ABOVE THE FOG

• BULLETIN OF THE SAN FRANCISCO AMATEUR ASTRONOMERS •

Vol. 56, No. 10 – October 2008

Wednesday, December 17, 2008 – General Meeting

Randall Museum . 199 Museum Way . San Francisco

7:00 pm Doors Open . 7:30 pm Announcements . 8:00 pm Speaker

SFAA's General Meetings take place on the 3rd Wednesday of each month (except January)

MEMBERS' NIGHT - MEMBER SPEAKERS

MICHAEL PORTUESI

ASTROPLANNER: ASTRONOMY SOFTWARE FOR OBSERVERS

Most popular astronomy software takes the form of a "planetarium" that shows the sky for a time and place. While educational and entertaining, this isn't the most useful kind of software for people who observe and photograph the sky. Michael Portuesi will demonstrate AstroPlanner, for Mac and Windows platforms. AstroPlanner is different: it allows you to plan observing sessions, create observing lists by searching astronomical catalogs, log your observations, and drive your telescope. If AstroPlanner's rich feature set were not enough, it offers a built-in scripting language that allows you to add your own features. Michael will demonstrate some additions he has developed for the software.

Michael Portuesi operates the San Francisco Sidewalk Astronomers website (www.sfsidewalkastronomers.org), and is past-president of the San Francisco Amateur Astronomers. When not observing the Universe with telescope and sketchbook, he delights in engaging the public with talks about astronomical topics.

JOHN DILLON

THE AUTOPSY OF HEAVEN: GALILEO, TELESCOPES AND THE CHURCH

The world is about to celebrate the 400th anniversary of Galileo's telescope and the revolutionary observations he made with it. When he published his discoveries, the story goes, Galileo threw off the yoke of the ancient Greeks and challenged the authority of the Church – thus opening the way for "modern" science. But John Dillon will take a longer view of the history of science and explore a subtler, more complex, relationship between Galileo, telescopes, science and the Church.

VIVIAN WHITE

A talk about the International Year of Astronomy and what SFAA can do to participate.

Vivian White is an astronomy educator with the Astronomical Society of the Pacific. She earned her Bachelors degree in physics and astronomy from San Francisco State University and has worked with teachers, kids, and amateur astronomers ever since.

2008 Club Officers & Contacts

President	DIRK LAMMERTS	president@sfaa-astronomy.org
Vice President	Stephanie Ulrey	vicepresident@sfaa-astronomy.org
Secretary	Barbara Arrighi	secretary1@sfaa-astronomy.org
Treasurer	Vivian White	treasurer1@sfaa-astronomy.org
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	Elan Morpurgo	elan@sfaa-astronomy.org 415 383-2247
	Jorge Morales	jorge@sfaa-astronomy.org
Alternate Board Members	Jared Willson	jared@sfaa-astronomy.org
	Lon Carter	lon@sfaa-astronomy.org
Webmaster	Joe Amato	wbmstr@sfaa-astronomy.net

Club Telescopes

The SFAA owns eight very fine, easy to use, loaner telescopes well-suited for deep sky, planets, and star parties. All scopes are available to any SFAA member. The loaner custodians for the majority of our fleet are Pete & Sarah Goldie. Please contact them at telescopes@sfaa-astronomy.org for details if you are interested in borrowing a scope or if you have items you can donate for the loaner program (eyepieces, star maps/books, red flashlights, collimator, etc.). Please contact the appropriate member indicated below if you are interested in borrowing one of the telescopes.

1) 6" f/10.3 Dobsonian/Ken Frank ken@sfaa-astronomy.org
2) 8" f/7 Dobsonian/Pete Goldie
3) 8.5" f/6 Dobsonian/Pete Goldie
4) 10" f/8 Dobsonian/Pete Goldie
5) 114mm f/4 Newtonian StarBlast/Pete Goldie
6) 8" f/10 Celestron SCT/Annette Gabrielli/ annette@sfaa-astronomy.org
7) 8" f/10 Meade SCT/Stefanie Ulrey/treasurer@sfaa-astronomy.org
8) 9.5" f/5.6 Celestron Newtonian/Ken Frank/ ken@sfaa-astronomy.org

Club Astronomy Videos

The SFAA owns a series of astronomy videotapes featuring Alex Filippenko, a world-renowned professor of astronomy at UC Berkeley. The videotapes provide an introduction to astronomy and cover topics such as the Solar System, the lifecycles of stars, the nature of galaxies, and the birth of the Universe. The SFAA loans the tapes free to all members. If you are interested in viewing these tapes, you may check them out at any of the SFAA General Meetings. These tapes were kindly donated to the SFAA by Bert Katzung. For information on the course tapes themselves:
http://www.teach12.com/ttc/assets/coursedescriptions/180.asp

Membership Dues

Membership is billed for each upcoming year on June 30. Members may receive no more than one bulletin after the expiration of membership.

SFAA Website and Online Services

The SFAA web site at sfaa-astronomy.org is provided to our members and the general public for the sharing of club information and services. The web site contains links for club star parties, events, newsletters, lectures and meetings. If you wish to interact with other people who are interested in astronomy, the SFAA web site offers public and members only bulletin board forums. If you wish to remain up-to-date on club activities, then we encourage you to subscribe to one or both of our public mailing lists, which will allow you to receive our newsletter and/or club announcements via email. Other useful and interesting information and services are available on the site such as observing location reviews, member astronomy photos, and members only telescope loans. Information about SFAA's membership, organization and by-laws are available at the club's online public document archive. If you need to contact a representative of the SFAA, then please visit our contacts page to help in finding the right person to answer your questions.

