

The Race to the Moon

Don Surles

In a few months the world will acknowledge the 50th anniversary of the beginning of the Space Age. For those youngsters in our group the Soviet Union stunned the world and especially the USA with the launch of Sputnik, October 4th, 1957. This was accomplished just a few weeks after their successful test launch of the first intercontinental ballistic missile. The acronym ICBM would dominate the evening news for years – they already had the “H-bomb” and now they had the capacity to deliver it to North America. The USSR’s capability to develop rockets and potentially dominate space spawned a sense of urgency in the USA that fuelled scientific progress at ever increasing rates for the same years to come.

Textbooks were re-written in the late 1950’s with an emphasis on higher order thinking in science and math. Memorizing math rules was still necessary but critical thinking was emphasized with the introduction of set theory and problem solving...no longer was it possible to just solve an equation and pass...we were taught to solve written problems. Each week, My Weekly Reader, the grade-school weekly student newsletter, documented the progress of rocket science, the nuclear arms race, and the perils of living in a nuclear age that included the possible total destruction of Earth or the domination of the world by the Soviet Union. I never quite finished sorting out which would have been worse...but, there was an overall sense of urgency to “catch up” to the performance of the Soviet Union.

Sputnik’s “beep, beep, beep” signaled the beginning of a race to the Moon that was absolutely exciting, lasted 12 years, and ended with the landing of Neill Armstrong and Buzz Aldrin on the Moon, July 20th, 1969...“Houston, the Eagle has landed”.

The 60’s...those were the days my friends...we thought they’d never end. Space races, the assassination of JFK, Martin, and Bobby, Vietnam, campus uprisings, race riots, the Great Society, Selma, “I have a Dream”, hippies, flower power, LSD, R&R to acid rock, the summer of love, Woodstock, war protestors, Bay of Pigs, muscle cars with 400+ horsepower...very exciting, violent, and progressive times. Sadly the 60’s did end just as the first wave of the baby boom generation reached adulthood.

But how did we get to the Moon before the USSR? I was a teenager during the 60’s...turned 20 in the fall of 1966. Even though I watched the evening news and have a pretty good awareness of what was going on in the USA and Vietnam, I really don’t have a satisfactory appreciation for the events in the rest of the world during that period.

So, here goes...this is my understanding of how we got there first. First, we had ‘encouraged’ Germany’s Wernher Von Braun to join the USA Army Ballistic Missile Agency after WWII. Von Braun had been involved in the development of the WWII V2 rockets and later became the director of the Marshall Center in Huntsville, AL. He was directly responsible for the development of our rocket engine technology which included the Saturn V rocket – our Moon rocket. The USSR’s chief rocket developers were Sergei Korolev (died 1966) and Vasily Mishin. Mishin kept private diaries from 1960-1974 and these have provided a valuable understanding of the USSR space program. The USSR did not reveal the identity of their “anonymous Chief Designer” (Korolov) until after his death. We created the National Air and Space Administration (NASA) to coordinate our space development efforts. Hundreds of thousands of Americans were involved as employees of or contractors to NASA. With the tragic assassination of John Kennedy the leaders of our country were standing in line to appropriate the necessary funds to achieve his challenge...NASA was fully funded during that period.

Both countries continuously improved the rocket engine and guidance systems on a frantic scale...each successor was multiple times more powerful than the previous. When engine size became a limiting factor they strapped multiple engines to a single vehicle to improve boost.

Interspersed with the technology development were the headline grabbing “Firsts”...and most belonged to the USSR:

1961 – First man in orbit in Space...USSR...Yuri Gagarin, – First full day in orbit ...USSR...Gherman Titov

May 1961– Alan Shepard – first American in space – but not in orbit

1962 – First two-spacecraft mission...USSR...Vostoks 3 & 4, Feb – John Glenn – first American in orbit...5 hours on Mercury 6

1963 – First long duration mission...5 days...Vostok 5...USSR, – First woman in space...Valentina Tereshkova...Vostok 6...USSR

March 1965 – first spacewalk – Aleksei Leonov – Voskhod 2...USSR, June 1965 – Ed White made first USA spacewalk...Gemini IV

The Mercury and Gemini missions were precursors of the Apollo Moon Missions to come later. Mercury developed hardware for safe spaceflight, a single man craft...there were several test flights and six manned Mercury missions. Gemini was a larger version space craft for two astronauts. Gemini improved techniques for spacecraft control, rendezvous and docking, spacewalking, and a record breaking two weeks in space. On the USSR side were the Vostok (“East”) (1961-1963 – 1 person vehicle) and the Voskhod (“Sunrise”) (1964-1965 – 3 person vehicle)

Space suit technology was greatly improved during this period. The original suits worn by Gagarin, Shepard, Glenn, and others were modified pressure flight suits worn by high altitude test pilots. Moon suits would have to be a life preserver in the harsh environment outside the protection of Earth. Each was an improvement over it’s predecessor and each one was fitted to the individual astronaut. Dover’s ILC Industries manufactured the Moon Suits for the USA. Backpacks supplied oxygen, heat and humidity control, suit pressure, and power for communications/data display systems. The suit had 22 layers of different materials and a 3-layer under-

(See [Race](#) on page 3)

How to Join the Delmarva Stargazers: Anyone with an interest in any aspect of astronomy is welcome

NAME _____

ADDRESS _____

CITY, STATE & ZIP _____

E-MAIL ADDRESS (If any) _____

Do you need the newsletter snail mailed to you (Y/N)? _____

Please attach a check for \$15 made payable to Delmarva Stargazers and mail to Kathy Sheldon, 20985 Fleatown Rd, Lincoln, DE 19960. Call club President Jerry Truitt at 410-885-3327 for more information.

