WEST VIRGINIA UNIVERSITY
EBERLY COLLEGE OF ARTS AND SCIENCES
THE DEPARTMENT OF PHYSICS
WVU PLANETARIUM AND OBSERVATORY

Mountaineer Skies

Volume 13, Issue 3 http://planetarium.wvu.edu/ July – August – September, 2013

On July 5, the Earth will be at aphelion. This is when it is farthest from the Sun. The Sun will be the closest to the Earth next on January 4, 2014. There is only a small difference in distances. Perihelion is 91 million miles and aphelion is 95 million miles. The difference is because our orbit is elliptical not circular. If the orbit were circular, the Earth-Sun distance would always be the same.

Mars is only 0.8 degrees from Jupiter on July 22. It could be an interesting occurrence.

On the night of August 12/13 the Perseid Meteor Shower will peak. It can be quite spectacular, with up to 100 incidences per hour possible. This is a great one to view as not only are there many meteors expected, but also with the moon setting at 22:12, the dark celestial stage after that time will be perfect. Look toward the NE just before midnight as the constellation of Perseus rises.

September 22 brings the Autumnal Equinox, or the first day of autumn. This is one of the two days a year when the period of day and night are of equal length. The other day is the Vernal Equinox, or the first day of spring. This will, of course, come in the new year, 2014, on March 20.

INSIDE THIS ISSUE

In The Sky This Quarter

Planets in the Night Sky

Beginning of July, 2013

	Const	Rise	Transit	Set	Mag
Sun		05:56	13:24	20:51	-26.8
Mercury	Gem	07:03	14:13	21:18	3.2
Venus	Cnc	07:56	15:11	22:27	-3.9
Mars	Tau	04:36	12:05	19:33	1.5
Jupiter	Gem	05:17	12:46	20:12	-1.9
Saturn	Vir	15:27	20:53	02:18	0.5

Beginning of August, 2013

	Const	Rise	Transit	Set	Mag
Sun		06:20	13:26	20:32	-26.8
Mercury	Gem	04:50	12:05	19:21	-0.1
Venus	Leo	09:06	15:34	22:04	-3.9
Mars	Gem	04:05	11:33	19:02	1.6
Jupiter	Gem	03:46	11:11	18:38	-2.0
Saturn	Vir	13:27	18:52	00:17	0.7

Beginning of September, 2013

	Const	Rise	Transit	Set	Mag
Sun		06:49	13:20	19:50	-26.8
Mercury	Leo	07:29	13:49	20:14	-1.1
Venus	Vir	10:09	15:45	21:23	-4.0
Mars	Cnc	03:42	10:56	18:13	1.6
Jupiter	Gem	02:11	09:34	17:00	-2.1
Saturn	Lib	11:32	16:58	22:20	0.7

Gem	Gemini, The Twins
Lib	Libra, The Scales
Leo	Leo. The Lion
Tau	Taurus, The Bull
Cnc	Cancer, The Crab
Vir	Virgo, The Maid

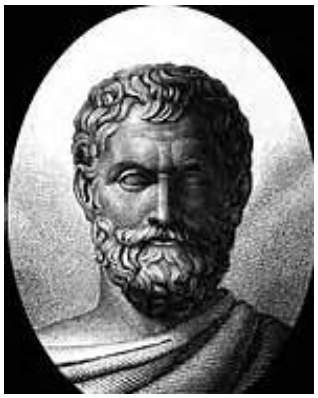
About: Eratosthenes Calculating the Earth's Circumference

About 236 BC, a brilliant Greek mathematician (also an astronomer, geographer, poet, musician, and, perhaps, surprisingly, a noted athlete), determined the circumference of the Earth without using a long tape measure. His name was Eratosthenes and he did this incredible feat by having "a think" or an experiment of the mind. The accuracy of his results is astonishing.

He was born in 276 BC in Cyrene (now in Libya), a land just to the west of Egypt in North Africa. Early on he distinguished himself as having a brilliant mind. After childhood schooling, he studied in Athens, where he became a serious student of a diverse mixture of disciplines - music, literature, rhetoric, as well as the natural sciences, mathematics, and even meteorology.

Later he was appointed head librarian of the famous library at Alexandria, Egypt. Like his friend Archimedes, he was a versatile, voracious scholar. He was contemporarily called "pentathlos" or "generalist" because of his extremely broad knowledge of so many fields.

Sadly, towards the end on his life, he was afflicted with the gradual loss of his sight, thought to have been the result of the cruel affliction known as macular degeneration. Because of this untreatable condition, it is believed that he starved himself to death in 196 BC.

