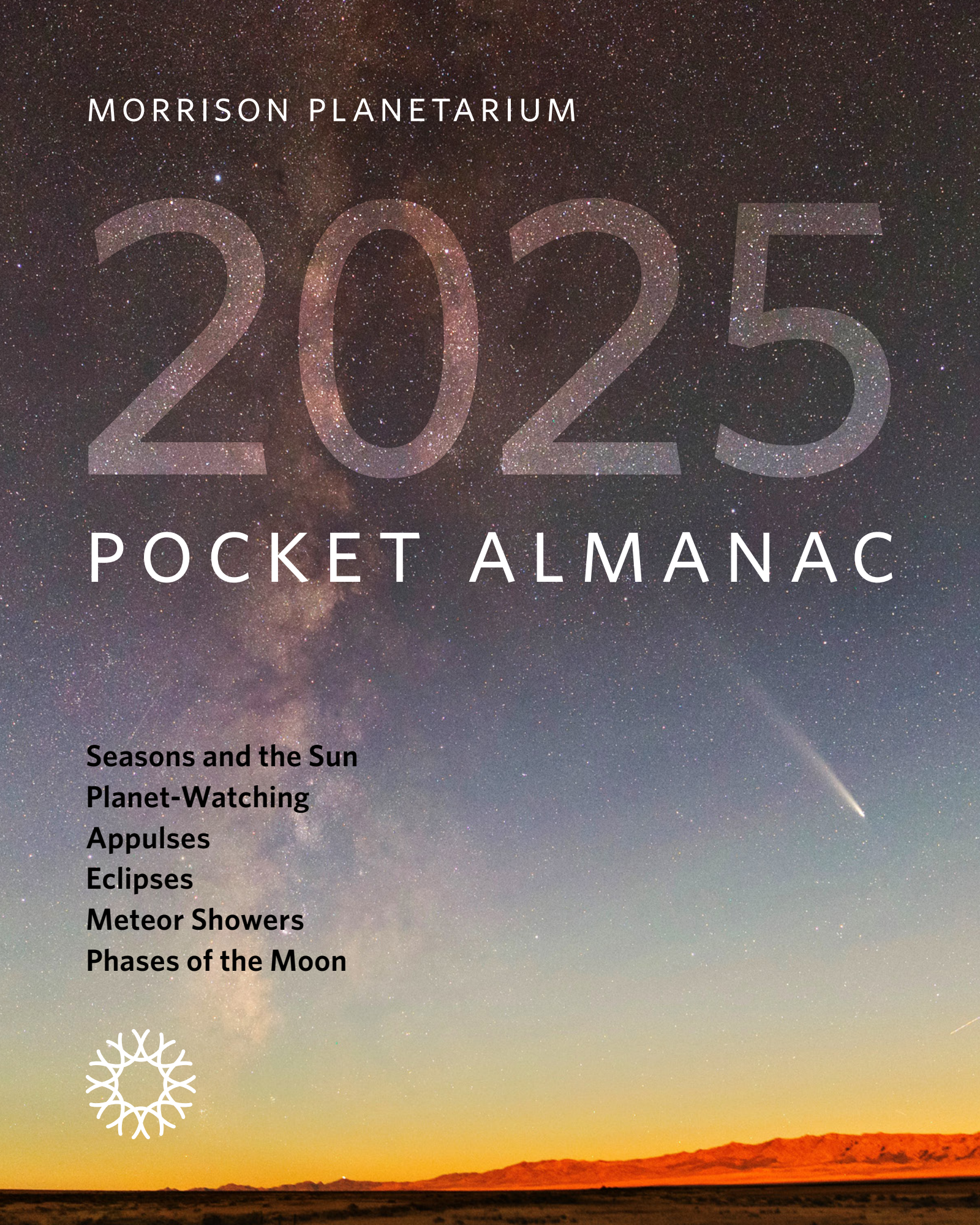

MORRISON PLANETARIUM

2025

POCKET ALMANAC

Seasons and the Sun
Planet-Watching
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ALEXANDER F. MORRISON PLANETARIUM

Since 1952, the Academy's Morrison Planetarium has served the community as a valuable resource for astronomy education and skywatching information. It was the first major planetarium in the U.S. to build its own optomechanical star projector, which was considered at the time to be the world's finest simulator of the night sky. Now updated with state-of-the-art digital technology, the planetarium immerses audiences in fulldome imagery based on actual scientific data, from the smallest living cells to the surfaces of distant planets and immense clusters of galaxies.

