



The Sky This Month

Joel Swallow





The Sky this Month

- The Moon this month
- The planets this month
- The Big Dipper: signpost to the sky
- Double Stars



The Moon This Month

- Full Moon: November 14th
- New Moon: November 29th
- Full Moon: December 14th

November – Beaver Moon / Frost Moon



[2]

December – Cold Moon / Long Nights Moon



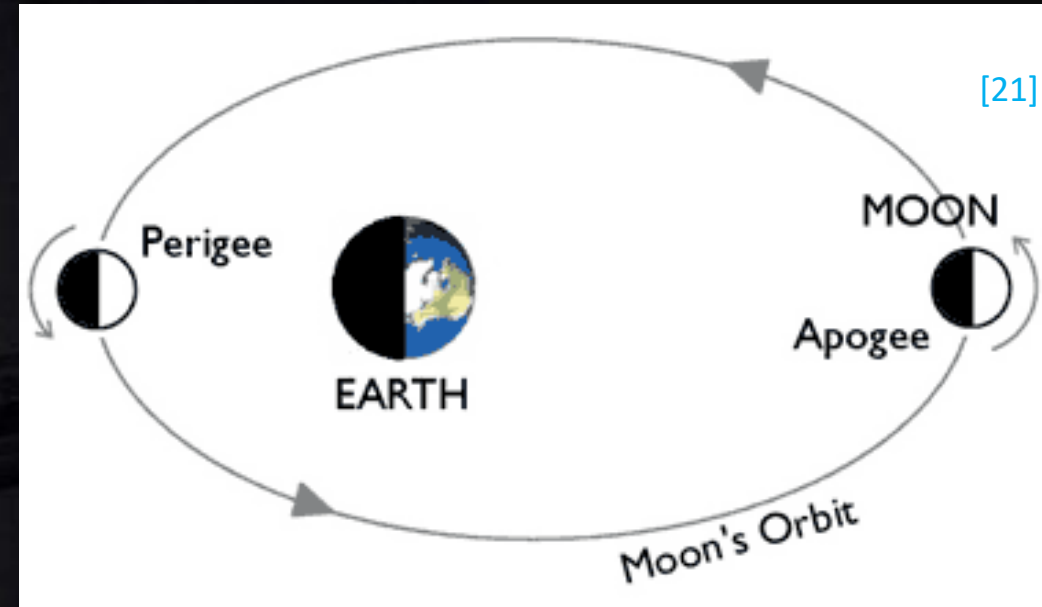
[3]

[1]



November 23
Waning Crescent
Illumination: 29%

Supermoons : November 14th and December 14th



- On December 14th The Moon is 6.5% closer than it is on average
- The Supermoon last month was even closer! – the closest it has been at the time of a full moon since 1948.
- <http://time.unitarium.com/moon/where.html> : shows you where the moon is tonight (or any night) in relation to the Earth!

FULL MOON COMPARISON 2016



April 22, 2016
406,248 kms
Apogee Full Moon



November 14, 2016
356,523 kms
Perigee Full Moon

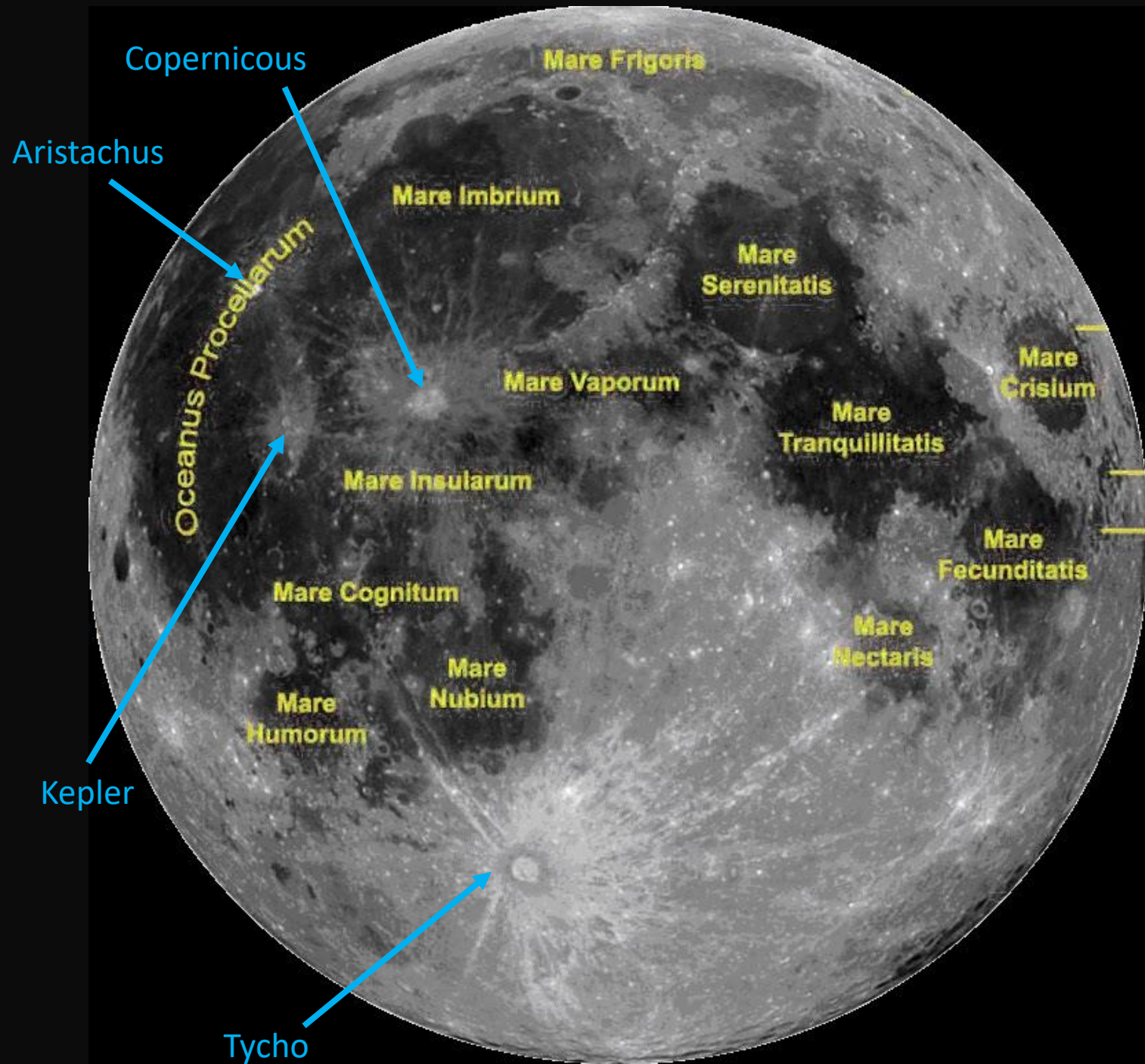
Distance to Earth

Images taken by James Kevin Ty from Manila , Philippines
Canon EOS 500D DSLR with Canon EF 100-400mm f/4.5-5.6 IS L Lens set at 400mm f/11



