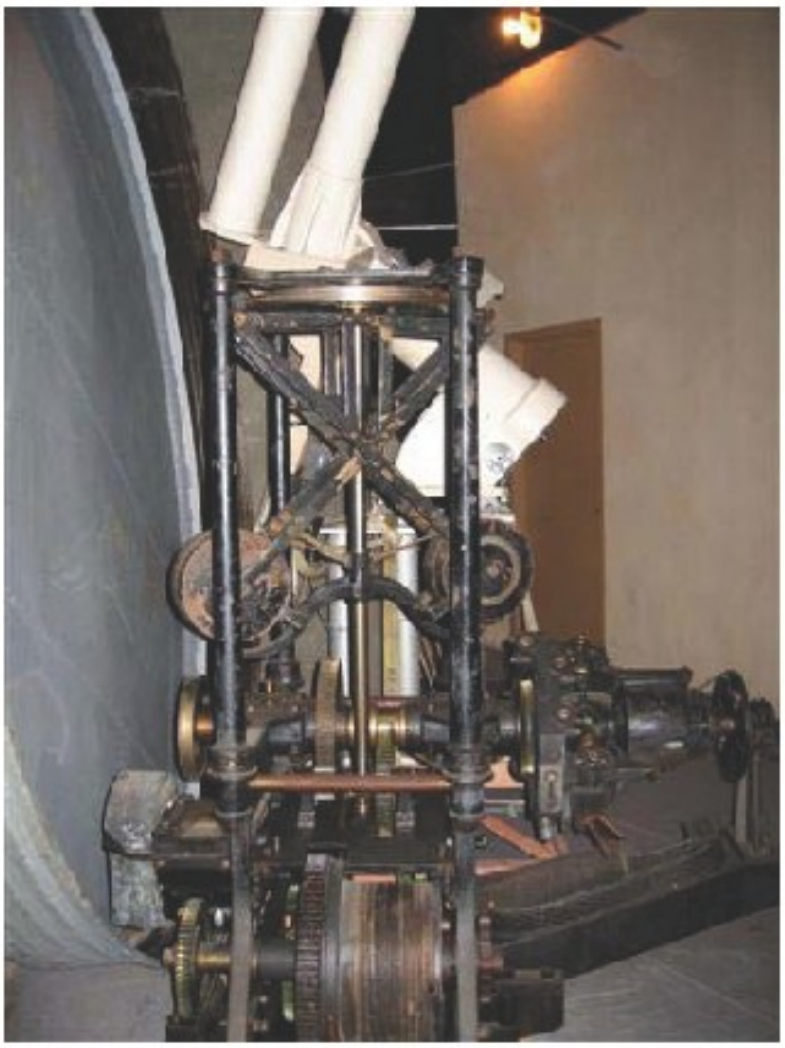
Santa Anita race track and environs through the smog (Picture by Carla Johns)

dragged much food, munchies, and all to restock the pantry in the dome. We were able to look over the 60" in detail, go into the basement (Coude' Room, or maybe more properly the Clock Room) where the large gears are that move the telescope East and West (Hour Angle) could be seen. It sure seemed empty from my visits of a half century or so ago. The large weight-driven clock for tracking was gone, much of the mechanism for clamping and unclamping the drive gear was also gone, as was the "microscope" for reading the hour circle from the control desk upstairs.

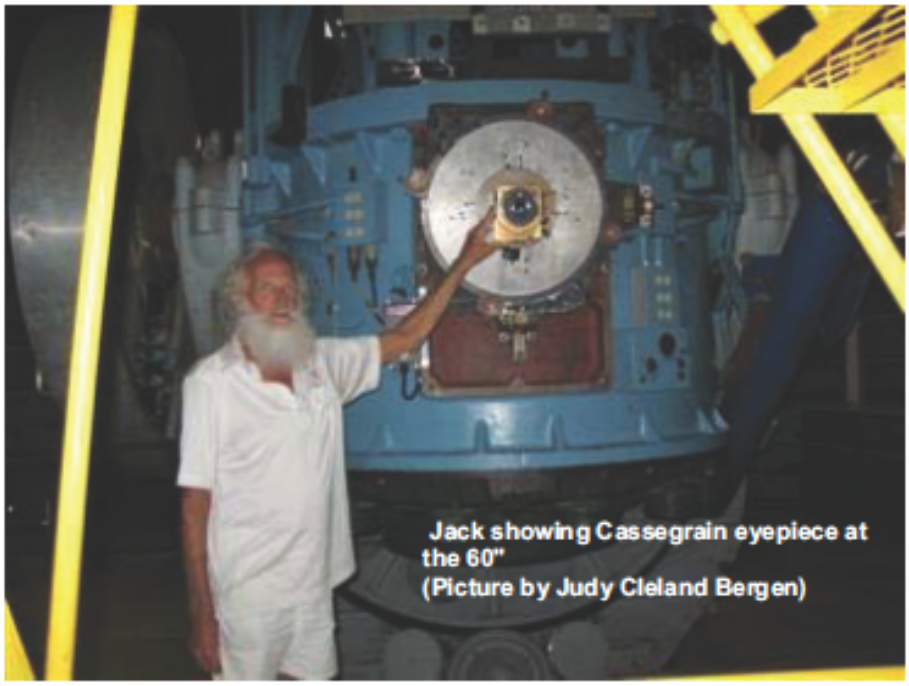


Drive gears for the 60" showing the main gear motors and encoders (Picture by Judy Cleland Bergen)

The telescope has been computerized and all the motions, slewing, setting and tracking, are now done just with the large worm gear that used to be only for tracking. Back upstairs, we saw the extra "cages", upper sections to the telescope tube, Newtonian focus, and the Coude' mirror. The Cassegrain mirror is the one currently installed on the telescope. And there is an eyepiece! This scope is no longer used all that much for research, but more for public outreach, with viewing sessions for various groups including the Los Angeles Astronomical Society. Carla moved the 'scope so we could try to get a view of the mirror. We really didn't see it, but we did look at the back of the glass through the mirror mount structure. St. Gobain wine bottle glass - a beautiful emerald green. That glass is 60 inches in diameter, 7.5 inches thick, and weighs about 1900 pounds. The telescope floats on a large drum of mercury to relieve most of the 23-



picture of the original weight-powered driving clock of the 60" telescope.