CALIFORNIA ACADEMY OF SCIENCES

Home to Morrison Planetarium, Steinhart Aquarium, Kimball Natural History Museum, Osher Rainforest, and world-class research and education programs, the California Academy of Sciences is the world's greenest museum and one of San Francisco's "must-see" destinations. Explore the depths of a Philippine coral reef, view a rainforest canopy amid swarms of butterflies, and blast off to the outer reaches of the Universe, all under one living roof. Daily interactions with animals, educators, and biologists within immersive, hands-on exhibits offer discovery and wonder for visitors of all ages.

SEASONS AND THE SUN

The terms below apply to the Northern Hemisphere.
South of the equator, the seasons are reversed.

SPRING
EQUINOX

MAR 20

2:01 AM PT

SUMMER
SOLSTICE

JUN 20

7:42 PM PT

AUTUMN
EQUINOX

SEP 22

11:19 AM PT

WINTER
SOLSTICE

DEC 21

7:03 AM PT

PERIHELION

(Earth closest to the Sun):
JAN 4—0.98333 AU

APHELION

(Earth farthest from the Sun):
JUL 3—1.01664 AU

AU = Astronomical Unit, the average distance from Earth to the Sun (149,597,871 km or 92,955,807 mi)

DAYLIGHT SAVING TIME

(clocks set one hour ahead of Standard Time): MAR 9–NOV 2

Times and dates in this Pocket Almanac are given in Pacific Time. Calendars using anything other than Pacific Time may list certain events as occurring on the following day, because the conversion to other time zones occasionally crosses midnight, thus advancing the date.

PLANET-WATCHING

Five planets can be seen in the sky with the unaided eye. They are generally brighter than most stars and typically don't twinkle. Over time, they can be seen to change their positions against the constellations, which is why the ancients referred to them as "wandering stars."

PLANET	MORNING SKY	EVENING SKY	CONJUNCTION	OPPOSITION
Mercury	JAN 1–FEB 9 MAR 24–MAY 29 JUL 31–SEP 13 NOV 20–DEC 31	FEB 9–MAR 24 MAY 29–JUL 31 SEP 13–NOV 20	FEB 9 *(sup)* MAR 24 *(inf)* MAY 29 *(sup)* JUL 31 *(inf)* SEP 13 *(sup)* NOV 20 *(inf)*	
Venus	MAR 22–DEC 31	JUN 1–MAR 22	MAR 22 *(inf)*	
Mars	JAN 1–15	JAN 15-DEC 31		JAN 15
Jupiter	JUN24–DEC 31	JAN 1–JUN 24	JUN 24	
Saturn	MAR 12–SEP 20	JAN 1–MAR 12 SEP 20–DEC 31	MAR 12	SEP 20

Visibility ranges above may vary slightly with latitude and are based on conjunction dates. A planet may become lost in the Sun's glare the closer it is to conjunction.

CONJUNCTIONS—A conjunction occurs when a planet is in line with the Sun as observed from Earth and is crossing from the morning to the evening sky (or vice-versa). In the case of Mercury and Venus, *inferior (inf)* conjunction is when the planet is on the same side of the Sun as Earth and located between them, while *superior (sup)* conjunction is when the planet and Earth are on opposite sides of the Sun (planets farther from the Sun than Earth never come between the two and so are never seen at inferior conjunction).

OPPOSITIONS—Opposition is the best time to observe an outer planet, when it's *opposite* the Sun in the sky. This means it rises at sunset and is visible all night, appearing largest and brightest in our sky. Being inside Earth's orbit, Mercury and Venus are never seen at opposition.

APPULSES

Occasionally, two planets appear very close together in the sky—this is called an appulse. On the following dates, the planets listed will be separated by 1° or less (easily within the same field of view in binoculars).

