

OBSERVER



FROM THE INSIDE LOOKING OUT

Taken on July 25th in San Luis State Park near the Great Sand Dunes in Colorado, Jeff made this image of the Milky Way during an overnight camping stop on the way to Santa Fe, NM. It was taken with a Canon 60D camera, an EFS 15-85 lens, using an iOptron SkyTracker. It is a single frame, with no stacking or dark/bias frames, at ISO 1600 for two minutes. Visible in this south-facing photograph is Sagittarius, and the Dark Horse Nebula inside of the Milky Way. He processed the image in Adobe Lightroom.

Image © Jeff Tropeano

Calendar

- 2..... First quarter moon
- 8..... Full moon
- 14..... Aldebaran 1.4° south of moon
- 15..... Last quarter moon
- 22..... Autumnal Equinox
- 24..... New moon

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SEPTEMBER SKIES *by Dennis Cochran*

Cygnus the Swan dives onto center stage this month, almost overhead. Leading the descent is the nose of the swan, the star known as Albireo, a beautiful multi-colored double. One wonders if Albireo has any planets from which to see the pair up-close. Apparently, double stars can have planets. In the middle of the swan the cross star, Sadr, γ (gamma) Cygni, where the wings and body meet, is surrounded by nebulosity that may not be visible except in a big scope. Open star cluster M29 lies 1.5 degrees south of Sadr.

Deneb α (alpha) Cygni, itself a member of the Summer Triangle along with Altair and Vega, marks the tail of the swan, and piled up east of it are the North America and Pelican Nebulae, beloved by imagers. The location of this large, spread-out sky cloud is around $20^h 55^m +45^\circ$. An-

other famous deep-sky object is the Veil Nebula, also known as the Cygnus Loop, a supernova remnant so large that its separate arcs were known and named before it was found to be one wide wisp that came out of a single star. The Veil is down the downish wing, so to speak, and off of its leading edge centered around $20^h 52^m +31^\circ$, west of the line connecting the stars ϵ (epsilon) and ζ (zeta) Cygni. Then, trailing behind the swooping bird is a larger cluster M39 at $20^h 30^m +48^\circ$ which includes 30 stars in a seven light-year bubble. If you don't use celestial coordinates, M39 is up-left of Deneb 10 degrees. Finally, follow the uppish wing's first two stars, δ (delta) Cygni and ι (iota)2 Cygni, to look behind its trailing edge to find two planetaries, NGC 6826 and NGC 6833. The for-

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PRESIDENT'S MESSAGE

by Ron Hranac

Like many couples, my wife and I enjoy the occasional date night. One of our favorite date night activities is to visit a local book store after going out for dinner at one of our favorite neighborhood eateries. We are both avid readers, a fitting interest for a semi-retired school teacher (her) and a telecommunications engineer and confirmed geek (me). A review in a recent issue of *QST*, a ham radio magazine, convinced me to add the new book *Faraday, Maxwell, and the Electromagnetic Field: How Two Men Revolutionized Physics*, by Nancy Forbes and Basil Mahon, to my shopping list.

While looking through the science section of the store for the Forbes & Mahon book, I ran across a copy of *Neil Armstrong: A Life of Flight*, by Jay Barbree. This particular book wasn't on my list, but I had read an excerpt from it in the August 2014 issue of *Astronomy* magazine. At the time the excerpt piqued my interest, and I thought it might be nice to get a copy down the road.

So much for waiting. I just finished reading *Neil Armstrong: A Life of Flight*, and wholeheartedly recommend it. Author Barbree is a space correspondent for NBC News, where he has worked for 56 years, and was a long-time friend of Armstrong's. If you lived through the space race, were glued to the TV set on July 20, 1969 when Armstrong and Buzz Aldrin were the first humans to walk on the Moon, or just have an interest in the space program in general or perhaps Neil Armstrong in particular, I think you'll find this book a worthwhile read.



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

Photo courtesy: Jeff Tropeano

That got me thinking about astronomy-related books. Many of us have two or three favorites on hand, and some even maintain modest collections of astro-themed references. I am occasionally asked about good astronomy-related books, especially for those new to the hobby. After giving it some thought, here is my list. I carry the first four books in my observing accessories bag. Given the availability of several quite good smart phone apps, you might wonder why I pack around references. Well, for one thing, they don't have batteries that can go dead.

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DAS SCHEDULE

SEPTEMBER

- 1 Labor Day.
- 5 DAS General Membership Meeting at Olin Hall (Begins at 7:30 P.M.).
Speaker: Dave Schlichting .
- 12 E-Board Meeting at Chamberlin (Begins at 7:30 P.M.).
- 20-28 Okie-Tex Star Party.
- 26-28 EGK Dark Sky weekend.
- 27 Colorado Astronomy Day, Denver Museum of Nature & Science (10:00 A.M.), and Open House at Chamberlin (7:00 P.M.) .