Jack showing Cassegrain eyepiece at the 60"
(Picture by Judy Cleland Bergen)

ton weight on the bearings so it can be moved with a minimum of effort. The telescope was the world's largest active telescope when it saw first light in1908 and the first truly research-grade reflector. Remember, this instrument, all the heavy castings and the mirror, were brought up a truly primitive trail largely by mule power!

After thoroughly going through the 60", we hiked down to the "monastery", the sleeping quarters for the visiting astronomers. This was a first for me, I'd never been past the shop/library/laboratory/pool hall building a bit further up the road. Carla didn't have the keys to that one; it would have been interesting to poke around in there and see if that really nice pool table was still there. I think every major observatory has a first class pool table!

Lick and Palomar sure do.

On the way down there we stopped at some large concrete piers, one of which had a bronze plaque identifying it as where Michelson set up his measurement equipment to measure the velocity of light between Mt. Wilson and a distant mountain near Mt. Baldy in 1926.

On the way, now to the dome of the 100", we stopped at the little "cook shack" at the end of the causeway to the 100". Carla explained that this little kitchen was placed out away from the telescopes because Hale, the first Director, was afraid of someone starting a fire in the dome if the kitchens were in the domes.

Then it was on to the historic 100" Hooker telescope. Up the three staircases, the first flight of 24 steps, the number of hours in a day; the second, 15 steps, the number of degrees in one hour (of right ascension or longitude) and the final one of 13 steps, the (true) number of zodiacal constellations, adding up to 52, the number of weeks in a year. These lead to what is called the "bullring" immediately under this huge 87-ton piece of machinery.

Here, the mirror end of the telescope looks much like the nose of a large steam locomotive. Through a vent, one can look at the actual 9,000 pound piece of glass, emerald green with numerous bubbles, reminds me of St. Paddy's day - great quantity of green beer. The glass had to be cast in three melts which gave rise to all the bubbles. George W. Ritchey, the optician who was responsible for the grinding and polishing, and George Ellery Hale, the Director, rejected the first blank. St. Gobain tried again. http://www.mtwilson.edu/vir/100/mirror/

After more trepidation and deliberation it was finally decided to use the first piece of glass after all. Roughly 4½ tons of French wine bottle glass was ground and polished to a final accuracy of about a millionth of an inch to become the world's largest-ever telescope.

Think of all those French wine bottles that gave their lives for the world's biggest telescope.

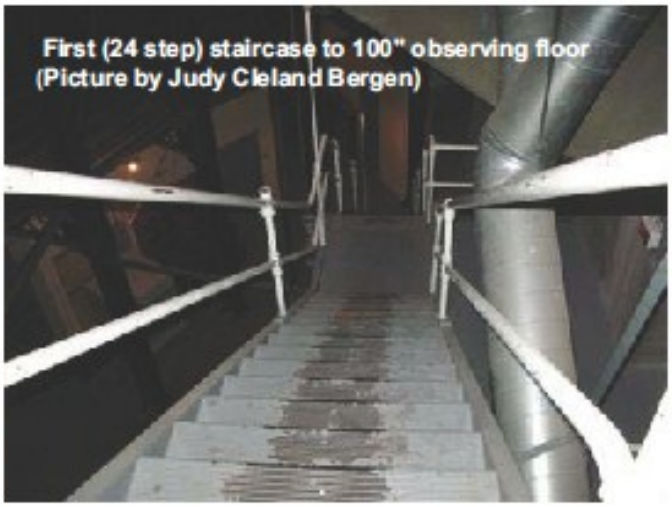
The 100" saw first light in 1917. The first view, Jupiter, was very disappointing, a really terrible image. The telescope a failure? Hale and a couple of others returned in the wee hours of the morning and tried again. Perfection! It seems the dome had been open all day and the mirror was distorted by the warmth of the day, but after settling most of the night, the distortions disappeared, the tele-

scope was a success.

We then went up on the main floor where the control desk is located. Carla opened the dome and then gave us a ride. One is absolutely convinced that the telescope is turning about a vertical axis, clearly not the case, but the rotation of this 500-ton dome is so smooth and quiet that there is no sensation of motion. Proof that this is an illusion? look outside and notice the landscape is also majestically moving by. Now it was downstairs to another control room and into the coude' focus station, where we could see the huge slewing and driving gears, the latter being a 1440-tooth worm, 17 feet in diameter. Like the 60, the weight-driven clock drive is disconnected and all the movement of the telescope is through the big worm gear by computer control.

"Danger, Laser" signs are all over the place, part of the laser-induced artificial guide star for their advanced adaptive optics system, which measures the turbulence of the atmosphere and corrects for it, allowing a much sharper image than the telescope alone. Like the 60", the 100" is supported by mercury floats at both ends of the polar axis, allowing effortless moving of the 87-ton mass. The original driving clock was said to produce about 1/100th horsepower.