The Moon

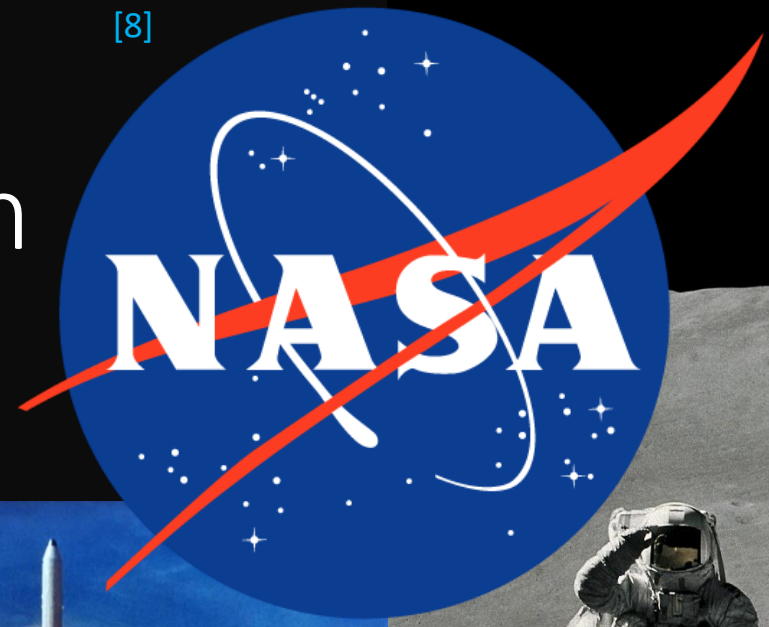
- The dark regions of the Moon are called **Mare** (seas).
- The lighter regions are known as the **lunar highlands** – oldest rock and mountain ranges.
- Lots of **craters**: always best to view when these lie on the **terminator**.





[8]

The Moon



[9]



[7]

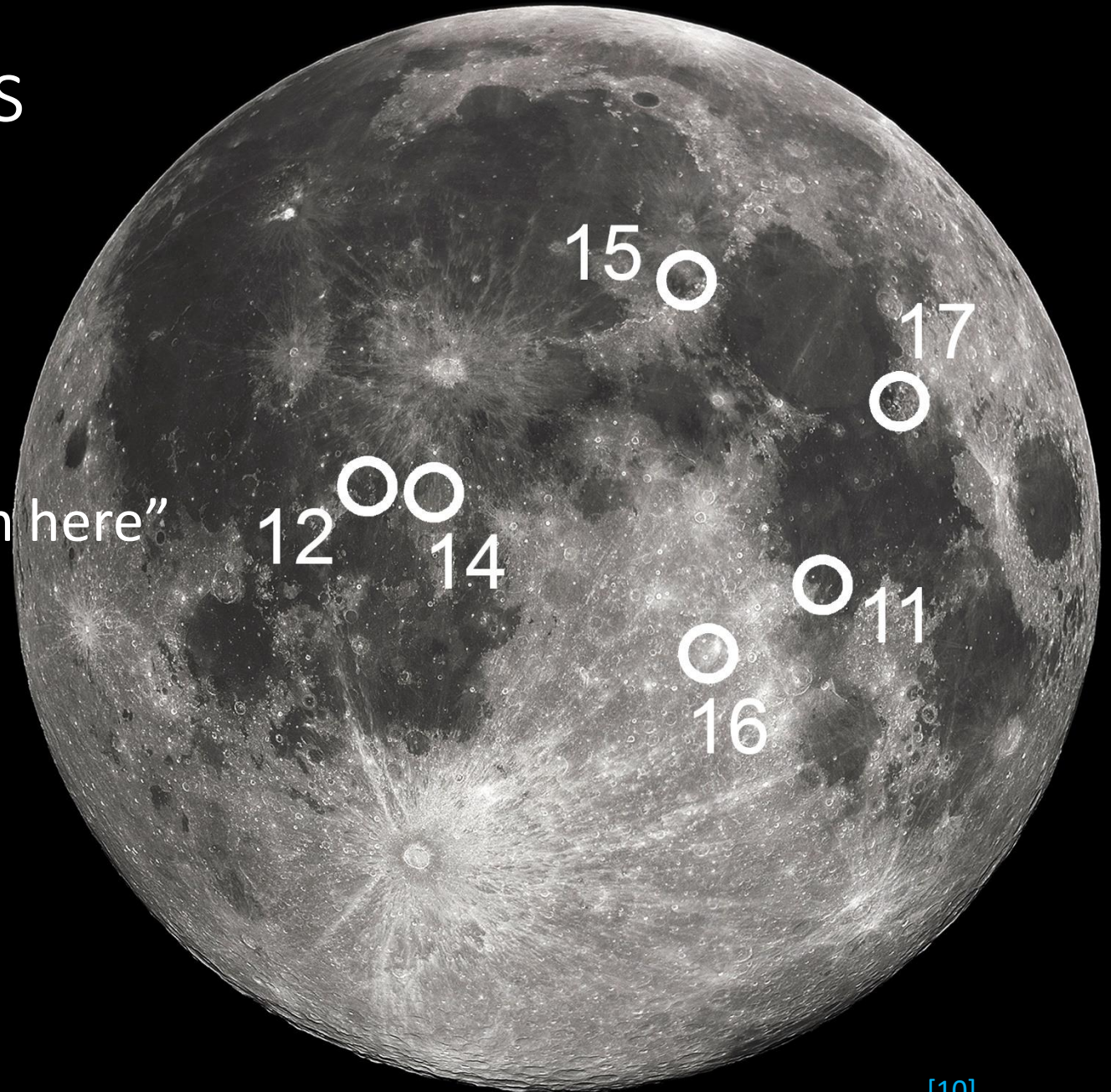


[6]

- The only astronomical object (apart from the ISS) you can observe that has had a visit from humans!

Apollo Landing sites

- 11: Sea of tranquillity
- 12: Ocean of Storms
- 13: “Houston, we've had a problem here”
- 14: Fra Maro Highlands
- 15: Hadley Rill
- 16: Descartes Mountains
- 17: Taurus-Littrow valley

