

# The High Desert Observer



## August 2016



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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, including their quarterly publication, *Reflector*, in digital or paper format.

Individual Dues are \$30.00 per year

Family Dues are \$36.00 per year

Student (full-time) Dues are \$24.00

Annual dues are payable in January. 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. Contact our Treasurer, Patricia Conley (treasurer@aslc-nm.org) for further information.

*ASLC members receive electronic delivery of the HDO and are entitled to a \$5.00 (per year) Sky and Telescope magazine discount.*

### August Meeting --

Our next meeting will be on **Friday, August 26**, at the Good Samaritan Society, Activities Room, starting at 7:00 p.m.

The speaker will be **Bert Stevens**

Topic: Astrophotography before the CCD

How It All Got Started

### ASLC Board of Directors, 2016

[Board@aslc-nm.org](mailto:Board@aslc-nm.org)

President: Daniel Giron; [President@aslc-nm.org](mailto:President@aslc-nm.org)

Vice President: Christina Lugo; [VP@aslc-nm.org](mailto:VP@aslc-nm.org)

Treasurer: Patricia Conley; [Treasurer@aslc-nm.org](mailto:Treasurer@aslc-nm.org)

Secretary: John McCullough; [Secretary@aslc-nm.org](mailto:Secretary@aslc-nm.org)

Director-at-Large: Tracy Stuart; [Director1@aslc-nm.org](mailto:Director1@aslc-nm.org)

Director-at-Large: Ed Montes [Director2@aslc-nm.org](mailto:Director2@aslc-nm.org)

Immediate Past President: [rrichins73@comcast.net](mailto:rrichins73@comcast.net)

### Committee Chairs

ALCor: Patricia Conley; [tconley00@hotmail.com](mailto:tconley00@hotmail.com)

Apparel: Howard Brewington; [comet\\_brewington@msn.com](mailto:comet_brewington@msn.com)

Calendar: Chuck Sterling; [csterlin@zianet.com](mailto:csterlin@zianet.com)

Education: Rich Richins; [Education@aslc-nm.org](mailto:Education@aslc-nm.org)

Grants: Sidney Webb; [sidwebb@gmail.com](mailto:sidwebb@gmail.com)

Librarian: **\*\*\*OPEN\*\*\***

Loaner Telescope: Daniel Giron (Temporary) **\*\*\*OPEN\*\*\***

Membership: Judy Kile; [jkile3916@gmail.com](mailto:jkile3916@gmail.com)

Night Sky Network: **\*\*\*OPEN\*\*\***

Observatories:

Leasburg Dam: David Doctor; [astrodoc71@gmail.com](mailto:astrodoc71@gmail.com)

Tombaugh: Steve Shaffer; [sshaffer@zianet.com](mailto:sshaffer@zianet.com)

Outreach: Chuck Sterling; [csterlin@zianet.com](mailto:csterlin@zianet.com)

Web-Site: Steve Barkes; [steve.barkes@gmail.com](mailto:steve.barkes@gmail.com)

HDO Editor: Charles Turner; [turnerc@stellanova.com](mailto:turnerc@stellanova.com)

### Member Info Changes

All members need to keep the Society informed of changes to their basic information, such as name, address, phone number, or email address. Please contact [Treasurer@aslc-nm.org](mailto:Treasurer@aslc-nm.org) and [jkile3916@gmail.com](mailto:jkile3916@gmail.com) with any updates.

### 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.

**Outreach Events For July 2016**  
by Jerry McMahan

***Day Care School, Friday, July 8, 2016***

This event was held at Young Park. It was set for the school, but others visiting the park also came to look through the scopes. We had a very large number of observers. Luckily, we also had many telescopes set up. The event was scheduled for 7 to 9, but we were still set up by 10 pm due to the large crowds.

The evening began with clouds, and lightening in the East, moving our way. It cleared up and the clouds did not cause a problem until around 10 pm.

Steve Shaffer brought his Questar and was set up for Solar observing early, as well as dark sky in the evening. Daniel Giron also had his refractor on the Sun. Chuck Sterling put his 100mm refractor on the Sun and his 10 inch for the evening.