Above the Fog is the official bulletin of the San Francisco Amateur Astronomers. It is the forum in which club members may share their experiences, ideas, and observations. We encourage you to participate by submitting your articles, announcements, letters, photos and drawings. We would also like to hear from our new members. Tell us about yourself – what you have done in the past and what other clubs you have joined. **The deadline for the next issue is the 20th day of the month**. Send your articles to **Editor@sfaa-astronomy.org**

IMPORTANT DATES

SFAA GENERAL MEETINGS & LECTURES

Wednesdays
December 17
January 24 – Annual Awards Dinner
February 18
7:00 p.m. Doors open. 7:30 p.m. Announcements. 8:00 p.m. Speaker
Randall Museum, 199 Museum Way (Near 14th Street and Roosevelt)

BOARD MEETINGS

Tuesdays
December 9
January 13
February 10
7:00-8:30 p.m.
Randall Museum, 199 Museum Way
(Near 14th Street and Roosevelt)

MT TAM STAR PARTIES – SPECIAL USE PERMIT – MEMBERS ONLY

Special Use Permit observing nights on Mount Tamalpais are private and open *only* to SFAA members. Please arrive by sunset (times listed below). A permit is required for each car. We must vacate the mountain by 2:00 a.m. except on specially approved nights (such as Messier Marathon).

SATURDAYS - GATEKEEPERS NEEDED
December 27 – 4:58 p.m.
January 24 – 5:18 p.m.
February 28 – 5:49 p.m.

CITY STAR PARTIES - TELESCOPE CLINIC ONE HOUR BEFORE SUNSET

Saturdays
December 20 – 4:51 p.m. at *Randall Museum, 199 Museum Way (Near 14th Street and Roosevelt)*

Weather may cancel the City Star Party
Please note that while City Star Parties WILL ALWAYS be held on Saturdays, some will be closer to the last quarter phase of the moon, while others will be close to first quarter. This is so we can work around dates for Mt. Tam public star parties as well as our members-only events on Mt. Tam.

Map and directions – Land's End (Pt. Lobos) http://www.sfaa-astronomy.org/clubarchive/directions-pointlobos.php

NEW SFAA MEMBERS
Scope City is offering to new members a $25 credit toward the purchase of telescopes and binoculars.
Obtain a receipt for dues payment from
Vivian White, Treasurer,
treasurer@sfaa-astronomy.org.
Contact Sam Sweiss at Scope City
to arrange for your discount.

PRESIDENT'S COLUMN

2008 – a year in retrospect.

We started the year with our Annual Dinner at a new location - Delancey Street Restaurant. The room got a bit crowded towards the later part of the evening but most people I heard from liked the food, and the setting was really nice. Delancey will also be the venue for our 2009 annual dinner.

February brought us a special event at the Randall Museum to observe the total lunar eclipse. It had been cloudy and rainy for days before the night of the eclipse. And the day started with thick cloud cover all over the city. But then the clouds broke open just in time for the eclipse. And while conditions weren't perfect, everybody who had come to the Randall was rewarded with some nice views. Which reminds me that the weather overall was pretty good this year, especially compared with the long stretches of fog, clouds, and rain in the two previous years.

March was the time for our Messier Marathon on Mt. Tam. Although the night was cut short by cloud cover moving in, observers on the mountain were eagerly checking off Messier objects from the list of 110 targets up to that point. And Don Machholz' talk about Charles Messier and the "Marathon" named after him that he gave at the General Meeting earlier that month had put everyone into the right spirit for this endeavor.

Summer got really busy with out-of-town star parties. It started with the annual SFAA night at Fremont Peak Observatory in June when we took over FPOA's 30 inch telescope for two nights. It was quite an adventure moving that beast around manually and climbing up the ladder to get to the eyepiece eight feet above ground level.

And then we went to Yosemite in July. Unfortunately, clouds and a three quarter Moon limited the view on the main night of observing. But the overall experience of hiking in beautiful Yosemite Valley during the daytime, observing from Glacier Point, and spending the nights at Bridalveil Creek campground provided for a very special experience.

During the morning hours of August 1st, we participated in another eclipse event – this time the total solar eclipse broadcast live from China. The San Francisco Exploratorium hosted a great overnight event with Chinese music and culture performances, educational sessions, and, as the highlight, the video feed from China. The SFAA participated with telescopes outside and with demonstrations inside the Exploratorium.

September brought our biggest outreach event for the year. The California Academy of Sciences re-opened its doors with a spectacular weekend-long event after years of renovation and restoration. Close to 50,000 visitors came to celebrate the opening, check out the museum, and participate in all the activities that many groups had put together in collaboration with the Academy. The SFAA was present with a big exhibit booth, and more than 20 volunteers operated the solar scopes, conducted interactive supernova and galaxy scale demonstrations, showed how to grind a mirror, and handed out hundreds of SFAA brochures.

Also in the fall, we joined the Night Sky Network, and we instituted the SFAA Star Rewards program. The Night Sky Network is a partnership between amateur astronomy clubs, NASA, the Astronomical Society of the Pacific, and the Astronomical League, that supports public outreach through educational materials and training on a variety of astronomical topics. Member clubs have conducted close to 10,000 outreach events over the past four and a half years. Star Rewards is our own program to reward volunteers and to encourage broader participation among our membership.

One of the last official events for this year will be the General Meeting and Member's Night on December 17.

I will close the last President's Column for this year with the words of Frank Borman circling the Moon on board Apollo 8 in December 1968:
"Good night, good luck, a Merry Christmas and God bless all of you – all of you on the good Earth."

DIRK LAMMERTS
PRESIDENT

ANNUAL AWARDS ……

THE CONTEST IS ON DECEMBER 17

MEMBERS WILL CAST VOTES AT THE DECEMBER 17 MEMBERS' NIGHT MEETING. PRIZES FOR FIRST, SECOND AND THIRD PLACE WINNERS WILL BE AWARDED.

ASTRONOMICAL ART AND LITERARY SUBMISSIONS RECEIVED ARE INCLUDED IN THIS NEWSLETTER. WE LOOK FORWARD TO SEEING MANY MORE ENTRIES AT THE MEMBERS' NIGHT MEETING.

Astrophotography

Members are encouraged to submit astrophotographs (up to three entries per member) for judging. All entries will be accepted and exhibited at the December meeting and voted upon by the general membership. Entries must have been taken this year (2008) and be of an astronomical theme. Size should be reasonable (11' x 14' or less), mounted or unmounted.

Astronomical Arts

This contest is open to all members and will be judged by the membership at the December General Meeting. Any art related to astronomy is welcome. Your drawings of astronomical objects are worth sharing with other club members, as well as craftwork, sculpture, jewelry, and paintings -- there are almost no restrictions here. Size is a consideration since we have to fit all entries, and club members, in the museum, alongside the Astrophotography Award entries. Also, no living critters, please. The museum may frown upon any living, breathing things that are not part of official exhibits. Live acts are restricted to the human kind. Please bring your entries to the December meeting. Any questions can be directed to club officers listed on page two in this bulletin.