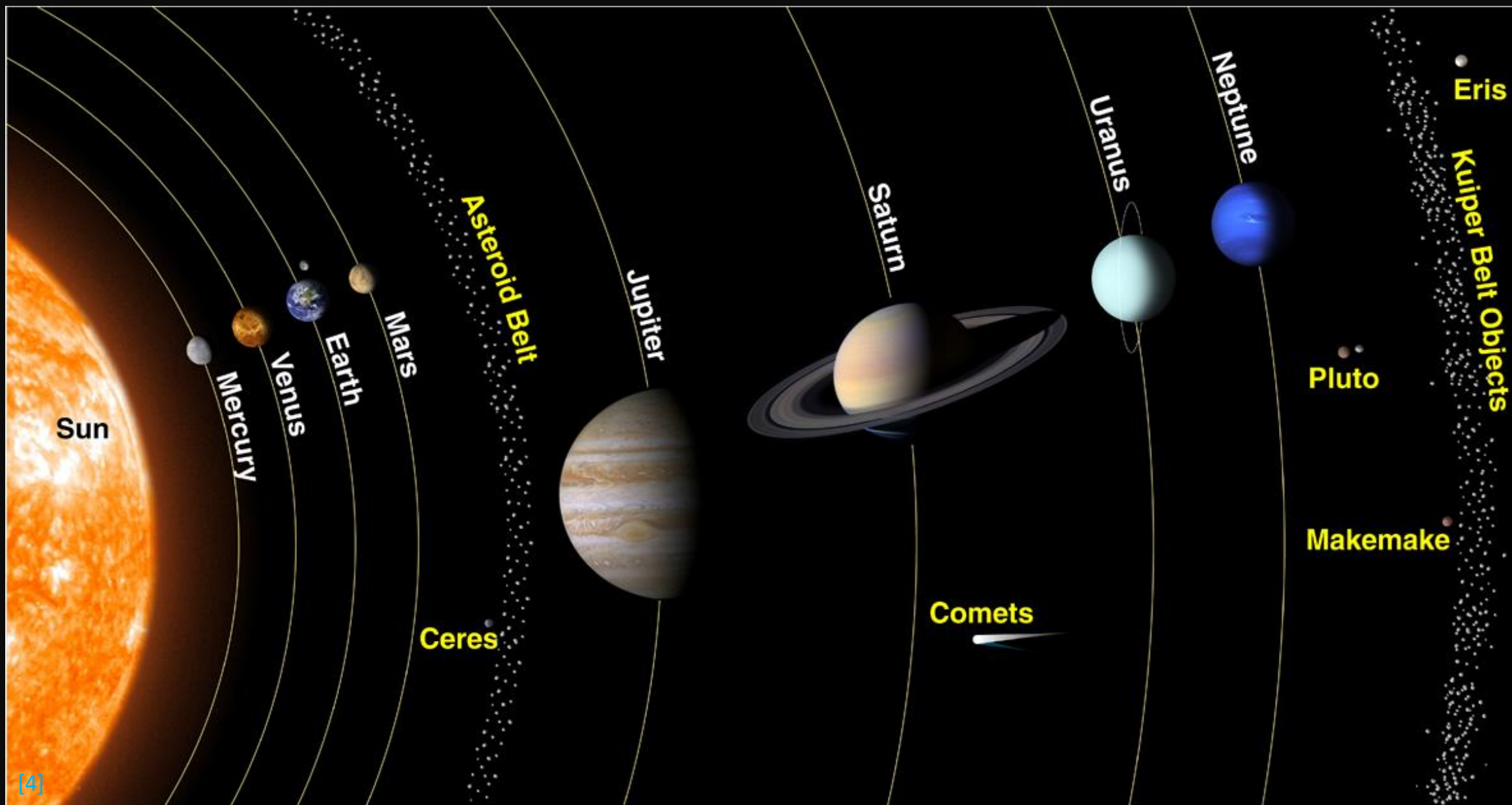


Apollo Landing sites

- 11: Sea of tranquillity
- 12: Ocean of Storms
- 13: “Houston, we've had a problem here”
- 14: Fra Maro Highlands
- 15: Hadley Rill
- 16: Descartes Mountains
- 17: Taurus-Littrow valley



The Planets This Month





Mars

Mercury at Greatest Eastern Elongation

Venus

Mercury

S

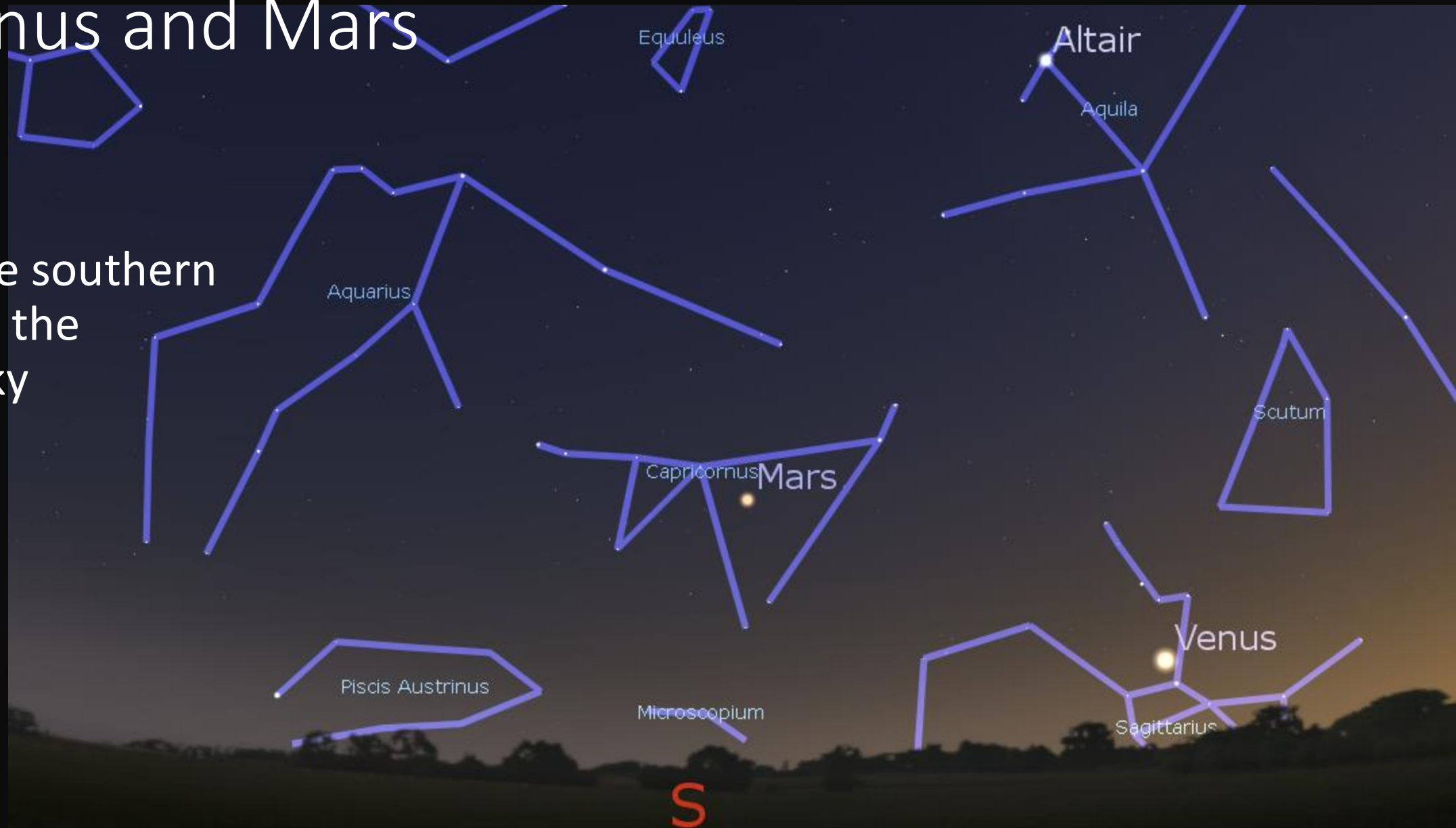
- This is when the planet is furthest from the sun in the sky
- Still only 20.8 degrees away!
- Look in the W / SW sky just after sunset , forming a nice line with Mars and Venus!