Tracy Stuart observed Mars with his 8 inch. I had my 8inch on the Moon. Sid Webb pointed at Jupiter. Chuck claimed Saturn. Steve roamed the Cosmos with the Questar. Ed Montes also participated by directing traffic and answering questions.

The school also set up a screen and projected a movie. I would have been interested watching the movie, but I have it at home, so I did concentrate on the Moon. I would call it a very successful outing.

***Moongaze, Saturday, July 9***

Chuck Sterling and I were the only club members present at the event this time. Chuck had his 10 inch and I brought the 8 inch. We had a good night observing Mars, Jupiter and Saturn.

***Leasburg, Saturday, July 23***

It looked like we might have another cloudy night at the park. It cleared and we had a good night. At least it was a good night for Ed Montes, with his refractor, Chuck Sterling with the 10 inch and myself with the 8 inch. It was not as good at the observatory since the 16 inch was not slewing in at least one axis. Daniel Giron made the attempt to operate the scope, but had to call off that part of the program. Sid Webb was also with us.

It was also a music night. It is rare that the musicians stay after their performance to view through the telescopes. This time, the singer not only stayed, but was with us for the entire evening.

\* \* \*

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

Aug	02	02:45	New Moon
	10	12:21	First Quarter Moon
	12	07:00	Perseid meteors peak
	13	19:30	OUTREACH; MoonGaze, International Delights Café
	18	03:28	Full Moon
	24	21:41	Last Quarter Moon
	26	19:00	ASLC Monthly Meeting; Good Samaritan Society Creative Arts Room
	27	19:30	Dark Sky Observing at Leesburg Dam State Park
Sep	01	03:03	New Moon
	01	19:30	OUTREACH, at Leesburg Dam State Park:
	02	00:00	Neptune at Opposition
	05	00:00	Labot Day, All Day
	09	05:49	First Quarter Moon
	10	19:00	OUTREACH; MoonGaze, International Delights Café
	16	13:04	Full Moon
	22	08:21	Autumn Equinox
	23	19:00	ASLC Monthly Meeting; Good Samaritan Society Creative Arts Room
	23	03:56	Last Quarter Moon
	24	00:00	Okie-Tex Star Party Begins- thru Oct 02
	24	19:00	Dark Sky Observing at Leesburg Dam State Park
	30	18:12	New Moon

Be sure to visit our web site for the latest updates: [www.aslc-nm.org](http://www.aslc-nm.org)

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### **Announcements**

1. August's ASLC speaker is Bert Stevens. The topic will be Astrophotography Before the CCD: How it all got started.

Take a trip down memory lane as we look at the tools and techniques used to take astrophotos in the decades before the CCD camera became available to the amateur astronomer. See some images taken in that era with various pieces of equipment. Do you remember gas hypersensitization? FujiChrome R100? Photomicrographic Color Film? How about 103a-F spectroscopic film? We will take a look at these techniques and more as we see how it was done "in the good-old-days".

2. New Meeting Location: In August, we will begin holding our monthly meetings at the Good Samaritan Society Creative Arts Room. Check out the web site at [www.aslc-nm.org](http://www.aslc-nm.org) for a map and directions. Basicly, from the old meeting location at DACC, go up University(East) and cross over I-25. Just past I-25, turn left on South Telshore Blvd and go about 2 blocks to Buena Vida Cir and turn right. The meeting location is the second building on the right. Go inside and look for the Creative Arts Room and familiar faces.

3. The IDA has announced another Dark Sky Park in New Mexico. The Capulin Volcano National Mounment is a Gold-tier International Dark Sky Park. See [www.darksky.org](http://www.darksky.org) for details of the award.

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**Meeting Minutes**  
by John McCullough

***Minutes, July 2016 ASLC Meeting***

***Show & Tell:***

***There were no informal presentations prior to tonight's meeting.***

***Call to Order:***

Daniel Giron, President, Astronomical Society of Las Cruces (ASLC, the Society), called the July 2016 business meeting to order at 7:32 pm., 22 July 2016, Room 141, Doña Ana Community College (DACC), Las Cruces, New Mexico.

