

OBSERVER

HAPPY NEW YEAR!!

NEW YEARS FIREWORKS

The Fireworks Galaxy (NGC 6946 and Caldwell 12) is not only visually explosive: nine supernova have been observed in the complex arms of the face-on spiral. Located about 22.5 million light years from Earth, the galaxy was discovered by William Herschel in 1798. It is relatively difficult to observe because of its location close to the plane of the Milky Way. This image was made by Darrell Dodge at the EGK Dark Site on November 30, 2013, with a Canon 450D through an AstroTech 8-inch Ritchey-Cretien imager. 12 six-minute subframes of RGB were dark subtracted, stacked and aligned with Nebulosity 3.1 and processed with CS5.

Image © Darrell Dodge

Calendar

- 1..... New moon
- 3..... Quadrantids meteor shower peak
- 7..... First quarter moon
- 15..... Full moon
- 23..... Last quarter moon
- 30..... New moon

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JANUARY SKIES

by Dennis Cochran

We once mentioned the pointy head of Perseus, where the outlines of the constellation meet above Mirfak and Algol, at the η (eta) star of the hero, Perseus—He rode the winged horse Pegasus. Andromeda branches northeast from the square of Pegasus. When visiting M31 in Andromeda (00^h 45^m +42°), you could then scoot westward out to 23^h 30^m +33° to find the Blue Snowball planetary nebula (NGC 7662), entangled in the far western stars of Andromeda, a little more than 01^h west of M31.

Perseus is next to the east of Andromeda, essentially overhead in the evening. Northwest of η (eta) Per is a knot of star clusters NGC 869, NGC 884 and smaller NGC 957, a bit east of the other two. Those other two are known as “h and Chi Persei,” the Double Cluster that delights sky viewers. If you diverge west about one hour of right ascension and down a bit to 01^h 45^m +51°

you'll find the exploded star, or planetary nebula, M76. Then, almost north of η (eta) Per centered at 02^h 35^m +61.5° is a crowd of nebulae on my *Peterson Field Guides to the Stars and Planets*, Chart #2, but not discussed therein: IC 1795, IC 1805 and IC 1848 mixed with star cluster Melotte 15: Check 'em out, Dano! Farther east at that declination are a variety of objects just 10 minutes east of the 03 hour line, including the planetary IC 289 and a bright nebula IC 1871.

Northeast of the pointy head of Perseus and east of Cassiopeia sprawls Camelopardalis the Giraffe, an animal related to camels, as its name suggests. A spiral galaxy NGC 2403 that lies just outside the Local Group (the home neighborhood of the Milky Way), is out near the eastern Camelopardalis and western Ursa Major border at 07^h 35^m +66°. NGC 2403 could be star

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PRESIDENT'S MESSAGE

by Ron Hranac

Have you ever watched a meteor shower? If not, you're missing one of astronomy's easiest-to-observe events. One does not need to use binoculars or a telescope—the unaided eyes work just fine.

Before digging too deeply into meteor showers, it might be helpful to review some of the terminology first. That streak of light we see in the night sky and often call a shooting star (it's not a star at all) is known as a meteor. A meteor is produced when a meteoroid enters the Earth's atmosphere at a pretty fast clip, as much as several tens of thousands of miles per hour or more. Surprisingly, most meteoroids that produce visible meteors are no larger than a grain of sand to perhaps the size of a pea or small piece of gravel. Larger meteoroids can produce fantastic fireballs, sometimes bright enough to be seen in daylight. If a meteoroid survives the fiery trip through Earth's atmosphere and reaches the ground, we call it a meteorite. Meteor showers do not produce meteorites—the meteoroids associated with showers are too small to survive the trip to the ground.

Quick side note: The origin of the word "meteor" dates back to the mid-16th century, and in years past was used to describe atmospheric phenomenon, including lightning. From that perspective, it's easy to understand why the TV weather person is called a meteorologist: Someone who studies atmospheric phenomenon, in this case the weather!

Meteors first become visible about 60 miles above the Earth's surface, give or take, so what appears to be close is usually quite some distance away. Sporadic meteors can



DAS President Ron Hranac during Solar Day at the Denver Museum of Nature & Science.

Image courtesy of Jeff Tropeano

appear to come from any direction, but meteor showers appear to radiate from a common point in the sky known as a radiant.

Most meteor showers are named after the constellation in which the radiant lies. For example, the annual August Perseids meteor shower appears to radiate from the constellation Perseus, and December's Geminids shower has its radiant in Gemini.

