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The Astronomical Society of Las Cruces (ASLC) is dedicated to expanding public awareness and understanding of the wonders of the universe. ASLC holds frequent observing sessions and star parties and provides opportunities to work on Society and public educational projects. Members receive the *High Desert Observer*, our monthly newsletter, plus membership to the Astronomical League, which includes their quarterly publication, *Reflector*.

Individual Dues are \$30.00 per year

Family Dues are \$36.00 per year

Student (full-time) Dues are \$24.00

Dues include electronic delivery of the *HDO*. Prorated dues are available for new members. Dues are payable to ASLC with an application form or note to: Treasurer ASLC, PO Box 921, Las Cruces, NM 88004

ASLC members are entitled to a \$5.00 (per year) Sky and Telescope magazine discount.

ASLC Board of Directors, 2015

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Outreach: Chuck Sterling; csterlin@zianet.com

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HDO Editor: Ron Kramer; ronjkramer@aol.com

February Meeting

Our next meeting will be on **Friday, February 27**, at the DACC Main Campus, Room 141, Technical Studies Building, starting at 7:00 p.m.

The presentations will be by Al Grauer of the Catalina Sky Survey, who will discuss the latest in Earth Approaching Objects, and Alan Dyer from Canada, who will show us his astroimaging work from New Mexico and around the world.

New & Existing Member Package

Membership Chair, Judy Kile has sent member packages to all current members before the June meeting. These were sent via Yahoo!Groups email. If you did not receive your package, please let her know (jkile@elp.rr.com) and she will send you a regular email with the package.

Outreach

Outreach is a very important part of ASLC. We are always looking for more volunteers to help us educate the public. Even if you do not have a portable telescope to bring to the events, please consider attending our public outreach programs to help answer questions, share knowledge and point out constellations in the sky.

Events

ASLC hosts deep-sky viewing and imaging at our dark sky location in Upham. We also have public in-town observing sessions at both the International Delights Cafe (1245 El Paseo) and at Tombaugh Observatory (on the NMSU Campus). All sessions begin at dusk. At our Leasburg Dam State Park Observatory, we hold monthly star parties. Located just 20 miles north of Las Cruces, our 16" Meade telescope is used to observe under rather dark skies. Please see *Calendar of Events* for specific dates and times.

Annual Dues

Please note that annual dues are due in January. Contact our Treasurer, Patricia Conley (treasurer@aslc-nm.org) for further information. Dues can be paid at the next meeting or via mail, sent to Treasurer ASLC, PO Box 921, Las Cruces, NM 88004.

From the Prez

Two Thumbs Up for the ASLC!

In the January, 2015 issue of the HDO, I wrote about building upon our successful outreach efforts. Since last year, thanks to past President Rich Richins, our organization is in social media with Facebook and people are taking notice. Last month, Bert Stevens started a monthly column, called The Night Sky, in the Las Cruces Sun-News and the first article was printed in the January 25th edition. On February 6th the ASLC was on-air from 7 to 8 in the morning on KOBE 1450 AM radio. Thanks to efforts by ASLC member Robert Westbrook, who arranged time on the morning talk show with Kelly O'Connell, Bert Stevens talked to the public about astronomy and the ASLC as a guest of the show.



KRWG, on February 5th, aired a segment on Oñate High School's "Knights at Night" outreach program. Science teacher and program coordinator Shelly Pope mentioned the Astronomical Society of Las Cruces by name as a participant of the event that took place on February 4th. Thanks to Chuck Sterling, Rich Richins, Robert Westbrook, Tracy Stuart, Ed Montes and all the others who participated in that very successful outreach. The ASLC even got some "Likes" on Facebook from people who attended. Hopefully we may have some of the students there become interested in joining our society.

During the last two Moongazes visitors had some fun in participating in a Moon Quiz testing their knowledge of the Moon. Moon trivia cards in both English and Spanish were handed out to visitors. Each card had the society's name and web address on them. ASLC member Cristina Lugo helped with the Spanish translation and, along with Chuck Sterling and Jerry McMahan, engaged visitors in exploring the Moon.

Outreach is something that every member can participate in regardless of the level of experience in astronomy. Beginners can have as much fun as the most experienced, so I encourage those who have not participated in outreach to give it a try.

The ASLC is getting more public attention and I hope that our efforts will build our society into an organization of which the public looks to in expanding their learning and enjoyment of astronomy. Two thumbs up for the ASLC!

Remember that the February meeting on the 27th will be different from our regular meetings since we will not have a show and tell segment and a business meeting. Instead we will have two very interesting speakers: Al Grauer of the Catalina Sky Survey, who will talk to us about the latest in Earth Approaching Objects; and Alan Dyer from Canada, who will show us his astroimaging work from New Mexico and around the world. Talks start at 7 pm at the DACC Technical Services building room 141, so I encourage everyone to be there by 6:45 pm. There will be door prize drawings for those who attend. The public will also be invited.

Let's explore!

