San Diego Astronomy Association

Celebrating Over 50 Years of Astronomical Outreach

April 2025

https://www.sdaa.org/
A Non-Profit Educational Association
P.O. Box 23215, San Diego, CA 92193-3215

Next SDAA Business Meeting
April 8th at 7:00pm

Via Zoom

Next Program Meeting
April 24th

Mission Trails Regional Park
Visitor and Interpretive Center
1 Father Junipero Serra Trail

CONTENTS

April 2025, Vol LXIII, Issue 4
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San Diego Astronomy Association
Incorporated in California in 1963

April 24th Progam Meeting

April 24, 2025 (Thursday)
6PM to ~9:30PM
MTRP (in-person)
Hosts: Cathy Handzel - DarkSky San Diego County, Chapter President, MTRP Staff, Kin Searcy and Dave Decker

Topic: International Dark Sky Week

DarkSky International strives to promote lighting practices that reduce the negative impacts of light pollution on wildlife, biodiversity, climate change, and human health. This recognition from the lighting design community beautifully illustrates the relationship between good lighting design and responsible dark sky-friendly practices.
'The Starry Walk' filmmaker, Olivier Bleys (Film screening)
Star party on the visitor center patio (Lyrids meteor shower is happening also!)

Newsletter Deadline
The deadline to submit articles for publication is the **15th** of each month.

See https://sdaa.org/program-meeting/

Link to SDAA Merchandise Store https://sdaa28.wildapricot.org/SDAA-Store

Link to Outreach Calendar https://calendar.google.com/calendar/embed?src=g-calendar@sdaa.org&ctz=America/Los_

San Diego Astronomy Association

San Diego Astronomy Association Board of Directors Meeting
March 11, 2025 – Unapproved and subject to revision

1. **Call to Order**
   The meeting was held via Zoom and was called to order at 7:04pm with the following board members in attendance: Dave Decker, President; Bee Pagarigan, Vice President; Mike Chasin, Treasurer; Kin Searcy, Recording Secretary; David Wood, Corresponding Secretary; Drew Koning, Director; Jerry Hilburn, Director; Ross Salinger, Director; and 7 SDAA members. BOD member absent and excused was Gracie Schutze, Director.

2. **Approval of Last Meeting Minutes**
   The February meeting minutes were approved by unanimous resolution. (Motion: D Konig/Second: J. Hilburn)

3. **Treasurers & Membership Report**
   The Treasurer's report was approved by unanimous resolution. (Motion: K. Searcy/Second: J. Hilburn) SDAA membership is presently 761. D&O insurance premium paid. The 2025 County Board of Equalization Property Tax Exemption request has been received by the county.

4. **Standard Reports.** The February standard reports are included as submitted with Board discussion and action in italics.

a) TDS Operations Report for March 2025 **Pagarigan/Myers**

Private Pads to be inspected and identified with respective numbers on a date TBD by Private Pad Committee Members.
Member request to install red lights for guidance at TDS main gate – work in progress
TDS Spring Clean-up scheduled for April 26, 2025. *(See item in New Business*)

b) Lipp Observatory **Rumsey**

Observatory: We continue to have excellent star parties. Number of visitors remains very high. Jim Traweek and Brian McFarland assisted with Lipp Telescope maintenance. Nearly everything checked out perfectly. We also cleaned and re-greased the worm and worm wheel – had been thirteen years since the last time. Still have a few follow-on maintenance items to accomplish. Scope is performing well.

We are still on track for a special star party with the University of San Diego on March 27.

c) Loaner Scopes **Krizak**

20 loaner items are currently out. 9 items were returned in January and 11 were checked out.

Two donated telescopes are pending evaluation and entry into the fleet:

Orion XT10i with encoders and push-to hand box
MiniTower Pro with an 8" SCT

The loaner laser collimators were checked, and one was found to be out of collimation itself. I was able to correct the collimation and then proceeded to get the Newtonian scopes into proper collimation.

A Celestron SE tripod with adjustable wedge was donated, and I see no reason for us to keep it. Unless anybody has any objections, I'll get it listed in the newsletter for sale to the membership. The tripod is in good shape and is probably valuable to members with Celestron SE scopes that wish to use them in equatorial mode. It would also be valuable to a member with a SeeStar S50 that wants to configure their scope in equatorial mode.

The donated Orion dob dolly/platform is another item that needs (re)assembly to see if it's complete. If so, it would probably make a good sale to club membership.

d) Storage Facility **Krizak**

There are still a few auction items that haven't been picked up yet. I'm looping back with the auction winners to see if we can get them picked up.

The Bill Lucas Newtonian still needs to find a permanent home. I propose we move it into the TDS storage box until a designated use for the scope or its optics can be found.

The storage facility is still in good condition and is seeing regular use.

e) Private Pads **Smith**

There has been minimal interest in leasing a pad while the power issue remains. I do expect that perhaps there will be an uptick now that the BOD has voted to proceed and there will probably be more once a rough timeline is established. I did get one response about power from the last Newsletter Article. Pad 55 is OK with running an extension cord from the road, but that is one of the locations that may result in a VERY long cord run (or a run through thick brush) depending on if they share power with pad 54 or 56. They would also

be interested in the Solar Option. *(The Chair thanked Mark Smith for his excellent article in the newsletter.)*

f) SDAA Private Pad Policy Committee **Gracie/Mark/Bill/Bee**

Board Action. Search in progress for a new chairperson to replace Pagarigan **Action Item BOD: 03-01** BOD members inform Dave Decker of nominee.

g) SDAA Monthly Programs **Pagarigan/Searcy/Dorothy Wood**

Work in progress

Program speaker schedule for remainder of year work in progress

Speaker fee of $200 permitted on trial basis

Tap in-house expertise speakers to reduce cost

Tasks Completed

March speaker scheduled - Steve Murray graciously agreed to present again

April meeting moved to 4/24 and will be in-person at MTRP, topic IDA, Cathy Handzel POC. *(Dave Decker expanded on this event which will be 6-9:30pm at the MTRP Visitor Center and include showing of an IDA movie with a star party afterwards on the terrace. Star party may extend later. SDAA will provide funding to support this event.)*

Board Action:

Establish Start/Stop time for 4/24/25 MTRP Program – 6PM-9:30PM

Decide if program should be streamed (D. Wood) **Action Item: BOD 03-02**

h) AISIG **Wood**

The first AISIG meeting of the year took place on Zoom on February 26th. The initial discussion revolved around planetary imaging, with several members sharing their equipment setups and data processing techniques. The latter part of the meeting

involved gathering input from the members on the topics they would like to see covered during the upcoming year.