(Race from page 2)
garment.

During this period computing was in the realm of "mainframe". Computer use was reserved for formal programs written in code by computer programmers after developers had spec'd out the structure, data storage, calculations, and output. Needless to say the average person did not have access to computers except via a programmer. Most engineers relied on their slide rule for quick and dirty analyses and decisions. Three-decimal place accuracy was about all a slide rule could deliver. Another interesting factoid is the computer on-board the Eagle was a 256 byte...yes, I said byte...and it apparently was overloaded calculating Eagle's rate of descent which is why Neil Armstrong took command of the Eagle during the landing.

Remember the 1980's computer game "Lunar Lander"? I managed to crash onto the Moon's surface quite a few times.

So, after Mercury and Gemini there was the Apollo program. Apollo was our mission to send a man to the Moon and return safely. There were 17 missions from 1966 to 1972. Most of the missions involved testing the rockets and modules that would later be used in the Moon landings. Six of the missions actually landed on the Moon. Here is a recap of the missions:

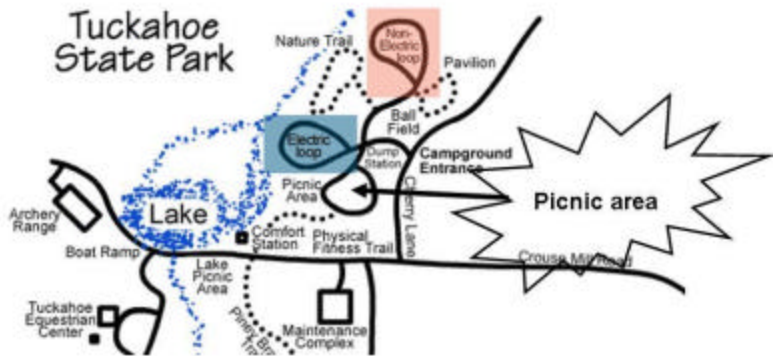
As you can see this was an aggressive program by today's standards. With the exception of #13 each mission accomplished the stated goals.

Apollo #	Date	Results
1	2/26/1966	Suborbital test of Saturn 1B
2	7/5/1966	Orbital test of Saturn 1B
3	8/25/1966	Suborbital test of Saturn 1B with Command & Service Module(CSM); CSM survives hi-speed re-entry
4	11/9/1967	1st launch of Saturn 5 and test of CSM in orbit; CSM heat shield tested
5	1/22/1968	Unmanned test flight of lunar module...launched by Saturn 1B
6	4/4/1968	2nd test flight of Saturn 5 launching CSM into Earth orbit
7	10/11-22/1968	3-man Earth orbital test flight of CSM; launched by Saturn 1B
8	12/21-27/1968	1st manned Saturn 5 launch; 10 orbits of Moon in Apollo CSM
9	3/3-13/1969	Earth orbital test of CSM & Lunar Module; launched by Saturn 5
10	5/18-26/1969	Full dress rehearsal of Moon landing in lunar orbit; 2 1/2 days spent orbiting the Moon
11	7/16-24/1969	Armstrong & Aldrin land on Moon July 20, 1969
12	11/14-24/1969	Conrad & Bean land on Ocean of Storms
13	4/11-17/1970	Landing attempt canceled after O2 tank explosion damages craft; men return safely
14	1/31-2/9/1971	Shepard & Mitchell land on Frau Mauro
15	7/26-8/7/1971	Scott & Irwin land on Hadley Rill; 1st use of lunar roving vehicle
16	4/16-27/1972	Young & Duke land on Descartes
17	12/7-19/1972	Cernan & Schmitt land near Sea of Serenity; Schmitt is 1st scientist to land (geologist)

Many books, documentaries, movies, etc, have been created to document the successes of the Apollo program...those were the days my friends...the days when men walked on the Moon...some of America's finest days!

We're Having a Picnic !!!!

The Delmarva Stargazers will hold their annual 'members appreciation' picnic on July 14th at the picnic pavilion, Tuckahoe State Park. The club will supply hot dogs, hamburgers, corn on the cob, beverages, and watermelon. Covered dishes or desserts would be appreciated. Since this is our 'new moon' weekend, bring your observing equipment for, hopefully, a star gaze after the picnic. Picnic starts around 2PM until ?? If you have not been to Tuckahoe lately, a map is provided at right.