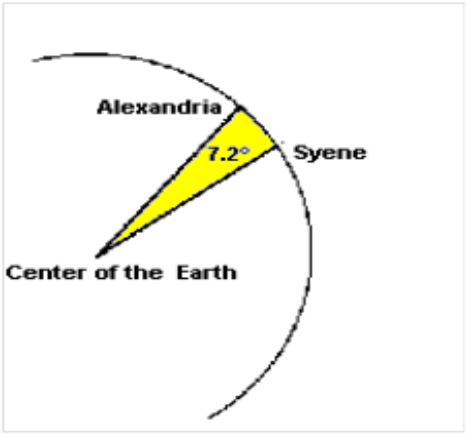


Eratosthenes

How he did it

First, Eratosthenes made two basic assumptions: the Earth is spherical and that the rays of the Sun are essentially parallel. Both of these assumptions turned out to be correct or nearly so. He also knew that on the Summer Solstice (the first day of summer) at noon in Syene in southern Egypt (not Cyrene which is in Libya) there was no shadow cast at the bottom of a well, indicating that the sun was directly overhead.

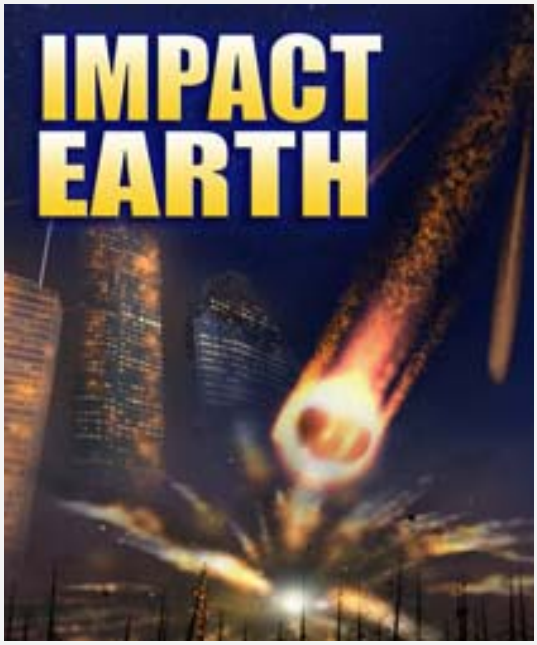
He also knew that on that same date and time in his hometown of Alexandria which was north of Syene by about 787 km (489 miles), the sun was never directly overhead, even on the first day of summer, so a shadow was cast. Using a very tall tower in Alexandria, he measured the angle of the shadow and got 7.2°. This means that the two cities (Alexandria and Syene) are separated by 787 km (489 miles) or 7.2°. The angular difference is equal to 1/50th of a full circle (360°/7.2° = 50). So he simply multiplied 50 times 787 km (489 miles) and got the circumference of the Earth: 50 x 787 km = 39,350 km or 24,451 miles.



The actual circumference at the equator is 40,075 km (24,901 miles), a difference of only 725 km (450 miles) or 1.8 %. Incredible, and he did it 2250 years ago without an electronic computer.

Certainly one of the giants of antiquity.