Meteor showers occur when the Earth passes through a stream of debris left behind by a passing comet or sometimes an asteroid. In the case of the Perseids shower, meteors are produced when ice and dust particles left behind by comet Swift-Tuttle collide

Continued on Page 4



DAS SCHEDULE

JANUARY

- 1 New Year's Day
- 3-5 EGK Dark Sky weekend
- 11 Open House (Begins at 5:30 P.M.)
- 17 General Membership Meeting at Olin Hall (Begins at 7:30 P.M.) Nominations of Officers
- 20 Martin Luther King Day
- 24 E-Board Meeting at Chamberlin (Begins at 7:30 P.M.)
- 31-2 EGK Dark Sky weekend

FEBRUARY

- 31-2 EGK Dark Sky weekend
- 8 Open House (Begins at 6:00 P.M.)
- 14 DAS Annual Meeting at Olin Hall (Begins at 7:30 P.M.) Election of Officers, Valentine's Day
- 17 Presidents Day
- 21 E-Board Meeting at Chamberlin (Begins at 7:30 P.M.)
- 28-2 EGK Dark Sky weekend

Open House costs: If the skies are clear, \$2 per person (\$5/family), and \$1 per person in the event of inclement weather.

Public nights are held at Chamberlin Observatory every Tuesday and Thursday evenings beginning at the following times:

March 10 - September 30 at 8:30 P.M.

October 1 - March 9 at 7:30 P.M.

Costs to non-members are: \$3.00 adults, \$2.00 children.

Please make reservations via our website (www.denverastro.org) or call (303) 871-5172.

Society Directory

President:
Ron Hranac 303-790-0893
president@denverastro.org

Vice President:
Lisa Judd (626) 487-8515
vp@denverastro.org

Secretary:
Dena McClung 303-564-8630
secretary@denverastro.org

Treasurer:
Brad Gilman (720) 488-1028

Executive Board Members

John Barela	Digby Kirby
Jack Eastman	Scott Leach
Joe Gafford	Ed Scholes
Chuck Habenicht	Dan Wray

Past President, Ron Pearson
President Emeritus, Larry Brooks

Committees

Van Nattan-Hansen Scholarship Fund:
Tim Pimental (Chair)
PO Box 100621
Denver, CO. 80250-0621

EGK Dark Site Committee:
Darrell Dodge, Interim Chair
[Email: darksite@denverastro.org](mailto:darksite@denverastro.org)

IDA Representative:
Dr. Robert Stencel
[Email: coloida@botmail.com](mailto:coloida@botmail.com)

Volunteers or Appointed Representatives

ALCor:
Darrell Dodge (303) 932-1309

Newsletter:
Editor: Patti Kurtz (720) 217-5707
[Email: p_kurtz@comcast.net](mailto:p_kurtz@comcast.net)
Proofreaders: Darrell Dodge, Ron Hranac, Lisa Judd, Zack Kurtz
The *Observer* is available in color PDF format from the DAS website.

Website:
Darrell Dodge
[Email: webmaster@denverastro.org](mailto:webmaster@denverastro.org)

IT Coordinator:
Scott Leach

Librarian:
Phil Klos
DAS Information Line: (303) 871-5172

DAS Correspondence:
Denver Astronomical Society
Chamberlin Observatory c/o Ron Pearson
2930 East Warren Avenue
Denver, Colorado 80210

The Executive Board conducts the business of the DAS at 7:30 p.m. at Chamberlin Observatory. Please see the Schedule of Events for meeting dates. All members are welcome.

www.denverastro.org

JANUARY SKIES

(CONTINUED FROM PAGE 1)

hopped to by gliding west across the top of the dipper from δ (delta) to α (alpha) UMa and continuing west past dim η (eta) UMa, then farther west and down a bit to \omicron (omicron) UMa. NGC 2403 is 45 degrees northwest from there about eight diagonal degrees. A dimmer galaxy NGC 2460 could be visited by drifting straight west from \omicron (omicron) UMa about four degrees.

In the western part of Camelopardalis, lined up north-south, are some other hard-to-locate objects. One could take a long diagonal hop northeast from the pointy head of Perseus about 11 degrees to NGC 1502, a star cluster at $04^{\text{h}} 08^{\text{m}} +62^{\circ}$. It is about two degrees directly above NGC 1501, a planetary nebula. Then, if you drift up from cluster NGC 1502 six degrees and turn west for a short ways to $03^{\text{h}} 50^{\text{m}} +68^{\circ}$, there is the beautiful IC 342 galaxy. With a large scope you can see spiral details.