Literary

Submissions may be fact or fiction, humor or opinion. You may have a favorite story about an observing experience, a trip, or about people who have crossed your astronomical path in one memorable way or another. Share the stories of your astronomy observing and/or travel experiences, maybe an article you have written, and enable us to appreciate them with you.

ASTRONOMICAL ARTS ENTRY

LINDA MAHAN

The Story of Eartha and Luna

A story written by Linda Mahan with her watercolor illustrations. Fourteen individual pages are set into a hand-made folder, trimmed with the planets of our solar system, made of varied agates

http://sfaa-astronomy.org/awards/2008_entry_mahan.php

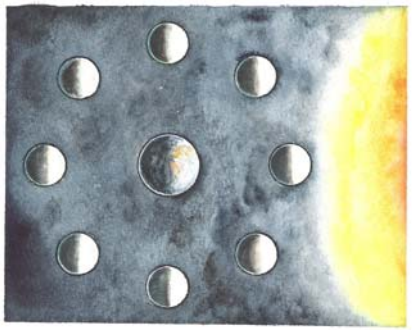
The
Story of
Eartha and Luna

by
Linda Mahan

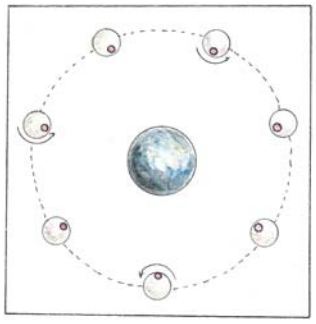
Dedicated to
Nancy Mahan-Weber
Mother's Day May 12, 1996

In the beginning the Parent Body slowly spun out the days, condensing, solidifying and maturing. Suddenly the Parent experienced a devastating impact by a ***Large Body*** from another neighborhood that struck her deeply, fusing and melting their materials together as much as possible. The heat and power of this collision caused a large chunk of the Parent's body to be violently ejected from its mass, throwing rocky material outward that coalesced almost immediately into a new Body the parent named "Luna". The Parent gave up its former leisure and immediately began to spin in circles much faster then ever before.

With the new mother's gravitational pull on her daughter, Luna bulged slightly and the tidal forces acted to keep the small youngsters face locked forever toward the parent in ***synchronous rotation.*** The new daughter was a warm and malleable constant companion who shared her parent's very elements. She named her mother "Eartha". Luna would eventually become cool, solid, endlessly interesting and glowingly elegant.

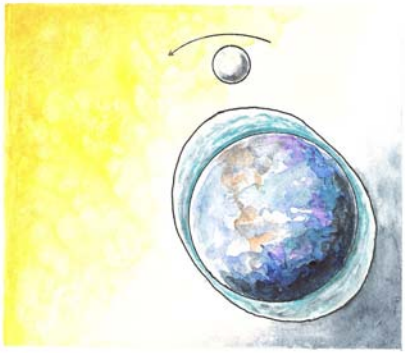


Almost immediately Eartha discovered her offspring seemed to go through ***phases.*** Sometimes Luna was completely in the dark, but soon after, the light dawned on her and she grew more brilliant with each passing day. Always after Luna gave her most brilliant performance she seemed to need time to return to rest and quiet again. Luna learned her mother also went through ***phases,*** but fortunately not the same ones at the same time. So Luna and Eartha's most brilliant moments never compete with each other.

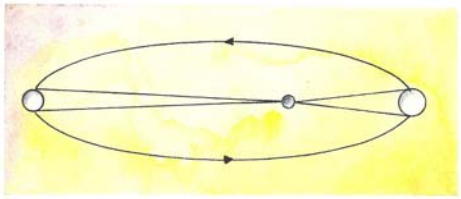


Eartha and Luna are good citizens of their galaxy and carefully observe the ***Law of Universal Gravitation.*** They are connected by gravity to revolve about each other, in mutual attraction, around a common point at their center of mass, which is the point of cooperation and attention between them. So that her gaze remains on her mother, Luna must rotate once for every revolution around Eartha.

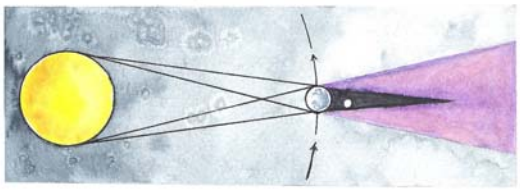
There were many violent volcanic eruptions when Eartha's daughter was young, and lava flowed freely on Luna's face. She also received many impacts from visiting meteoritic material that left a big impression. Eartha can see over 30,000 craters, large and small and many overlapping ones as Luna was repeatedly struck for a long time. These experiences left many scars, but now Luna's surface is calm and relatively unperturbed.



Eartha and Luna have ***gravitational interactions*** that result in great tides that flex and vex Luna and cause her to have many little "moon-quakes" (which are nothing compared to her mother's major cataclisms). Luna gets especially upset at ***new and full moon.*** But she also exerts tidal forces on her mother. Eartha feels this and responds with her great tidal bulges as her oceans are dragged outward and ahead of Luna's position in the sky. This bulge forces Luna to spiral away from her mother for a while.The pull from Luna causes Eartha's tidal bulging to create frictions within her mother's body that cause her rotation to slow down.

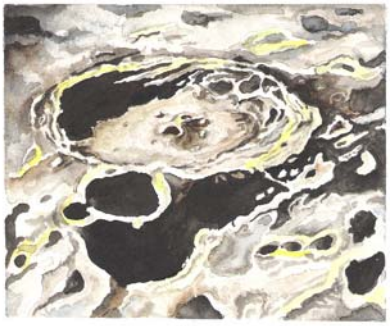


Twice a day Eartha's breast heaves a sigh as her oceans rise and fall in response to Luna's ***elliptical, counterclockwise orbit.*** The gravitational pull on her mother is greater when Luna is closer, at ***perigee,*** by some 20%. Luna sometime dances farther away, at ***apogee,*** and she is sometimes a bit lower or a bit higher in the sky. Eartha has learned to always know where to find her beautiful daughter (even when she is trying to hide) and to appreciate her influences.