***President's Comments:***

Daniel Giron, President, welcomed the group to tonight's meeting and asked that all members be sure to check in on the roster and that visitors and guests sign the guest list. He noted that Javier Ocasio, Dan Washburn, and Anne Grauer are visiting the meeting tonight. He then asked if all members had received the latest edition of the Society's newsletter, the High Desert Observer (HDO), had a chance to read the June meeting minutes and if there any were any comments, issues, or concerns. Noting none, Ed Montes moved and Chuck Sterling seconded that the June minutes as published in the HDO be approved. The June minutes were accepted by acclamation.

***Treasurer's Report:***

The Treasurer, Trish Conley, was not present at tonight's meeting. Daniel Giron gave a report of the 2017 budget meeting that he, Trish, and Howard Brewington recently held. The Society's accounts contain a cumulative balance of \$20,075 and expected expenses for 2017 are estimated to be \$4,280. There was no additional Treasurer's report.

***Committee Reports:***

***Outreach Committee:***

Chuck Sterling, Outreach Coordinator, reported there will be "Music and the Stars" events at Leasburg Dam State Park (LDSP) on 23 July and 27 August, weather permitting. Daniel will open and operate the observatory, but additional telescopes are always welcome. There will be a Moon Gaze at International Delights Café (IDC) on 13 August. Chuck noted no school star parties are scheduled until November.

***Tombaugh Observatory:***

Steve Shaffer, Committee Chairman, was not present at tonight's meeting, but Jerry McMahan noted no NMSU Astronomy Department open houses are planned until the start of the university's fall semester.

***ASLC Observatory at Leasburg Dam State Park (LDSP):***

David Doctor, Committee Chairman, was not present at tonight's meeting but Daniel reported that four (4) more members have volunteered to be trained to operate the observatory and telescopes. Daniel stated that any additional members that want to be briefed on the operation of the observatory should contact Dr. Doctor; the more the merrier.



**General Announcements:**

The Society will begin holding monthly meetings in the Creative Arts room of the Good Samaritan Society beginning with the 26 August meeting.

**Recognitions/Achievements:**

*There were no recognitions, awards, or achievements announced at tonight's meeting.*

*The business portion of the meeting was adjourned at 7:59 pm.*

**Presentation:**

***This month's speaker was Loretta Hall on "Getting men to the Moon: Behind the Scenes Stories".***

Summary: Nearly half a century ago, the world watched in awe as seven Apollo missions over a four-year period took twenty-one men to the moon and back. Twelve of those men landed on the moon, explored it, and brought back samples of rocks and dirt. April 11-17, 2015, marked the forty-fifth anniversary of the Apollo 13 mission, in which an explosion aboard the spacecraft nearly doomed three astronauts. January 31, 2016, marked the forty-fifth anniversary of the launch of the next moon mission, Apollo 14, as well as the fifty-fifth anniversary of the chimpanzee Ham's suborbital flight that launched the Mercury Program. This presentation reveals insiders' stories of what it took to overcome challenges and accomplish triumphs in the Apollo program and its predecessors, Mercury and Gemini.

Loretta Hall is the author of three space books. "Out of this World: New Mexico's Contributions to Space Travel" recounts the stories of New Mexico people and programs that played crucial roles in the development of manned spaceflight and, more recently, the commercial space industry. "Space Pioneers: In Their Own Words" presents annotated excerpts from oral history interviews with ninety men and women who worked on various space programs from 1945 through the space shuttle era. Her newest book, published in January 2016, is "The Complete Space Buff's Bucket List: 100 Space Things to Do before You Die." Ms. Hall is a member of the Historical Society of New Mexico's Speakers Bureau and a Space Ambassador for the National Space Society.

Anne Grauer displayed a draft state legislature proclamation declaring 04 June as Cosmic Campground Day.

The July meeting of the Astronomical Society of Las Cruces concluded at 8:50 pm.