Recent Outreach Events

by Jerry McMahan & Steve Shaffer

Saturday, January 10; Leasburg Dam State Park Observatory

This month's event was attended by Bob Armstrong, Sid Webb, Daniel Giron, Christina Lugo, Ron Kramer, Jerry McMahan and Chuck Sterling.

Most of us worked in, or just outside the observatory. We did not set up many telescopes outside. Daniel had a refractor set up and there was at least one more. I brought the ETX-125, but left it in the car since I had a slight

sore throat. I decided to work inside since, after turning 40, I probably need to be more careful. (By after 40 I mean 40 + or - 30, with the minus indicating maturity age).

Chuck had indicated that he would not be able to attend, so several of us, none of who had operated the observatory by ourselves, or from scratch, made the attempt to get things ready. We got as far as actually getting the telescope to work and got stuck. Luckily Chuck did show up to save the evening. After this, things went well and we had a successful event.

Friday, January 23; Tombaugh Observatory Open House (by Steve Shaffer)

Jerry McMahan and myself were unable to open the shutter on the dome due to, I think, snow and ice. I had the thought that I could take the step ladder outside and climb up on the icy roof. Use my cold back muscles to attempt to open the shutter while Jerry used the hand controller operated motor to assist. But better sense prevailed and we attended the ASLC monthly meeting instead of supporting the NMSU Open House.

Saturday, January 24; Moongaze Phase One

Christina Lugo brought a small refractor and a small Newtonian. Chuck Sterling set up his 100mm refractor. I set up the ETX-125. Daniel Giron also attended. It was not a good night. It was cold and the Moon could be seen through clouds, but the craters, although visible, were very not easy to see. It was also a thin Moon phase so it was going behind the building by 9:00 pm.

Daniel brought a 6 question true, or false, Moon quiz. Spectators seemed to enjoy competing against each other as though it were a quiz show. I would also like to nominate Christina for MPV (Most Valuable Player for those of you who do not follow sports) since she has brought portable propane heaters to the last two Moongazes. They really helped on the cold night.

Saturday, January 31; Moongaze, Phase Two

Due to the in-between Moon phase, we did a second Moongaze. It did not look good since the cloud cover was pretty bad. One lady asked how long I would be there. I said I would stay until 6:00 before deciding to set up, or give up. Some cloud breaks indicated that I could at least try it. After all, I have told Ron that I controlled weather at Moongaze. I set up and we had a clear view of the Moon for 10 minutes, and than nothing for 30 minutes. I thought my weather controlling powers were failing. At last, it did clear. What a feeling of power! Can world domination be far behind?

I had the ETX-125. Chuck Sterling is still feeling a bit under the weather (he feels bad, not the clouds), so he did not set up a scope, but did stop by on two occasions to see how things were going. The second time he said he saw his shadow and realized the the Moon was shining. Daniel Giron brought more quiz question and handed out pictures of the Moon with information about the Moon on the other side. Christina Lugo provided the propane heat again. Do you think she realizes that we will be expecting air conditioning for the summer? We were also joined by John McCullough who answered questions from the public.

The Moon's terminator was near the crater Aristarchus, the brightest crater on the Moon. Going down, the rays of Tycho were easily visible. When Jupiter appeared above the building, Christina brought out her 114mm Newtonian. She set up on the Moon and I moved the ETX to Jupiter. All four Galilean moons were visible, although we lost Io, as it went behind Jupiter, later in the evening.

Wednesday, February 4; Oñate High School Phase 2

Due to bad weather (the day of the snow), our invitation was rescheduled for this evening. It was a clear night and not very cold. Ed Montes observed the comet with his 102mm refractor. Rich Richins brought the club's 10-inch Dobsonian and spent most of the time on the Andromeda Galaxy. Since Tracy Stuart's 8-inch has apparently passed away, he brought a 90mm Maksutov. Chuck Sterling, feeling better, set up the 10-inch SC and pointed at Jupiter. I had the ETX-125 Mak on Venus early and the two days past full Moon later.

Chuck also aided a man with his new Orion Maksutov that did not know how to operate it. Another man said he had a new Meade GoTo scope that he didn't know how to use. I told him about Moongaze on February 28, and he said he would bring it.

Several club members commented on how enthusiastic some of the people were about what they were seeing through the scopes. That also makes the experience rewarding for us as well.