As a novel concept for the AISIG meetings, the format was an informal discussion among all attendees, which was well-received with a lively exchange of questions and discussions on various aspects of planetary imaging. One attendee found it an excellent opportunity for "tech geeks" to connect and engage in conversations. We intend to adopt this meeting format throughout the year. The Next ASISG meeting is scheduled for March 26th.

i) Newsletter **Kuhl**

Nothing new to report this month.

j) Website **Stevens**

Contacts page was updated last month with the new Board and Committee Chairs. **Action Item BOD 03-03** Please review. Some of the pictures are pretty old. Please send new pictures for anyone who would like theirs updated.

https://sdaa.org/contacts/.

I posted a notice on the Julian Starfest website that we are looking for a new coordinator for the event. See https://julianstarfest.com/.

I have not yet received program information for the March SDAA meeting. *(Note speaker info received)*

k) SDAA Social Media Report for March 2025 **Pagarigan**

SDAA Podcast Hosts – Pagarigan/Morquecho

Tasks WIP or Completed

Video/Audio from 2024 SDAA Events undergoing edit
Video from 2025 Banquet undergoing edit
Program schedule for 2025 work in progress

l) Outreach Report **Ammann**

February might be the all time SDAA record setter for **cancelled** events? The weather was a major factor and a learning experience. If the weather forecast was for 'partly

cloudy' skies, that was a *GO* because in some cases, it was a clear night! The following **ten** events were cancelled for February because of foul weather: Stars-in-the-Park, Kumeyaay Lake Campground, Oakoasis County Park, Marie Curie Elementary School, Avondale Elementary School, Tierra Bonita Elementary School, K.Q. Ranch RV Resort, Village Elementary School, Sycamore Canyon Nature Preserve (East), and Barona Charter School.

If the weather cooperated like in the past, January and February would have been record breakers because of the number of events. The **six** schools and parks we did complete were very rewarding and fun because of their small numbers. They were: TDS Public Night, Tierra del Sol Middle School, Toler Elementary School, Sycamore Canyon Nature Preserve (West), TDS Member Night, and Canyon View Elementary School. I might add that Toler Elementary School's host and principal were the most hospitable and serious about dumping unnecessary lighting around their buildings, providing us with a dark playground.

February was indeed a sad month for stargazing and sharing the night sky with the general public.

Here are the numbers for February:

2025	Previous Total	February	YTD
Completed	9	5	14
Canceled	8	10	18
Total Attendance	775	470	1245

m) TARO **Wood**

TARO operations were still hampered by the weather but several member requested projects were completed. Unfortunately, the weather station system operation has become intermittent and occasionally drops the connection between the outdoor weather sensor and the software. Troubleshooting with the manufacture is ongoing but the outdoor weather station might need to be uninstalled and sent back the manufacture for testing and repair.

Projects completed - 3

New Project requests - 2

Total current projects in the Scheduler - 7

Total Imaging hours - 134 hours

n) Cruzen **Salinger**

Nothing much to report regarding the Cruzen. We had one user about a week ago who only stayed a couple of hours. I'm planning a new training session in April when the weather is better and more predicable in advance.

o) Merchandise Report **Burch**

Nothing new to report

p) Astronomical League Report **Smith**

Nothing to report.

q) JSF Report **Vacant**

No Report

r) North Grid Reconstruction - **Wood**

SDG&E has assigned a project number to the project and has sent the Neal Electric project proposal to their east county project coordinator for review. Once the Review has been completed, the project will be submitted to the county in order to obtain county permits

The 35% system design document created by ELEN Consulting has been delivered and is currently under review. We have 14 days from document delivery to comment and return to Neal for processing.

E. Rumsey and D. Wood will attend a 35% design review meeting this week with Neal to review the design and to update the cost and payment schedule. It was recognized that materials costs may increase due to the trade war.

5. Old Business

a) Website – WA – Privacy and ADA. Nothing to Report

b) Telescope Build Committee. On Hold

c) **JSF Coordinator**. There is still no JSF Coordinator and action is needed in the next few months to secure contracts and permits. There is a risk of cancellation. Previous committee members are willing to support. **Action Item BOD 03-04** BOD members let Dave Decker know if they know anyone who can take over this responsibility.

6. New Business

The BOD reviewed two proposed charters for committees necessary for SDAA strategic planning and expansion. These were the Project Proposal Committee Charter, drafted by J. Hilburn and the Strategic Planning Committee Charter, drafted by K. Searcy. Both charters are available on the SDAA public website.

a) The Project Proposal Committee will review, evaluate, and recommend action on project proposals submitted by SDAA members in response to a call for proposals that fit the SDAA goals established through the strategic planning process This committee will ensure fair, transparent, and strategic allocation of SDAA resources, including funding from the recently received endowment. This will be a member committee with a BOD member as liaison and the SDAA treasurer as non-voting financial member. The committee will meet monthly and report to the BOD quarterly. One of the early tasks will be to develop evaluation procedures for the various types of proposals expected to be submitted.

The BOD unanimously adopted the following resolution (Motion: K. Searcy/Second: M. Chasin)

> Move to accept the committee charter regarding the Project Proposal Committee as written and establish the committee. Appoint Jerry Hilburn as board liaison and who will report prospective membership to the board.

b) The Strategic Planning Committee will develop a strategic plan for SDAA and its associated Foundation. The committee will produce a core strategy for the strategic plan including an initial set of phased organizational goals, resource allocations, and key business processes to implement the strategy and, once the initial set of projects have been determined, write a strategic plan for SDAA. This will be a smaller “tiger team” member committee with BOD liaison and professional support. BOD members agreed that this should be a standing committee but reserved the option to restructure the committee based on the scope and schedule of the work. It was agreed that the committee should benchmark SDAA’s planning against similar non-profit and astronomical organizations.