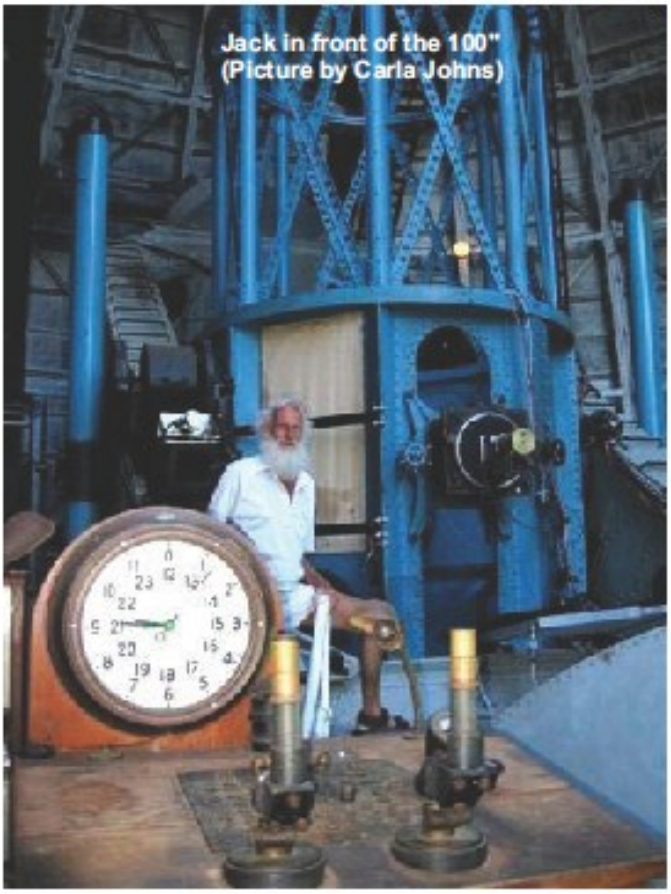
Down in the bowels of the building we found the parking places for the upper cage sections of the telescope, the coude' mirror which sends the light to powerful spectrographs in the basement, the Cassegrain mirror, which is on the telescope and the empty place for the Newtonian focus. Empty, because this setup was given to the Smithsonian, no doubt with Edwin Hubble's favorite chair. It was a true piece of history to see the boxes, both here and at the 60" with names such as Baade, Zwicky, Humason, Adams, Pease, Babcock, Nicholson, and Hubble, the true pioneers of discovery that put Mt. Wilson forever on the map and made major advances in our knowledge of our universe.


First (24 step) staircase to 100" observing floor
(Picture by Judy Cleland Bergen)

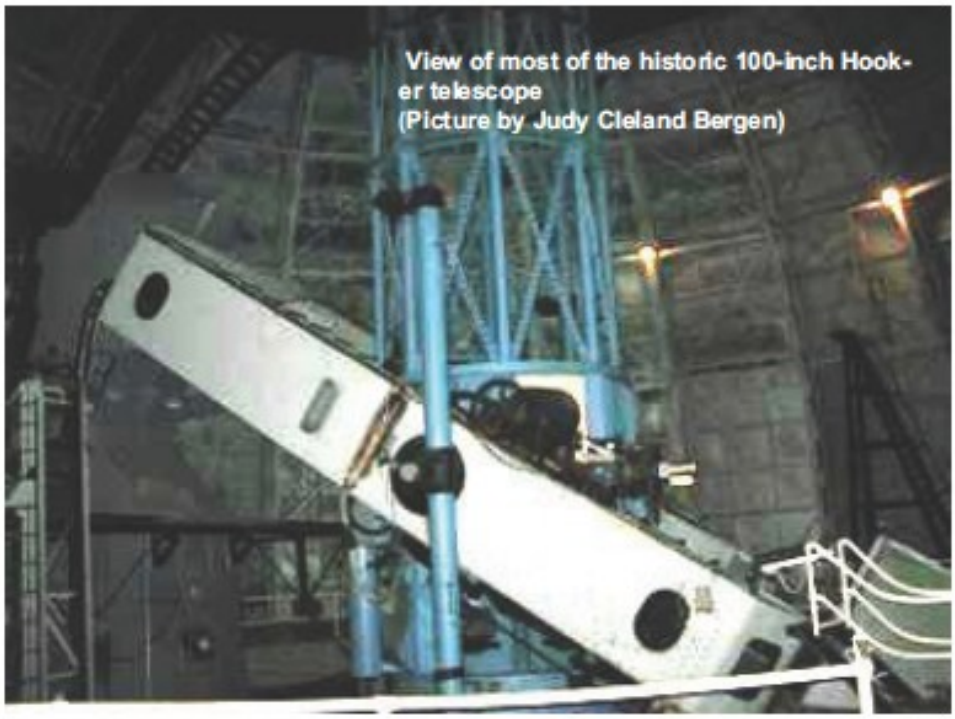
If you want to read more about these discoveries over the 100 or so years, for which Mt. Wilson was a leading player, there's a truly wonderful book, ***"The Day we Found the Universe"*** by Marcia Bartusiak, ISBN 978-0-375-42429-8. One of the best ever books I have ever read.

Alas, all too soon we were heading out. We didn't get over to the Solar Telescopes, that'll have to wait for another trip. We headed down to Pasadena and had a wonderful Mexican feast at El Cholo, highly recommended by Carla, a fitting conclusion to a truly wonderful day.

Many heartfelt thanks to our won-


Jack in front of the 100"
(Picture by Carla Johns)

derful hosts, Carla and Todd Johns of the Mt. Wilson Observatory association.

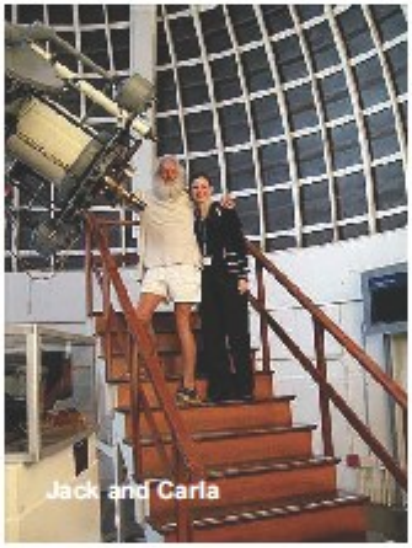


View of most of the historic 100-inch Hooker telescope
(Picture by Judy Cleland Bergen)

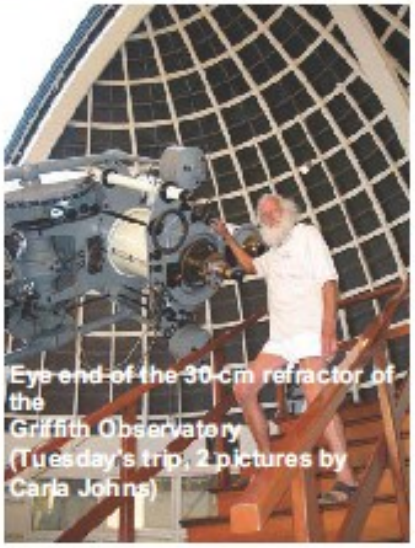
More of the dome shutter mechanism at the 100"
(Picture by Judy Cleland Bergen)

Dome part of the shutter opening and closing mechanism
(Picture by Judy Cleland Bergen)

Top of 100" looking out at the sky
(Picture by Judy Cleland Bergen)



Jack and Carla



Eye end of the 30-cm refractor of the
Griffith Observatory
(Tuesday's trip, 2 pictures by Carla Johns)

Why Go Back To Neptune

NETA APPLE

With budgets for exploration being cut, most of the formerly planned missions to explore Neptune and Uranus have been placed on hold. Outer solar system experts such as Dr. Heidi Hammell and Dr. Randii Wessen, with both of whom I was able to discuss issues addressed in this paper, have quietly pressed for a return mission to Neptune rather than Uranus due to unique science opportunities presented by Neptune. Here I present some of the most pertinent arguments supporting such a mission. Special thanks to Dr. Wessen for his comments and suggestions on this essay.