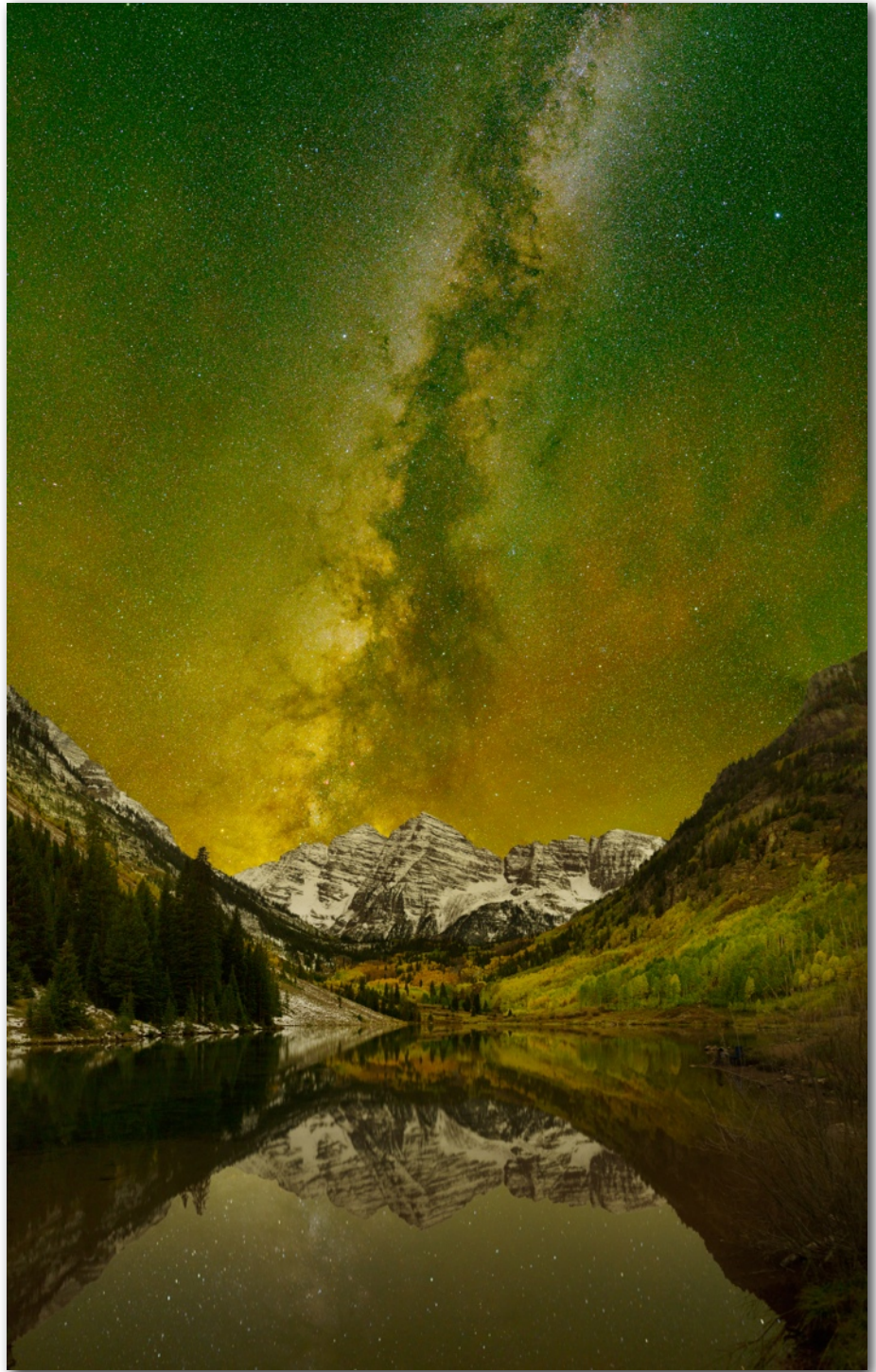
Jupiter is up and huge in the evening southeast sky, while Saturn is a morning object. The square of Pegasus should be west of the Meridian, and on its west side and a little outside, just west of the 23h line and halfway down that side of the square, is 51 Pegasi, the star with the first known exo-planet. You won't be able to see the planet but you know it's there. ★

MAROON BELLS SPECTACULAR NIGHTSCAPE PANORAMA: SEPTEMBER 28, 2013

The Maroon Bells in the Colorado Rockies is a special place any time of year, but especially so in the fall, with the changing colors. The scene is especially spectacular in years when a good dusting of snow is put on the mountain peaks and the storm is not intense enough to blow the leaves off of the trees. But even more special is when all these things come together during a calm and clear night, as was the case on September 28, 2013. The view of the Maroon Bells and the lake reflection is to the southwest, so only in the fall does the Milky Way show tall over the mountains in the evening.

This scene is all natural light. The light on the land is that from the night sky: light from stars, the Milky Way galaxy, and airglow: light from molecules in Earth's upper atmosphere excited by solar ultraviolet light during the day and from cosmic rays. The molecules emit light throughout the night. The green is from oxygen typically 90-100 km high. The red is typically from hydroxyl (OH) 80 to 90 km high. The airglow light is emission line sources, like that from a neon sign. That narrow-band light creates enhanced colors on the landscape, in particular greens and reds in the trees. Go to www.clarkvision.com for more details.