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Calendar of Events (Mountain Time - 24 hr. clock)

FEB 20	17:50	Moon-Venus Conjunction
20	18:28	Moon-Mars Conjunction
21	22:18	Venus-Mars Conjunction
25	10:14	First Quarter Moon
25	16:02	Moon-Aldeberan Conjunction
27	19:00	ASLC Monthly Meeting, DACC Main Campus, Room 141 (Technical Services Bldg)
27	20:00	OUTREACH; Tombaugh Observatory
28	dusk	OUTREACH; MoonGaze, International Delights Café
MAR 05	11:05	Full Moon
12	02:25	Moon-Saturn Conjunction
13	11:48	Last Quarter Moon
14	dusk	OUTREACH; Leasburg Dam State Park Observatory
20	03:36	New Moon
20	16:45	Spring (Vernal) Equinox
20	19:00	ASLC Monthly Meeting, DACC Main Campus, Room 141 (Technical Services Bldg.) Please note date change for this meeting
21	16:13	Moon-Mars Conjunction
21	dusk	OUTREACH; Messier Marathon at Leasburg Dam State Park
22	13:51	Moon-Venus Conjunction
25	00:55	Moon-Aldeberan Conjunction
27	01:43	First Quarter Moon
	27	21:00 OUTREACH; Tombaugh Observatory
28	dusk	OUTREACH; MoonGaze, International Delights Café

Be sure to visit our web site for the latest updates: www.aslc-nm.org

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January Meeting Minutes

by John McCullough

Show & Tell

Tonight's pre-meeting Show & Tell session began with John Kutney talking about PHD Guiding software, a computer freeware application from Stark Labs, and his experience with it. He likes several of the features and accessories that come with the product. John went through the process involved in setting up and tuning a mount. After describing the software package, John ran a simulation. There were several questions following his presentation.

Steve Shaffer followed by demonstrating a field repair of a TELRAD red spot finder. Jerry Gaber pointed out some other practical fixes for a TELRAD.

Call to Order

Daniel Giron, President, Astronomical Society of Las Cruces (ASLC, the Society), called the January business meeting to order at 7:30 pm, 23 January 2015, Room 141, Doña Ana Community College (DACCC), Las Cruces, New Mexico.

President's Comments

The President, Daniel Giron, welcomed the group to tonight's meeting and thanked John Kutney and Steve Shaffer for their Show & Tell presentations. Daniel asked that all members register their presence on the sign-in sheets and welcomed new members Christina Lugo from Las Cruces and Andrew Maese from El Paso and visitors Barry Shaw and Rabih Aboujaoudi.

Officer's Reports

Secretary's Report

Daniel Giron reported the minutes for the November 2014 meeting had been submitted by the Secretary, John McCullough, for publication in the January 2015 issue of the Society newsletter, the *High Desert Observer (HDO)*. If there are no corrections, revisions, or discussion, Daniel asked that the minutes be accepted as published. Ron Kramer moved that the minutes be accepted as published and Bert Stevens seconded. The motion passed by acclamation. There was not an additional Secretary's report.

Treasurer's Report

The Treasurer, Trish Conley, provided an update of income and expenditures for the current fiscal year since October 2014. She also reported current balances in the Society's accounts. There was not an additional Treasurer's report.

Committee Reports

Membership

Judy Kile, committee chair, requested that members not submit new application/information forms to her for the time being. She has recently relocated and does not have Internet service yet.

Outreach

Chuck Sterling, program coordinator, reported on coming events. He noted the star party at Oñate High School on 22 January had to be canceled because of inclement weather (snow). It has been rescheduled for 04 February. There will be Moon Gazes at IDC on 24 January, 31 January, and 28 February. A star party will be held at Desert Hills Elementary on 12 February. The next event at Leasburg Dam State Park (LDSP) will be on 14 February.

Education

Rich Richins, committee chairman, reports the Society's Face Book page got approximately 400 hits last week. Ed Montes reported he has had problems posting images to the Face Book page. Rich asked that Ed get with him following the meeting to work out the issues.

Website

Steve Barkes, webmaster, had no issues to report. Rich Richins, web lackey, has been updating the website on a semi-daily basis.

Newsletter (HDO)

Ron Kramer, newsletter editor, asked if any members present are not receiving the newsletter. He asked if anyone that does receive it, reads it. Inputs are always needed and welcomed. Ron noted articles submitted for the *HDO* may also appear in the Astronomical League's quarterly newsletter, the *Reflector*.

Apparel

Ron Kramer, acting chairman, reported that he had submitted an order for new apparel items and they should be available at the February 2015 meeting. This will include items of ladies' apparel. Some items may have higher prices than they have had historically. Ron is actively seeking a replacement as chairman.

ALCON2015

Ron Kramer, committee chairman, recapped the Astronomical League's (AL) 2015 annual convention that will be held in Las Cruces. Ron stated the Hotel Encanto will be the convention headquarters, 06 - 11 July, and he expects 100-200 people to attend. He also gave a synopsis of the tours and events that will occur in conjunction

with the convention. He is working on a keynote speaker for the closing banquet, but Society founding member Walter Haas still plans on attending if his health allows. To date, 21 session speakers and 15 vendors have been confirmed. The convention website is up (www.alcon2015.astroleague.org); check it for details. The next planning/organizing meeting will be the first week of February. Volunteers are still needed; if members are interested, contact either Ron Kramer or Bert Stevens.

Tombaugh Observatory

Steve Shaffer, coordinator, reported that water had apparently leaked into the dome's seal. At the last NMSU astronomy open house, the Tombaugh's dome was frozen closed.

Fund-raising & Grants

Sid Webb had nothing to report.