Neta Apple

Why Go Back to Neptune?

The only spacecraft to visit Neptune was the Voyager 2 craft, which did a fly-by in 1989. Most of what is known about Neptune came from Voyager 2 data. Observations of the planet have been made using the HST, Keck I, and James Clerk Maxwell Telescope (JCMT). However, these earth-based instruments lack the needed resolution for most investigations, and there have been huge leaps in spacecraft technology since 1989.

The best way to learn more about the ice giant planets would be to send a spacecraft to Uranus or Neptune. Uranus is closer and the two planets are very similar, but Neptune offers unique science goals including an unknown internal heat source and its largest satellite, Triton, which may be a captured trans-neptunian object (TNO). Study of Neptune and its largest moon, Triton, would assist in understanding planetary magnetic fields, atmospheric activity, planet and solar system formation, planetary rings, and the character of TNOs.

What is Currently Known?

Located an average of 30 AU from the Sun, with a visual magnitude of 7.8, and an angular diameter of 2.3 arcseconds, Neptune is impossible to discern as more than a blue disk from Earth without using a very large telescope (NASAweb). As a result, not much was known about Neptune prior to Voyager 2's visit in 1989.

While spectroscopy had shown that Neptune's atmosphere contained methane, ammonia, and large amounts of hydrogen, (Chapman &Cruikshank in Cruikshank, 1995), the precise chemical and isotopic compositions of observable cloud layers were unknown. It was known that Neptune must have an internal heat source because the amount of heat radiated from the planet is greater than that received from the Sun, but the composition of the interior of the planet cannot be investigated from Earth. It was unknown if Neptune possessed a magnetic field. Two satellites were known and it was suspected that Neptune had rings, or at least ring-arcs (Miner & Wessen, 2002). Thus Voyager had a lengthy list of science goals for its Neptune encounter including (Miner & Wessen, 2002):

Chemical abundances of atmospheric hydrogen, helium and methane

Study of thermal emissions to determine how much heat comes from the planet's interior

Vertical structure and composition of the atmosphere

Rotation rate and meteorology

Auroral activity

Ring-arc structure and satellites, and search for more ring material

Study motion of rings, ring particles, interaction of ring material with the magnetosphere, and ring particle properties

Study of satellites including sizes, shapes, masses, surface characteristics

Search for additional satellites

Study interaction between Neptune's magnetosphere and the solar wind and characterize the magnetic field and explore its physics

As Voyager approached the giant planet, two ring-arcs became obvious confirming the presence of rings or partial rings. Voyager 2 data refined Neptune's mass from estimates made on Earth, indicating a mass of 102.43 x 10^{24} kg (NASAweb). Temperature measurements were made on the incoming and outgoing sides, and it was shown that Neptune emits 2.8 times as much energy as the Sun provides, clearly indicative of a still undetermined internal heat source (Burgess, 1991). According to Dr. Randii Wessen (Wessen 2008), some think the internal heat is due to frictional heating as the heavier helium descends through Neptune's atmosphere. Temperature data revealed temperature gradients in various levels of the atmosphere with isolated warmer and colder spots. The high atmosphere was shown to be nearly 85% hydrogen, 13% helium, and 2% methane. Acetylene, methane ice, and some ammonia were detected in the deeper atmosphere (Burgess, 1991).

Wind speeds were determined by tracking clouds in images. Maximum wind speeds were found to be in excess of 400 m/s (Gibbard, et. al., 2002). The Great Dark Spot (GDS), which resembled a large hole in the atmosphere and was presumed to be a storm, moved around the planet in about 18 hours (Burgess, 1991). Other clouds such as the one named "Scooter" had a period of only 16.1 hours which was later found to agree closely with the interior rotation period of 16 hours 7 minutes determined from radio emissions from the planet (Burgess, 1991).

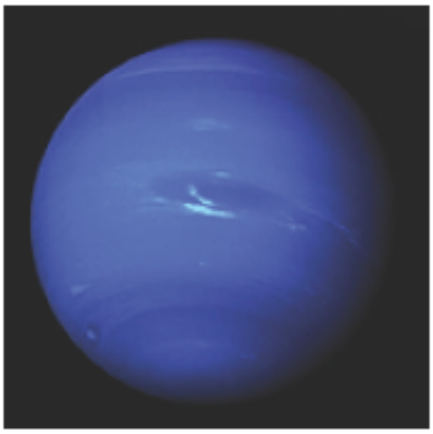


Figure 1. Neptune as imaged by Voyager 2. (NASAweb)

Keck I high-resolution infrared imaging has shown that dark spots like the GDS, bright spots and wispy clouds (see Figure 1) form and disappear over long periods of time. Researchers were surprised to find that not only had the GDS observed by Voyager disappeared (Sromovsky, et. al., 2001), but that there seems to be a cycle during which GDS-like spots form and disappear regularly (Hammel & Lockwood, 2007). A feature at the south pole of the planet, imaged by HST, shows prominent periods of brightening as well (Rages, Hammel & Lockwood). These variations cannot be attributed to seasonal variation; Neptune's tropical orbital period is 59,799.9 days (NASAweb) so there has been insufficient time to observe seasonal variation on Neptune.