Image © Roger Clark



ABOUT THE DAS

Membership in the Denver Astronomical Society is open to anyone wishing to join. The DAS provides trained volunteers who host educational and public outreach events at the **University of Denver's Historic Chamberlin Observatory**, which the DAS helped place on the National Register of Historic



Places. First light at Chamberlin in 1894 was a public night of viewing, a tradition the DAS has helped maintain since its founding in 1952.

The DAS is a long-time member in good standing of the **Astronomical League** and the **International Dark Sky Association**. The DAS's mission is to provide its members a forum for increasing and sharing their knowledge of astronomy, to promote astronomical education to the public, and to preserve Historic

Chamberlin Observatory and its telescope in cooperation with the University of Denver.

The DAS is 501 (c)(3) tax-exempt corporation and has established three tax-deductible funds: the Van Nattan-Hansen Scholarship Fund, the DAS-General Fund and the Edmund G. Kline Dark Site Fund.

More information about DAS activities and membership benefits is available on the DAS website at www.denverastro.org ★

Book Review

ALIEN SEAS: OCEANS IN SPACE*Edited by Michael Carroll and Rosaly Lopes, with a Foreword by James Cameron**Springer, July 2013: 200 pages, 51 color illustrations plus black and white paintings, numerous supplemental drawings and charts.**by Darrell Dodge*

DAS members know Michael Carroll well from his enthusiastic DAS meeting presentations and the pleasure of seeing his imaginative and uncannily realistic space art in astronomy magazines. Mr. Carroll's enthusiasm for astronomy feeds his generosity to colleagues – both those in his chosen field of illustration and those whose scientific work enables his artistic imagination to soar. This collaborative spirit is well reflected in Mr. Carroll's and Rosaly Lopes' new compendium, *Alien Seas: Oceans in Space*, a virtual scientific and imaginative travelogue of as many seas and sea-like places in the solar system and the universe as one could possibly think.

This sumptuously illustrated compendium of technical articles on the present, past, and imagined seas in our solar system and beyond actually does much more than fulfill its promise. Because seas of chemicals and rock in various states of matter are an integral part of a planet's birth, development, and evolution, the 12 articles provide a fascinating perspective on planetary geology and the few places in our universe that are most capable of supporting life. We also discover how toxic most of the "seas" of the solar system really are; information that is sobering at times.

WHAT'S IN THE BOOK

Film director James Cameron sets the stage with a Foreword that describes his realization of the alien nature of the extreme, undersea environment of Earth's oceans, then Mike Carroll takes us on a journey with a variety of perspectives in the 12 papers that comprise this compendium. After Carroll's brief introduction, we take a trip outward from the Sun, from the funny and inventive imagination of David Grinspoon, who explores what the long-ago-evaporated lost-ocean of Venus might have been like, to Jeffrey Blancett's hopeful, but down-to-earth discussion of the possibilities for exploring the seas of exo-planets.

On the way outward through the solar system we encounter the water oceans of the past on Mars (Timothy Parker); seas of molten rock on the Moon, Mercury, Mars, Venus, and Io (Rosaly Lopes); the water seas beneath the surface of Jupiter's moons Europa, Ganymede, and Callisto (Robert T. Pappalardo); the oceans of the moons of Saturn, and the outer planets (John Spencer); the "sand seas" of the Earth, Venus, Titan, and Mars (Jani Radebaugh); the lakes

and seas of Titan (Karl Mitchell); the possible liquid helium seas beneath the surface of Saturn (Kenneth H. Baines and Mona L. Delitsky); and finally, the "alien seas" of our own water planet (Chris McKay), which still haven't been fully explored. By the time we reach Jeffrey Blancett's discussion of exo-planet seas, we're impressed with the lethality of most of the seas of our solar system. As Blancett notes, because the range of materials and material states that humans can tolerate is relatively narrow, any hope of taking an actual dip in seas other than Earth's will require traveling to another planetary system.

For example, I've recently held the romantic thought (encouraged by popular astronomy magazines) that Europa might be a promising place to find alien life-forms. But outside of the water seas (if indeed they are water) the surface environment is anything but hospitable. It's not just that Europa's ocean is covered by a thick icy crust, but (to quote Robert Pappalardo) "the harsh, charged particle radiation that envelops Europa would kill a human in minutes, ripping apart cell walls and life-sustaining chemical bonds." While Pappalardo still believes that Europa's ocean is the "most probable extraterrestrial biome"

*Continued on Next Page***PRESIDENT'S MESSAGE**

with Earth's upper atmosphere. The Perseids shower peaks around August 12th, with Perseids meteors visible for as much as a couple weeks before and after the peak.