OCTOBER

- 4 Yom Kippur.
- 11 DAS Annual Auction (Setup begins at 11:00 A.M.).
- 17 E-Board Meeting at Chamberlin (Begins at 7:30 P.M.).
- 18 DAS Open House (7:00 P.M.).
- 24-26 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 and students with ID.

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

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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

SEPTEMBER SKIES

(CONTINUED FROM PAGE 1)

mer is the so-called Blinking Nebula because of the tendency of the central star to appear and disappear as you peer at it, at $19^{\text{h}} 40^{\text{m}} +50^{\circ}$. NGC 6833 is two degrees south of it, and you may later want to ooze down-east to a third planetary NGC 6844 at $20^{\text{h}} 12^{\text{m}} +46.5^{\circ}$. This is just north of halfway between Deneb and δ (delta) Cygni.

If you're a planetary nebula lover, an entire string of these objects cascades on down through the Swan. NGC 6881 lies in the body of the bird halfway between γ (gamma) and η (eta) Cygni at $20^{\text{h}} 14^{\text{m}} +37.5^{\circ}$. Unable to pull up from our plunge we find NGC 6857 at $20^{\text{h}} 02^{\text{m}} +34^{\circ}$ below and slightly left of η (eta) Cygni and then southeast of Eta six degrees is NGC 6842 at $19^{\text{h}} 55^{\text{m}} +29^{\circ}$. The well-known "Dumbbell Nebula" is south of that seven degrees at $19^{\text{h}} 59^{\text{m}} +23^{\circ}$. Finally we plunge southeast another seven degrees to the $+20$ declination level to find NGC 6886 at $20^{\text{h}} 25^{\text{m}}$, and west of that, NGC 6905 at $20^{\text{h}} 25^{\text{m}}$. Drift farther west to about $19^{\text{h}} 45^{\text{m}} +18.5^{\circ}$ to find globular cluster M71. A small star cluster in open space southwest of the Veil Nebula is at $20^{\text{h}} 35^{\text{m}} +28^{\circ}$. See if you can find it, maybe capture its image.

Let's go up into Draco, a huge, twisting constellation. Think of a Chinese dragon writhing down a street in Hong Kong. Around the head of Draco, four stars at the bottom of the twist centered on $17^{\text{h}} 40^{\text{m}} +54^{\circ}$ includes double stars: faint Kuma ν (nu)2 Draconis at the northwest corner of the head and fainter μ (mu) Draconis four degrees west of that at $17^{\text{h}} 07^{\text{m}} +54.5^{\circ}$. Then, ϕ (phi) Draconis is just below χ (chi) Draconis at $18^{\text{h}} 20^{\text{m}} +71^{\circ}$, and there's a pair at $18^{\text{h}} 0^{\text{m}} +80^{\circ}$ marked as 40 and 41 on my chart. If you're not dizzy from our previous plunge there's another one of these exploded stars at $18^{\text{h}} 0^{\text{m}} +67^{\circ}$ (NGC 6543) east of ζ (zeta) Draconis. One of the brightest planetaries, this was the first to be examined with a spectroscope. It showed emission lines that suggested it was a gas cloud rather than a small cluster.

Go way to the south now to find Capricornus, just to run into another planetary, one you may have heard of, the Saturn Nebula (NGC 7009). It is above the middle of the jester's-grin shape of the Sea-Goat at $21^{\text{h}} 05^{\text{m}} -11^{\circ}$, actually in Aquarius. While you're at this object, detour southwest a short ways to $20^{\text{h}} 0^{\text{m}} -17.5^{\circ}$ for star cluster M73, and west of that another



UNDER THE STARS

At this summer's Star Stare, David imaged the Milky Way.

Image © David Shouldice

degree is M72, a small globular cluster. Now let's drift up to large globular M2 in Aquarius approaching Equuleus the four-sided horse, at $21^{\text{h}} 35^{\text{m}} -01^{\circ}$, straight north of β (beta) Aquarii five degrees. It's very condensed and bright. Another biggie, M15, is up-left from Equuleus and up-right from ϵ (epsilon) Pegasi four degrees at $21^{\text{h}} 30^{\text{m}} +12^{\circ}$. About seven degrees to the northwest is a small globular NGC 7006, in eastern Delphinus at $21^{\text{h}} 0^{\text{m}} +16^{\circ}$, straight east of the top of the dolphin three degrees.