The BOD unanimously adopted the following resolution (Motion: J. Hilburn/Second: R. Salinger)

Move to accept the committee charter regarding the Strategic Planning Committee as written and establish the committee. Appoint Dave Decker as board liaison who will report prospective membership to the board and evaluate and recommend professional support.

c) Spring Cleanup April 26. J. Hilburn agreed to be coordinator and Dave Decker agreed to contact EDCO for the roll off trash box. Mike offered his services to string trip private pads for a $20 donation to SDAA.

d) John Downing was appointed interim pad 70 manager to handle the required maintenance. Final disposition of pad 70 has not been resolved.

e) DocuSign/Acrobat. The BOD is evaluating platforms for electronic signing and management of SDAA documents, such as the Conflict-of-Interest statements required of BOD members and key committee members. Action Item BOD 03-03 Dave Decker and K. Searcy take for action.

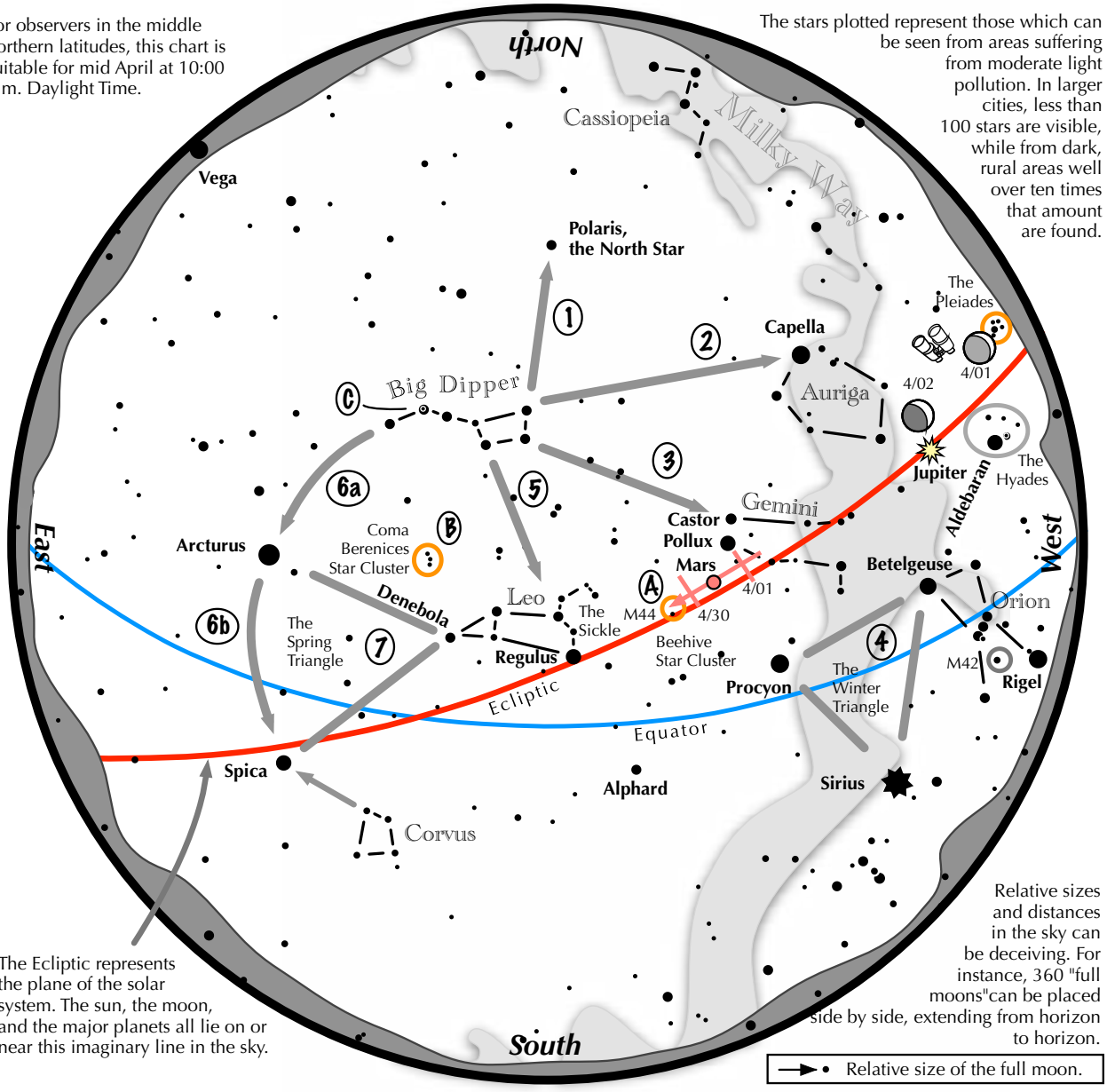
f) TDS Road Maintenance. Tierra Del Luna has deteriorated to the point that members are concerned, and additional storms are on the way. David W. noted that it is a county road that is privately maintained. J. Hilburn had contacted a local contractor three years ago to drag the road and fix SDAA's culvert. Although Tierra Del Luna requires more work for a long term fix, such work would require county permits. The BOD resolved to allocate $3000 for a short-term fix. (Motion: M. Chasin/ Second: R. Salinger) **Action Item: BOD 03-05** J. Hilburn will contact the previous contractor for the work.

7. Adjournment: The meeting was adjourned at 9:06pm.

Navigating the April Night Sky, Northern Hemisphere

For observers in the middle northern latitudes, this chart is suitable for mid April at 10:00 p.m. Daylight Time.

The stars plotted represent those which can be seen from areas suffering from moderate light pollution. In larger cities, less than 100 stars are visible, while from dark, rural areas well over ten times that amount are found.



The Ecliptic represents the plane of the solar system. The sun, the moon, and the major planets all lie on or near this imaginary line in the sky.