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Star Gazer Outreach

Jerry Truitt

Pittsville Maryland had heard of my "Astronomy at the Library" program here in Cecil County and requested my services. Even though it is a 2 hour drive for me I arranged a date for the show on Friday June 8th. The Pittsville Library, it is located next to an elementary school just a short distance from the center of town. The library itself is a trailer, but they had a good selection of books, particularly astronomy books and they also had computers for people to use. They also went out of their way to decorate the Library in a star gazing theme along with having ice cream and sodas.

We had so many people show up that they couldn't all fit in the library to see the show. I had made 30 hand outs which was not near enough. The hand out was a skymap chart from www.skymaps.com for June, a pronunciation guide for the brightest stars and a list of helpful links.

The temperature was 92 and the humidity 98%, which of course reflected all the lighting from Ocean City and the Rt. 50 malls so the sky was bright. However, the things out were also bright and, before dark, Venus was an easy object. It was easy to see the quarter phase of Venus.

The 40 people each politely took a turn while I explained what they were seeing. Saturn was now clearly visible but so was Jupiter, I went for Jupiter saving spectacular Saturn for last, since I was sure I would not be able to find much else in these conditions.

We were able to see the 4 moons and the cloud belts were bright and prominent, so Jupiter was a big hit. I don't think anyone there had looked through a telescope before so they were truly amazed at seeing the moons and features of the planet's cloud system.



I next went to Saturn; the first one looked, turned and said you put a picture in there didn't you? Each one who looked let out a gasp, a 'wow' or 'Oh'. One gentleman stepped up looked and said thank you to me. I said wait, come back you didn't see it. He said yes I saw it. I said no you didn't, I didn't hear you say wow. I adjusted the scope to get Saturn back in the FOV and told him to look again. Of course he went WOW! I stood there telling the others in line that if I don't hear a wow I know you're not seeing it.

The Kerry O'Donnell from the library were thrilled and said they had not had an event draw near that many people before. They presented me with a Cat in the Hat "There's No Place like Space" book. They said to thank all of the Delmarva Stargazers for providing the community with a valuable service.



Now I thought that was pretty much it. The following Monday I received a call from the Virginia Space Flight Academy. Seems Stephanie

Ewell - Director of Educational Operations lives in Salisbury and had heard about my show at Pittsville.

Stephanie runs a summer adventure camp with an emphasis on engineering to its 13 to 15 year old students at Wallops Island. Space Flight Adventure Camp is sponsored by the Eastern Shore Regional Partnership, the [Virginia Commercial Space Flight Authority](#), [NASA](#), the [U.S. Navy Surface Combat Systems Center](#), [NOAA](#), the [Marine Science Consortium](#), [Eastern Shore Community College](#), the [Chincoteague Chamber of Commerce](#), and the [Eastern Shore Chamber of Commerce](#). She says under the shadow of dishes and rockets students are always asking for information about astronomy. She asked if I would stop down and talk to them about astronomy and how they could incorporate it into their program. She also asked if I would be willing to give a presentation for them at one of their classes.

Since I have family that frequently brings me to the area I agreed to come down. Of course, I also asked if she could assist in getting us a tour of the facility during a Saturday. Wallops offers tours Monday-Friday but not on weekends.

The Delmarva Stargazers Announces a Writing Contest.

The DMSG will raffle away astronomy gifts to members who submit articles to the Star Gazer News.

How to enter:

- 1 Open to DMSG members.
- 2 Members may submit original articles at least 500 words (1/2 page) for publication in the Star Gazer News.
- 3 Articles **must** be authored by the member.
- 4 Pictures can be included, but they do not count towards word count (1 picture = 1000 words).
- 5 Must be astronomy related. Each article = one chance in the raffle. The drawing will be made at the star parties based on the previous 6 issues – need not attend to win (but it would be nice to see you there). *The editor of the Star Gazer News qualifies articles submitted.*

THE LIGHT YEAR PROJECT

Barlow Bob

The distance to objects within our solar system, including the Moon, Sun and planets can be measured in miles, kilometers, or Astronomical Units. Distances to objects beyond the solar system are typically measured in light years. One light year equals the distance in miles a beam of light travels in a vacuum in one earth-year, or about 5.8 Trillion miles. Since it takes so long for light from the stars to arrive here on Earth, when we see an object in the night sky, we are not observing this object the way it appears today. Instead, we are seeing it the way it looked at an earlier date in history. Most people-on-the-street have no idea what a light year is or how far away the stars are.

The Light Year Project is a hands-on-method of explaining a light year to people-on-the-street and students, by involving them in this educational astronomy exercise. The Light Year Project spreadsheet consists of five columns. Column one lists the name of a constellation, while column two contains a celestial object located in the constellation. Next, column three lists the light year distance to the object. Column four contains a date in history, while column five contains a history event.