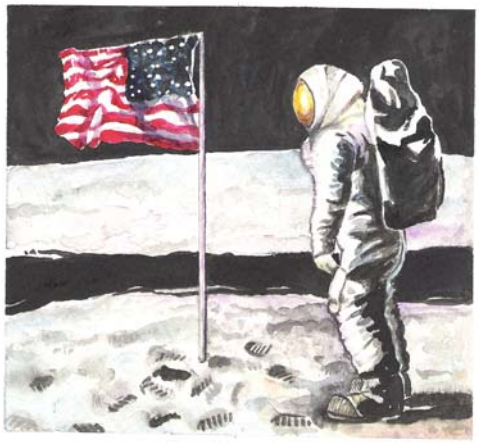


Eartha tries to not stand in her daughter's way and prevent her from receiving the full warmth of the Sun on her face. The distances between them are so great that Luna seldom enters the large, cone-shaped shadow her mother extends nearly a million miles into space opposite the direction of the Sun. She may also pass above or below Eartha's shadow and completely miss having her full light diminished. She is very good at this. An eclipse may occur to her up to three times per year. During Luna's ***eclipses*** Eartha's shadow does not obscure her daughter altogether. Her normal full brilliance is replaced with a dark reddish-brown color Eartha loves to see. Luna enters Eartha's dark ***umbral*** shadow, passes through and exits relatively slowly so her mother can enjoy her daughter's special appearance for two or three hours. Sometimes Luna avoids entering the darkest part of Eartha's shadow, but passes through less dark ***penumbra.*** Eartha barely notices this. Sometimes just a small area of Luna is eclipsed by the shadow as she passes through just a part of the ***penumbra.***

Sometimes, when in her ***new phase,*** Luna stands in front of the Sun's light and sufficiently close enough to her mother that she blocks the sunlight and casts her ***own*** shadow on Eartha. Since Luna is so much smaller, her dark ***umbral*** shadow can never obscure her mother, but it does sweep a narrow path across Eartha's body. If Eartha does not have her eye open at exactly the right spot, she will miss being in the shadow completely and seeing her daughter with the brilliant halo of the Sun's corona blazing around her in a ***total solar eclipse.***



Eartha loved seeing her daughter's face but always wondered what was on the far side, forever out of her view. When Eartha had developed sufficiently she decided to learn about herself and her environment. She finally figured out how to send spacecraft to explore Luna's surface. When pictures were brought back in 1959, she was surprised to see Luna's backside is thicker and covered almost entirely by craters, (which were named in a language Eartha has trouble trying to pronounce).



Eartha yearned to know more and to have a part of Luna she could hold to her bosom. She studied harder and sent ***Ranger*** spacecraft that sent more pictures before crash landing. Finally she sent 5 ***Orbiter*** missions and they successfully sent hundreds of high resolution pictures of over 99% of her daughter's body. Eartha studied these in close detail to decide where she would actually send Explorers. The Explorers she had been training worried they might sink down into Luna's body. So five successful ***Surveyor*** missions were sent to find a spot solid enough for them to land. Eartha was so excited when on July 20, 1969 the Explorers on ***Apollo 11*** landed on Luna's "Sea of Tranquillity" and began collecting pieces of her daughter to finally bring home.

A few more Explorers arrived in the Apollo 12, and 14 -17 missions, leaving footprints that will remain on Luna for millions of years. They placed seismometers to detect "moon quakes" and to help Eartha know what is at her daughter's core. Eartha sent robot spacecraft and orbiting satellites around Luna, but she has been unable to persuade the Explorers to return to her daughter since 1979. There are so many more questions Eartha has. What is Luna like at her poles? She needs more rock samples. She wants to know more about the far side. ***She wants to send more Explorers.***

In the future, Eartha knows that tidal interactions will allow Luna to enlarge her orbit, and her aging mother will slow her rotation once again. Eartha will someday direct her tidal bulge toward Luna to keep her from spiraling away, and the mother will finally fix her gaze toward her daughter in a stable configuration of mutual regard.

LITERARY ENTRY

Darryl Moore

There comes a time when the universe

makes itself known to intelligence by intelligence

in silence her words streak across the solar system

unaware without a care

in view or out of view of his path

the third obstacle from center

three for emphasis

cannot tolerate her words

why

learn from the past

the effects from his words were planetary

THINK !!!

San Francisco Amateur Astronomers
P.O. Box 15097
San Francisco, CA 94115

BALLOT

2009 OFFICERS AND BOARD OF DIRECTORS

OFFICERS

_____	President	Dirk Lammerts
_____	Vice-President	Stefanie Ulrey
_____	Secretary	Barbara Arrighi
_____	Treasurer	Vivian White

_____ Write-in _____ *Name* _____ *Office*

_____ Write-in _____ *Name* _____ *Office*

BOARD OF DIRECTORS

Board-recommended candidates

_____ Jim Cottle
_____ John Dillon
_____ Kenneth Frank
_____ Dave Frey
_____ Annette Gabrielli
_____ Elan Morpurgo
_____ Jared Willson

Additional candidates

_____ Joe Amato
_____ Lon Carter
_____ Dave Goggin

_____ Write-in _____ *Name*

_____ Write-in _____ *Name*

VOTING INSTRUCTIONS

The club members listed above are candidates for Officers and Board of Directors of SFAA for the year 2009. Please vote for a total of four officers and a total of seven board of directors including write-ins. ***Voting for more than four officers or for more than seven board members per ballot will invalidate the entire ballot.*** Family memberships may submit a separate ballot for each voting family member. Write-ins for officers must include the candidate's name and office for which he or she is nominated.

All candidates, including write-ins, must have committed to attending at least seven board meetings and may not miss more than two consecutive meetings during the calendar year for which they are nominated.

The seven board of directors' candidates who receive the highest number of votes will become regular board members. The two candidates receiving the next highest number of votes will become alternate board members. The new Officers and Board of Directors will be installed at the Annual Awards Dinner on January **24,** 2009.

Please return your ballots to: SFAA Secretary, POB 15097, San Francisco CA 94115
Ballots must be postmarked no later than January 15, 2009.