The atmosphere exhibits several layers in the level where atmospheric pressure is 1 bar, (the same as that at sea level on Earth), which ranges from 1000 – 4000 km (Burgess, 1991). Zonal flows determined from surface winds are found to be complex jet patterns alternating between prograde and retrograde directions of flow (Aurnou, Heimpel & Wicht, 2007). Atmospheric data from Voyager and newer data from JCMT (Marten, et. al., 2005) shows abundances of various chemical constituents including methane, hydrogen, and carbon monoxide indicating that there is likely rapid mixing ongoing in the atmosphere, possibly due to convection produced by Neptune's internal heat source (Hesman, et. al., 2007). Temperature distributions detected by Voyager indicate that the equator and poles of Neptune are warmer than the mid-latitudes. This is consistent with material rising in temperate regions, cooling as it expands, then flowing toward the poles and equator where it heats up again due to compression as it descends (Burgess, 1991). According to Owen and Encrenaz (2003) all the carbon originally in the core of Neptune should now be thoroughly mixed in the atmosphere as methane. However, in 2007 Hesman et. al. reported the unexpected detection of carbon monoxide (CO) in the stratosphere of Neptune. This could be due to the aforementioned convective process driven by the internal

heat source of the planet; however, without another source for the CO this would indicate that Neptune has an abundance of oxygen 440 times solar! Current estimates of chemical abundances indicate that Neptune has an abundance of some elements greater than 3 solar (Owen & Encrenaz, 2003). An accurate determination of the CO profile throughout the atmosphere is needed to determine the correct mechanism for the abundance of CO, but investigation of the deep atmosphere of Neptune cannot be accomplished from Earth due to obscuring cloud and haze layers (Burgess, 1991). While constraints on the interior of the planet can be determined from the Voyager data, there is insufficient data to determine its structure.

Voyager discovered six rings, one of which, the Adams ring, has ring-arcs (NASAweb). These ring-arcs are puzzling because they apparently contain higher concentrations of ring material than the rest of the ring. Such ring-arcs would be expected to have dissipated rapidly. They must be the result of a recent event or their contents must be somehow renewed. Further, there appears to be a lack of shepherd moons, only two having been found thus far (Miner & Wessen, 2002), so it is unknown how the rings maintain their form.

The magnetosphere of Neptune was found by Voyager to be oriented 46.9 degrees off the rotational axis of the planet which has an obliquity of 28.32 degrees (NASAweb). One possible explanation for this is the presence of a layer of high-pressure liquid water operating as a dynamo (Stevenson, 2003). The magnetic field of Neptune varies in its presentation to the solar wind as the planet orbits the Sun, causing changes in configuration of the magnetotail and might allow solar wind particles into the upper atmosphere (Miner & Wessen, 2002). Possible auroral activity was detected by Voyager, however more data is needed to confirm if this was classical aurora (Bhardwaj & Gladstone, 1998).

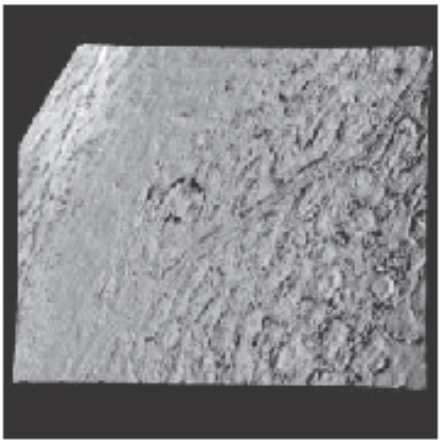


Figure 2. High resolution image of Triton's surface. http://photojournal.jpl.nasa.gov/catalog/PIA00061

Voyager discovered six previously unknown satellites (Miner & Wessen, 2002). Currently, thirteen are known (NASAweb). Data from Triton proved most exciting. Images show the surface of Triton to be somewhat like that of a cantaloupe (see Figure 2) with very little evidence of impact cratering, indicative of the surface being relatively young. Triton's orbit is retrograde, as are those of three smaller satellites (NASAweb), and it has been hypothesized that Triton may actually be a captured TNO. Voyager images show dark material erupting in columns from Triton on at least two occasions (Kirk et. al., 1995). The energy source of these geysers and the chemical abundances of their contents are unknown.

Why Return to Neptune Instead of Going to Uranus?

Characterization of the interior of Neptune or its heat source cannot be ascertained from exterior study. While Uranus is considered to be similar to Neptune, its atmosphere is less active. Neptune offers more science goals including an internal heat source and rings which exhibit ring-arcs, a feature not observed in the rings of any of the other giant planets. The ring-arcs may be remnants of a fairly recent collision event and could thus provide unique information about planetary ring formation.

Most compelling is the opportunity to study Triton, a possible TNO. Study of Triton could provide insight into the character of TNOs which are otherwise currently out of reach for prolonged, detailed study, and could provide much needed information for refining models of planet and solar system formation.

A spacecraft similar to the Cassini spacecraft, the Neptune Orbiter/ Triton Explorer (SpaceTodayweb), could be placed in orbit around Neptune to observe its atmosphere, magnetic field, weather patterns, satellites, and rings in various wavelengths over a period of some years. Such a craft might carry probes capable of descending into the atmosphere of Neptune to sample chemi-

cal abundances and measure wind speeds to assist in determining the structure and content of the relatively deeper upper atmosphere. Probes could be landed on Triton's surface while an orbiting craft studies and images the surface from above.

These science goals cannot be achieved from Earth. While HST, Keck and JCMT can image Neptune, their usefulness is limited by distance. Only in situ instruments would suffice to thoroughly investigate the deep atmosphere and magnetic field. Only a spacecraft in orbit about Neptune can collect data about the planet, rings, and satellites in the detail needed to provide information for modeling Neptune's interior and for use in studies of giant planet formation. With the continued discovery of giant exoplanets such studies could contribute much to knowledge of the formation and dynamics of planetary systems.

To accomplish all these science goals the proposed Neptune Orbiter/ Triton Explorer might have to use multiple launches and be assembled in space (SpaceTodayweb) because of extra bulk and mass. (This approach would be a very expensive mission so it not likely to be pursued.) Due to Triton's lack of atmosphere parachutes would not work and probes landing there would require other landing methods which would add mass and bulk. Probes designed to withstand the pressures in Neptune's upper atmosphere would also have extra mass and would take up a larger proportion of the available payload. Because of the enormous mass of Neptune and Uranus, density and pressure increase to extreme levels relatively high in their atmospheres. The best that can be expected from an entry probe is exploration as deep as a few hundred kilometers into the atmosphere before the probe would be crushed. This just barely begins to explore the upper regions of these atmospheres.