The first major meteor shower of 2014 is the Quadrantids shower, which happens in early January. The name is from the old constellation Quadrans Muralis, which is now part of Boötes. The Quadrantids shower is related to the asteroid 2003 EH₁, which some believe may be a dead comet. Unlike other major showers, the Quadrantids' major activity lasts only a few hours around the peak. That said, the shower still produces a few meteors from late December through mid-January. The 2014 peak is predicted to happen on Friday, January 3rd at 12:37 P.M. MST. The best times to observe this shower are the nights of the 2nd or 3rd.

How does one go about observing a meteor shower? Find a dark location away from bright lights, and lay down on a blanket, air mattress, or lawn chair. If it's cold, consider bundling up in a sleeping bag. It's not necessary to look toward the shower's radiant. Instead, look more or less straight up, so your peripheral vision captures a larger portion of the sky. Now wait and watch. During some of the better major showers, there can be 50 to 60 or more meteors per hour, and during minor showers or off-peak nights you might see only a handful per hour. As with other nighttime astronomical observations, moonlight and bright lights can wash out the sky and obscure many of the meteors.

If Mother Nature doesn't cooperate with clear skies, try listening to the shower. Go to <http://spaceweatherradio.com/> and listen for meteor "pings," which happen when radio signals bounce

off of the ionized columns of air produced when meteoroids zip through the atmosphere and create meteors. Sometimes it's possible to hear meteor pings on an FM radio tuned to a clear spot on the dial where there is no local station (an outside antenna helps here). The radio waves of a distant FM station will bounce off of the meteor, allowing you to hear a syllable or two of someone talking, or a note or two of music from that distant station. That brief blip of sound is the ping.

Want more information about meteor showers? A good place to start is the American Meteor Society's website at <http://www.amsmeteors.org/>. If you have an iPhone or iPad, there is also a very useful app available in the App Store called "Meteor Shower Guide." ★

(CONTINUED FROM PAGE 2)

MEET YOUR FELLOW ASTRONOMER

by Dena McClung

This month's profile features Dennis Cochran, the author of *The Observer's* monthly "Skies" column. At the monthly Open House at Chamberlin Observatory, Dennis is often the first person a guest meets upon entering, as he sells them tickets. Dennis was DAS's secretary for a few years, and he is still a very active member, bringing a telescope to various outreach events.

Dennis had his first experience with astronomy at the Griffith Park Observatory near Los Angeles as a youngster. He and his brother began observing while growing up in southern California, using a 10-inch Newtonian telescope that his brother had been given by their father. Dennis built his first telescope in the 1950s using wood, a pipe mount, a mirror he had ground in his dad's shop, and optics made by a friend, telescope builder Thomas Cave. In 1969, Dennis joined the Orange County Astronomers. He describes himself as a casual observer who enjoys simply finding objects in a telescope eyepiece.

Dennis lived in southern California until 1997 except for a couple of instances. He spent five years (ending in 1984) in New Mexico, and about a year each in Maryland and Boston shortly thereafter. He was a member of the Goddard Astronomy Club at the Goddard Space Flight Center in Greenbelt, Maryland, during the 1986 appearance of Comet 1P/Halley. Dennis's career was in software configuration management, and while in California he worked at Edwards Air Force Base. When his company lost

that contract, Dennis moved to Colorado in 1997 and found work in that field through a friend, becoming employed at Buckley Air Force Base.

Those of you who are regular readers of the Skies column have no doubt been entertained by Dennis's sense of humor. When he took over writing the column, his goal was to inject some personality into it, and he says he hasn't had any complaints. He draws information from several publications for each installment, tailoring it to our location.

In addition to his duties with the DAS, Dennis likes to travel. He has been to Europe at least once per year since 2000. Through a friend he knew from the Sierra Club, Dennis was introduced to a British company that specializes in walking, cycling and sightseeing tours. His favorite place is the Italian Dolomites, which are a southern spur of the Alps, and feature a system of gondolas that give breathtaking views of the landscape. He has been to the Royal Observatory in Greenwich, England, which is now a history museum. While visiting the Old City Observatory in Edinburgh, Scotland, and before being chased away by a docent, Dennis came across an unusual 16-inch Schmidt Camera with a 24-inch mirror in a stairwell. And, at the Lowell Observatory (in Flagstaff, Arizona), Dennis recognized a dismantled Tinsley Cassegrain, photos of which had been used in magazine ads.

Dennis is a lifelong bachelor, but is still close to his two brothers and one sister. He frequently travels to

the west coast to visit family in California, Oregon and Washington. ★



DENNIS COCHRAN

Image courtesy: Joe Gafford

BOOK REVIEW

in the solar system, finding such life looks much more difficult than even the hard luck expedition in the recent film "Europa Report."