Relative sizes and distances in the sky can be deceiving. For instance, 360 "full moons"can be placed side by side, extending from horizon to horizon.

Relative size of the full moon.

Navigating the April night sky: Simply start with what you know or with what you can easily find.

1. Extend an imaginary line north from the two stars at the tip of the Big Dipper's bowl. It passes Polaris, the North Star.
2. Draw another imaginary line west across the top two stars of the Dipper's bowl. It strikes Capella low in the northwest.
3. Through the two diagonal stars of the Dipper's bowl, draw a line pointing to the twin stars of Castor and Pollux in Gemini.
4. Look in the west-southwest for the bright Winter Triangle stars of Sirius, Procyon, and Betelgeuse.
5. Directly below the Dipper's bowl reclines the constellation Leo with its primary star, Regulus.
6. Follow the arc of the Dipper's handle. It first intersects Arcturus, then continues to Spica.
7. Arcturus, Spica, and Denebola form the Spring Triangle, a large equilateral triangle.

Binocular Highlights

A: M44, a star cluster barely visible to the naked eye, lies to the southeast of Pollux.
B: Look nearly overhead for the loose star cluster of Coma Berenices.
C: In the Big Dipper's handle shines Mizar next to a dimmer star, Alcor.

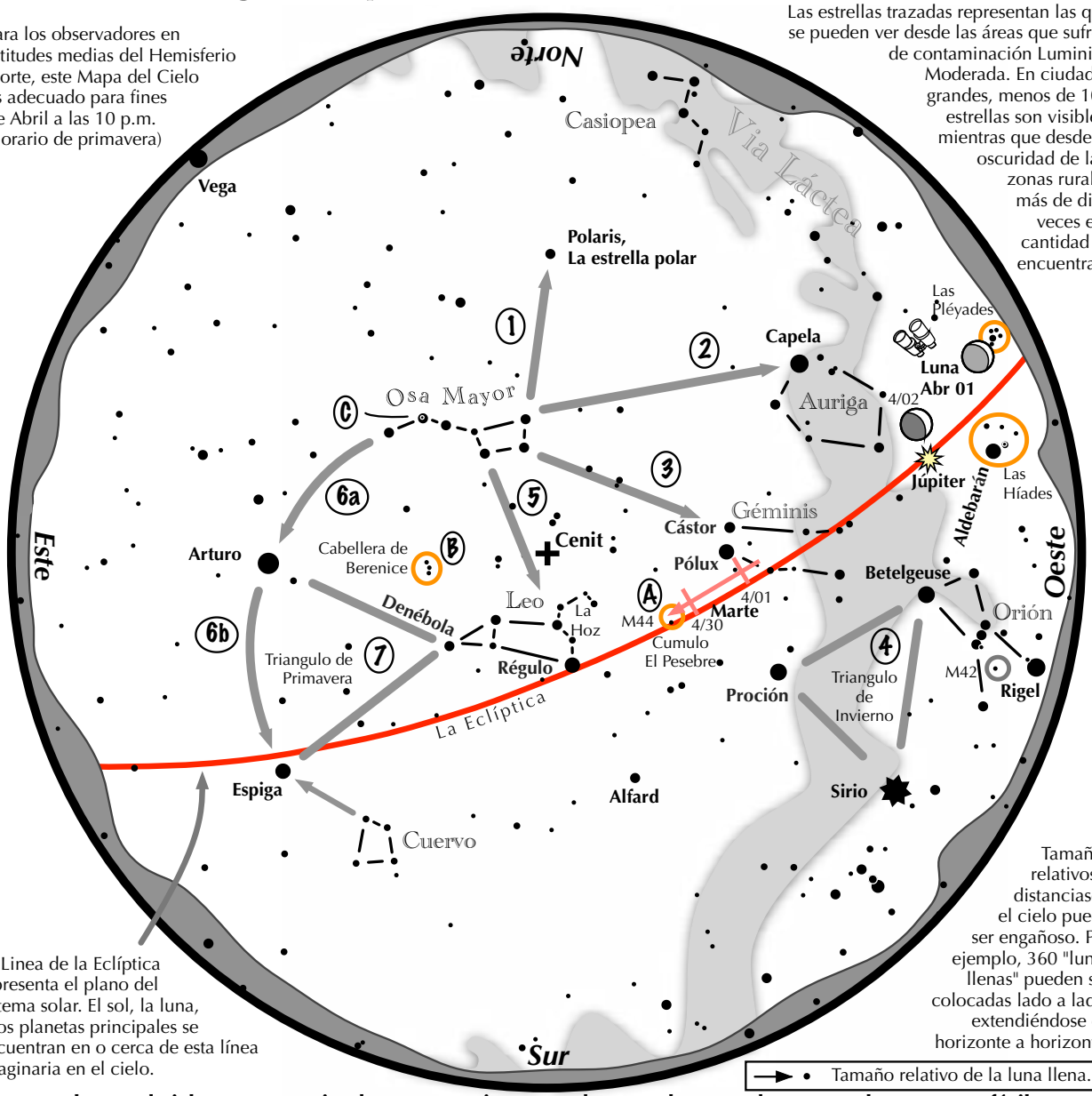
Astronomical League
www.astroleague.org

San Diego Astronomy Association

Navegando por el cielo nocturno de Abril

Para los observadores en latitudes medias del Hemisferio Norte, este Mapa del Cielo es adecuado para fines de Abril a las 10 p.m. (horario de primavera)

Las estrellas trazadas representan las que se pueden ver desde las áreas que sufren de contaminación Luminica Moderada. En ciudades grandes, menos de 100 estrellas son visibles, mientras que desde la oscuridad de las zonas rurales más de diez veces esa cantidad se encuentran.



La Linea de la Eclíptica representa el plano del sistema solar. El sol, la luna, y los planetas principales se encuentran en o cerca de esta línea imaginaria en el cielo.

Tamaños relativos y distanciasen el cielo puede ser engañoso. Por ejemplo, 360 "lunas llenas" pueden ser colocadas lado a lado, extendiéndose de horizonte a horizonte.

→ • Tamaño relativo de la luna llena.