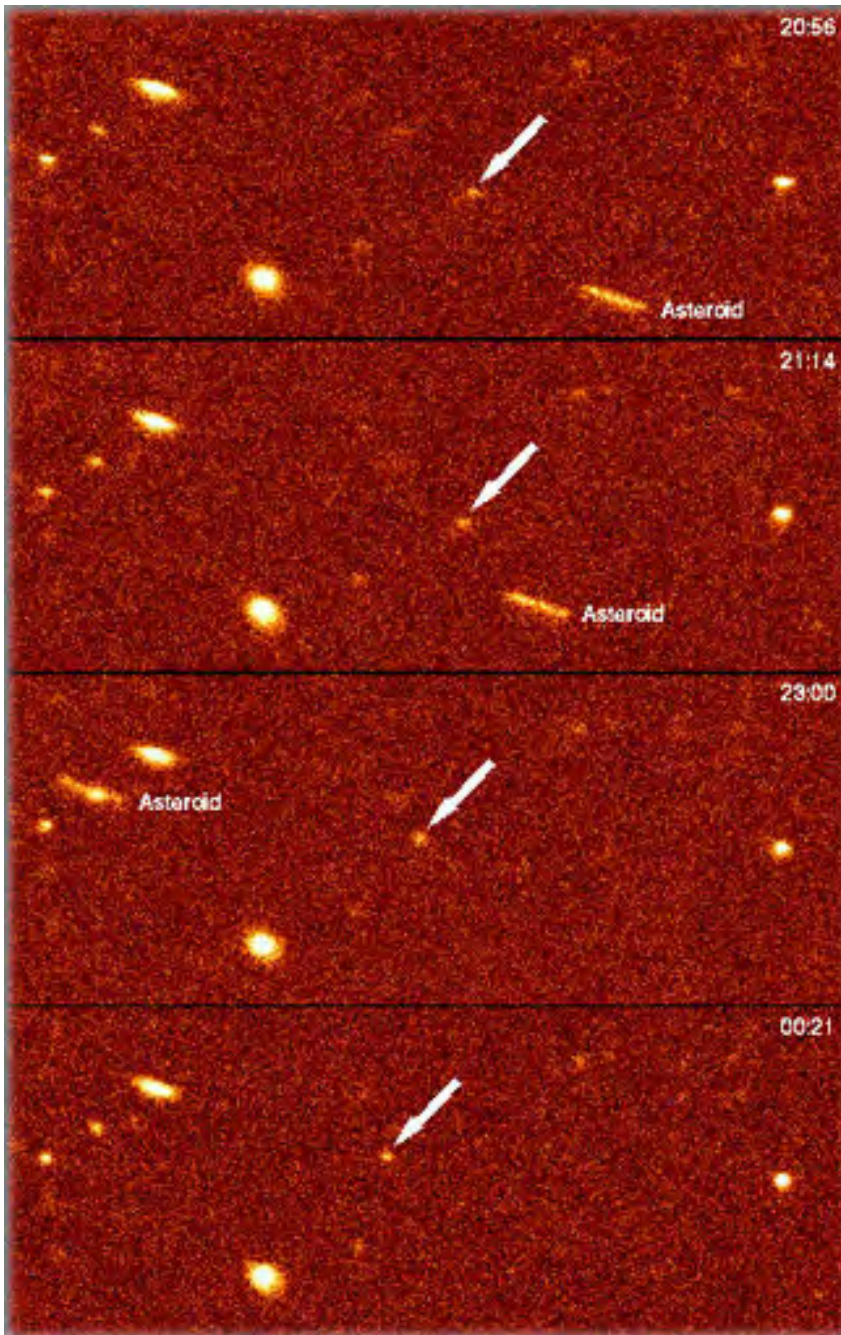
-Respectfully submitted by John McCullough, ASLC Secretary

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## Back at the Telescope

by Bert Stevens

Trans-Neptunian Objects (TNOs) are dwarf and minor planets that orbit our Sun out beyond the orbit of Neptune. There were no known TNOs before 1930. Pluto was the first TNO to be discovered on February 18, 1930 by Clyde W. Tombaugh at Lowell Observatory in neighboring Arizona. Lowell Observatory was on a mission to find the next planet beyond Neptune. Slight anomalies in Neptune's orbit were seen as evidence that there was another planet further out.