Mars and Saturn are still there in the southwest in line west and slightly north from Antares, the heart of the Scorpion. Speaking of icky arachnids, while you're ogling all of these sky wonders have you been attacked by night creatures? No? Well, there's still time for that. ★

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 ★



DAS ANNUAL PICNIC IN PHOTOS

The Denver Astronomical Society held its annual summer picnic at Bear Creek Lake Park near Morrison on Sunday, August 10th. Activities enjoyed by members included solar observing (until

the clouds rolled in), horseshoes, bicycling and hiking on nearby trails, and a game of ladder toss. No, folks weren't throwing ladders. Also called ladder golf, participants toss a pair of small balls joined by a short

tether at a ladder-like rack. The highlight of the day, of course, was the barbecue itself and a chance to socialize with fellow members and guests.—Ron Hranac ★



Image © Darrell Dodge



Image © Ron Hranac



Image © Darrell Dodge



Image © Darrell Dodge



Image © Ron Hranac

UPCOMING VOLUNTEER OPPORTUNITIES!!

We have two exciting outreach events coming up!

★ **Thursday, September 11, from 7:30 to 9:30 P.M. at The Meadows at Castle Rock.** They've asked us to provide a lecture on basic astronomy and a "what's up in the night sky" talk, as well as several telescopes to view through.

★ **Colorado Astronomy Day at the Denver Museum of Nature and Science.** The event will be on **Saturday, September 27.** As usual, they want us to have a table inside of "Space Odyssey" as well as telescopes for solar viewing outside the museum. They would also appreciate a couple of speakers so if you have a great idea for a talk, please send it my way and I'll see what the museum is looking for.

If you are interested in helping out at either (or both!) of these events, please send me an email at m63.sunflower.galaxy@gmail.com. If you already put your name in the hat for

Colorado Astronomy Day at the last general meeting, you do not need to send your name again. Ron Hranac was kind enough to forward me that list.

Photos courtesy of Jeff Tropeano. ★



Last year's Colorado Astronomy Day at the Denver Museum of Nature & Science brought the skies to a lot of folks—the young and the not-so-young. The DAS showed up with telescopes to share with the public and gave enlightening talks! At nightfall, people met at Chamberlin for a night of observing.



PRESIDENT'S MESSAGE

- ✓ *Sky & Telescope's Pocket Sky Atlas*, by Roger W. Sinnott
- ✓ *Sky & Telescope's Binocular Highlights*, by Gary Seronik
- ✓ *Finder Charts of The Messier Objects*, by Brent Watson (two volume set)
- ✓ *The Cambridge Star Atlas, Third Edition*, by Wil Tirion (this is the 9" x 12" spiral bound laminated edition)

If you're interested in learning the constellations, there are a lot of references that can help with that. One of my favorites is another *Sky & Telescope* publication, *A Constellation Album*, by P.K. Chen. For each constellation this book includes a written description, a nice astrophoto, and a clear plastic ". . . overlay showing the star pattern as the ancients may have imagined it." Even if you know the constellations like the back of your hand, the overlays are a lot of fun—plus, the book is educational.

A couple other excellent beginners' books are *The Backyard Astronomer's Guide*, by Terence Dickinson and Alan Dyer, and *Turn Left at Orion: Hundreds of Night Sky Objects to See in a Home Telescope—and How to Find Them*, by Guy Consolmagno and Dan M. Davis.

(CONTINUED FROM PAGE 2)

One of my astro-related passions is meteorites, and there is a decent selection of books available on the subject. One I especially like is *Rocks from Space, Second Edition*, by O. Richard Norton. Another is *Meteorites*, by Alain Carion (translated by Anne Black).

Among the best ways to check the optics of a telescope is a star test. But how does one go about doing so? Start with *Star Testing Astronomical Telescopes, A Manual for Optical Evaluation and Adjustment*, by Harold Richard Suiter. This is arguably the last word on the subject. Ok, maybe not quite the last word; Suiter has written a second edition of this book. My copy is the first edition.

Finally, a perennial favorite of many is the *Observer's Handbook*, published each year by the Royal Astronomical Society of Canada.

What about *Faraday, Maxwell, and the Electromagnetic Field: How Two Men Revolutionized Physics*, the book at the top of my date night shopping list? I bought it along with the Neil Armstrong book. It's next on my reading list. ★

GEARING UP FOR OKIE-TEX

Photos by Chuck Habenicht

Every year numerous DAS members venture south for the Okie-Tex star party at Camp Billy Joe outside of Kenton, OK. These photos from last year show (counter-clockwise from upper left): Jack Eastman giving his talk on “Ridiculously Tiny Telescopes;” one of those tiny telescopes; Joe Gafford with his setup; a view of the field from inside a camper’s tent; and Tim Havens with his twin Takahashi binocular telescope.