Navegando por el cielo nocturno: simplemente comience con lo que sabe o con lo que puede encontrar fácilmente.

1. Haz una línea hacia el norte desde las dos estrellas en la punta de la Osa Mayor. Pasa por Polaris, la estrella polar.
2. Haz una línea a través de las dos estrellas superiores de la punta del tazón de la Osa Mayor. Llegaras a Capela en el noroeste.
3. A través de las dos estrellas diagonales de la Osa Mayor, dibuja una línea que apunta a las estrellas gemelas de Cástor y Pólux en Géminis.
4. Busque en el oeste-suroeste las brillantes estrellas del Triángulo de Invierno de Sirio, Procíon y Betelgeuse.
5. Directamente debajo del tazón de la Osa Mayor se encuentra Leo con su estrella principal, Régulo.
6. Siga el arco del mango del tazón de la Osa Mayor. Primero cruza Arturo, luego continúa hacia Espiga, luego Cuervo.
7. Arturo, Espiga y Denébola forman el triángulo de primavera, un gran triángulo equilátero.

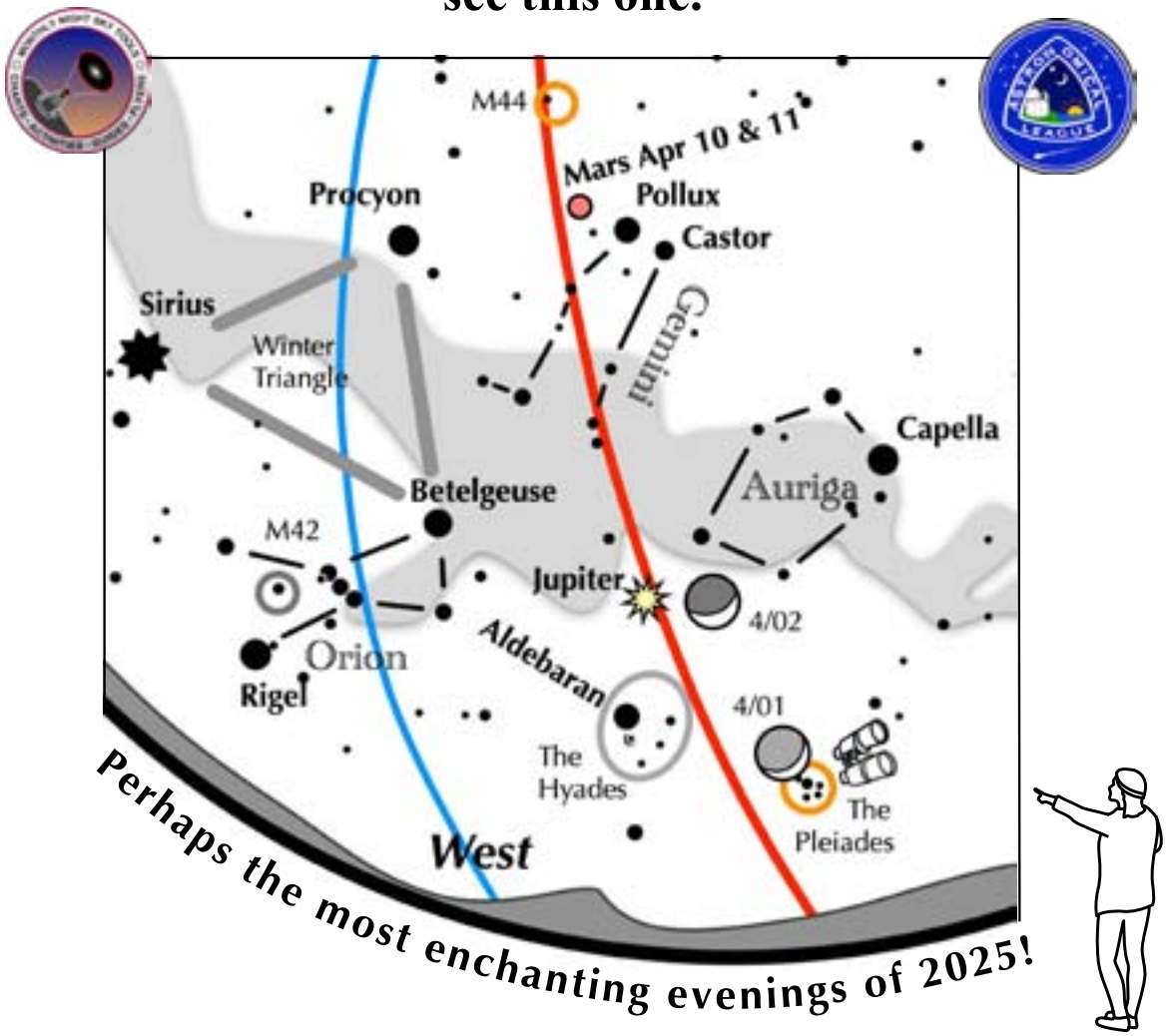
Puntos destacados con binoculares

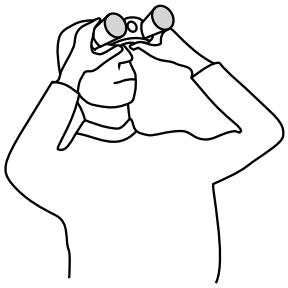
A: M44 (Cumulo El Pesebre), un cúmulo de estrellas apenas perceptible a simple vista, se encuentra al sureste de Pólux. **B:** Mira alto en el este para ver el cúmulo de estrellas perdidas de Cabellera de Berenice. **C:** Mizar brilla junto a una estrella más tenue, Alcor.

Liga Astronómica
www.astroleague.org

Traducción al español por Dr. Salvador Aguirre

If you can see only one celestial event this April, see this one.





Enhance the scene – use binoculars!

On April 1 & 2, look low in the west-northwest 60 minutes after sunset.

• On the first evening, the crescent moon, glowing full with earthshine, floats immediately above the delicate Pleiades star cluster. To its upper left, shine Aldebaran and the intriguing Hyades star cluster. And bright Jupiter lies above that.

• On the second evening, the slightly thicker, but more pronounced crescent moon moves above the Pleiades and next to Jupiter.