The two columns on the right hand side of the spread sheet are blank. The object of this exercise is to have students understand a light year, by completing the spreadsheet. Using astronomy reference books, the student obtains the light year distance to the celestial object. Next they subtract or add the current year from this light year distance, to determine a date. This date can be either BC, or AD. Finally, using a history reference, add a history event that occurred at this date. Most of the light year distances are included on the spreadsheet. However, five of these distances are not included. Students can fill in these light year distances for extra credit.

These are several reference sources for this project:

The Time Chart History of the World ISBN-13:978-0-7607-6534-0,

ISBN-10:0-7607-6534-0, published by Barnes and Noble, is a fifteen foot-long history time line. This chart contains information about the history of our civilization. While there are many other history resources, this long wall chart is impressive for kids of all ages.

The Illustrated Timeline of the Universe by Richard Sanderson and Philip Harrington; Sterling Publishing; ISBN -13:978-1-4027-3605-6

The following astronomy reference books contain light year distances:

NightWatch by Terrance Dickinson, Firefly Press; ISBN 1-55209-300-X

Star Watch by Philip S. Harrington; John Wiley & Sons; ISBN 0-471-41806-4

The Messier Objects by Stephen James O'Meara; Cambridge University Press; ISBN 0 521 55332 6

The Caldwell Objects by Stephen James O'Meara; Cambridge University Press; ISBN 0-933346-07-2

Here's how to use the Light Year Project. At an amateur astronomy event ask a child for their age. Then find an object in the sky that is the same age as the child. Explain to the child that they are observing this object the way it looked, when the child was born. If the child is eight years old, show them Sirius and explain that that this star is 8.6 Light Years away. The light that the child sees tonight traveled through space for 8.6 years, which is longer length of time than the child had been alive. They are seeing this star the way it looked 8.6 years ago, not as it appears tonight. If Sirius exploded 7.6 years ago, they would not see it explode until one year from tonight.

For adults, the spring star Arcturus, in the constellation Bootes is a great example. Arcturus lies 37 light years from our solar system. Explain to them that they are seeing this star as it appeared 37 years ago. What were they doing 37 years ago, when they were born. Subtracting 37 from 2007 is 1970. The Vietnam War occurred in 1970.

You can also find three 10-year-old children and one 7-year-old child. Explain to them that the light from Arcturus has been traveling through space for their combined lifetimes and just arrived at the Earth tonight.

For objects that are farther away, use the total ages, in your family, class, club, school, or church/temple. Add their ages together and find a celestial close to the same light year distance as their combined ages.

This educational Light Year Project can be used at amateur astronomy outreach events and star parties. A four-generation family, consisting of a child, one parent, a grandparent and an eighty eight-year old great grandmother attended a summer astronomy program many years ago. The great grandmother, who did not have good eyesight, observed Saturn for the first time, through my telescope.

She said that when she was ten years old, her father had a little telescope. However, he would only allow her brothers to look through it. She was not permitted to do this, since she was a girl. I told her that she could look through my telescope and observe something, that her father would not allow her to see, so long ago.

I found a star that was seventy eight light years away. As she was looking at it, I told her that she was looking at the star the way it appeared in her sky, when she was ten. The great grandmother and her family cried. This was a cherished emotional experience for this family.

That summer night was one of those "magic moments" when we amateur astronomers get the chance to give someone the memory of a lifetime.

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(A partial list for the summer is on pg. 6 — Ed.)

Magazine Subscriptions

As a paid member of DMSG, you can sign up -or- renew your S&T or Astronomy magazines through the club for a discount over private rate. S&T, reg. \$42.95, is \$32.95 thru DMSG, Astronomy, reg. \$44, is \$34 thru DMSG. See Tony Codella for details.