This year’s event is **September 20-28th**. Information is at: <http://www.okie-tex.com>. ★



NASA'S Space Place

DROUGHTS, FLOODS AND THE EARTH'S GRAVITY, BY THE GRACE OF NASA

by Dr. Ethan Siegel

A Space Place Partners' article

When you think about gravitation here on Earth, you very likely think about how constant it is, at 9.8 m/s^2 (32 ft/s^2). Only, that's not quite right. Depending on how thick the Earth's crust is, whether you're slightly closer to or farther from the Earth's center, or what the density of the material beneath you is, you'll experience slight variations in Earth's gravity as large as 0.2%, something you'd need to account for if you were a pendulum-clock-maker.

But surprisingly, the amount of *water content* stored on land in the Earth actually changes the gravity field of where you are by a significant, measurable amount. Over land, water is stored in lakes, rivers, aquifers, soil moisture, snow and glaciers. Even a change of just a few centimeters in the water table of an area can be clearly discerned by our best space-borne mission: NASA's twin Gravity Recovery and Climate Experiment (GRACE) satellites.

Since its 2002 launch, GRACE has seen the water-table-equivalent of the United States (and the rest of the world) change significantly over that time. Groundwater supplies are vital for agriculture and provide half of the world's drinking water. Yet GRACE has seen California's central valley and the southern high plains rapidly deplete their groundwater reserves, endangering a significant portion of the nation's food supply. Meanwhile, the upper Missouri River Basin—recently home to severe flooding—continues to see its water table rise.

NASA's GRACE satellites are the only pieces of equipment currently capable of making these global, precision measurements, providing our best knowledge for mitigating these terrestrial changes. Thanks to GRACE, we've been able to quantify the water loss of the Colorado River