11/12/16 4:25 pm



Venus and Mars

- Low on the southern Horizon in the evening sky

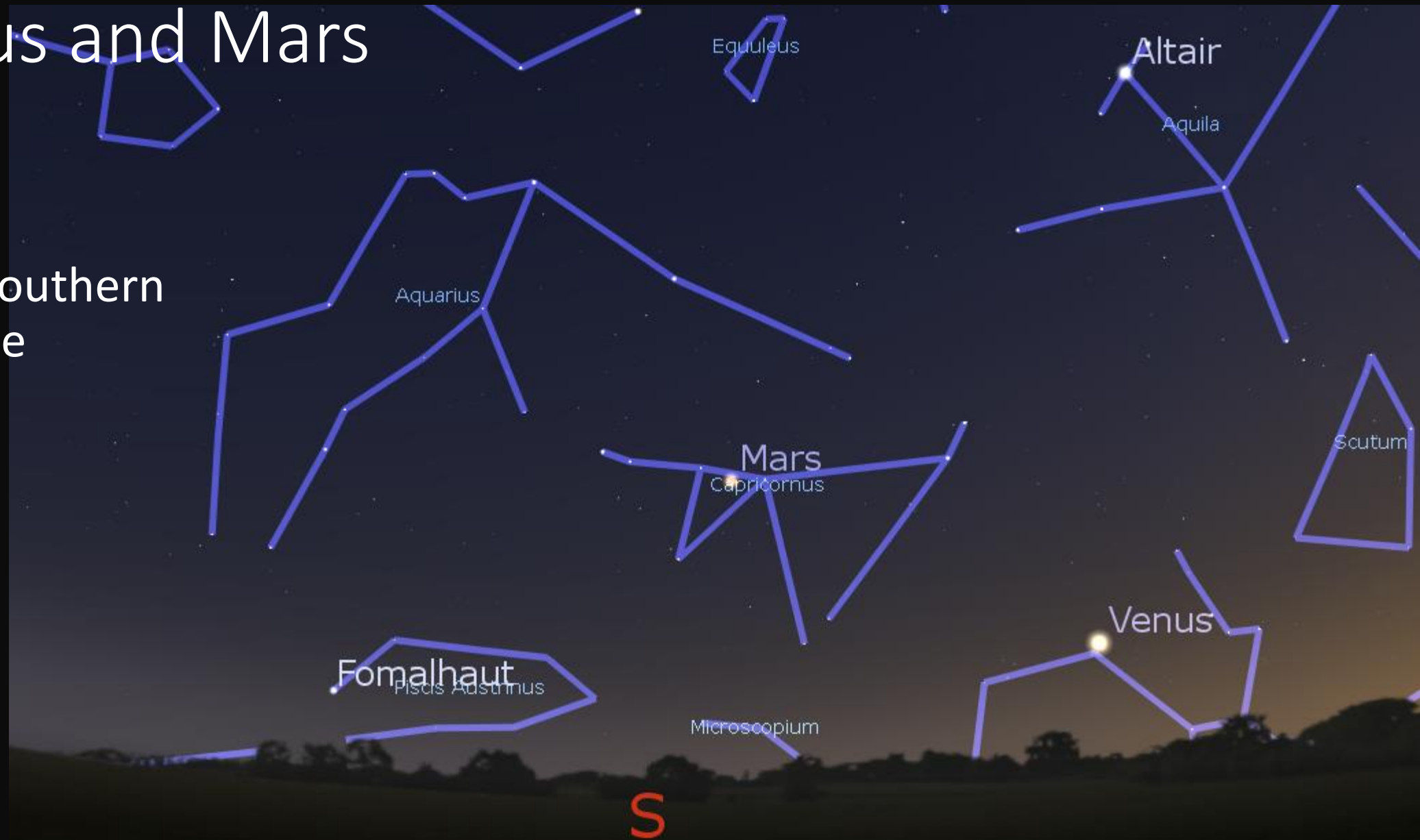


23/11/16 5:00 pm



Venus and Mars

- Low on the southern Horizon in the evening sky.

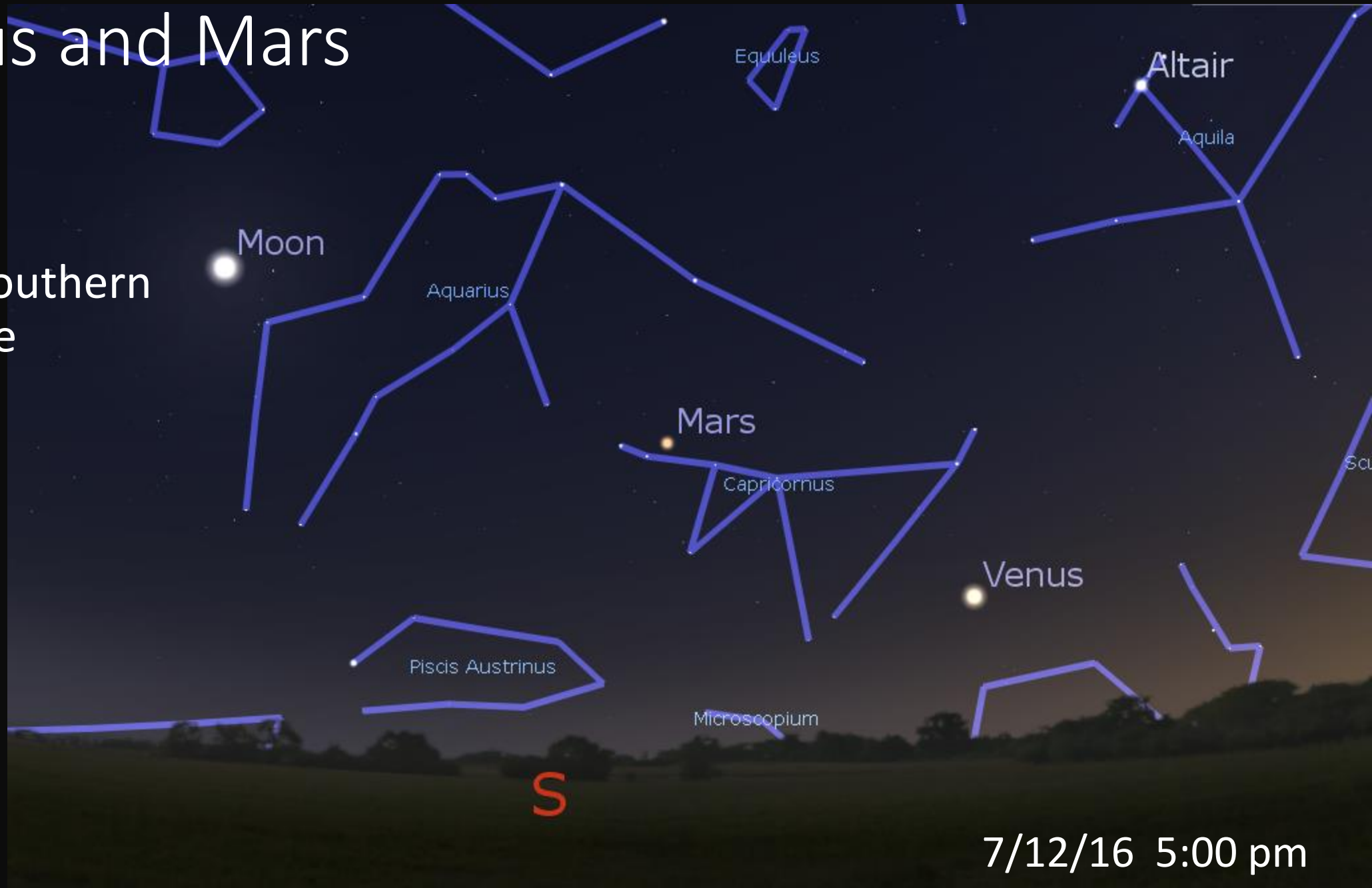


30/11/16 5:00 pm



Venus and Mars

- Low on the southern Horizon in the evening sky.