Conclusions

While Uranus may be very much like Neptune in many ways it does not offer as many opportunities for obtaining unique knowledge as does the Neptune system.

Most of what is known about the Neptune system comes from data gathered by Voyager 2 during its brief encounter. While HST, Keck I, and JCMT have been useful for imaging Neptune, none of these instruments is capable of observing the unique science opportunities in the Neptune system in detail, including investigation of the rings, ring-arcs, magnetic field, and interior heat source of the planet. Neptune's largest satellite Triton, a possible captured TNO, provides a unique opportunity to learn about the outer solar system. With the potential information available from Neptune, its rings, and satellites, it seems that a return to Neptune is not only highly desirable, but essential.

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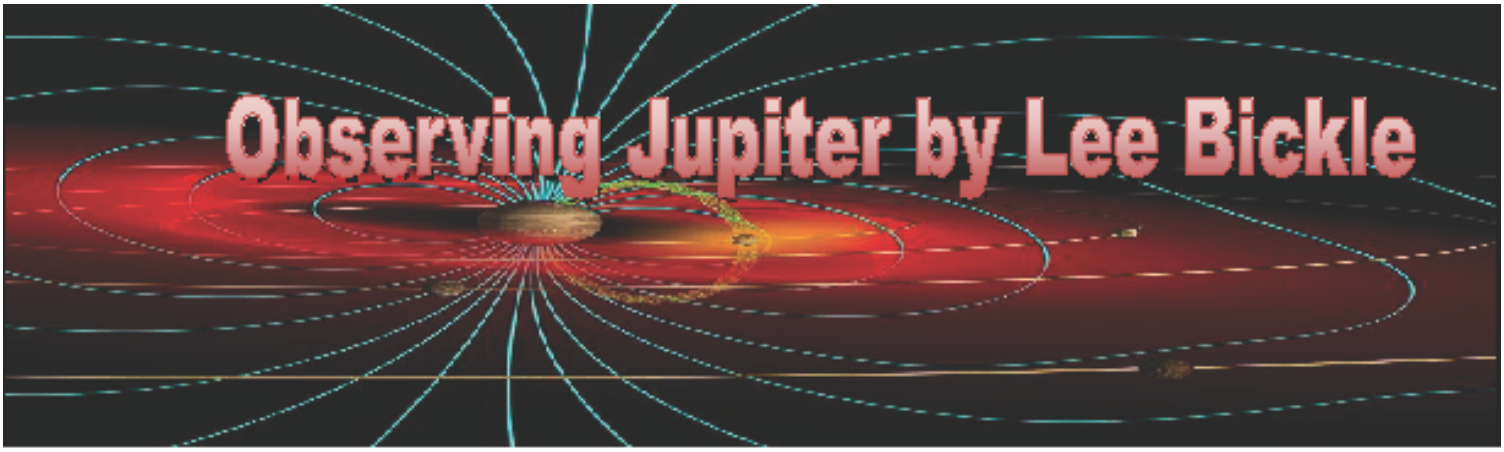


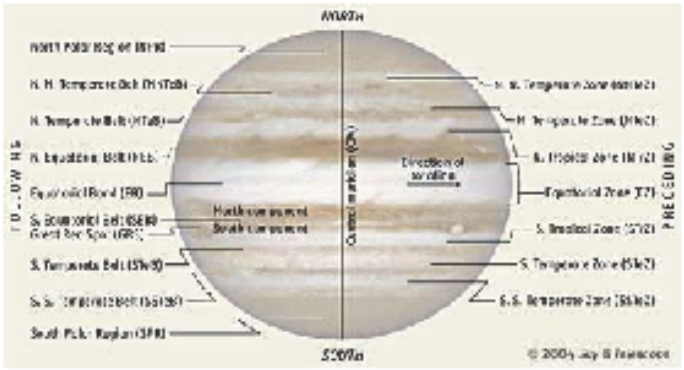
Observing Jupiter by Lee Bickle

For almost as I long as I can remember, our neighboring planets have interested me. I remember thumbing through kids books and enjoying reading about the Solar System while chuckling at cartoon illustrations and being in awe at the satellite imagery that was available at the tune. It wasn't until I took a class in high school taught by Kevin Manning, former member of our club, that my interest was revived to the point of actually observing the planets for myself. I discovered that with my dad's 7 x 50 binoculars I could make out Jupiter's moons, and I began to save my pennies for a telescope. Kevin gave me a couple of issues of a telescope equipment classifieds magazine, and I bought my first telescope, a homemade 6" dob, in '96 or '97. That was when I first felt like I could discover the planets for myself.

For a few years I got to know my telescope and added some basic self-taught observing techniques to what I already had. The Moon, Jupiter, and Saturn were my first major subjects, and they fascinated me like nothing else in the sky through my telescope. But my interest waned as adulthood set in, and it wasn't until about two years ago that I acquired a few more eyepieces (than the only one I had!) and started to observe for more detail. I found out that with patience, and a little more knowledge of what to look for, that there was more to be seen than I had ever noticed before with my low-grade equipment.

Since taking more care in my own observing, and joining the club and seeing how other people get more out of their time and effort, I feel like I have been able to make my own time and effort much more rewarding. For starters, taking note of external variables makes a big difference. I collimated my mirrors in the past, but not every time, and my focuser was a little off-axis. Also, I often observed in poor weather conditions, or did not wait for the objective to acclimate to the outside temperature. Without taking those into account, I can tell from looking back that I had gradually come to expect poor quality views and therefore planned for short sessions that were not as rewarding as they could have been.