Loaner Telescope Program

Frank Fiore, program coordinator, reported three of the five useable telescopes in the program are currently loaned out. There have been some operational issues with the telescopes. Daniel described how the program works, allowing members to try different types of telescopes and mounts before purchasing a new or different setup. Interested members may contact Frank for additional information.

Library

Daniel Giron, acting librarian, is looking for a volunteer to house and maintain the Society's library.

Publicity

Daniel Giron, publicist, provided meeting and event announcements to the Las Cruces Sun-News and Las Cruces Bulletin.

Old Business

Outreach – Daniel Giron believes the Society needs to build on its public outreach successes. He had a list of ideas that he distributed for reference. Bert Stevens will have a monthly article in the *Sun News* to reach the general public; members should watch for it. Daniel is working with local radio outlets to inform the public of upcoming astronomical events and ASLC outreach events. Members need to actively engage the public at outreach events, for instance engaging in astronomical "trivia" contests and awarding prizes, if possible. Perhaps the membership can create and develop astronomy-related videos that can then be linked from the website. Daniel would like to develop a weekend/overnight astronomy camp at LDSP similar to what the Tucson club conducts. This requires additional discussions with the Park staff. He would like to see the Society get back into local schools classrooms via Project Astro, Night Sky Network, school star parties, etc. This has been done in the past and should be revitalized. Daniel suggested creating, possibly selling through the Park's visitor center, astro-image post cards using the observatory at LDSP and then having these available at other LDSP/outreach events. This would demonstrate the imaging capabilities of the observatory and Society astro-imagers. He also suggested expanding the presentations at the LDSP events by having 30-45 minute astronomy presentations aimed at a general audience. Daniel noted that a significant number of visitors to outreach events are Spanish speaking only. There are a few ASLC members who speak Spanish and the Society should consider reaching out to this segment of the population.

New Business

Monthly Meeting Date Conflict – The regular March meeting (fourth Friday, 27 March) conflicts with the DACC/NMSU spring break and the meeting room will not be accessible. After some group discussion, including the scheduling of the annual Messier Marathon in March, it was agreed to conduct the March meeting on 20 March. The regular May meeting (fourth Friday, 23 May) conflicts with the DACC/NMSU Memorial Day holiday/semester break. Following additional discussion, it was agreed to conduct the May meeting on 29 May.

Presentation

This month's presentation was about the Magdalena Ridge Optical Interferometer project by Dr. Ifan Payne, Program Director. The Optical Interferometer performs optical astronomy in a manner similar to how the Very Large Array (VLA) performs radio astronomy via interferometry. Dr. Payne gave a brief history and overview of optical interferometry and some background of the Magdalena Ridge Observatory program(s).

From the MRO's website and Dr. Payne's handout:

"The Magdalena Ridge Observatory Interferometer (MROI) project's mission is to develop a ten-element imaging interferometer to operate at wavelengths between 0.6 and 2.4 microns with baselines from 7.8 to 340 meters. The technical and scientific goals are to produce model-independent images of faint and complex astronomical targets at resolutions over 100 times that of the Hubble Space Telescope. The goal of the MROI is threefold, to support programs in:

- Astronomy
- Space situational awareness
- Education & outreach

The astronomical science program includes the following three areas:

- Star and planet formation
- Stellar accretion and mass loss
- Active galactic nuclei

The space situational awareness program includes imaging of Geosynchronous Satellites (GEOS), both commercial and military. More details on the key science mission for MROI can be found on our MROI science mission page. For basics of interferometry also check out our *What is Interferometry* page and the Glossary.

The design of the MROI project can be broken down into the following categories:

MROI System Architecture

- The Unit Telescope (UT)
- The Array Infrastructure & Beam Combining Facility (BCF)
- The Beam-Train Subsystems
- The Instruments
- The Control System

The MROI team has finished most of the design work and is currently building all the major subsystems. The BCF was completed in early 2008. The first telescope and enclosure foundations were installed in 2011. The factory acceptance tests (FAT) for the first telescope are complete (AMOS). The fringe tracker beam combiner and cryogenic Dewar (ICoNN) have been fabricated and the team has achieved stable laboratory fringes. Many other subsystems are at similar levels of development. Please look at our multimedia, our publications, and LIVE webcams pages for more up to date content."

Dr. Payne also had information regarding public support of the MROI. The URL is: <http://www.mro.nmt.edu/about-mro/interferometer-mroi/>.

The January meeting of the Astronomical Society of Las Cruces concluded at 9:09 pm.

-Respectfully submitted by John McCullough, ASLC Secretary

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Back at the Telescope

by Berton Stevens

Comet 67P/Churyumov–Gerasimenko (abbreviated as 67P/C-G) is no longer alone. The European Space Agency's (ESA) Rosetta spacecraft with its Philae lander is now accompanying this comet in its trip around the Sun. This is the first time that a spacecraft has entered orbit around a comet, but not the first time a comet has been observed from a nearby spacecraft.

