

## **Introduction to all-sky maps for observing planets and bright stars at morning and evening mid-twilight**

[March 2022, lat. 40° N]

by Robert C. Victor and Robert D. Miller

When organizing a first sky watching session for students, we suggest that you begin your outdoor session during evening twilight, so students can experience the joy of discovering and identifying the brighter stars as they first appear. Begin your session no later than one-half hour after sunset, or even earlier if the Moon or a bright planet is visible. You may wish to continue until the sky is dark enough for naked-eye observation of constellations of interest. Binoculars and telescopes can provide inspiring views of Moon, planets, double stars, star clusters such as the Hyades and the Pleiades in Taurus and the Beehive in Cancer, the Great Nebula in Orion's sword, Andromeda Galaxy, and more.

If you also schedule a predawn session, you can start as early as 1¾ to 2 hours before sunrise, before morning twilight begins, to allow enough dark-sky time to observe a selection of constellations and deep sky objects. Continue long enough into twilight to watch some of the brighter stars disappear. The March predawn sky is similar to that seen at nightfall in July. From dark sites without a bright Moon, the Milky Way star clouds of the Summer Triangle, Sagittarius, and Scorpius will be in fine view before twilight gets underway.

My friend and former colleague at Michigan State

University, Mr. Robert D. Miller, has kindly created computer programs and provided us with monthly sky charts tracking daily locations of the five naked-eye planets and the 15 stars of first magnitude or brighter visible from latitude 40° north. (The 1.6-mag. star Castor is also plotted, to help identify 1.2-mag. Pollux, just 4.5° away.) Positions of the stars and planets are plotted each day at the moment the Sun is 9° below the horizon, which we have called "mid-twilight". Locations of the planets are plotted as a separate dot for each day, with larger dots plotted weekly on the 1st, 8th, 15th, 22nd, and 29th day of the month. Star positions during the course of the month are plotted as continuous tracks, with all stars drifting westward (left to right on the charts) in the course of the month, owing to the Earth's revolution around the Sun.

For latitude 40° N, the moment of evening mid-twilight during the course of the year occurs 43 to 53 minutes after sunset, and morning mid-twilight occurs a similar interval ahead of sunrise. For locations south of lat. 40° N, the same stage of twilight occurs closer to sunset and sunrise, and for locations farther north, twilights are longer.

### **In March 2022, at morning mid-twilight, brilliant**

**Venus** is found in SE to ESE, as depicted on our morning mid-twilight star map for March 2022

[N202203A.pdf]. **Mars lingers nearby all month.** The fainter red planet appears 5° lower right of Venus at start of March, reaches a minimum distance of 3.9° lower right

of Venus on March 15 and 16, and ends month  $6^\circ$  to the right of Venus. **On March 2, Mercury and Saturn form a close pair  $0.7^\circ$  apart, within  $23^\circ$  lower left of Venus,** but binoculars will be required to spot the pair just above the ESE horizon in bright twilight. Mercury is the brighter member of the pair, with Saturn to its upper left. Mercury gets lower each lower each morning, and will disappear within a few days, while Saturn, getting higher, becomes visible to unaided eye. **On March 28 and 29, Saturn will appear within  $2.2^\circ$  lower right of Venus. On March 28, the three planets Venus, Saturn, and Mars will span just  $5.3^\circ$ , with a 16-percent illuminated crescent Moon just  $5^\circ$  to  $7^\circ$  below them.**

**Bright stars of March mornings** include the *Summer Triangle* with its brightest member, blue-white **Vega** very high in ENE, approaching overhead, and **Altair** and **Deneb** nearby. **Antares**, the red supergiant star marking the heart of Scorpius, begins low in south and ends month slightly lower, in SSW. Bright, golden **Arcturus** begins March high in WSW, with **Spica**  $33^\circ$  to its lower left, in SW. Both stars move lower as month progresses, Arcturus toward west, and Spica toward WSW.

**Evenings during March 2022**, no naked-eye planets are visible. Our evening mid-twilight sky map [N202203P.pdf] shows **Sirius, the “Dog star”**, the brightest nighttime star, crossing the southern sky, from SSE to SSW in the course of the month. Northernmost of the bright stars is **Capella, the “Mother Goat star”**, passing north of overhead in early March and high in WNW at month’s

end. **Sirius, Procyon, the “Lesser Dog star”, and Betelgeuse, shoulder of Orion, the Hunter,** comprise the nearly equilateral *Winter Triangle*. Members of the *Winter Hexagon*, in clockwise order beginning with its brightest star, are **Sirius; Procyon; Pollux and Castor, the “Twin” stars of Gemini, just  $4.5^\circ$  apart; Capella; Aldebaran, eye of Taurus the Bull; Rigel, Orion’s foot;** and back to **Sirius**, completing the polygon, with **Betelgeuse** inside.

**Regulus, heart of Leo, the Lion**, appears in the east at dusk as March opens, and climbs high into southeast as month progresses. **Arcturus, the “Bear-watcher star”**, rises in ENE late in March, while **Deneb**, one of the stars of the *Summer Triangle*, sinks out of sight in NNW.

*Robert C. Victor was Staff Astronomer at Abrams Planetarium, Michigan State University. He is now retired and enjoys providing sky watching sessions for groups in and around Palm Springs.*

*Robert D. Miller, who provided the twilight charts, did graduate work in Planetarium Science and later astronomy and computer science at Michigan State University and remains active in research and public outreach in astronomy.*