With Jupiter still high in the sky in the evenings, and not far from its opposition a few weeks ago, I thought it might be fun to relay some of my own recent experiences observing Jupiter and maybe pass along whatever I have learned which people might find helpful or at least interesting. Following the Galilean moons around is fun, especially if you are armed with transit and occultation predictions which can be found online or on good planetarium software (or from your own calculations if you are hard core like that!) The information in the following diagram from Sky & Telescope magazine is also good to have when beginning to observe the planet itself beyond the initial observations of it being a pretty, striped, white ball in the sky:

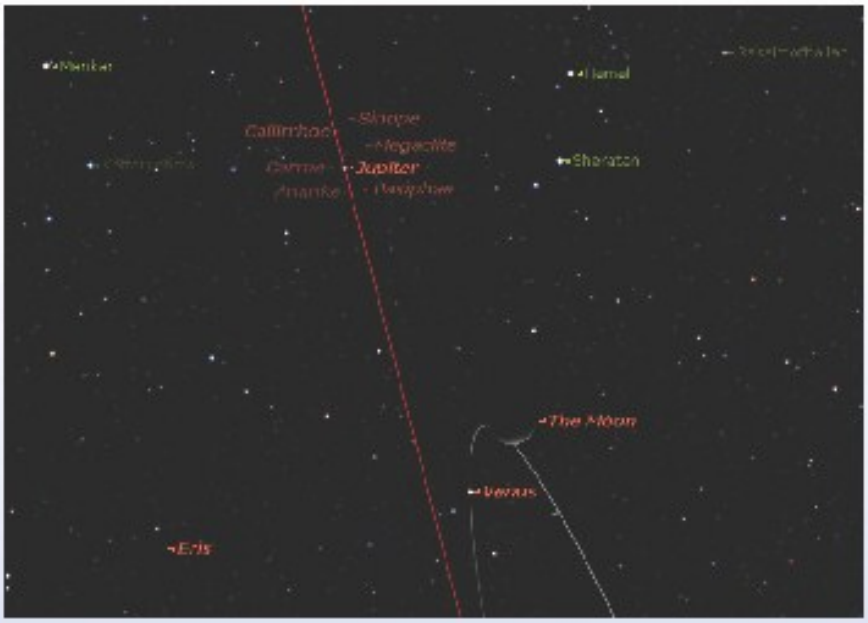


Putting names and labels to the observable features really helped open my eyes to noticing more detail and subtle differences. The narrow, light stripe currently splitting the SEB and bunching up over the Great Red Spot into swirling disturbances has

been changing rapidly the past weeks and months, ever since the belt's revival last year. Knowing what I am looking at helps me remember what I am looking for, and helps me pick out details I did not notice last time I looked.

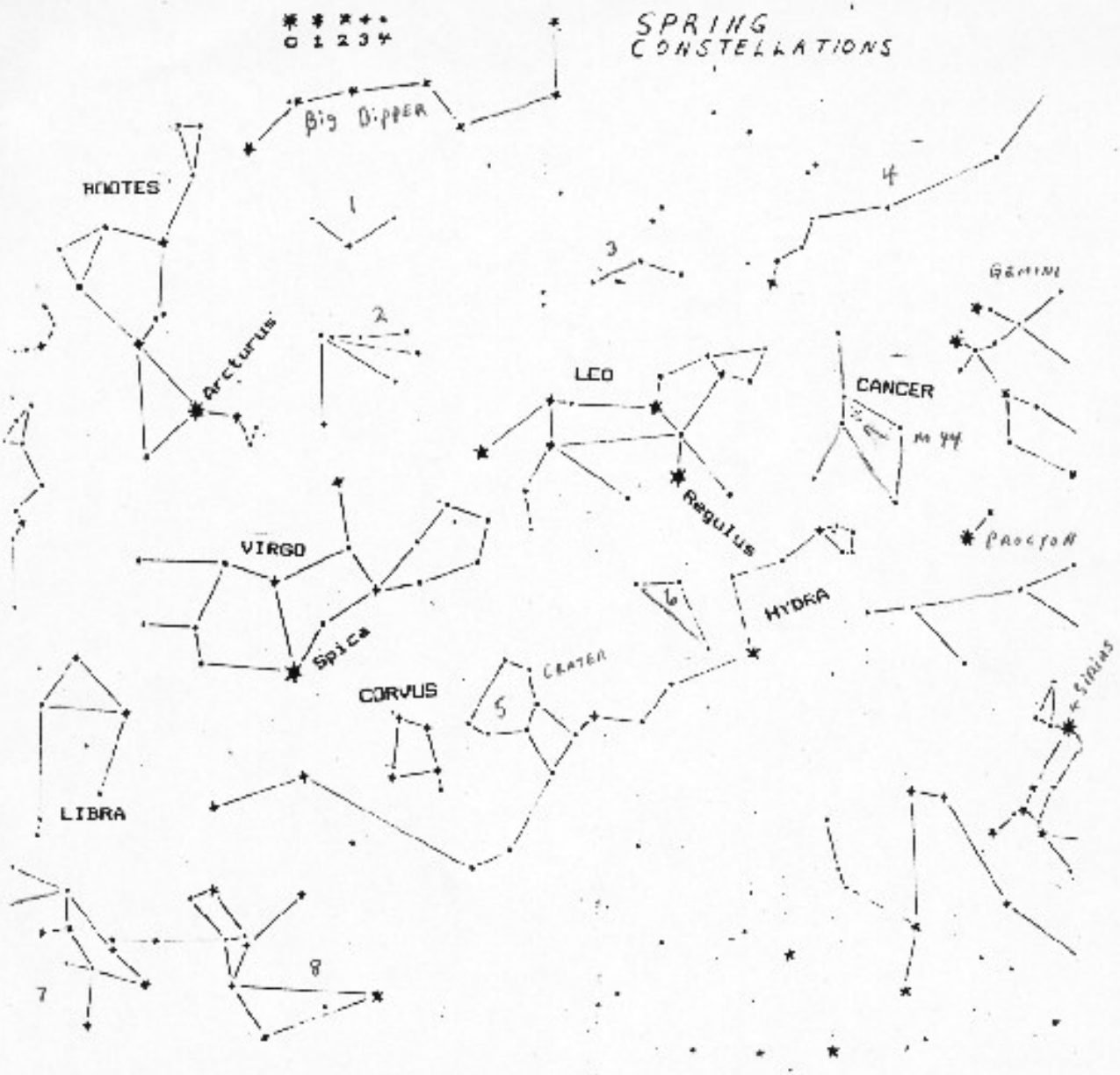
If you haven't spent much time looking at Jupiter again for yourself this year, you might not know what you're missing out on! There has always been at least one person looking at Jupiter at any given time during the star parties, so there is also that opportunity to ask them what they are getting out of their observing or maybe ask to take a look yourself and compare what features you see with what they see. It also seems to me that guests get more out of the short time they spend looking at Jupiter if they can spot a feature and look again later and see how it has rotated, or know that what details they are looking at (usually the two main belts and the equatorial zone at the least) have names and histories. Jupiter can present more beauty to the curious observer than the casual one in my experience. Is that your experience as well?