One of the most famous comets is Halley's Comet. This comet is designated 1P/Halley, the first comet in the catalog of comets indicates its special place in the comet world. Its renowned is based on being the first comet to have its orbit computed and its return predicted before its next appearance. This was a great success for Sir Isaac Newton's theory of gravitation.

Historical records now show that Comet Halley has been seen since 240 B.C., and probably before. Even though they could be seen in the sky, no one could explain what they were. The Greeks, especially Aristotle, thought that comets were some type of atmospheric phenomena. This misconception stood for many years until 1577 when Tycho Brache's observations of the Great Comet of 1577 showed that it had a parallax less than that of the Moon, making it more distant than the Moon.

Edmund Halley was interested in gravity and orbits. He went to talk to Isaac Newton, only to discover that Newton had already solved the problem. Halley persuaded Newton to publish his theory and in 1687, Halley financed the publication of Newton's *Principia*, describing the mathematics behind gravity. Sir Edmund Halley started applying Newton's theory to comets. The theory allowed Halley to compute the orbits of all the comets for which he could obtain accurate positions. He was also able to compute the perturbations in their orbits caused by the giant planets Jupiter and Saturn. When he applied these affects to the comets of 1682, 1607, and 1531, he discovered that their orbits were almost identical. Halley announced his findings that these three comets were actually the same comet and that it would return in 1758.

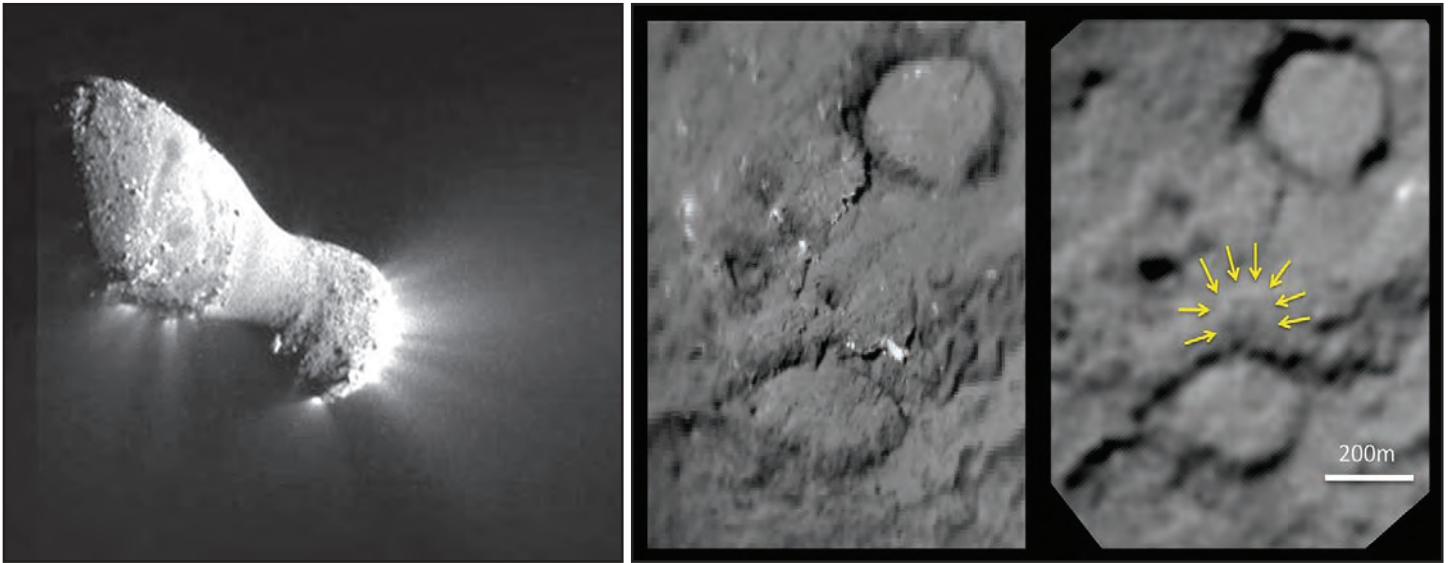
This persnickety comet actually did not appear until Christmas Day 1758 and it did not reach perihelion until March 13, 1759, but three French mathematicians has computed the delay based on the attraction of Jupiter and Saturn. Once the comet was recovered, it was hailed as a huge success for the Theory of Gravity. French astronomer Nicolas Louis de Lacaille named the comet after Halley to honor his successful prediction proving that comets orbited the Sun just like planets.

Comet Halley's most recent return was in 1986, when it passed through perihelion on February 9. Four year earlier, astronomers made deep exposures with the 200-inch Hale telescope and were able to recover the comet well before perihelion. To make close-up observations of this famous comet, the then Soviet Union launched the Vega 1 and Vega 2 spacecraft. ESA followed with the Giotto spacecraft and the Japanese sent two probes, Suisei and Sakigake. This group of five spacecraft was collectively referred to as the Halley Armada. The United States did not participate in this international effort due to budget cuts in 1981.