• Above it all, red Mars plows through Gemini, reaching alignment with Castor and Pollux on April 10 & 11.

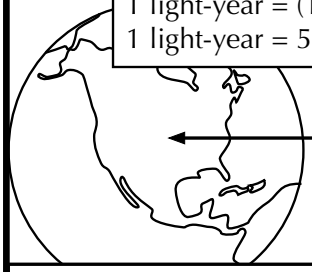
www.astroleague.org

A light-year is a unit expressing distance, not time.

Understanding the Light-Year (ly)

One light-year equals the distance that light travels through a vacuum in one year: about 5.9 trillion miles (or about 9.5 trillion km)

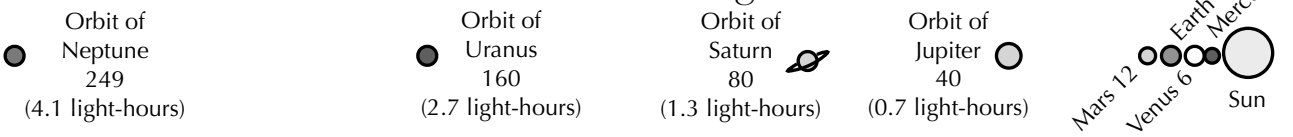
1 light-year = distance that light travels through a vacuum in 1 year
1 light-year = (velocity of light) x 1 year
1 light-year = (186,000 miles/sec x 3600 sec/hr x 24 hrs/day x 365.25 days/year) x 1 year
1 light-year = 5,870,000,000,000 miles = about 5.9 trillion miles



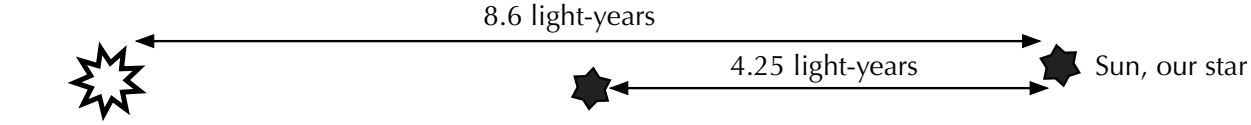
Distance to the Moon = 1.25 light–seconds

... another 498 light-seconds (or 8.3 minutes) to the Sun →

Distance from the Sun (light-minutes)



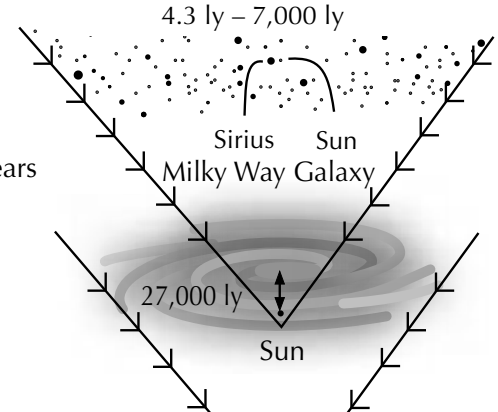
Distance to the Stars – and beyond (light-years) ...



Sirius, brightest star in our night sky

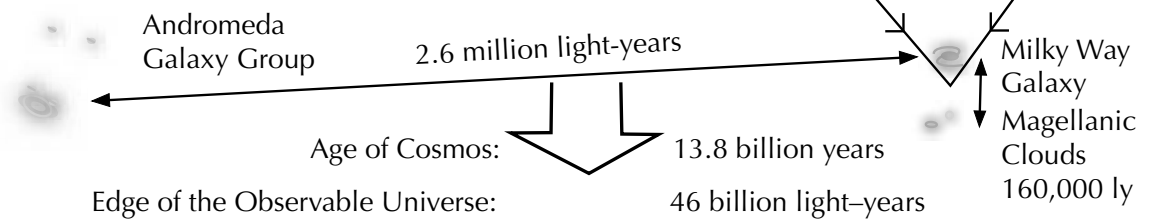
Proxima Centauri, the nearest star and member of the Alpha Centauri star system

All stars visible to the unaided eye:
4.3 ly – 7,000 ly



- ★ Distance to nearest star, Alpha Centauri: 4.3 light–years
- ★ Distance to next spiral arm in Milky Way: 7,000 light–years
- ★ Distance to center of the Milky Way Galaxy: 27,000 light–years
- ★ Diameter of Milky Way Galaxy: > 100,000 light–years

★ Distance to the farthest object a person can see with the unaided eye:
M31, the Andromeda Galaxy – 2.6 million light-years



Age of Cosmos: 13.8 billion years

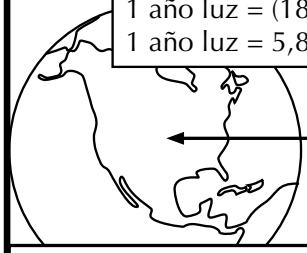
Edge of the Observable Universe: 46 billion light–years

Un año luz expresa distancia, no tiempo.

Entendiendo el año luz (al)

Un año luz es igual a la distancia que recorre la luz a través del vacío en un año: aproximadamente 5,9 billones de millas (o alrededor de 9,5 billones de kilómetros)

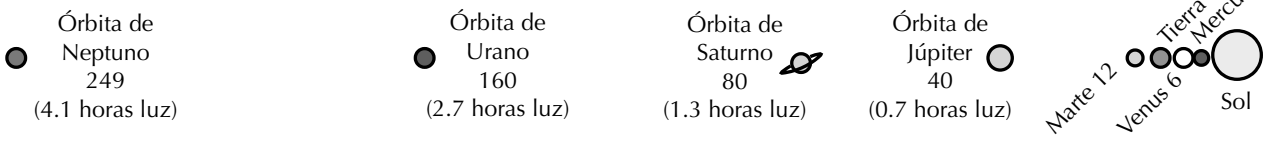
1 año luz = distancia que recorre la luz a través del vacío en 1 año
1 año luz = (velocidad de la luz) x 1 año
1 año luz = (186,000 millas / seg x 3600 seg / hora x 24 hora/dia x 365.25 dia/año) x 1 año
1 año luz = 5,870,000,000,000 millas = aproximadamente 5,9 billones de millas



Distancia a la luna = 1.25 segundos luz

... otros 498 segundos luz (o 8,3 minutos) al sol

Distancia del sol (minutos luz)



Distancia a las estrellas – y más allá (año luz) ...