AUGUST 12—Venus & Jupiter 1° apart, morning sky

PHASES OF THE MOON

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
New Moon	29	27	29	27	26	25	24	22	21	21	19	19
First Quarter	6	5	6	4	4	2	2	1/30	29	29	27	27
Full Moon	13	12	13	12	12	11	10	9	7	6	5	4
Last Quarter	21	20	22	20	20	18	17	15	14	13	11	11

ECLIPSES

This year, the Sun, Earth, and the Moon line up four times, producing two lunar eclipses and two solar eclipses.

MARCH 13–14—The year's first eclipse is a **total lunar eclipse**, easily visible from the Americas as well as Western Europe and West Africa. During a total lunar eclipse, the Moon passes through the dark central portion of Earth's shadow (the **umbra**), resulting in the Moon becoming very dark. Weather permitting, the entirety of the eclipse will be visible from all of North America, but in San Francisco, only night owls will get a good look—the eclipse begins Thursday at 8:57 PM PDT and ends in the early morning Friday at 3:00 AM PDT, with maximum occurring just before midnight at 11:58 PM PDT.

MARCH 29—The first solar eclipse of the year is a **partial solar eclipse**, when the center of the Moon's shadow misses Earth. Instead of the deep darkness of a total eclipse or the "ring of fire" of an annular eclipse, the Sun appears as a crescent during a partial eclipse. The eclipse will be visible from Northwest Africa, Europe, and Northern Russia, but observers in eastern Nunavut and northern Quebec will see the greatest coverage, where more than 90% of the Sun's disc will be blocked by the Moon.

SEPTEMBER 7-8—The Moon passes through the **umbra**, the deepest part of Earth's shadow, for a second time in 2025, creating another **total lunar eclipse**. However, the action happens on the opposite side of the globe! Europe, Africa, Asia, and Australia will get a good look, but observers in the Americas are out of luck.

SEPTEMBER 21—The final eclipse of the year is another **partial solar eclipse**, visible from the South Pacific, New Zealand, and Antarctica. Once again, only a portion of the Sun's disk will be blocked by the Moon, and the last solar eclipse of the year isn't as deep as the March event. Even at maximum, only about 85% of the Sun's disk will be covered by the Moon.

MAJOR METEOR SHOWERS

On any given night, about two to four sporadic meteors can be seen per hour and slightly more frequently toward dawn, as tiny particles of space dust burn up in Earth's atmosphere. When Earth passes through the dust trail left behind by a passing comet, more of these particles rain through the atmosphere, causing a meteor shower. Showers are named after the constellation from which meteors appear to radiate. Visibility can be affected by weather and by the Moon's brightness.

SHOWER	ACTIVE PERIOD	PEAK DATE*	RATE*	MOON PHASE
Quadrantids	JAN 1–5	JAN 2–3	40	Waxing crescent (!)
Lyrids	APR 15–30	APR 21–22	20	Waning crescent
Eta Aquarids	APR 20–MAY 21	MAY 3–4	10–15	First quarter
Delta Aquarids	JUL 18–AUG 12	JUL 29–30	20	Waxing crescent
Perseids	JUL 17–AUG 23	AUG 12–13	60	Waning gibbous
Orionids	OCT 2–NOV 7	OCT 21–22	20	New (!)
Leonids	NOV 6–30	NOV 17–18	15	Waning crescent (!)
Geminids	DEC 4–17	DEC 14–15	50–80	Waning crescent
Ursids	DEC 17–26	DEC 22–23	5–10	Waxing crescent

**The peak date of a meteor shower is when the maximum rate of meteors is expected to be observed, but it is not the only date to watch for them. Moonlight-permitting, better-than-usual rates may also be seen during the midnight-to-dawn hours a day or two before and after the peak date. Exclamation marks (!) indicate favorable prospects. Rates given are for ideal conditions (clear sky, no Moon, observing site away from bright lights, dark-adapted vision).*

DIGITAL POCKET ALMANAC is downloadable at: *www.calacademy.org*.

QUARTERLY SKYGUIDE, visit: *www.calacademy.org/exhibits/morrison-planetarium*

THE BENJAMIN DEAN LECTURE SERIES presents monthly talks for the general public by noted scientists in the fields of astronomy and space science, including leading cosmologists, astrobiologists, planet hunters, and principal investigators for NASA space missions. For information, please visit: *www.calacademy.org/events/benjamin-dean-astronomy-lectures* or call 415.379.8000.

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