2013 Planetarium Shows



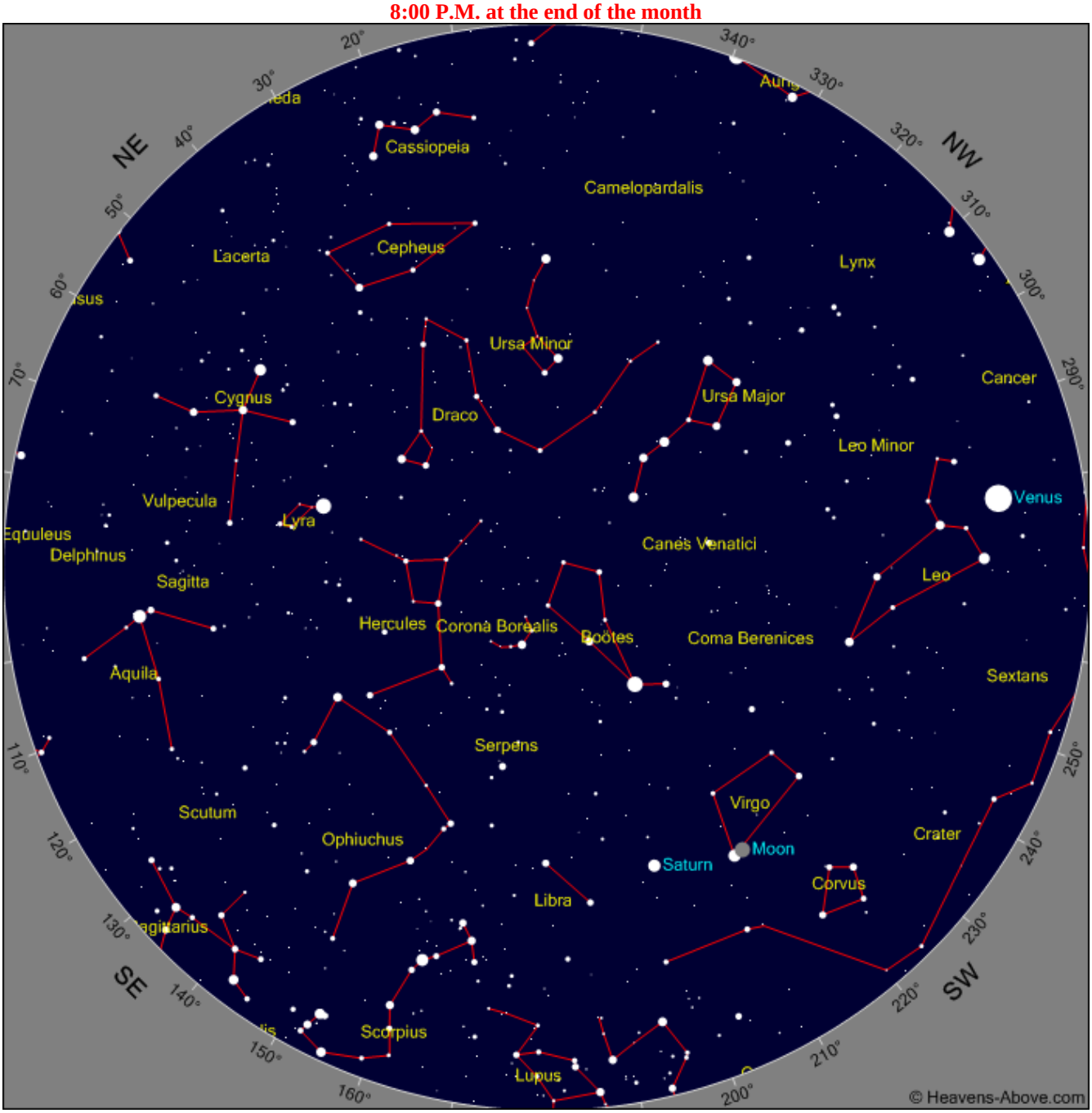
July **Closed**	**August 23** **8:00 P.M. Dawn of the Space Age** **9:00 P.M. Impact Earth**	**September 13 & 27** **8:00 P.M. Dawn of the Space Age** **9:00 P.M. Impact Earth**
October 11 & 25 **7:00 P.M. Dawn of the Space Age** **8:00 P.M. Impact Earth**	**November 1 & 22** **7:00 P.M. Dawn of the Space Age** **8:00 P.M. Impact Earth**	**December 6, 13, & 20** **7:00 P.M. 'tis the Season** **8:00 P.M. 'tis the Season**

For those who are interested in bringing a group, such as schools or scouts, during the day, please call for more information. These shows are usually given on Tuesday or Thursday mornings.For further information or reservations, please call John Hopkins at (304) 293-4961, or by email at: jghopkins@mail.wvu.edu

Selected Sunrise/Sunset and Moon Rise/Moon Set Times

Date	Sunrise	Sunset	Moon Rise	Moon Set	Moon Phase
Jul 8	6:00 A.M.	8:50 P.M.	6:28 A.M.	8:52 P.M.	New
Jul 15	6:05 A.M.	8:47 P.M.	1:21 P.M.	NA	First Qtr
Jul 22	6:10 A.M.	8:42 P.M.	8:27 P.M.	6:05 A.M.	Full
Jul 29	6:16 A.M.	8:36 P.M.	NA	1:56 P.M.	Last Qtr
Aug 6	6:23 A.M.	8:28 P.M.	6:14 A.M.	8:02 P.M.	New
Aug 14	6:31 A.M.	8:18 P.M.	2:27 P.M.	NA	First Qtr
Aug 20	6:37 A.M.	8:10 P.M.	7:40 P.M.	6:05 A.M.	Full
Aug 28	6:44 A.M.	7:58 P.M.	NA	2:33 P.M.	Last Qtr
Sep 5	6:51 A.M.	7:46 P.M.	7:02 A.M.	7:36 P.M.	New
Sep 12	6:58 A.M.	7:34 P.M.	2:24 P.M.	NA	First Qtr
Sep 19	7:04 A.M.	7:23 P.M.	7:19 P.M.	7:13 A.M.	Full
Sep 26	7:11 A.M.	7:12 P.M.	NA	2:02 P.M.	Last Qtr