8.6 año luz

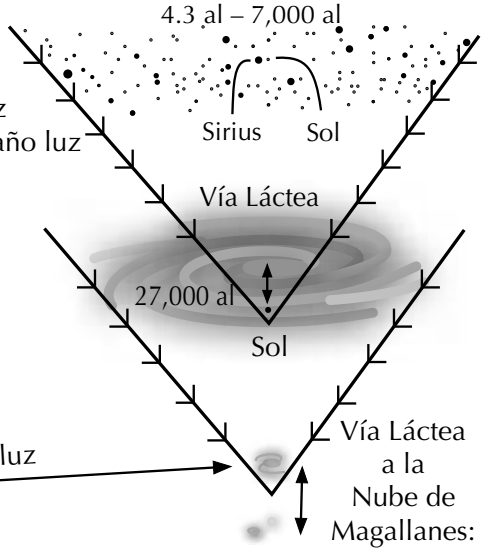
4.25 año luz

Sol
nuestra estrella

Sirio, la estrella más brillante de nuestro cielo nocturno

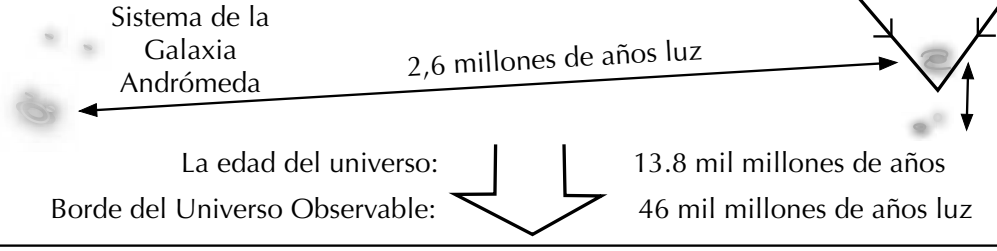
Proxima Centauri, la estrella más cercana y miembro del sistema estelar Alpha Centauri

Todas las estrellas visibles a simple vista:
4.3 al – 7,000 al



- Distancia a la estrella más cercana, Alpha Centauri: 4.3 año luz
- Distancia al siguiente brazo en espiral en la Vía Láctea: 7,000 año luz
- Distancia al centro de la Vía Láctea: 27,000 año luz
- Diámetro de la Vía Láctea: > 100,000 año luz

- Distancia al objeto más lejano que una persona puede ver a simple vista: M31, la galaxia de Andrómeda –2,6 millones de años luz



La edad del universo: 13.8 mil millones de años

Borde del Universo Observable: 46 mil millones de años luz

TDS Cleanup on April 26th

The SDAA will be holding its annual spring cleanup at TDS on Saturday, April 26th from 9AM to 4PM. A dumpster will be positioned at the compound for everyone to use in sprucing up their pads and junk removal. A list of allowed items will be posted on the container. Cleanup will commence at 9AM. This is a good time to clear any decomposing tarps and carpeting, as well as dried brush from your pad area.

Due to power being off on the private pads attendees are encouraged to bring battery or gas weed trimmers to help with clearing spring growth on the private pads. Also recommended are yard tools, sun protection, and to wear protective clothing as desert brush and cactus can be irritating. We will supply water, soda, and light snacks for everyone who attends.

If you own a private pad but are unable to attend, Mike Chasin has graciously offered to clean up your pad area for a $20 donation to the club. Please send a note to treasurer@sdaa.org requesting his services.

This is a great opportunity to come out and visit the site. Tours of the compound will be held in the afternoon. New members are encouraged to come out and help cleanup TDS, meet fellow members, and learn how to open and access the site on their own.

Please contact Jerry Hilburn at 858-877-3103 or send email to jerry.hilburn@sdaa.org to RSVP as this will help with planning supplies.

Ad Astra!

Astronomical.League

on Facebook ...

Monthly sky maps,
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San Diego Astronomy Association

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Have a great new piece of gear? Read an astronomy-related book that you think others should know about? How about a photograph of an SDAA Member in action? Or are you simply tired of seeing these Boxes in the Newsletter rather than something, well, interesting?

Join the campaign to rid the Newsletter of little boxes by sharing them with the membership. In return for your efforts, you will get your very own byline or photograph credit in addition to the undying gratitude of the Newsletter Editor. Just send your article or picture to Newsletter@SDAA.Org.

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The NSN program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

April's Night Sky Notes: Catch the Waves!

By Kat Troche

The Electromagnetic Spectrum

If you've ever heard the term "radio waves," used a microwave or a television remote, or had an X-ray, you have experienced a broad range of the electromagnetic spectrum! But what is the electromagnetic spectrum? According to Merriam-Webster, this spectrum is *"the entire range of wavelengths or frequencies of electromagnetic radiation extending from gamma rays to the longest radio waves and including visible light."* But what does **that** mean? Scientists think of the entire electromagnetic spectrum as many types of light, only some that we can see with our eyes. We can detect others with our bodies, like infrared light, which we feel as heat, and ultraviolet light, which can give us sunburns. Astronomers have created many detectors that can "see" in the full spectrum of wavelengths.

This illustration shows the wavelength sensitivity of a number of current and future space- and ground-based observatories, along with their position relative to the ground and to Earth's atmosphere. The wavelength bands are arranged from shortest (gamma rays) to longest (radio waves). The vertical color bars show the relative penetration of each band of light through Earth's atmosphere. Credit: NASA, STScI

Telescope Types

While multiple types of telescopes operate across the electromagnetic spectrum, here are some of the largest, based on the wavelength they primarily work in:

- **Radio:** probably the most famous radio telescope observatory would be the Very Large Array (VLA) in Socorro County, New Mexico. This set of 25-meter radio telescopes was featured in the 1997 movie Contact. Astronomers use these telescopes to observe protoplanetary disks and black holes. Another famous set of radio telescopes would be the Atacama Large Millimeter Array (ALMA) located in the Atacama Desert in Chile. ALMA was one of eight radio observatories that helped produce the first image of supermassive black holes at the center of M87 and Sagittarius A* at the center of our galaxy. Radio telescopes have also been used to study the microwave portion of the electromagnetic spectrum.