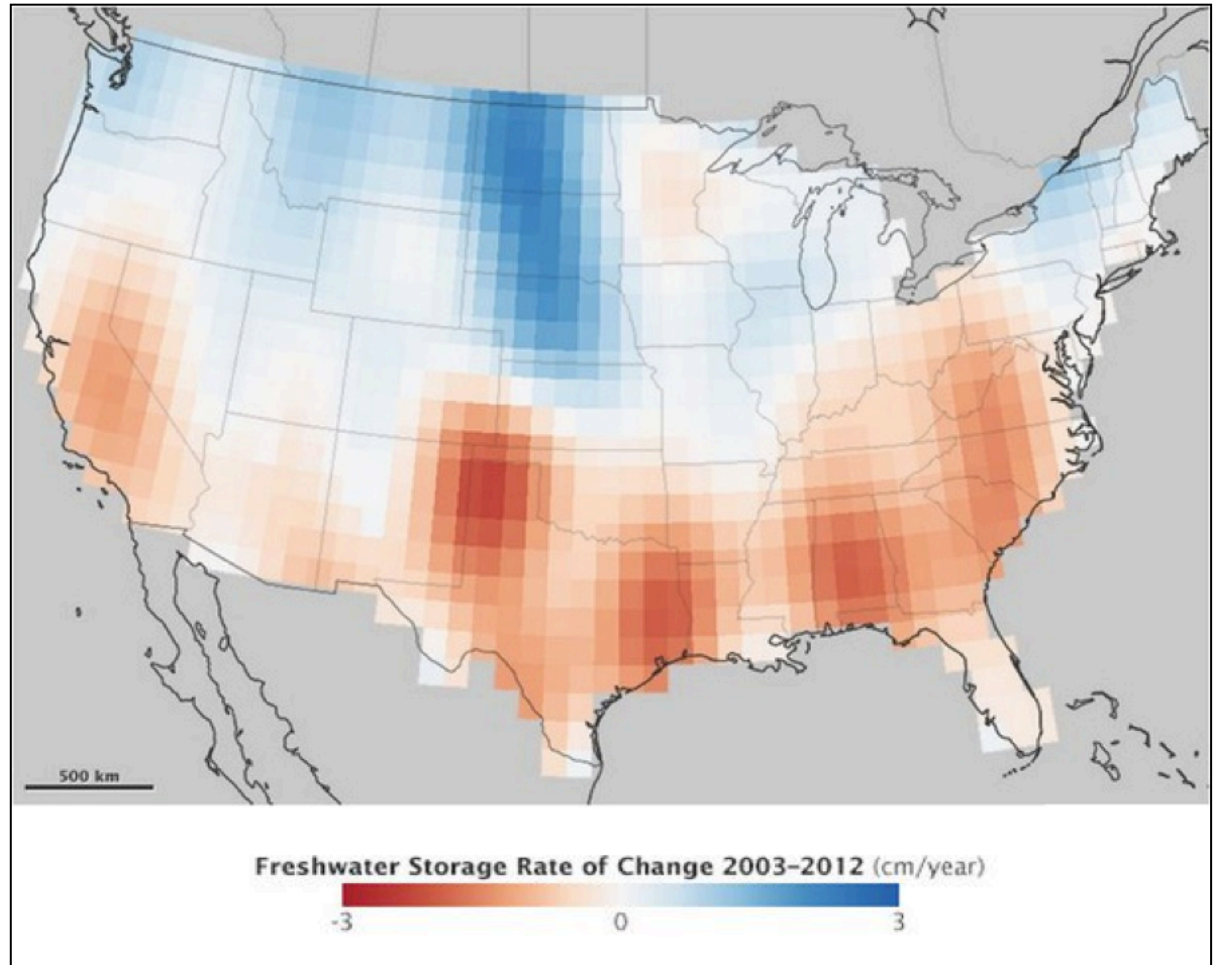


Image credit: NASA Earth Observatory image by Jesse Allen, using GRACE data provide courtesy of Jay Famigleitti, University of California Irvine and Matthew Rodell, NASA Goddard Space Flight Center. Caption by Holli Riebeck.

Basin (65 cubic kilometers), add months to the lead-time water managers have for flood prediction, and better predict the impacts of droughts worldwide. As NASA scientist Matthew Rodell says, “[W]ithout GRACE we would have no routine, global measurements of changes in groundwater availability. Other satellites can’t do it, and ground-based monitoring is inadequate.” Even though the GRACE satellites are nearing the end of their lives, the GRACE Follow-On satellites will be launched in 2017, providing us with this valuable data far into the future. Although the climate is surely changing, it’s water availability, *not* sea level rise, that’s the

largest near-term danger, and the most important aspect we can work to understand!

Learn more about NASA’s GRACE mission here: http://www.nasa.gov/mission_pages/Grace/

Kids can learn all about launching objects into Earth’s orbit by shooting a (digital) cannonball on NASA’s Space Place website. Check it out at: <http://spaceplace.nasa.gov/how-orbits-work/>. ★

SEPTEMBER SPEAKER: DAVE SCHLICHTING

Dave has been a longtime amateur astronomer who made a mid-life career change from the health care field to science teacher at Eaglecrest High School in Centennial, CO. Astronomy and space science soon became his primary teaching interests. Dave now teaches his full-year astronomy course to 300 students annually and also sponsors the Eaglecrest High School Astronomy Club. In 2012, Eaglecrest Astronomy Club students built a 20-inch Dobsonian telescope.

As an educator, Dave has been partnering with NASA since 2006. For the last seven years he has

been a presenter at the Space Exploration Educators Conference held each February at the Johnson Space Center in Houston. He is also the coordinator for a unique program called HUNCH, which provides high school students an opportunity to build scientific experiments done in micro-gravity. Qualified experiments may be deployed to the International Space Station.

Last year he was chosen to serve as Educator Ambassador for the **MAVEN mission to Mars**. MAVEN was built jointly by the University of Colorado and the University of California, Berkeley, and will arrive at Mars on Sept 21, 2014. This will be the subject of Dave's presentation to the DAS on September 5. ★

Photo provided by Dave Schlichting



FROM THE EDITOR:

For the last 20 years or so (off and on), I've enjoyed working with DAS members to gather articles and photos, and turn them into the publication we know as the *Denver Observer*. I've had the pleasure of working with many of you—help with proofreading and photo captions, event and date corrections, etc.—I couldn't have done it without you. Thank you. *Thank you, all.*

It's time I stepped down and let someone else express his or her creativity through this venue. I posted on the listserv that I needed a few months "hiatus," but I feel that a permanent editor is needed, if only for the sake of consistency. The DAS is a fine organization that deserves an editor committed to producing a quality publication.

I thank the numerous DAS presidents I've worked with over the years (they've always produced a monthly message to the membership on a timely basis and their proofreading has been "spot on"). Dennis Cochran, THANK YOU for writing the monthly "Skies" articles. Every month I could count on you whether you were in the country or not. Darrell Dodge, your advice and help has been immeasurable. Dan Miller (Signal Graphics), I don't know what I'd have done without you.

I'm launching a business that I hope some of you will check into. Within a month, "Oscar's Backyard" should be up and running. It's a simple project and one that I can funnel my creativity and "activism" into.

Thank you and best wishes always—*Patti Kurtz*



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