CONSTELLATION	OBJECT	LY	YR	HISTORY
AQUILA	ALTAIR	16.8	1990	Pres. George Bush
LYRA	VEGA	25	1982	Pres. Ronald Regan
HERCULES	ZETA	35	1972	Aaron Copland
AQUILA	BETA	45	1962	Cole Porter
AQUILA	DELTA	50	1957	Helen Keller
SCORPIUS	EPSILON	65	1942	WW II
SCORPIUS	ETA	72	1935	Joseph Stalin
LIBRA	ALPHA	77	1930	Albert Schweitzer
SAGITTARIUS	LAMDA	77	1930	Sir Winston Churchill
AQUILA	ZETA	83	1924	Lenin
OPHIUCHUS	ETA	84	1923	George Bernard Shaw
SAGITARIUS	ZETA	89	1918	World War I
OPHIUCHUS	EPSILON	90	1917	Sigmund Freud
SAGITTARIUS	GAMMA	96	1911	Pierre Auguste Renior
DELPHINIUS	GAMMA	101	1906	Robert E. Peary
OPHIUCHUS	EPSILON	108	1899	Johann Strauss
HERCULES	ETA	112	1895	Marconi invents radio telegraph
SAGITTARIUS	TAU	120	1887	Walt Whitman
SAGITTARIUS	EPSILON	145	1862	Civil War
LIBRA	GAMMA	152	1855	Percival Lowell
OPHIUCHUS	MU	156	1851	Johann Strauss
LYRA	EPSILON	160	1847	Jules Verne
LIBRA	BETA	160	1847	Mark Twain
LYRA	EPSILON	160	1847	W.F. Cody "Buffalo Bill"
HERCULES	EPSILON	163	1844	Samuel F.B. Morse
OPHIUCHUS	DELTA	170	1837	Hans Christian Anderson
SAGITTARIUS	SIGMA	225	1782	American Revolution
AQUILA	THETA	285	1722	Benjamin Franklin
LIBRA	SIGMA	290	1717	Edmund Halley
SAGITARIUS	DELTA	305	1702	John Flamsteed
HERCULES	PI	365	1642	Henry Hudson
LIBRA	IOTA	375	1632	Christiann Huygens
HERCULES	ALPHA	380	1627	Rembrandt
CYGNUS	ALBIRIO	385	1622	Johann Kepler
SCORPIUS	DELTA	400	1607	Galileo Galilei
SCORPIUS	TAU	430	1577	Ivan The Terrible
URSA MINOR	POLARIS	430	1577	Tyco Brahe
SCORPIUS	NU	435	1572	Johann Kepler
AQUILA	GAMMA	460	1547	Tyco Brahe
AQUILA	GAMMA	460	1547	King Henry VIII
OPHIUCHUS	ZETA	460	1547	Jacques Cartier
SCORPIUS	PI	460	1547	Martin Luther
SCORPIUS	KAPPA	465	1542	King Henry VIII
SCORPIUS	BETA	530	1477	Leonardo Da Vinci

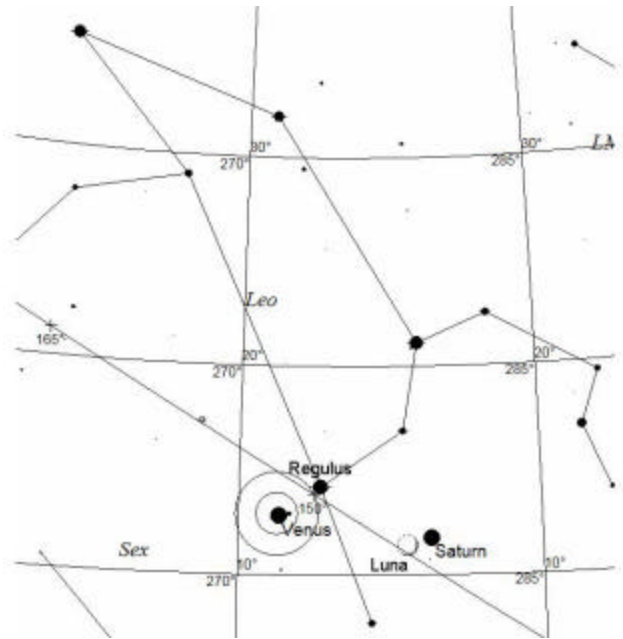
A star is beautiful; it affords pleasure, not from what it is to do, or to give, but simply by being what it is. It befits the heavens; it has congruity with the mighty space in which it dwells. It has repose; no force disturbs its eternal peace. It has freedom; no obstruction lies between it and infinity.

- [Thomas Carlyle](#)

LIGHT YEAR PROJECT - SUMMER © Barlow Bob 2007

- ⇨ The 1st column lists the constellation of interest.
- ⇨ The 2nd column lists the particular star.
- ⇨ The 3rd column lists the distance to that star in Light Years.
- ⇨ The 4th column lists a person from that era – or – an event that occurred when the light we see now just left that star.

This is an abbreviated list. See Pj if you would like to see the complete list.