July 2013 Sky Chart* for:
10:00 P.M. at the beginning of the month
9:00 P.M. in the middle of the month
8:00 P.M. at the end of the month



*Sky Chart used with the kind permission of Heavens-Above at http://www.heavens-above.com/

The WVU PLANETARIUM is located on the PL floor of White Hall on the main WVU campus.
Contributions can be made in support of the planetarium through the WVU Planetarium Project at the WVU Foundation, Inc., phone (304)284-4000. Thank You.

Edited by John Hopkins
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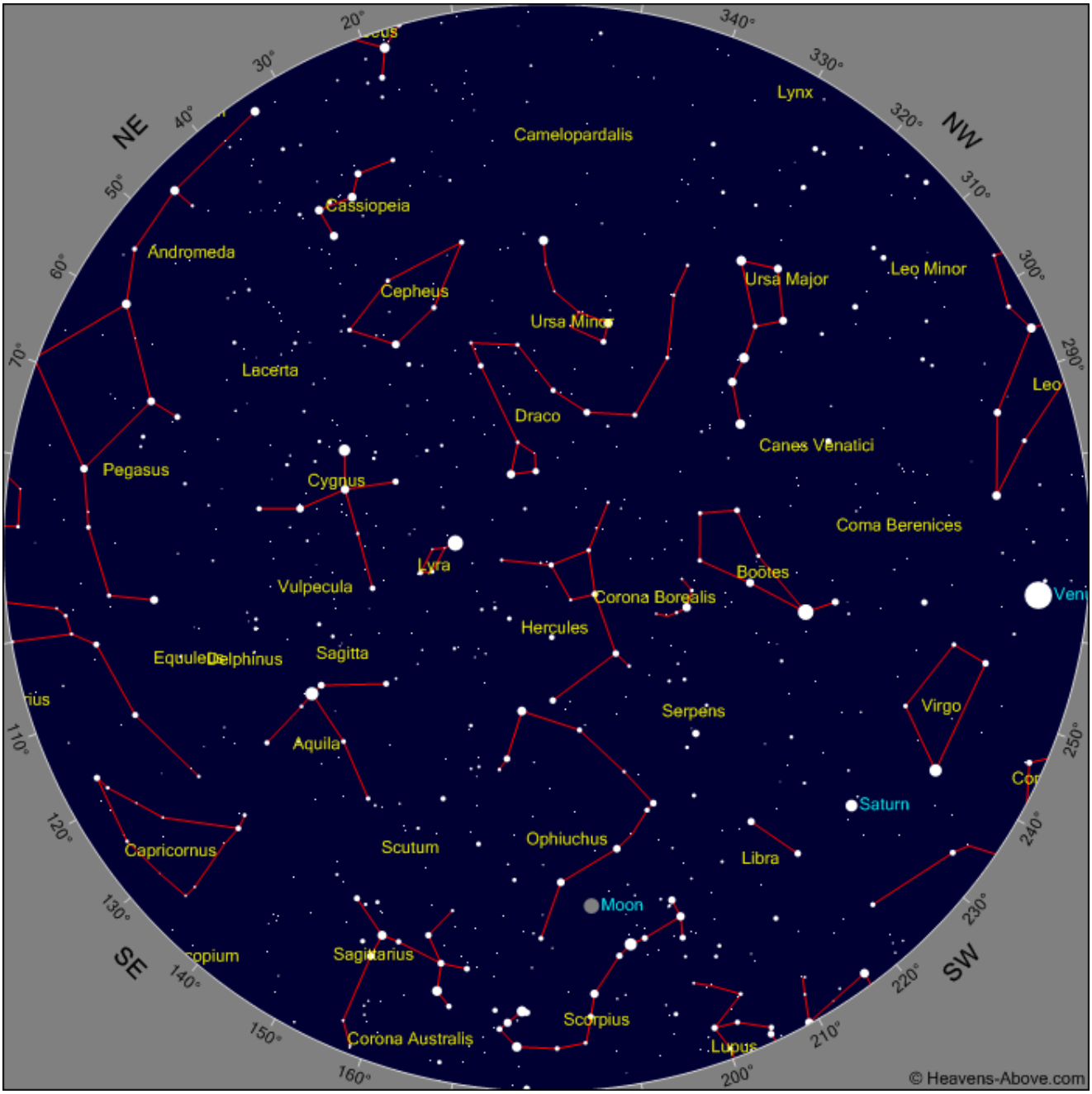