JUPITER, VENUS AND THE MOON



On Feb 25 , 2012

On March 12, 2012



The Big Dipper provides an easy signpost to point to some of the major Spring Constellations. If you draw a line backwards through the pointer stars, Dubhe & Merak, you come to the backward question mark that makes up the head of LEO. Returning to the Big Dipper and following the curve of the handle, you find the bright orange star Arcturus in BOOTES. If you continue along this path you come to the bright blue white Spica in VIRGO. An easy way to remember this is "Arc to Arcturus, straight on to Spica."

BOOTES (The Herdsman) * Arcturus Mag. -0.06 Distance 36 Light Yrs.
CANCER (The Crab) The dimmest of the Ecliptic constellations. It contains an interesting, faintly visible star cluster M-44, the Beehive.
LEO (The Lion) * Regulus Mag. 1.36 Distance 84 Light Yrs.
VIRGO (The Virgin) * Spica Mag. 0.91 Distance 220 Light Yrs.
LIBRA (The Scales) This Ecliptic constellation contains only two stars brighter than 3rd magnitude.
CORVUS (The Crow) Look for a rectangle of four 3rd magnitude stars just Virgo.
HYDRA (The Water Snake) This is the largest constellation spanning the full width of the springtime sky.

Minor Groups:

1 Canes Venatici (Hunting Dogs)
2 Coma Berenices (Berenice's Hair)
3 Leo Minor (Little Lion)
4 Lynx (The Lynx)
5 Crater (The Cup)
6 Sextans (The Sextant)
7 Lupus (The Wolf)
8 Centaurus (The Centaur)

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Club rates for print versions are $ 33 Sky & Telescope $ 34 Astronomy

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TCC NE CAMPUS - 3727 E. Apache St . - Room 1603 – in Bldg # 2 Student Union

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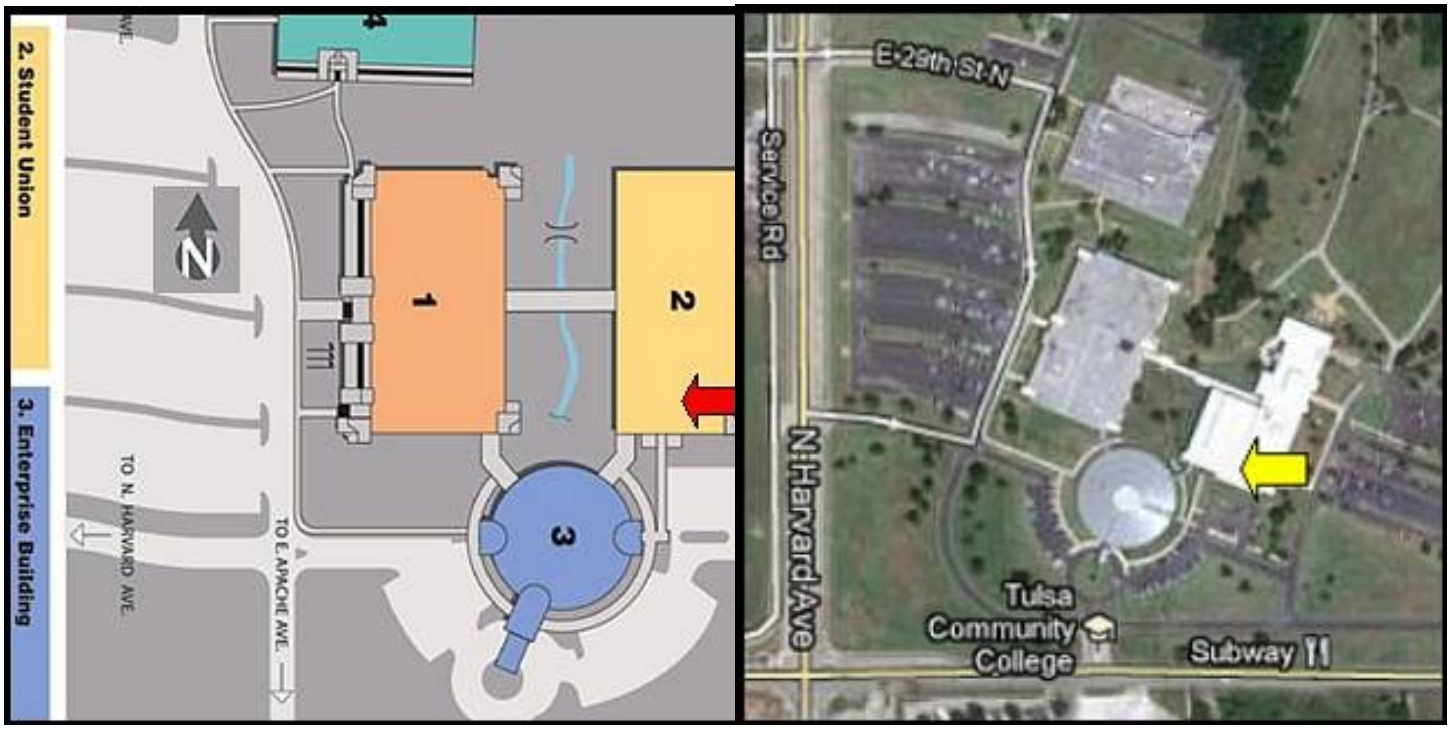
Go South about 1/2 mile to the campus located at the corner of N Harvard and Apache

Turn East on Apache and take the entrance in front of the large round building # 3

Then Turn Right and park in front of Student Union Bldg # 2 Room 1603 is just off the lobby.

Google Type Driving Direction Map at http://www.tulsacc.edu/13273/



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Magazine Subscriptions, $34 per year for "Astronomy" and $33 per year for "Sky and Telescope".

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