**Discovery Images for QB1:** *The discovery images of 1992 QB1 taken in 1992. Notice how slowly 1992 QB1 moves compared to the asteroid that happened to be in the frame. TNOs typically look like background stars and are harder to find than main belt asteroids.)*

Clyde Tombaugh was hired to run the telescope and blink the resulting images that eventually found Pluto. However, Pluto was too small to explain the discrepancies in Neptune's orbit. This problem remained until Voyager 2 flew by Neptune in 1989. Astronomers measured the changes to Voyager's orbit caused by Neptune showed that the estimate of Neptune's mass was incorrect. This meant that there really were no discrepancies in Neptune's orbit and finding Pluto was a fluke.

Nevertheless, Pluto was the only TNO until 1992 when (15760) 1992 QB1, the second Trans-Neptunian Object was discovered by David C. Jewitt and Jane X. Luu at the Mauna Kea Observatory, Hawaii. Much like a class of ships is named after the first ship in the class, other Kuiper belt objects were dubbed "cubewanos", after the "QB1" portion of its designation. After that discovery, more and more TNOs were discovered.

Meanwhile, back on Earth, geologists had discovered a layer of clay in the rocks worldwide from about 66 million

years ago that was very rich in the rare element iridium. You can see this layer for yourself in the rocks that are exposed near Raton, NM. Geologists had found dinosaur fossils below the iridium layer (in older rocks), but above it (in newer rocks), there were no dinosaur fossils. The iridium layer must have something to do with the death of the dinosaurs.



***The Cretaceous-Paleogene Layer:***

*The Cretaceous-Paleogene clay layer (gray) can be seen in this image taken in Geulhemmergroeve tunnels near Geulhem, the Netherlands. The structure of the boundary layer is complex, not just a simple layer. The finger is actually on the K–Pg boundary*

Physicist Luis Alvarez, his son, geologist Walter Alvarez, along with nuclear chemists Frank Asaro and Helen Michel, proposed that the iridium layer was a shadow of a catastrophic event that changed the Earth. The iridium layer, also known as the Cretaceous–Tertiary (K–T) boundary (now called the Cretaceous–Paleogene or K–Pg boundary) was the result of an asteroid impact that delivered a blanket of iridium that covered the Earth, but these deposits were more concentrated in the Caribbean area. Their 1980 paper brought the asteroid threat into sharp focus.

Even though asteroids were known to be rich in iridium, which is rare in Earth's crust, this was a radical theory for the time. If an asteroid killed the dinosaurs, where was the crater formed by this massive impact? In Mexico, geophysicists Antonio Camargo and Glen Penfield were conducting an aerial magnetic field survey in 1978 for Petróleos Mexicanos, the state-owned Mexican oil company. They were looking for the geological markers that hinted that there was oil below the surface.

When they surveyed the Gulf of Mexico north of the Yucatán peninsula, they found a 40-mile-across arc that displayed extraordinary symmetry. In studying previous surveys on the Yucatán peninsula, Glen Penfield found another arc that faced north toward the arc he found in the Gulf. When he matched up the two maps, the two arcs formed a circle 110 miles across, centered near the village of Chicxulub. Penfield reported his findings at a geological conference, but the geologists who specialized in impact craters were at a different conference and his results were ignored.

University of Arizona graduate student Alan R. Hildebrand and faculty adviser William V. Boynton published a paper in 1981, which included the iridium evidence along with the imbedded shocked



### **Asteroid Impact Crater:**

*The buried Chicxulub crater is visible in this gravity-gradient map of the northern Yucatán peninsula. The coastline is the white line coming up from the south on the left-hand side of the map and then moving horizontally to the right. Most of the concentric features are related to the structure of the crater, including the central uplift. The white dots are water-filled sinkholes called cenotes. They developed in the limestone around the crater, but the actual process is unknown.*