- **Infrared:** The James Webb Space Telescope (JWST) operates in the infrared, allowing astronomers to see some of the earliest galaxies formed nearly 300 million years after the Big Bang. Infrared light allows astronomers to study galaxies and nebulae, which dense dust clouds would otherwise obscure. An excellent example is the Pillars of Creation located in the Eagle Nebula. With the side-by-side image comparison below, you can see the differences between what JWST and the Hubble Space Telescope (HST) were able to capture with their respective instruments.

NASA's Hubble Telescope captured the Pillars of Creation in 1995 and revisited them in 2014 with a sharper view. Webb's infrared image reveals more stars by penetrating dust. Hubble highlights thick dust layers, while Webb shows hydrogen atoms and emerging stars. You can find this and other parts of the Eagle Nebula in the Serpens constellation. Credit: NASA, ESA, CSA, STScI, Hubble Heritage Project (STScI, AURA)

- **Visible:** While it does have some near-infrared and ultraviolet capabilities, the Hubble Space Telescope (HST) has primarily operated in the visible light spectrum for the last 35 years. With over 1.6 million observations made, HST has played an integral role in how we view the universe. Review Hubble's Highlights here.

The Crab Nebula, located in the Taurus constellation, is the result of a bright supernova explosion in the year 1054, 6,500 light-years from Earth. Credit: X-ray: NASA/CXC/SAO; Optical: NASA/STScI; Infrared: NASA/JPL/Caltech; Radio: NSF/NRAO/VLA; Ultraviolet: ESA/XMM-Newton

- **X-ray:** Chandra X-ray Observatory was designed to detect emissions from the hottest parts of our universe, like exploding stars. X-rays help us better understand the composition of deep space objects, highlighting areas unseen by visible light and infrared telescopes. This image of the Crab Nebula combines data from five different telescopes: The VLA (radio) in red; Spitzer Space Telescope (infrared) in yellow; Hubble Space Telescope (visible) in green; XMM-Newton (ultraviolet) in blue; and Chandra X-ray Observatory (X-ray) in purple. You can view the breakdown of this multiwavelength image here.

Try This At Home

Even though we can't see these other wavelengths with our eyes, learn how to create multiwavelength images with the Cosmic Coloring Compositor activity and explore how astronomers use representational color to show light that our eyes cannot see with our Clues to the Cosmos activity.

2025 TDS Star Party Schedule

Date	Type	Sunset	Astro. Twi.	Moonrise(set)	Closing	Illumination
Jan-04-2025	Public	4:56 PM	6:23 PM	(10:11 PM)	9:30 PM	28.3%
Jan-25-2025	Member	5:15 PM	6:40 PM	4:44 AM	9:30 PM	16.3%
Feb-01-2025	Public	5:21 PM	6:46 PM	(9:08 PM)	10:00 PM	14.9%
Feb-22-2025	Member	5:40 PM	7:02 PM	3:26 AM	10:00 PM	31.8%
Mar-01-2025	Public	5:46 PM	7:08 PM	(8:00 PM)	10:00 PM	5.0%
Mar-29-2025	Member	7:06 PM	8:30 PM	(7:47 PM)	11:30 PM	0.2%
Apr-19-2025	Public	7:21 PM	8:49 PM	1:47 AM	11:30 PM	65.5%
Apr-26-2025	Member	7:26 PM	8:56 PM	5:45 AM	11:59 PM	1.7%
May-17-2025	Public	7:42 PM	9:17 PM	12:27 AM	11:59 PM	79.6%
May-24-2025	Member	7:46 PM	9:24 PM	4:16 AM	11:59 PM	8.6%
Jun-21-2025	Member	7:59 PM	9:41 PM	2:50 AM	11:59 PM	19.3%
Jun-28-2025	Public	8:00 PM	9:41 PM	(10:55 PM)	11:59 PM	15.1%
Jul-19-2025	Public	7:55 PM	9:32 PM	1:29 AM	11:59 PM	32.1%
Jul-26-2025	Member	7:51 PM	9:26 PM	(9:22 PM)	11:59 PM	5.2%
Aug-16-2025	Public	7:31 PM	9:00 PM	12:15 AM	11:59 PM	46.0%
Aug-23-2025	Member	7:23 PM	8:50 PM	7:39 AM	11:59 PM	0.4%
Sep-13-2025	Public	6:56 PM	8:19 PM	11:06 PM	11:00 PM	60.5%
Sep-20-2025	Member	6:47 PM	8:09 PM	6:27 AM	11:00 PM	1.1%
Oct-18-2025	Member	6:11 PM	7:33 PM	5:17 AM	10:30 PM	7.1%
Oct-25-2025	Public	6:04 PM	7:26 PM	(8:37 PM)	10:30 PM	16.9%
Nov-15-2025	Public	4:47 PM	6:12 PM	3:07 AM	9:00 PM	18.1%
Nov-22-2025	Member	4:44 PM	6:10 PM	(6:26 PM)	9:00 PM	6.3%
Dec-13-2025	Public	4:43 PM	6:11 PM	1:58 AM	9:00 PM	33.2%
Dec-20-2025	Member	4:46 PM	6:14 PM	(5:17 PM)	9:00 PM	0.7%

SDAA is now registered with the employer fund-matching platform Benevity. If your workplace offers matching charitable donations for non-profits and uses Benevity to distribute funds, you can now designate the San Diego Astronomy Association. Thank you for supporting the SDAA!

MEMBERSHIP INFORMATION

Send dues and renewals to P.O. Box 23215, San Diego, CA 92193-3215 or renew on-line. The notice that your membership in SDAA will expire is sent by email. Dues are $60 for Contributing Memberships; $40 for Basic Membership; $70 for Private Pads; $5 for each Family membership.