San Francisco Amateur Astronomers
P.O. Box 15097
San Francisco, CA 94115

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P.O. Box 15097
San Francisco, CA 94115

Information Hotline: (415) 289-6636

Web Page: www.sfaa-astronomy.org

Sharing the Wonders of the Universe

San Francisco Amateur Astronomers
Annual Awards Dinner

Saturday, January 24, 2009

6:00 p.m. - No-host Bar 7:00 p.m. - Dinner

DELANCEY STREET RESTAURANT

600 Embarcadero, San Francisco CA 94107 . (415) 512-5179

$30.00 per person (*Tax and gratuity included)*

MENU

Includes appetizers, soup, salad, dessert
and non-alcoholic beverages
Served with Baskets of Assorted Breads

Select from the following entrée choices –

Oak Fired Barbequed Chicken
Oak Fired Barbequed Baby Back Ribs
Oak Fired Barbequed Combo
All above entrees served with greens

Mediterranean Vegetable Platter
Spinach and feta phyllos, over minted cucumber yogurt sauce, apricot spiced Israeli couscous, baba ganoush, hummus, olives, and pita bread

Dessert
Coffee or tea

PLEASE SEND A CHECK OR MONEY ORDER WITH YOUR CHOICE OF ENTREE PAYABLE TO
SAN FRANCISCO AMATEUR ASTRONOMERS
AND SEND TO P.O. BOX 15097, SAN FRANCISCO CA 94115
BY FRIDAY, JANUARY 11, 2008.
ANY REQUESTS RECEIVED AFTER THIS DATE CANNOT BE GUARANTEED.

FROM HIGHWAY 280: TAKE HIGHWAY 280 NORTH TOWARD CIVIC CENTER/BAY BRIDGE. TAKE LEFT RAMP ONTO KING ST AND PROCEED 1.0 MILE. CONTINUE ON THE EMBARCADERO, GO 0.4 MILE. MAKE A U-TURN AT BRANNAN ST. ONTO THE EMBARCADERO, ARRIVE AT 600 THE EMBARCADERO, ON THE RIGHT.

FROM HIGHWAY 101 (SOUTH OF SAN FRANCISCO): TAKE US-101 NORTH TO THE I-280 EXIT TOWARD PORT OF SAN FRANCISCO, GO 3.2 MILES. TAKE LEFT RAMP ONTO KING STREET, GO 1.0 MILE. CONTINUE ON THE EMBARCADERO, GO 0.4 MILE. MAKE A U-TURN AT BRANNAN ST. ONTO THE EMBARCADERO, ARRIVE AT 600 THE EMBARCADERO, ON THE RIGHT.

FROM MARIN COUNTY: TAKE US-101 SOUTH OVER THE GOLDEN GATE BRIDGE. CONTINUE ON RICHARDSON AVENUE, GO 0.2 MILES. CONTINUE ON LOMBARD STREET, GO 1.1 MILES. TURN LEFT ON VAN NESS AVENUE, GO 0.2 MILES. TURN RIGHT ON BAY STREET, GO 1.1 MILES. TURN RIGHT ON THE EMBARCADERO, GO 1.9 MILES. ARRIVE AT 600 THE EMBARCADERO, ON THE RIGHT.

SFAA STAR REWARDS VOLUNTEER RECOGNITION PROGRAM

The Star Rewards program was implemented in August 2008 to recognize the efforts of our SFAA volunteers. You did not have to enroll in the program; if you officially signed up to volunteer for a qualifying SFAA event, you have automatically received a Star Reward point.

Volunteers will be recognized at the SFAA annual member meeting December 17. Each person who has one or more Star Reward Points will be presented a SFAA volunteer pin! There will be a drawing for other great prizes. Each Star Reward Point will gain you a raffle ticket. You do not need to be present to earn your pin or for the drawing of the other prizes; you may pick them up at a later date.

This fall, the qualifying events included:

1. Gatekeeping duties at Mt. Tam SUP's and Public parties (officially signed up volunteers)
2. Providing refreshments at the member meetings.
3. Volunteering at the Exploratorium Solar Eclipse event on August 1.
4. Volunteering at the California Academy grand opening on September 24/25.
5. Presenting a talk at the Randall for a City Star Party or general member meeting.
6. Organizing other club events (Star-B-Q, etc).

Volunteers: Please watch for a forthcoming e-mail to notify you of your Star Rewards Program points. If you volunteered for a qualifying activity and do not receive an e-mail before the December 17 general meeting at the Randall museum, please contact me at secretary1@sfaa-astronomy.org.

If you have any questions, please e-mail at secretary1@sfaa-astronomy.org.

Thanks to all for your volunteer time in 2008.

Barbara Arrighi, Your Secretary

40 Years Back Toward the Moon – Apollo 8

Jim Cottle

Apollo 8, launched December 21st, 1968 was one of the most historic of the Apollo series and remains as a landmark for man first leaving the confines of earth's gravitational pull. The year 1968 was one of social turmoil in the United States including the assassinations of Bobby Kennedy and Martin Luther King, Vietnam anti-war protests and the brutality police showed peaceful demonstrators at the Democratic National Convention in Chicago. In contrast Apollo 8 placed an introspective cap on the year in late December, possibly the best Christmas present that 1968 had to offer the nation and, for that matter, the world. As the Apollo 8 astronauts pointed their television camera from the gray horizon of the lunar landscape back toward the earth, we were all forced to look back on ourselves, *spaceship earth* - an iridescent blue orb in an otherwise sea of darkness. This view in color, famously titled "Earthrise", has since become a signature reminding us all of the Apollo 8 mission and our first human foray across the boundary between our environment and into outer space.

Figure 1 The famous "Earthrise" photo taken by the Apollo 8

An Incredible Decision – "Are You Crazy?"

Incredible as it seems by today's standards, the first time we flew a crew in a Saturn V booster, it took them to the moon. Apollo 8 however, was not originally planned to be a lunar orbiting mission but rather a low earth orbit test of the entire Apollo stack (called the "D" mission). As early as August 1968 however, secret discussions were taking place to change the plan of record for one of the most incredible flights in man's history. This change in the Apollo 8 mission and its success went on and paved the way for the lunar landing by Apollo 11 in July of 1969. Arguably, it was one of the most risky and controversial management decisions of Apollo and, in retrospect, is representative of the aggressiveness of the effort, the risk taking of the era and the program's legendary success.