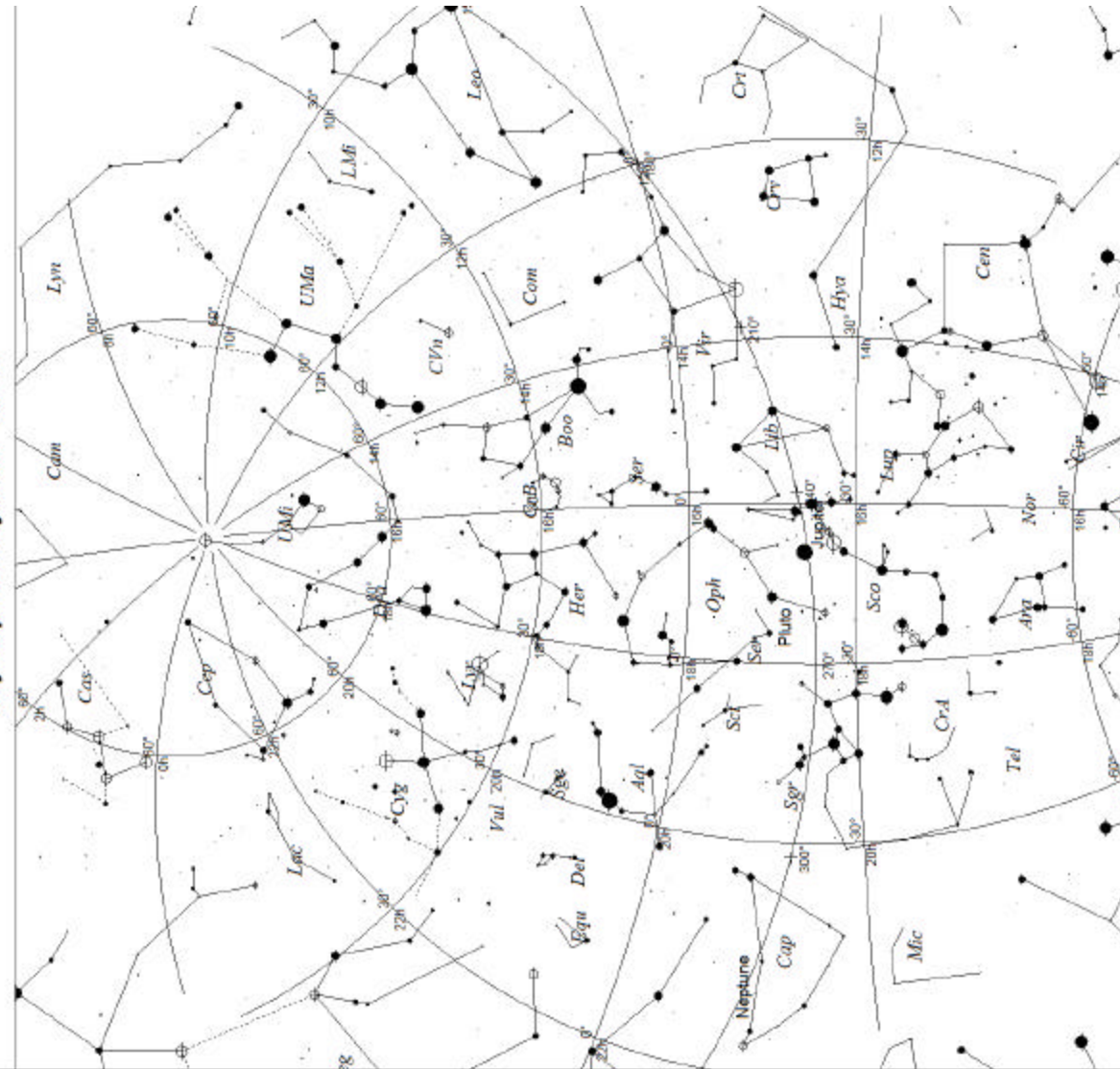


太阳系 tài yáng xì àn shuō 小暑 xiǎoshǔ (Slight Heat) —Pj Riley

(The Solar System in July— Chinese version)

水星 shuǐ xīng (Water Star) ♿ is a nice morning object this month, reaching it's greatest elongation west (20°) on the 20nd. 金星 jīn xīng (Gold Star) ♀ remains a nice evening object, shining at mag -4.4 this month before it starts its dive towards it's inferior conjunction in Aug. 火星 huǒ xīng (Fire Star) ♂ moves into Taurus by month's end. 木星 mù xīng (Wood Star) ♃ transits around 11PM. So there's great viewing all month. 土星 tǔ xīng (Earth Star) ♄ sets in the evening, and skims 月球 yuè qiú ☾ on the 16th. 天王星 tiān wáng xīng (Star of the Celestial King) ♅ is still in Aquarius, you can see it just before 太阳 tài yáng ☉ pops up. 海王星 hǎi wáng xīng (Star of the Sea King) ♆ is nearby in Capricornus. You can find the minor planet 冥王星 míng wáng xīng (Star of the Underworld King) ♇ just north of 木星 mù xīng (Wood Star) ♃ in Serpens Cauda. (As always, you can always find 地球 dì qiú (Mother Earth) ☁ by looking down). **Special Events:** On the 16th, look west at sunset, there is a binocular viewing of 月球 yuè qiú ☾, 金星 jīn xīng (Gold Star), 土星 tǔ xīng (Earth Star), and 轩辕十四 (the 14th Star of Xuanyuan) (see chart with telrad circles above) (Key to the names is: ♿ Mercury, ♀ Venus, ♂ Mars, ♃ Jupiter, ♄ Saturn, ☾ Moon, ♅ Uranus, ☉ Sun, ♆ Neptune, ♇ Pluto, ☁ Earth, and the 14th star of Xuanyuan is Regulus).