IMAGINARY WORLDS

As the very recent discovery (announced as this review was being finished) that Europa also has liquid volcanoes would suggest, this compendium – while filled with real and compelling scientific information—is a snap-shot in an exciting time when more and more about our solar systems planets and moons is being revealed every day. While strongly based in observational data, the authors are not afraid (or have been encouraged) to explore the possibilities rather than just report what is. Throughout the book, side-panels describe past, present, and planned expeditions to the planets and moons. The temporal nature of these descriptions begs the question we must ask of any book on solar system exploration: how long will the information here be current and useful? I would venture to say a long time, because we may have discovered enough to date that new discoveries may enrich the information provided here, rather than make it obsolete.

Among the more astounding ideas imagined in this book is the possibility (raised in the Baines and Delitsky article) of a material extraction process that begins with mining Saturn's depths for Helium-3 to power fusion reactors for electric power, without the radiation generated by the fusion of Helium-4. The authors then speculate that electrical power thus generated could be used to operate huge round, diamond-coated mining ships suspended by parachutes in Saturn's helium sea, which would harvest the natural diamonds that are thought to originate in the carbon soot created in Saturn's thunderstorms. This soot is thought to rain down in several areas in Saturn's atmosphere, eventually encountering pressures sufficient to form natural diamonds, which would be valuable for industrial applications.

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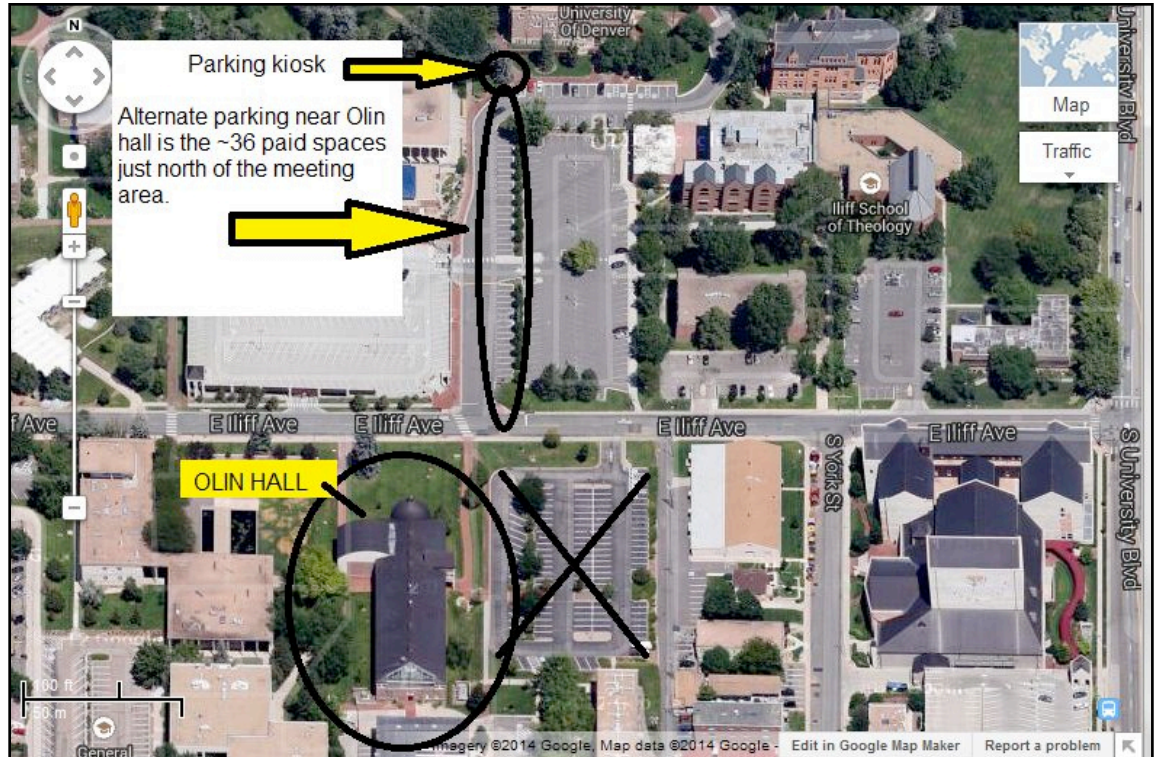
If I had to select my favorite articles in the book, they would probably be (in addition to Blancett's concluding chapter) Robert T. Pappalardo's contribution on the possibilities of finding water beneath the surface of Jupiter's moons Europa, Ganymede, and Callisto and John Spencer's on ice and water in the outer Solar System, including the water geysers of Enceladus that he is partially credited with discovering. In a compendium of excellently written articles, these were the most compelling and readable for me. The longest article, and the one (because of recent intense Martian exploration) with the most verifiable data, is Timothy Parker's contribution, "Oceans on Mars."