7/12/16 5:00 pm



Jupiter

- Prominent before dawn in the East/South East, rising ~4 hours before sunrise. Close to Spica in Virgo.

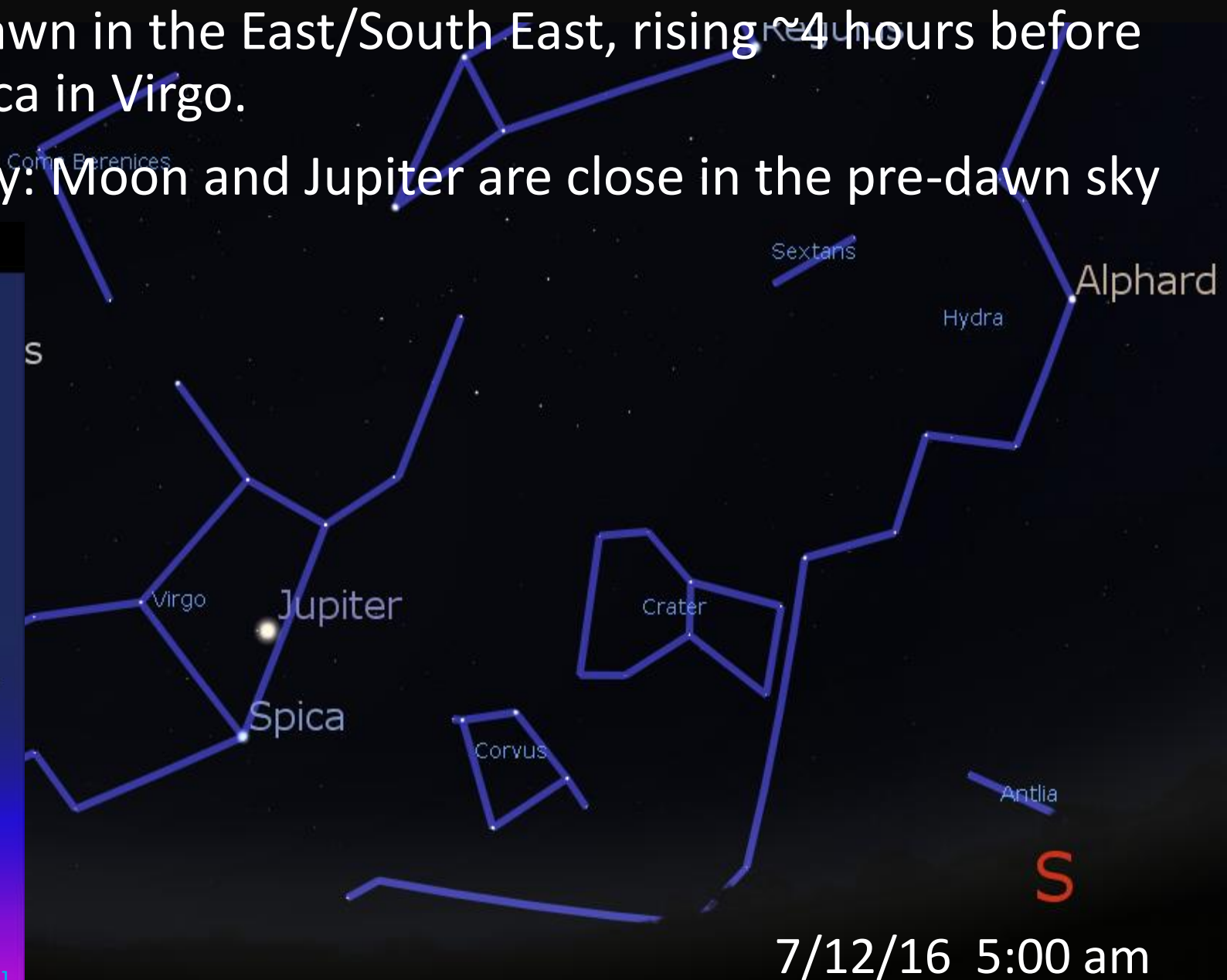
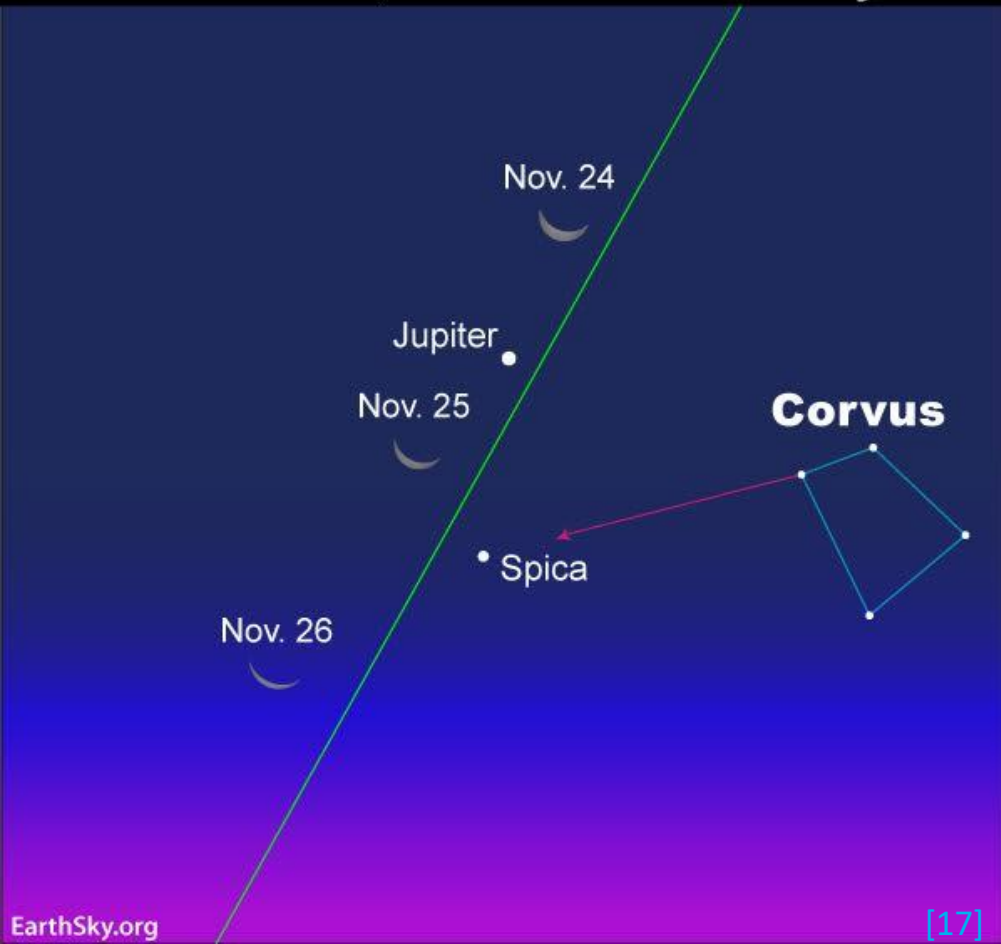




Jupiter

- Prominent before dawn in the East/South East, rising ~4 hours before sunrise. Close to Spica in Virgo.
- Tomorrow and Friday: Moon and Jupiter are close in the pre-dawn sky