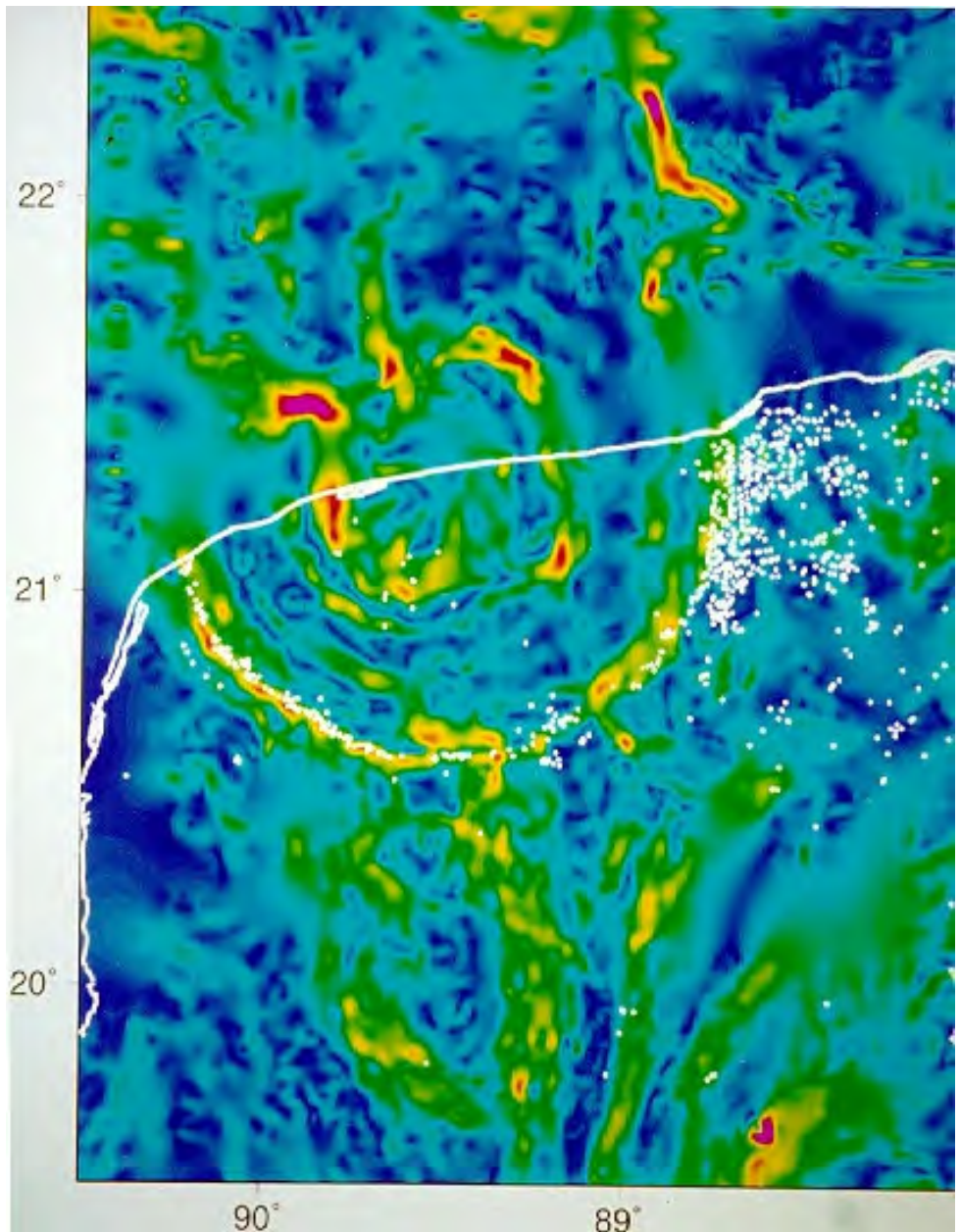
quartz and small weathered glass beads that would have come in the aftermath of an impact. They also could not find the crater. In 1990, a reporter told Hildebrand about Penfield's discovery of an impact crater in the Yucatán peninsula. They worked together to get samples from oil drilling in that area that were housed in New Orleans and found shock-metamorphic materials that could only come from an impact crater. This evidence turned a radical hypothesis into accepted fact.