Finally, a comment must be made on the illustrations, which are uniformly beautiful and informative. Each article contains at least one or two color space-art illustrations by Mr. Carroll, along with numerous charts, graphs, and black and white photos of planetary and moon features. These are augmented by 21 space-art illustrations in a concluding gallery by a number of other space artists, including Don Dixon, Ron Miller, William K. Hartmann, Dan Durda, Pamela Lee, and others. My favorite illustration is the cover by Mike Carroll, which depicts an imaginary situation, the possibility of which was discovered only recently: "an eruption of molten lava on the deep, buried rocky core of [Jupiter's moon] Ganymede ... melt[ing] out the surrounding high-pressure ice to form a huge water-filled cavern."

I think that quotation captures the essence of this book, which represents a leap of the scientific and artistic imagination, derived from hard observational data and useful scientific hypotheses. Despite all the color illustrations, this is no mere "coffee table book." The illustrations are postcard size and are arranged to flow with the text. This is a book intended for reading, discovery and understanding, not just casual meandering. ★

OLIN HALL PARKING CHANGES

At right is a map of alternate parking places. Please read the updates on the next page.



WELCOME NEW DAS MEMBERS!

- Russell Anderson
- Paul Ferlet
- Kayla Gehring
- Mark Meyer
- John Notar
- John Riskorski

**JANUARY SPEAKER:
MIKE MOORE**

Mike Moore is a writer, author and lecturer. He has seven books out, more than 180 articles published and has been on the History Channel. Mike's knowledge of history and his love for astronomy blend well. A recent convert to the astronomy addiction, he has over 500 hours and 600 recorded observations in the little more than three years since he started. ★



CASSINI PHOTO NEXT PAGE:

From NASA: Cassini delivers this stunning vista showing small, battered Epimetheus and smog-enshrouded Titan, with Saturn's A and F rings stretching across the scene.

The color information in the colored view is completely artificial: it is derived from red, green and blue images taken at nearly the same time and phase angle as the clear filter image. This color information was overlaid onto the previously released clear filter view (see PIA07786) in order to approximate the scene as it might appear to human eyes.

The prominent dark region visible in the A ring is the Encke gap (325 kilometers, or 200 miles wide), in which the moon Pan (26 kilometers, or 16 miles across) and several narrow ringlets reside. Moon-driven features which score the A ring can easily be seen to the left and right of the Encke gap.

A couple of bright clumps can be seen in the F ring. Epimetheus is 116 kilometers (72 miles) across and giant Titan is 5,150 kilometers (3,200 miles) across.

The view was acquired with the Cassini spacecraft's narrow-angle camera on April 28, 2006, at a distance of approximately 667,000 kilometers (415,000 miles) from Epimetheus and 1.8 million kilometers (1.1 million miles) from Titan. The image captures the illuminated side of the rings. The image scale is 4 kilometers (2 miles) per pixel on Epimetheus and 11 kilometers (7 miles) per pixel on Titan.

The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. The Jet Propulsion Laboratory, a division of the California Institute of Technology in Pasadena, manages the mission for NASA's Science Mission Directorate, Washington, D.C. The Cassini orbiter and its two onboard cameras were designed, developed and assembled at JPL. The imaging operations center is based at the Space Science Institute in Boulder, Colo.

For more information about the Cassini-Huygens mission visit <http://saturn.jpl.nasa.gov/home/index.cfm>. The Cassini imaging team homepage is at <http://ciclops.org>. ★

IMPORTANT CLUB UPDATES

DAS E-BOARD AND OFFICER ELECTIONS

Annual elections are just around the corner, and Tim Pimentel has been appointed Election Chairperson. If you would like to nominate an officer or E-Board candidate, submit your nomination(s) to Tim at ~vnb@denverastro.org. We will open nominations at the January general membership meeting, and the election will be held in February.

OLIN HALL PARKING

DU expects to close the Olin Hall parking lot in January as construction of a new building gets underway. Parking passes will no longer be available during our meetings, but DAS members can use available free parking on nearby streets on a first come, first served basis. As well, metered parking is available along the roadway north of the existing Olin parking lot for \$1.50/hour. Parking can be paid for in the kiosk at the north end of the short street, using cash, credit, or bitcoins, and the kiosk will provide a receipt that can be placed on the vehicle's dashboard. There

are handicapped spaces along the south end of Olin Hall for those who need that accommodation (See map previous page).

DAS MEMBERSHIP RENEWAL PAYMENTS START JANUARY 2ND, 2014!

The start of renewals will be announced in a ConstantContact email to all opted-in members. Members who have opted out of email communications will receive a letter via postal mail. The renewal fee for members who joined before 2013 is still \$36.