Southeast, Predawn/Dawn Sky



7/12/16 5:00 am



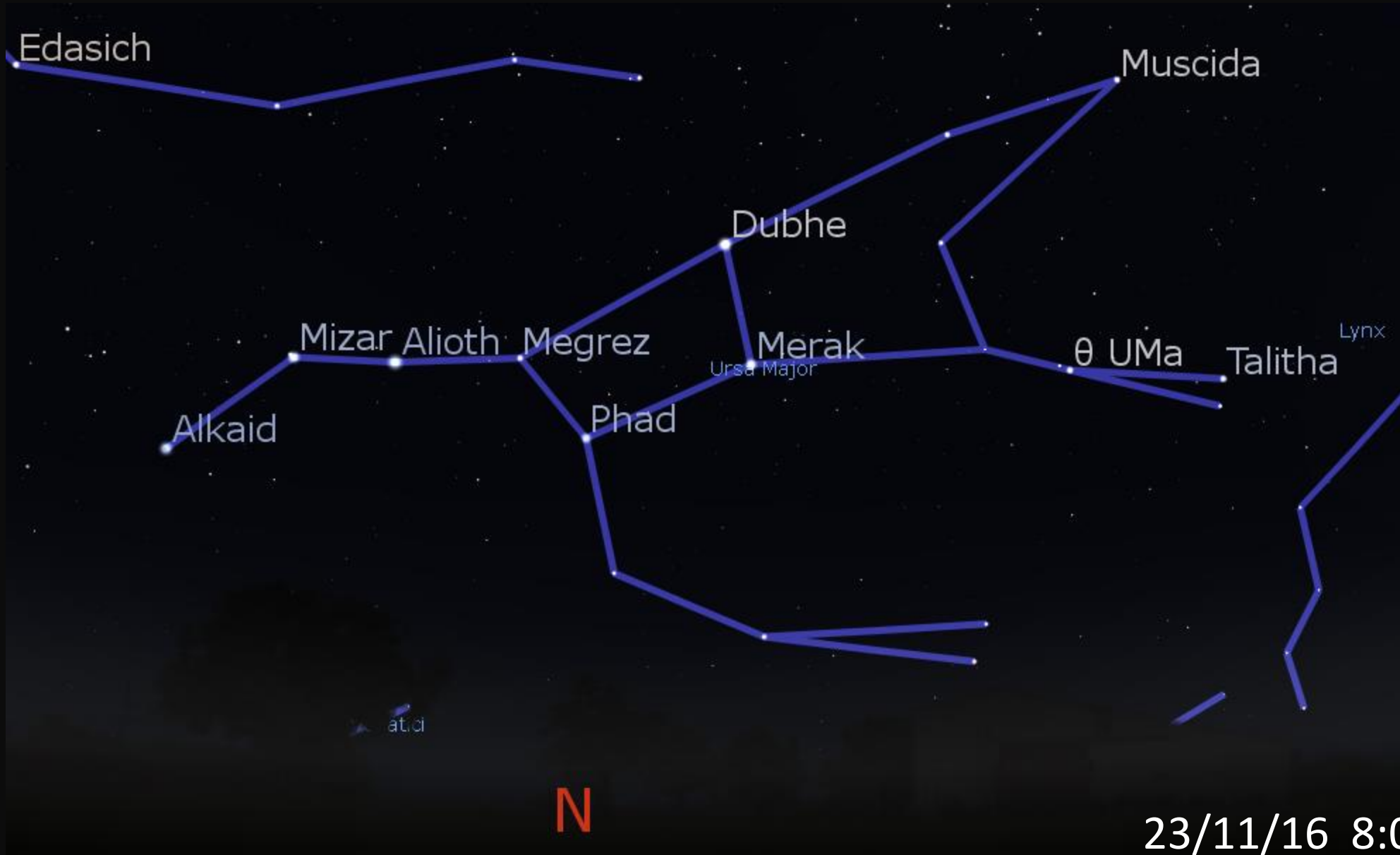
Uranus and Neptune



7/12/16 9:30 pm



The big dipper: the sky's signpost!





The big dipper: the sky's signpost!

- Arc to Arcturus
- Spike to Spica
- Leak to Leo
- Pointers to Polaris
- Continue to Cassiopeia
- Cross to Capella
- Creep to Castor





The big dipper: the sky's signpost!

- Arc to Arcturus
- Spike to Spica
- Leak to Leo
- Pointers to Polaris
- Continue to Cassiopeia
- Cross to Capella
- Creep to Castor





Double Stars

- “**Double Star**” two stars that *appear* to be very close together.
- Great targets for amateur, urban observing.
- Alcor is loosely bound to Mizar and sits in orbit with a radius of 1ly or 63000 A.U.





Some Double Stars To “split”

- **Albireo (Beta Cygni)**
- **Mag. 3.1** yellow primary (Albireo A)
- **Mag. 5.1** blue secondary (Albireo B)
- Observe early (until about 10pm)



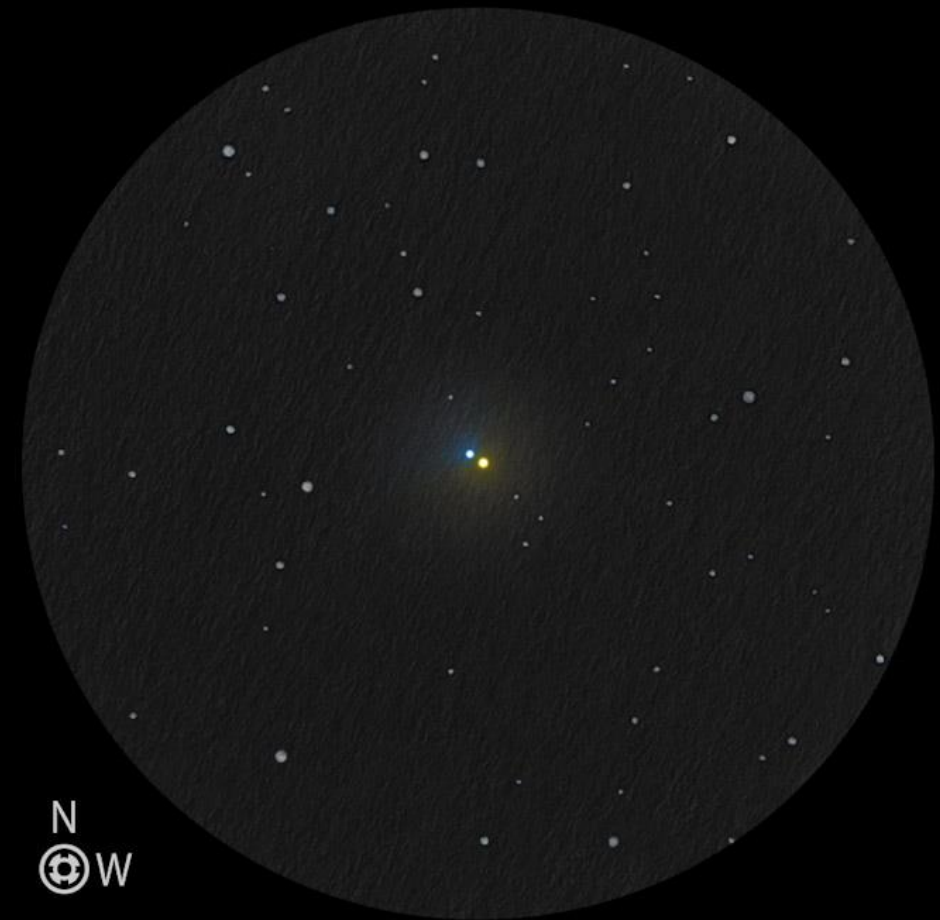
1/12/16 21:00 pm



Some Double Stars To “split”