Skymap 14 July 2007 10PM



Tuckahoe State Park, MD

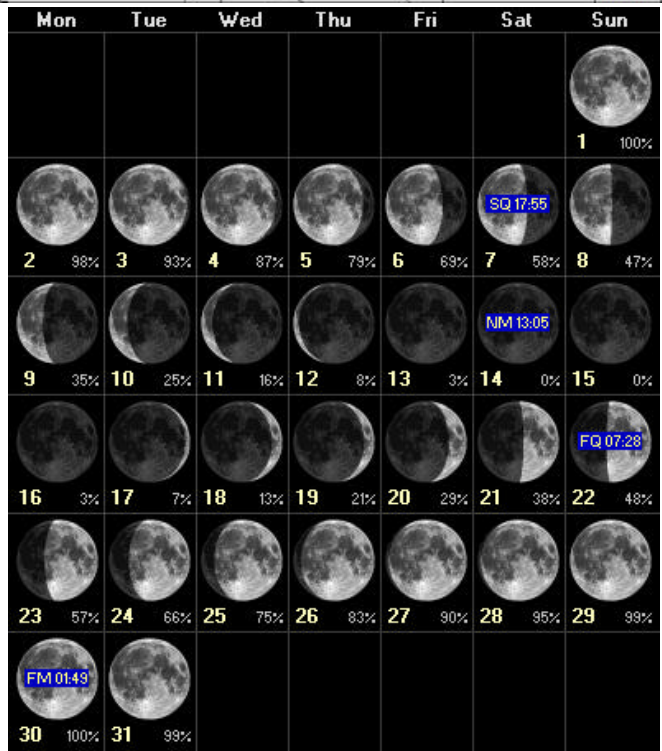
- SYMBOLS**
- △ Radio source
 - × X-ray source
 - Other object
 - Multiple star
 - Variable star
 - ☾ Comet
 - ☼ Galaxy
 - Bright nebula
 - ☉ Quasar
 - Dark nebula
 - ⊕ Globular cluster
 - Open cluster
 - ☾ Planetary nebula

- STARS**
- <1
 - 1.5
 - 2
 - 2.5
 - >5
 - 3.5
 - 4
 - 4.5
 - >5

Local Time: 22:00:00 14-Jul-2007
 Location: 38° 58' 0" N 75° 56' 0" W
 UTC: 02:00:00 15-Jul-2007
 RA: 16h26m29s Dec: +23° 57' Field: 180.0°
 Sidereal Time: 16:26:28
 Julian Day: 2454296.5833

Sun and Moon Data for July 2007
 Tuckahoe MD
 38.97°N 75.93°W 5hrW
 Daylight Time Civil Twilight

Date	Twilight	Rise	Sun Transit	Set	Twilight	Rise	Moon Transit	Set	%
7/1/2007	5:10a	5:42a	1:08p	8:33p	9:05p	9:53p	1:44a	6:21a	99
7/2/2007	5:10a	5:42a	1:08p	8:33p	9:05p	10:27p	2:38a	7:31a	95
7/3/2007	5:11a	5:43a	1:08p	8:33p	9:05p	10:57p	3:30a	8:42a	89
7/4/2007	5:11a	5:43a	1:08p	8:33p	9:05p	11:23p	4:20a	9:52a	82
7/5/2007	5:12a	5:44a	1:08p	8:33p	9:04p	11:48p	5:08a	11:02a	72
7/6/2007	5:13a	5:44a	1:08p	8:32p	9:04p	*****	5:54a	12:12p	62
7/7/2007	5:13a	5:45a	1:08p	8:32p	9:04p	12:13a	6:42a	1:23p	50
7/8/2007	5:14a	5:45a	1:09p	8:32p	9:03p	12:36a	7:31a	2:36p	39
7/9/2007	5:15a	5:46a	1:09p	8:31p	9:03p	1:09a	8:24a	3:52p	28
7/10/2007	5:15a	5:47a	1:09p	8:31p	9:03p	1:44a	9:21a	5:08p	18
7/11/2007	5:16a	5:47a	1:09p	8:31p	9:02p	2:28a	10:21a	6:21p	10
7/12/2007	5:17a	5:48a	1:09p	8:30p	9:02p	3:22a	11:24a	7:26p	4
7/13/2007	5:17a	5:49a	1:09p	8:30p	9:01p	4:26a	12:26p	8:20p	1
7/14/2007	5:18a	5:50a	1:10p	8:29p	9:00p	5:36a	1:24p	9:03p	0
7/15/2007	5:19a	5:50a	1:10p	8:29p	9:00p	6:47a	2:18p	9:37p	2
7/16/2007	5:20a	5:51a	1:10p	8:28p	8:59p	7:57a	3:07p	10:05p	5
7/17/2007	5:21a	5:52a	1:10p	8:28p	8:59p	9:03a	3:52p	10:29p	11
7/18/2007	5:22a	5:52a	1:10p	8:27p	8:58p	10:06a	4:34p	10:51p	18
7/19/2007	5:22a	5:53a	1:10p	8:26p	8:57p	11:07a	5:14p	11:11p	26
7/20/2007	5:23a	5:54a	1:10p	8:26p	8:56p	12:06p	5:54p	11:32p	35
7/21/2007	5:24a	5:55a	1:10p	8:25p	8:56p	1:06p	6:34p	11:54p	44
7/22/2007	5:25a	5:56a	1:10p	8:24p	8:55p	2:06p	7:17p	*****	54
7/23/2007	5:26a	5:56a	1:10p	8:23p	8:54p	3:08p	8:02p	12:20a	63
7/24/2007	5:27a	5:57a	1:10p	8:23p	8:53p	4:11p	8:50p	12:49a	72
7/25/2007	5:28a	5:58a	1:10p	8:22p	8:52p	5:13p	9:42p	1:25a	80
7/26/2007	5:29a	5:59a	1:10p	8:21p	8:51p	6:11p	10:37p	2:10a	88
7/27/2007	5:30a	6:00a	1:10p	8:20p	8:50p	7:04p	11:33p	3:03a	94
7/28/2007	5:31a	6:01a	1:10p	8:19p	8:49p	7:49p	*****	4:06a	98
7/29/2007	5:32a	6:02a	1:10p	8:18p	8:48p	8:27p	12:29a	5:15a	100
7/30/2007	5:33a	6:02a	1:10p	8:17p	8:47p	8:58p	1:23a	6:27a	99
7/31/2007	5:33a	6:03a	1:10p	8:16p	8:46p	9:26p	2:14a	7:39a	97