Knowing that the Earth had been hit by an asteroid more than six miles across only 66 million

years ago, it became clear that we needed to start looking for any other asteroid that could impact the Earth. The U.S. congress gave NASA the mission of looking for NEAs. Along with some private funding, they established a number of surveys looking for near-Earth asteroids (NEA).

One such program was piggybacked off an Air Force system designed to find and track artificial satellites as they travelled over the United States. This system made use of telescopes located on the White Sands Missile Range. The optical system would pick up objects moving both fast and slow. Since the Air Force needed to protect the specifications of its system, it does not report fast moving objects (satellites) outside the Air Force, but astronomers were allowed to report slower moving objects (NEAs) to the Minor Planet Center. This project, called LINEAR (Lincoln Near Earth Asteroid Research) is run by the Lincoln Laboratory of the Massachusetts Institute of Technology. Other surveys are/were located at Mount Palomar in California, the Catalina Sky Survey on Mount Lemmon in Arizona and Spacewatch at Kitt Peak, AZ.

A newer survey that became active in 2009 is the Panoramic Survey Telescope and Rapid Response System (Pan-STARRS). The first telescope (called PS1) in this system is located on the summit of





***Pan-STARRS Observatory:***

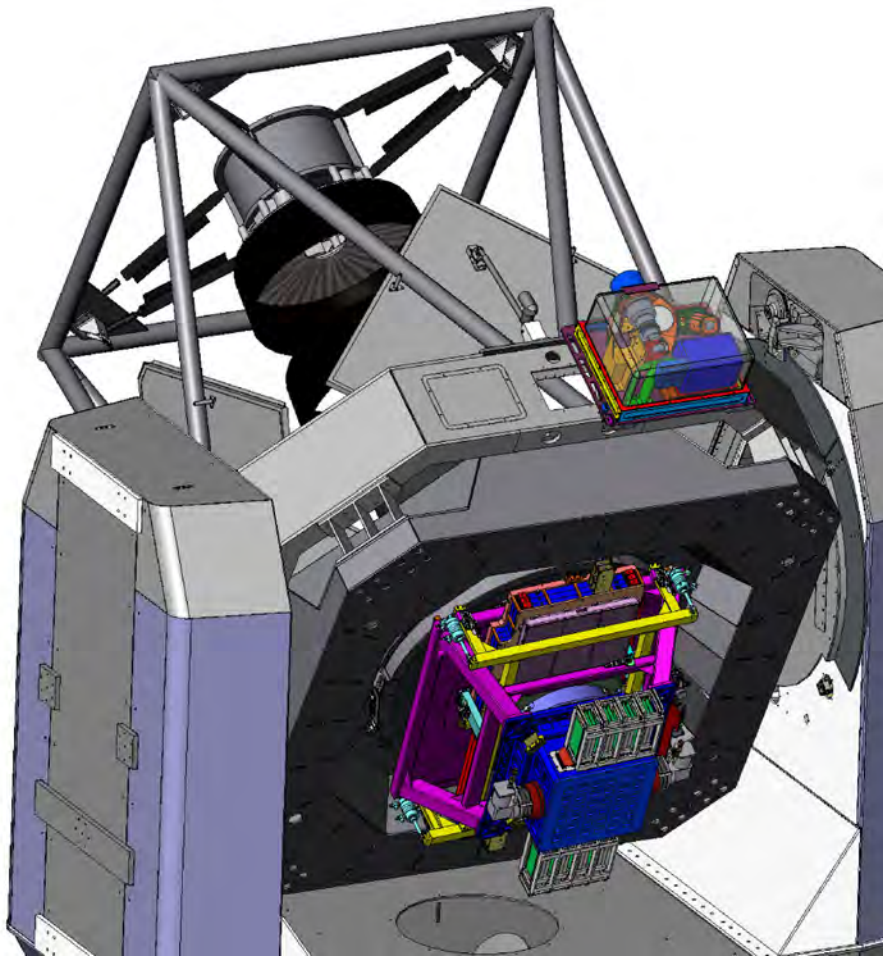
*The PS1 Observatory at dawn on Haleakalā, Maui, Hawaii*

Haleakalā on Maui, Hawaii. With a 72-inch telescope and a 1.4 billion-pixel camera, this survey can cover one-sixth of the sky each month in five colors. A second telescope, called PS2, will be almost identical and in operation, the two telescopes will observe the same area of the sky simultaneously and the resulting images will be stacked to increase the limiting magnitude.