Comet Halley's nucleus and inner tail is show in this image from the Halley Multicolour Camera (HMC) on board the Giotto spacecraft. The image was taken on March 13, 1986 as Giotto passed within 370 miles of the comet nucleus. Copyright: ESA/MPAe Lindau

Four of the five spacecraft had imaging capabilities and we got the first images of the nucleus of Halley spewing gas and dust into space. One thing we learned from these images was that the tail forms from specific regions on the comet rather than the entire comet. This was quite a departure from Fred Whipple's "dirty snowball" model that would have had material coming off the entire surface of the comet.



After the Deep Impact spacecraft observed Comet 9P/Tempel and hit it with an impactor, NASA redirected the spacecraft to Comet 103P/Hartley. NASA redesignated the extended mission as EPOXI (Extrasolar Planet Observation and Deep Impact Extended Investigation). After passing the Earth three times, EPOXI headed toward Comet Hartley, which it encountered on November 4, 2010, passing within 431 miles of the nucleus. This image was taken with EPOXI's Medium-Resolution Instrument.

The Deep Impact impactor site on Comet 9P/Tempel is shown here before (left) and after (right). The before image is a mosaic from the Deep Impact spacecraft from July 2005. The debris cloud from the impact keep Deep Impact from getting a good post-impact image, so NASA redirected the Stardust spacecraft to fly by Tempel and take the image on the right. The crater rim is marked by the arrows. There is a mound in the center of the crater, thought to be debris that fell back onto the comet after the impact.

A number of other spacecraft have flown by comets, but the most interesting was when the Deep Impact spacecraft dropped an impactor on comet 9P/Tempel. The impact occurred on July 4, 2005. This blew a five hundred foot wide crater into the comet and released ejecta that was analyzed by instruments on the spacecraft and on Earth-based telescopes. To get a better view of the crater, NASA directed the Stardust spacecraft to fly past the same comet on November 4, 2010 and photograph the impact area.

Now we have Rosetta that did not just fly by Comet 67P/C-G as other spacecraft have done to other comets, but it is going to accompany 67P as it swings around the Sun. One of Rosetta's earliest results was that Comet 67P/C-G has two lobes, the larger lobe is 2.5 miles by 2.1 miles by 1.1 miles while the smaller lobe is 1.6 miles by 1.4 miles by 1.1 miles.

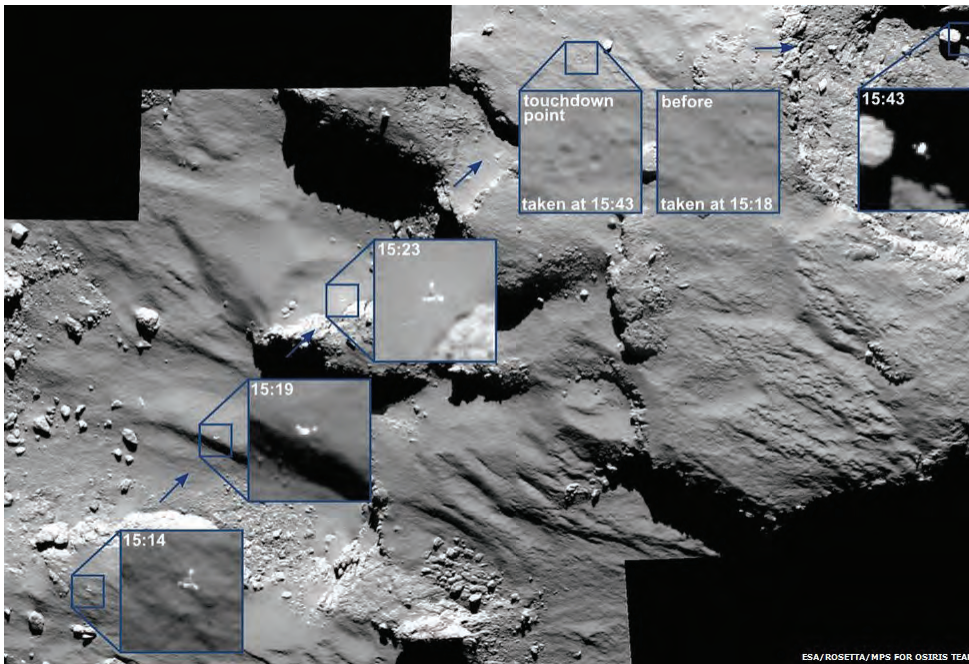
The ESA provided Rosetta with a lander to park on the surface of the comet and gather first-hand information on the comet's composition. Named Philae, the lander was designed to do a detailed analysis of the surface material and radio its findings back to Earth. Rosetta released Philae on November 12, 2014. It immediately headed for the preselected landing site on the small lobe.