Moondark for July: 2017

It's been another stellar year for [all of astronomy](#), riding a new wave of public enthusiasm for [science and exploration of the solar system and beyond](#). Increasingly popular amateur star fests blend real-sky observing and [virtual sky-seeing](#). And with gasoline topping \$7 a gallon, second-sky observing proves a collaborative and even spontaneous way for [amateurs from anywhere](#) to gather "in-world" for the camaraderie and inspiration of the [star parties of decades past](#).

In August, millions enjoyed the [highlight of the year](#) when the [Moon's shadow raced across the blue skies of the southeast US](#). Gazers everywhere marveled at yet another [Comet McNaught](#)—besides the coincidence of the discoverer's name, [this apparition](#) was eerily similar to that just ten years ago. This was a good year for viewing Jupiter, a mediocre one for Saturn, and [an off year for Mars](#). Unfortunately, deep sky observers have been consistently marginalized to fewer and more remote dark-sky sites. Despite the considerable [hindrances of light pollution](#) and a widespread high-altitude haze, dedicated observers continue to push their limits by bagging ever more [dim and challenging deep-sky quarry](#).

[Sky & Telescope](#) finally ceased print publication, leaving [Astronomy](#) as the only major dead-tree amateur astro publication. In truth, all the good authors have been exclusively online for more than a decade. Astro-[Web 2.0](#) collabro-connectivity, starting with [blogs](#) and [wikis](#), has been extended with server-side applications to provide seamless, customized and timely networking and support interactive media for amateurs. Annoyances of [web-page ads and pop-ups](#) have long since gone the way of the dinosaurs.

This year, [NASA](#) has generously supported the robotic exploration of the solar system, though a [return to the Moon](#) has clearly morphed into a purely commercial enterprise among the dozen spacefaring countries. As the prospects of moon colonization languished, it was never establish that the Moon is a critical [stepping-stone to Mars](#). With [more than a dozen robots rolling and porpoising](#) around the Red Planet, it is an open question whether it is worthwhile to send people there simply to leave footprints. Freshly collected [bits of Mars will be returned robotically](#) to Earth within the year.

The floodgate of planetary discoveries has continued, although planets like ours appear elusive and much less common than anyone expected. It remains a fact that [Earth is the only one at present known to have solid, liquid and gaseous water](#), and thus harbor life. A new, high-resolution map of Pluto from [New Horizons](#) has just been released, helping swing both public and professional opinion toward once again regarding [Pluto as the ninth planet](#). The [James Webb Telescope](#) is about to come online and peer deeply into the early Universe, and visitors to the [Air & Space Museum](#) now can touch the actual [Hubble Space Telescope](#).

Astrophysical research moves forward. Black holes are now well understood, but the inner workings of the Sun that [affect our climate are not](#). As well, dark matter and dark energy remain mysteries, though the latest studies have nailed down the moment of the [Big Bang](#) to 13.71 billion years ago, give or take a few million years. On the other hand, perhaps the best the answer to the [ultimate question of life, the universe and everything](#) isn't when or why, or [even 42](#), but maybe right in front of us.

Now and again, it's worth taking a few moments to get some perspective on where the last years and decades have brought us. The sky overhead is the same as that in our youth, yet those youngsters who join us today at the eyepiece or at the screen will in their lifetimes enjoy that very same sky in ways we can hardly imagine. But surely that will happen only if our generation of stargazers passes on its [excitement for, and appreciation of, the heavens above](#).

On the other hand, Casey Stengel said "Never make predictions, especially about the future." Doug Miller occasionally goes out on a limb while writing [Moondark](#): here the circumstances for the Sun, Moon and planets are accurate, the rest he made up for the last page of this month's [Delmarva Star Gazers' Star Gazer News](#). Graphics composite from [USNO AA](#), [USNO Eclipse Portal / HM Nautical Office](#) and [Moondark](#). This document was last revised on 24 June 2007. Text and images on this web page are free for non-commercial use with attribution under a Creative Commons License. Ask Doug about other uses.