Pan-STARRS's processing pipeline uses its own observations not just to determine the position (astrometry) of the moving objects that they have found, but also to determine the orbit of these objects. The Pan-STARRS team has been submitting their observations to the Minor Planet Center as well, and their results have been amazing.

The objects that they have reported have been fainter than were being reported by the other surveys, as faint as magnitude 22.5. These observations allow the discovery and tracking of even smaller NEAs (and comets). In 2015, Pan-STARRS discovered 754 NEAs, sixty-six of which were potentially hazardous asteroids (PHA). So far this year, they already have 483 NEA discoveries, with 36 being PHAs.

In addition to discovering the faster moving NEAs, they have designed an algorithm to take their observations and match them with previous images to search for the slower moving Trans-Neptunian Objects (TNOs). Typically, an NEO survey will check the same field over a few hours on a given night. While this is adequate to see the motion of NEAs and main belt asteroids, TNOs move so slowly that they appear as a fixed star. Only by tracking them over a period of days or longer can their motion be detected.



**Pan-STARRS Telescope Diagram:** The Pan-STARRS PS1 telescope-engineering diagram showing the back of the telescope and the camera assembly. The telescope and camera are just the front-end of a complex processing pipeline. This allows the Pan-STARRS system not only to find NEAs, but also TNOs. PS1 and PS2 are located on Haleakalā on Maui, Hawaii.

Detecting these objects is just the first step. The positions that were measured on current images must be connected to previous observations. It can be difficult to take a set of observations and relate them to one another. Pan-STARRS observations have very high accuracy, with typical residuals (the difference between the observed position and the position calculated from the orbit) being very small, typically, under 0.1 seconds-of-arc. Even so, slow moving objects produce fewer distinct positions than a fast

moving object, degrading the accuracy of the resulting orbit. This makes it harder to determine where a particular object would have been in an image from months or years earlier.

Pan-STARRS' new algorithm has allowed them to link the observations over the last six years to produce good orbits of these objects. They reported over two hundred new TNOs in the last half of July. The discovery announcements have been coming out rapidly, with over fifty TNOs announced in one day!

Most of these objects have orbital periods of two hundred to five hundred years. There have been a scattering of longer orbital periods, up to 4,290 years for 2014 LM28. This object has an orbit with a semi-major axis of 263.847 AU (24.5 billion miles), one of the most distant objects discovered in our Solar System when it is at aphelion. However, it was discovered near perihelion, when it was only about 16 AU (1.5 billion miles) away. This object is in a highly eccentric orbit, a very flat ellipse that takes it far from the Sun.

As of the end of July, there have been 1,738 Trans-Neptunian Objects discovered. These are the outer guard of the rocky bodies in our Solar System, debris left over from the formation of our Solar System. We do not know what really lies beyond it. The theoretical Hills Cloud, sometimes called the inner Oort Cloud, that extends from the Kuiper Belt (where the TNOs reside) out to about 25,000 AU. Beyond that is the Oort Cloud, which runs from the Hills Cloud out to about 200,000 AU (3.2 light-years). It is amazing that objects that are still orbiting our Sun can be three-quarters of the way to Alpha Centauri!

\* \* \*

**Photo of the Month**



**OBJECT The Milky Way: Sagittarius Region over the Sacramento Mountains from Mayhill, NM.**

Captured on July 4, 2016

Camera Canon 60D

Polarie Star Tracker

3 Minute Exposures x 24, 10 mm lens, ISO 1600

Processing with Pixinsight

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