Like most comets, 67P/C-G has very little gravity. Escape velocity is 2.2 miles per hour, so astronomers knew that they needed to provide some way to keep Philae on the surface. Philae's three landing legs were designed to absorb the shock of landing and keep it from bouncing off the surface. The landing impact was supposed to drive ice screws into the surface, but the surface turned out to be rocky instead of icy and the ice screws failed to grip.

The secondary system was a set of three harpoons that were to have been fired at 160 miles per hour into the surface. As they were firing, a jet of cold gas was to shoot from the top of the spacecraft to counteract the recoil

from the harpoon's firing. Unfortunately, the harpoons did not fire, possibly because the nitrocellulose that was to propel the harpoons was discovered to be unreliable in a vacuum after Rosetta was launched. In addition, the valve for the cold gas jet was discovered to be stuck before Philae was released from Rosetta, but since there was no way to fix it, controllers went ahead with the landing anyway.

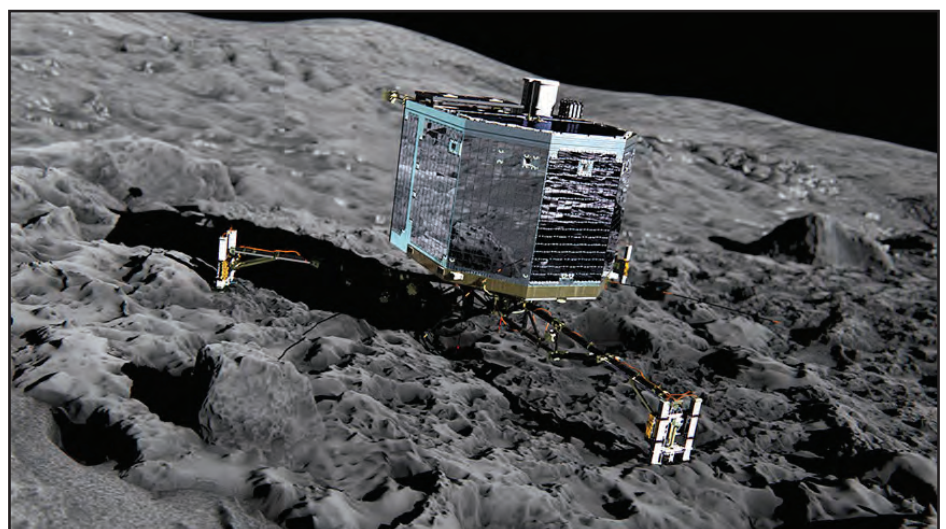
So Philae landed on the surface, but did not stay there. It bounced off, raising a dust cloud visible in images of the landing target. Contact with the surface caused power to the spinning reaction wheel to be switched off, as planned. This would not have been significant if it was anchored to the surface, but friction in the wheel's bearings transferred its angular momentum to the spacecraft, spinning it up to one revolution every 13 seconds. The spacecraft rose over half a mile above the surface before being pulled back down. One leg struck a projection from the surface about 46 minutes after first contact, slowing the spin to once every 24 seconds, but causing Philae to begin tumbling as well. An hour and five minutes later it hit the surface again, bouncing up for another six minutes before making a final landing.