"Are you crazy?" was the first response of James Webb, then the NASA administrator when he was presented with this radical departure from the regular A, B, C series of steps leading to a "G" mission (the lunar landing). Frank Borman, Apollo 8's commander, was summoned by Deke Slayton to return to Houston from his camped out nursing of the development of the Block II command module at North American Rockwell in Downey, California to receive the new proposal. As discussion progressed, the radical departure from the plan of record made more and more sense leading some to wonder why this had not been the original plan all along. Grumman Aerospace was struggling with the Lunar Module to be placed in the first manned Saturn V and there was no way it would be ready for a flight in 1968. Pressures were mounting for one-upmanship from the Soviet Union as the CIA warned that there were plans for a lunar fly-by using Soyuz. All hardware with the exception of the Lunar Module was nearly ready. This coupled with the near perfect success of Apollo 7's flight, including an exhaustive test of the newly designed Block II command module, cinched the decision. Essentially, NASA had a full complement of hardware for a moon orbital mission, a ready Saturn V and Command Module Block II model CSM-103. George Low's proposal to use the first manned Saturn V flight to take astronauts around the moon would be the plan. Apollo 8's crew secretly began preparing for the challenges of this task in late August in simulators.

The main technical challenges remaining were 1) the readiness of the navigation software for the Apollo Guidance Computer and 2) the dismal technical performance of Apollo 6's propulsion, when longitudinal vibrations nearly tore apart the upper stages of the Saturn V. Although Apollo 6 was officially declared a success publicly, fulfilling all "mission objectives", knowledgeable technicians and engineers in the program knew that, had it carried astronauts aboard, it most certainly would have been an aborted ascent as G-forces exceeded 10 times the force of gravity. Wernher Von Braun's Huntsville teams were systematically ironing out the POGO problems associated with the monstrous dynamical resonances of the Saturn V stack, which left the critical element for the Apollo 8 mission one of guidance software. Even with the pressures of this accelerated timeline, the Charles Draper Lab at MIT finished the software allowing Michael Collins (CAPCOM-Apollo 8) on December 21, 1968 to utter five words that to this day have a distinctly historical resonance: "You are GO for TLI". With this, Apollo 8's crew relit the SIV-B of AS-503 to become the first crew to swap the influence of gravity of the earth with another celestial body.

Figure 2 – The firing control room at KSC during the Apollo 8 countdown.

For the re-patriated German rocket engineers in the Apollo program that had been at Peenemunde and witnessed the first V-2 impinge upon the boundary of space, trans-lunar injection was an especially poignant moment. Konrad Dannenberg in 2007, one of the original propulsion engineers at Peenemunde (still around and in his nineties), described two events as the main highlights of his career (the first, on October 3, 1942 when Aggregate 4, A-4 no. 3, reached the boundary of outer space and the second when the third stage of the Apollo 8 Saturn V re-lit and sent humans for the first time beyond the point of dominant influence of earth's gravity). To these engineers, landing on the moon was now not only achievable but also somewhat "trivial" compared to the complexity of Apollo 8's success. All the pieces of the puzzle seemed to be falling into place. Indeed, most all the advances contributed by Apollo 8 were largely engineering based rather than scientific.

A problem of guidance

With the pogo problems of the Saturn V confidently addressed, the main issue with the new mission proposed for Apollo 8 was communication, navigation and guidance. After launch and two orbits around the earth, the third stage of the Saturn V, the SIV-B was to be re-ignited for trans-lunar injection and effectively elongating the elliptical orbit to include the influence of the moon's gravitation pull. While in this elongated ellipse, Apollo 8 would arrive at the moon coincidently in its orbit, fly in front of its leading edge and be captured by the moon's gravity.

A free-return trajectory was chosen such that this "capture", without further action, would sling the Command and service module back toward the earth should nothing else other than the original TLI burn be accomplished. The aggressive mission plan however, was for the astronauts to fire the service module's SPS engine while

behind the moon, out of reach of mission control, slowing the speed of the craft for a complete capture and placing it in a lunar orbit for 10 revolutions.

Figure 3 - A double exposure photo showing the rising crescent moon and the launch of Apollo 8.

Following this, the SPS engine would be fired once again to return to the command and service module toward the earth, with the command module hitting a re-entry corridor so small in tolerance and required accuracy that, to this day, it boggles the mind. To imagine this tolerance, consider the earth represented by a basketball. In this thought experiment, the re-entry corridor on a return trajectory by the Apollo 8 astronauts can be represented by a slice of cardboard placed tangential to the surface of the basketball. Navigating this corridor successfully is truly an awesome feat for a spacecraft traveling at 25,000 miles per hour. Too high and the command module skips like a stone on a pond, too low and it plunges to a fiery demise. In Apollo 8, communication and guidance was everything and a wonderful dress rehearsal for subsequent lunar landing missions.

So, with the hardware of the time and the infancy of digital computing in 1968, how was this possible? It turns out, as most of us know, that aside from the equations of Kepler and Newton, we only need to accurately know the elements of "the state vector" for the spacecraft. In other words, exactly what time is it now, where in X, Y, and Z is Apollo 8 at this very moment (3 numbers of position) and how fast is it moving in these three dimensions relative to us (another 3 numbers of velocity, dX/dt, dY/dt and dZ/dt)? The first set of numbers was determined from a combination of accurate time recording, inertial guidance (knowing where you started from with a spinning gyroscope), radar tracking from multiple ground-based stations, and verification of guide star sightings by the Astronauts aboard the Apollo 8 spacecraft. This last task is not unlike that performed by many of us today as we align our telescope's go-to mount to a set of tracking stars.