- **Albireo (Beta Cygni)**
- **Mag. 3.1** yellow primary (Albireo A)
- **Mag. 5.1** blue secondary (Albireo B)
- Observe early (until about 10pm)

Abireo (Beta Cygni / Struve-A 43)



OCT 16, 2011 • 05:00 UT

Orion XT8 - 8" f/5.9 Newtonian

Sketch: Pentax XW10: 120X (35' TFOV)

Measurements: 12 mm Meade Astrometric EP + 2X Barlow: 200X

Digital Illustration by Jeremy Perez © 2011

www.beltsofvenus.net



Some Double Stars To “split”

- **Albireo (Beta Cygni)**
- **Mag. 3.1** yellow primary (Albireo A)
- **Mag. 5.1** blue secondary (Albireo B)
- Observe early (until about 10pm)





Some Double Stars To “split”

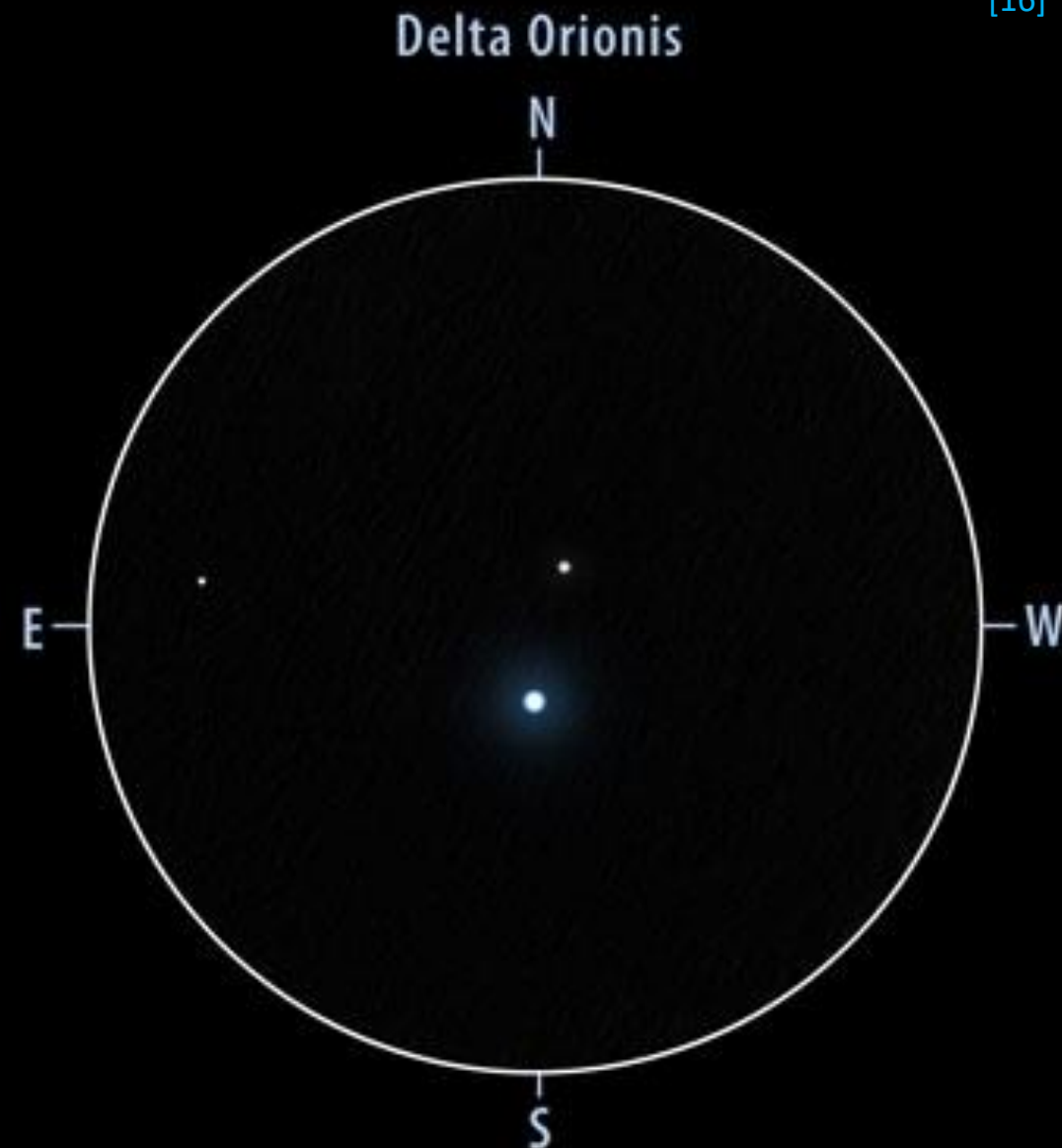
- **Mintaka (Delta Orionis)**
- Primary: **Mag. 2.2**
- Secondary: **Mag. 6.8**
- Observe after 9 pm.





Some Double Stars To “split”

- **Mintaka (Delta Orionis) : multiple star system**
- Separation **52''** ($\sim 1/60^{\text{th}}$ of a degree)
- Primary: **Mag. 2.2**
- Secondary: **Mag. 6.8**
- Actually in orbit with a radius of at least a quarter of a light year. (**Visual binary**)
- Observe after 9 pm.



JAN 17, 2005 • 04:10 UT
SkyView Pro 6LT EQ - 6" f/8 Newtonian
10 mm Sirius Plössl + 2X Barlow: 240X / 12' FOV
Sketch by Jeremy Perez



Some Double Stars To “split”