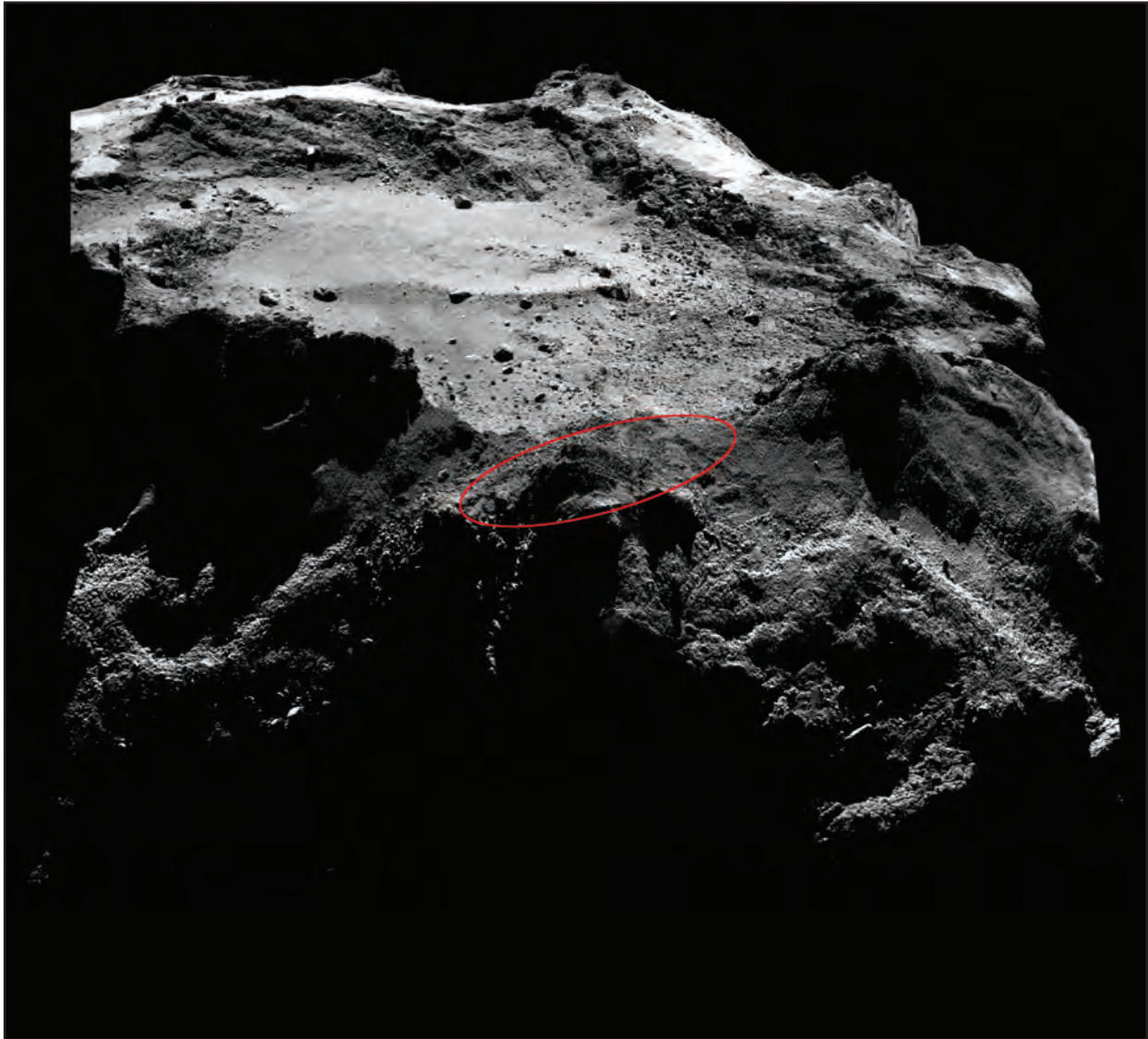


Rosetta's Narrow Angle Camera captured the Philae lander as it fell toward the surface of the comet's smaller lobe. The images were taken within approximately thirty minutes around the time of the first bounce. Times are UTC at the spacecraft on November 12, 2014.

Its new landing location appears to be in the shadow of a cliff. This means that Philae is not getting the sunlight it needs to recharge its batteries. Its primary battery was enough to power the lander through sixty hours of operation. The extended mission requires its secondary solar-powered battery that was supposed to allow it to operate at least a week longer. Without sunlight, Philae was only able to operate for three days. But hope exists that it will be able to recharge as Comet 67P/C-G travels along in its orbit, bringing more sunlight to the lander's solar cells.

An artist's view of how Philae should have looked on Comet 67P/Churyumov-Gerasimenko's surface after a successful landing.





This mosaic of Comet 67P's smaller lobe shows the area that ESA thinks contains the Philae lander. The images are taken by the OSIRIS narrow-angle camera from about twelve miles above the comet. Careful examination of the images still has not turned up the Philae lander, but the ESA is continuing the search. (Credits: ESA/Rosetta/MPS for OSIRIS Team MPS/UPD/LAM/IAA/SSO/INTA/UPM/DASP/IDA)

How will waiting get more sunlight to the lander's solar cells? Comet 67P/C-G rotates about its axis every 12.4 hours. The north axis points toward R.A. 4h 16m and declination 64° 6 minutes. The axis runs through the bridge linking the small and large lobes on the large-lobe end. The lander is getting about 90 minutes of sun each of the comet's days. The overall motion of the comet is northward, since perihelion is north of the ecliptic by about seven degrees.

Just as the location of the Sun in our sky changes as we go around it, 67P G-C will also see the position of the Sun in its sky change. The axis of rotation remains pointing at a fixed point in the sky, just like Earth's does. This is expected to bring the Sun higher in Philae's sky as the comet rounds the Sun. Once it gets more sunlight, it will be able to recharge its battery. This will take some time, but we may very well hear from Philae again when it is basking in sunlight, recharging its battery enough that it can come out of sleep mode. We may yet get more science results out of this little lander!

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Please consider offering a submission (article, image, blurb, etc.) to future issues of *High Desert Observer*. The aim is to have the best Society newsletter in the United States, and it can only be accomplished with contributions by our members. Thank you for your consideration.

If you have any comments or contributions to this monthly newsletter, please let me know. Every question will be answered.

Ron Kramer, Editor
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Photo of the Month



Sharpless 123 (Flying Bat Nebula) in Cepheus
Takahashi FS-60C @ f/6.2, EM200 Temma II, QSI 540wsg @ -15C
8x15 minutes Ha; 3x10 minutes L, 2x5 minutes each RGB (all bin1x1); 10xdarks/flats/flat darks/bias
Filters: Astrodon Ha (3mm, Astrodon Tru-Balance I-Series LRGB Gen 2
Taken by Jeffrey Johnson, an ASLC member, on October 29, 2014; <http://jeffastro.com>