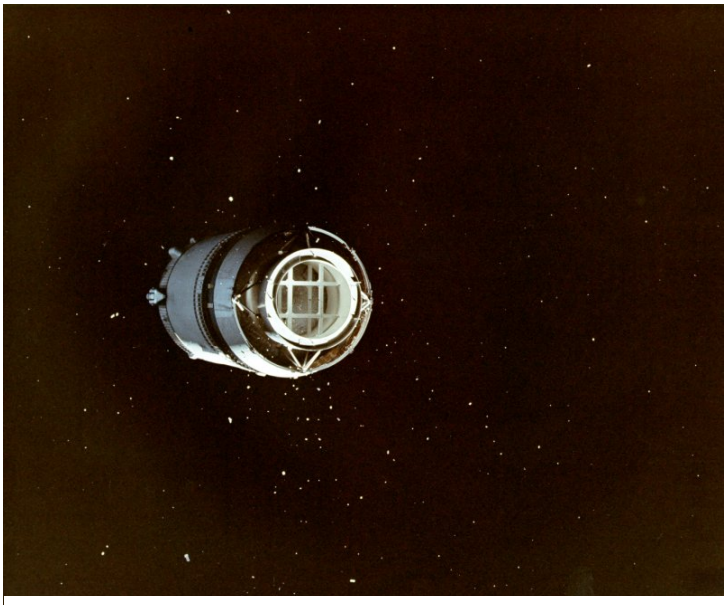

Figure 4 – Looking back toward the SIV-B third stage during trans-lunar coast.

An extremely accurate scheme using Doppler shift of the S-band carrier was devised for the second set of these numbers and for the determination of how distant the spacecraft was from the earth tracking station. The shift in a known accurate ground based carrier reference was used to determine the speed, and an synchronization of data frames provided the necessary time-delay measurements for the determination of distance. For an excellent reference on the details of exactly how this was achieved, please see *How Apollo Flew to the Moon*, by David Woods (2008 –Praxis). If there is one book you need to read on the subject, this is the one to get! The discussions on the state vector, guide star sightings and the details in this reference on navigation are excellent.

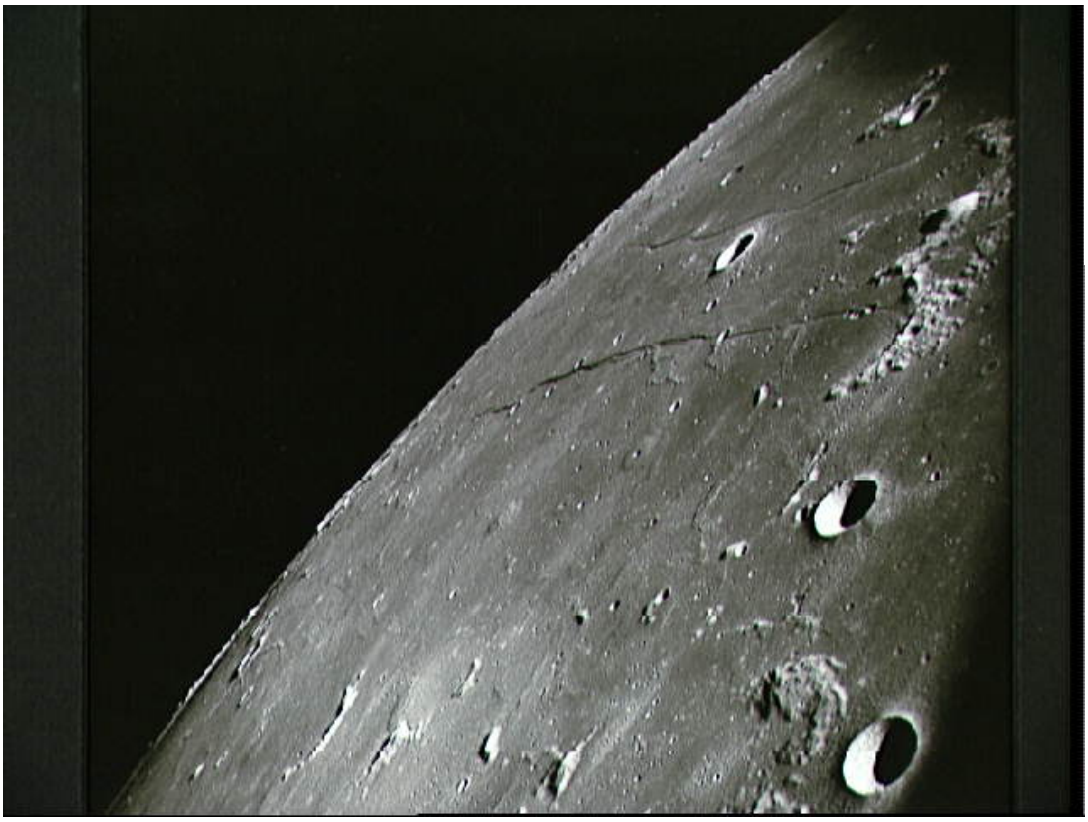

Figure 5 – Rupes Cauchy in eastern Mare Tranquillitatis (peering down toward the future landing site of Apollo 11.

Gifts to humanity from Apollo 8

Apollo 8's major objectives became a shake out of the communication and guidance of a lunar mission and reconnaissance of the landing site for Apollo 11. Although little new science was achieved, the mission provided us on the ground with some unique data and never before seen photographs of the moon, both near and far-sides.

Probably most profound for those of us watching in real-time, a gift of serious introspection was provided by the mission when, on Christmas Eve, the crew of Apollo 8 pointed their crude black and white television camera out the window of the command module to the distant earth and read from the first chapter of Genesis (creation). "In the beginning…." This view is nicely depicted in mission control in the photo shown below, where you can actually see the Earth on the projection monitor. This was an especially appropriate choice for the Astronauts, and its recitation united many around the world as we reflected at their accomplishments in the darkest part of the year of 1968 and looked forward to the missions and better times that were ahead. I will not elaborate on the fact that NASA and the Astronauts were actually sued for this indiscretion. I think that, for most people, including myself, it was a most appropriate and inspiring choice. It was one of those rare events that seemed to unite the world collectively as we compared the size of our hubris to that of the universe and felt a healthy dose of smallness.

Figure 6 – Two photos of the moon's far side from Apollo 8.

Major Present to the Crew from Santa Claus

Figure 7 - Mission Control in Houston as the Apollo 8 Astronauts read from the first verses of Genesis – Christmas Eve 1968.