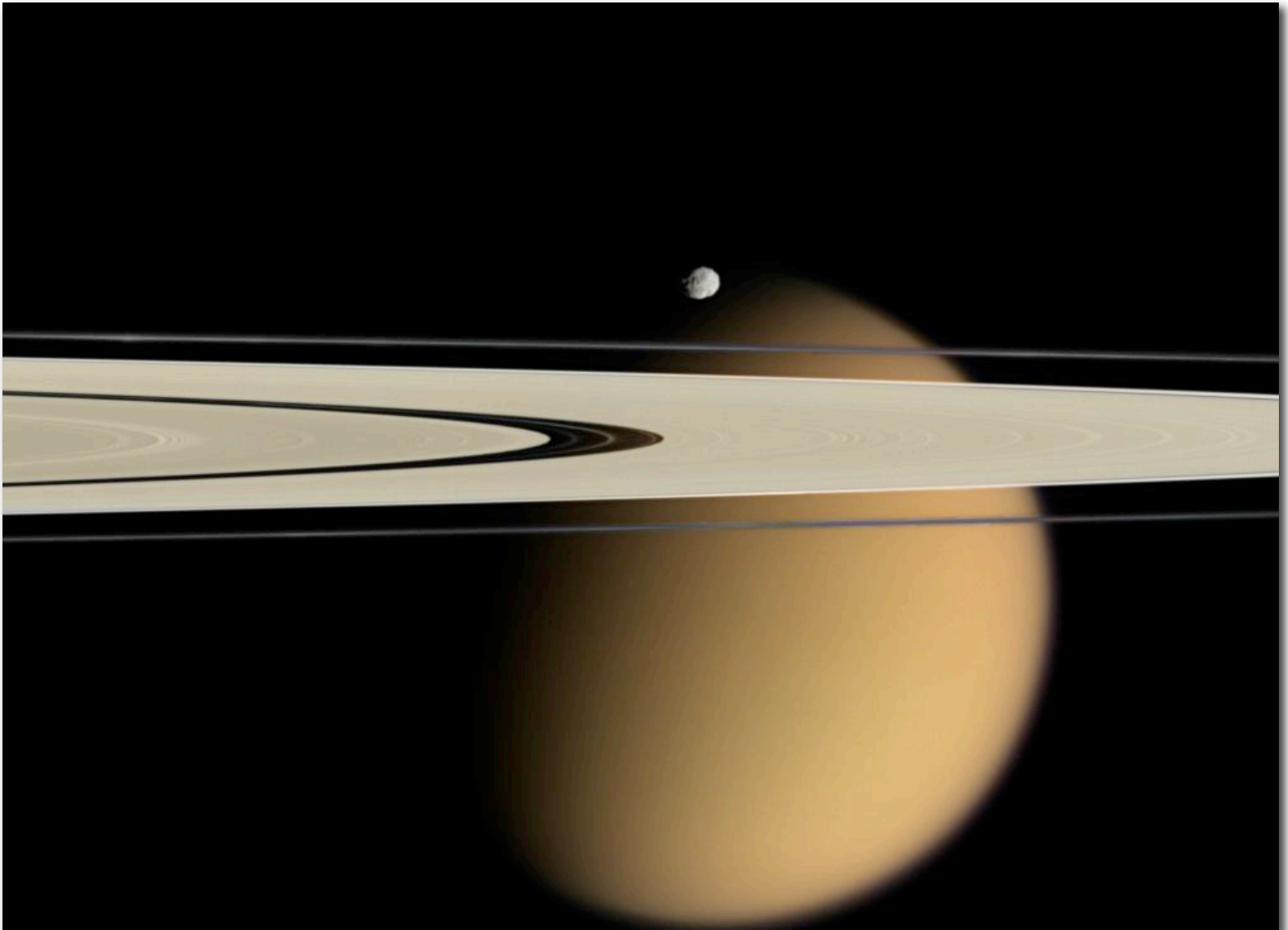
New members who joined the DAS in 2013 will receive an invoice in the mail specifying their pro-rated renewal fee and should wait to renew until the letter is received.

Everyone is encouraged to use PayPal, but mail-in forms are still acceptable.

Once renewals have started, see the DAS Web site for information and PayPal renewal buttons at www.denverastro.org/membership.html Please renew your membership by February 1st.

CASSINI STUNNER FROM THE ARCHIVES

(CAPTION PREVIOUS PAGE)



For Cloudy Nights.....

**Bubbler:
Star Nicknames**

Rules: Match each star name with the common nickname, drawing a straight line between the bubbles. Then, color in any closed figure that contains a *. The picture then describes the feeling you get from a great night of observing. (hint: no line can cross a bubble.)



The Denver Astronomical Society
 c/o Chamberlin Observatory
 2930 E. Warren Ave.
 Denver, Colorado 80210