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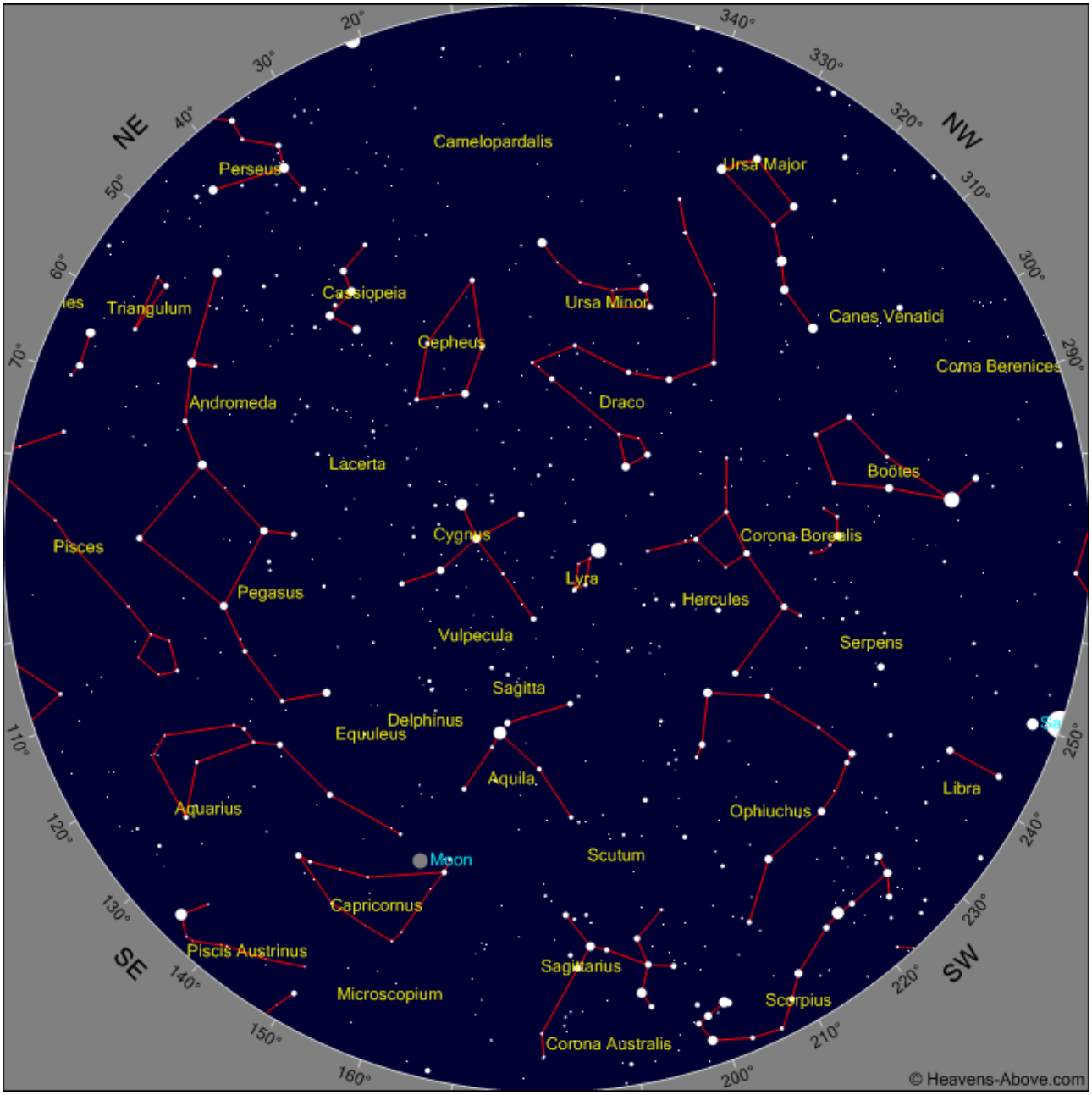
8:00 P.M. at the end of the month



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