While most folks back home were busy with their Christmas holiday activities, one question was undoubtedly on the minds of the crew of Apollo 8 and their families. Namely, would the SPS engine relight to send them on a journey home, or would they stay as a permanent reminder of their mission, the first perpetual human satellites of an extraterrestrial body? Fortunately, a lot of thought had gone into the design of the SPS engine. Burning Mono-Methyl-Hydrazine as fuel and Nitrogen-Tetroxide as oxidizer (called hypergolic propellants), the only thing necessary was to bring these liquids together in the SPS engine bell and several redundant paths of plumbing were provided as backup to do so. The success of this simplicity was tested repeat ably in Apollo 7. So, on December 25th, the SPS engine bell came alive once again to provide Apollo 8 with its trans-earth injection burn. "Control – Be advised that there *is* a Santa Claus!" was the voice from Apollo 8's Jim Lovell as the successful burn was executed.

Figure 8 - Artist's depiction of Apollo 8's trans-earth injection burn.

Fiery re-entry and Splashdown

On December 27th, Apollo 8 hit the re-entry corridor and created a major fireball. The USS Yorktown was close-by and provided recovery service for the crew. The mission was a phenomenal success and provided subsequent astronauts and ground crews with an exceptional degree of confidence in executing all the major navigation, tracking and control functions associated with circumnavigating cislunar space.

Figure 9 - Apollo 8 re-enters the Earth's atmosphere, and creates a fireball, captured on the ground in this photograph.

For the layperson in the United States, Apollo 8 was arguably the most optimistic historical event of 1968. For youngsters like me, who grew up in the fifties and sixties, we were convinced that if we could make it to the moon, we could travel to Mars, outer space and beyond. The images from Apollo 8 were teasers along-side our stored memories of Fritz Lang (Frau im Mond, 1929), Destination Moon-1950, Disney television and the popular culture surrounding extra-terrestrial travels. Apollo 8 took us to the edge of earth's celestial beach and, in pushing this boundary of our experience, presented an optimistic prediction for the future of the Apollo program specifically and manned spaceflight in general.

Figure 10 – Approaching the re-entry corridor on December 27th, 1968

Figure 11 – Frogmen get ready to assist hoisting of the command module of Apollo 8 to the USS Yorktown

Figure 12 – Welcome home celebration for the Apollo 8 Astronauts aboard the USS Yorktown.

BENJAMIN DEAN LECTURE SERIES

Jewish Community Center of San Francisco, 3200 California Street (at Presidio Avenue)

The Fall Benjamin Dean Lecture Series in Astronomy features exciting information about some of the newest telescopes and spacecraft exploring space. While the California Academy of Sciences is reopening to the public on September 27, the fall Dean Series will still be held at the Jewish Community Center at 3200 California Street in San Francisco. Tickets are $5 each, and are available online at http://www.calacademy.org/events/index.php or at the door. Parking is available across the street in the UCSF Laurel Heights campus parking lot or in the JCCSF garage. The #1 California, #3 Jackson, #4 Sutter, and #43 Masonic MUNI lines stop directly in front of the building. The #38 Geary and #24 Divisidero stop four to five blocks away.

The lectures will return to Golden Gate Park to take up their permanent home in the new Morrison Planetarium in January with the first lecture of the 20th Anniversary Benjamin Dean Lecture Series. Speakers will be Fellows of the California Academy of Sciences, and will include cosmologist Alex Filippenko, planet hunter Geoff Marcy, SETI Director Jill Tarter, and astrobiologists David Morrison and David Des Marais.

Monday, December 15, 7:30 p.m.
Dr. Robert Gold, Applied Physics Laboratory, Johns Hopkins University
"The MESSENGER Mission to Mercury"
The MESSENGER spacecraft is on its way to orbit Mercury, a planet of extremes. Mercury has the greatest temperature variation, the highest density, and the most Earth-like magnetosphere of any planet. Despite Mercury often being the closest planet to Earth, very little was known about it because it is very difficult to observe and study. It has taken 30 years to mount an orbital mission to this terrestrial planet. MESSENGER has already flown by the planet twice. It has revealed exciting new information about Mercury's structure and the geological processes that have shaped it. This lecture will cover the challenges of developing a spacecraft to deal with the extreme environment at Mercury and show some of the amazing scientific results from the MESSENGER flybys.

MEMBERSHIP DUES

SFAA membership now comes due in June. Before now, dues were payable in the month a member first joined. Last year, the SFAA board voted to make everyone's dues payable at the same time - in June of each year. This was done for two reasons: 1) to save a great deal of work for our volunteer Treasurer, present and future, and, 2) for the convenience of members - it's easier to remember! In the past, many members forgot their due date and their membership unintentionally lapsed.

N.B. for those of you who have a club discounted *Sky and Telescope* magazine subscription, you will need to renew your subscription separately. The magazine will send you a renewal notice. In the past, you had to send that renewal notice with payment to the SFAA; now you can mail your *Sky and Telescope* subscription renewal payment directly to *Sky and Telescope*. **Note: Not renewing your club membership on time may mean your magazine subscription(s) will also terminate.**

Thanks for bearing with us during this transition process -- it'll all seem worth it next year! Just complete the membership form on the last page of the newsletter and submit with your renewal check to:

San Francisco Amateur Astronomers
P.O. Box 15097
San Francisco, CA 94108

YEARLY RATES FOR MEMBERSHIP

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$25 – Individual Membership
$30 – Family or Foreign Membership
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MEMBER BENEFITS INCLUDE

- Subscribing to our Announcements mailing list to receive newsletter, activity and event announcements.
- Interaction with world class speakers as they present cutting edge astronomical research
- Discounts on Sky & Telescope and Astronomy magazines*
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- Annual club Astrophotography, Literary & Art Awards
- Social events, such as our annual picnic and our awards dinner
- Club telescopes – use one of the club's loaner scopes on a month-to-month basis
- Yosemite Star Party – held at Glacier Point exclusively for SFAA members
- Access to events and resources in Northern California and beyond
- Field trips – to observatories and other locations of scientific interest, such as Mt. Wilson Observatory in Pasadena, Chabot Space and Science Center, Fremont Peak, and the Stanford Linear Accelerator Center
- Extended observing hours at the Mount Tamalpais Astronomy Program
- Access to dark sites in Northern California

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