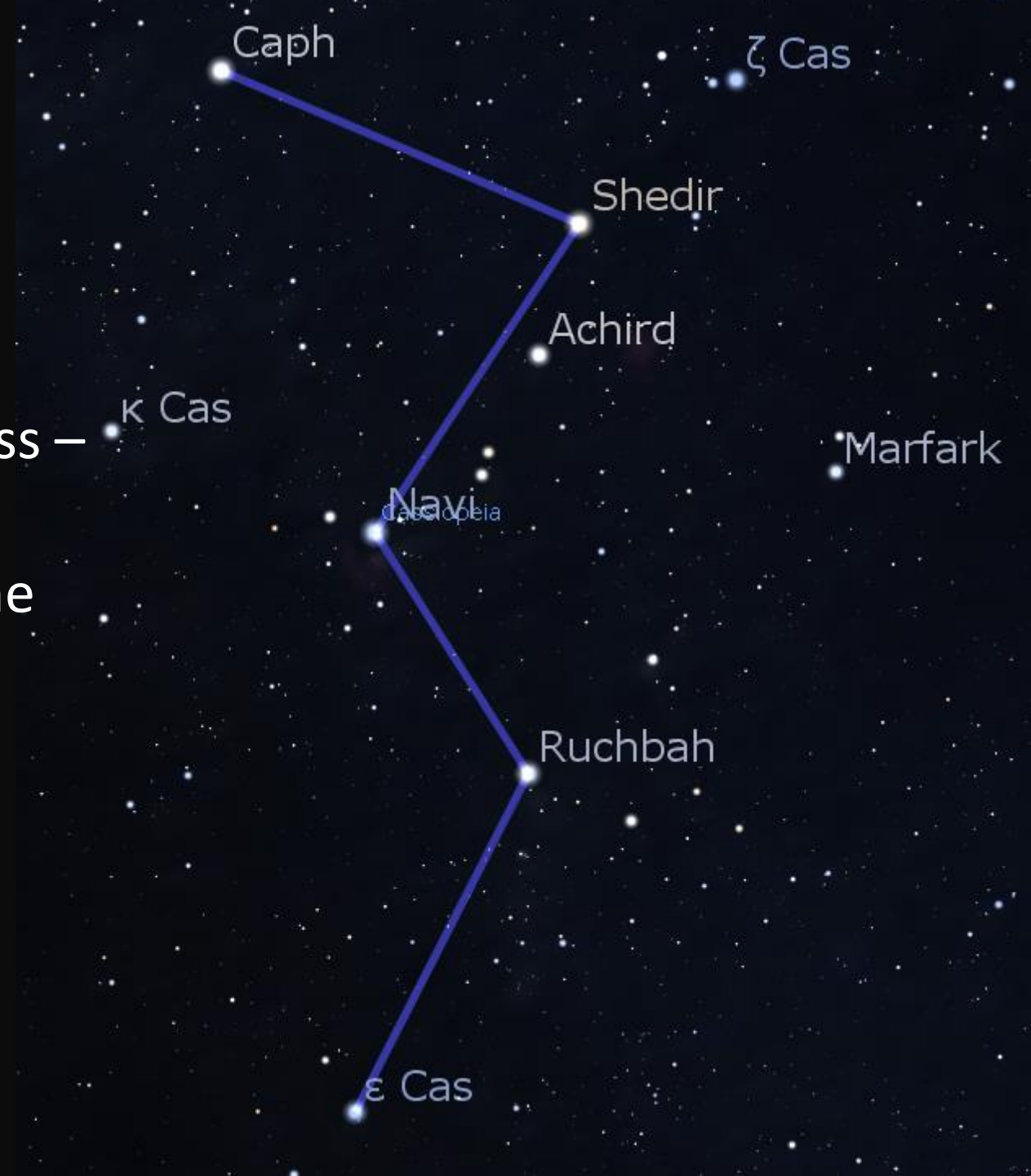
- **Mintaka (Delta Orionis) : multiple star system**
- Primary is a **triple star** formed of a **bright giant** and a hot **main sequence star** with an orbital period of 5.7 days (**spectroscopic binary**) both of which are orbited by a **sub-giant star**.
- Companion separated by 52'' on the sky is itself a spectroscopic binary with a faint companion in a 30 day orbit.
- So we have a quintuple star system! (but you will only see two).





Some Double Stars To “split”

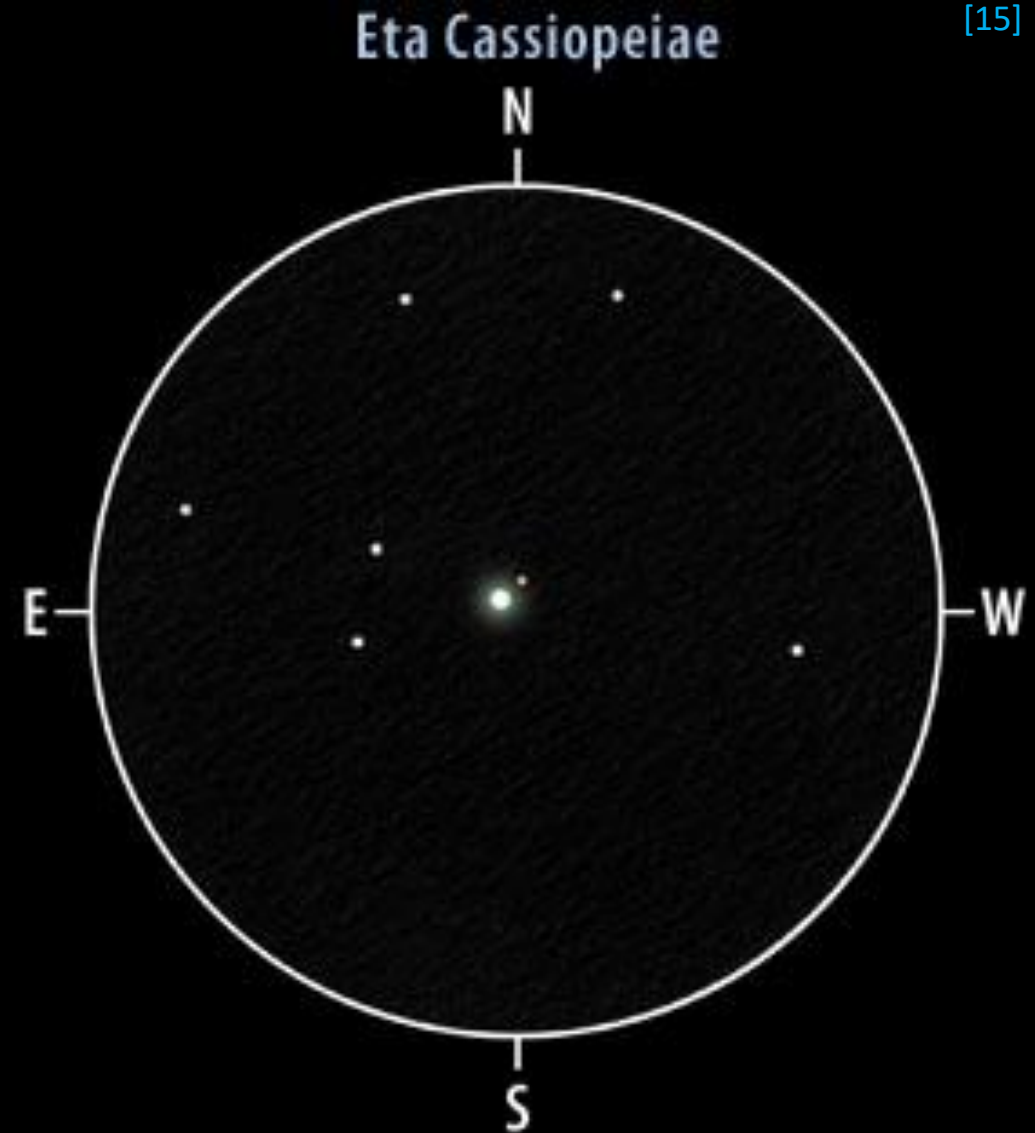
- **Achird (Eta Cassiopeiae)**
- Trickier: larger contrast in brightness – look for colour differences.
- Eta Cassiopeiae is very similar to the sun
- Primary: **Mag. 3.4**
- Secondary: **Mag 7.5**





Some Double Stars To “split”

- **Achird (Eta Cassiopeiae)**
- Trickier: larger contrast in brightness – *look for colour differences.*
- Eta Cassiopeiae is very similar to the sun, with mass $0.97 M_{\odot}$ and radius $1.01 R_{\odot}$
- Primary: **Mag. 3.4**
- Secondary: **Mag 7.5**



AUG 02, 2005 • 06:55 UT
SkyView Pro 6LT EQ - 6" f/8 Newtonian
10 mm Sirius Plössl + 2X Barlow: 240X / 12' FOV
Sketch by Jeremy Perez



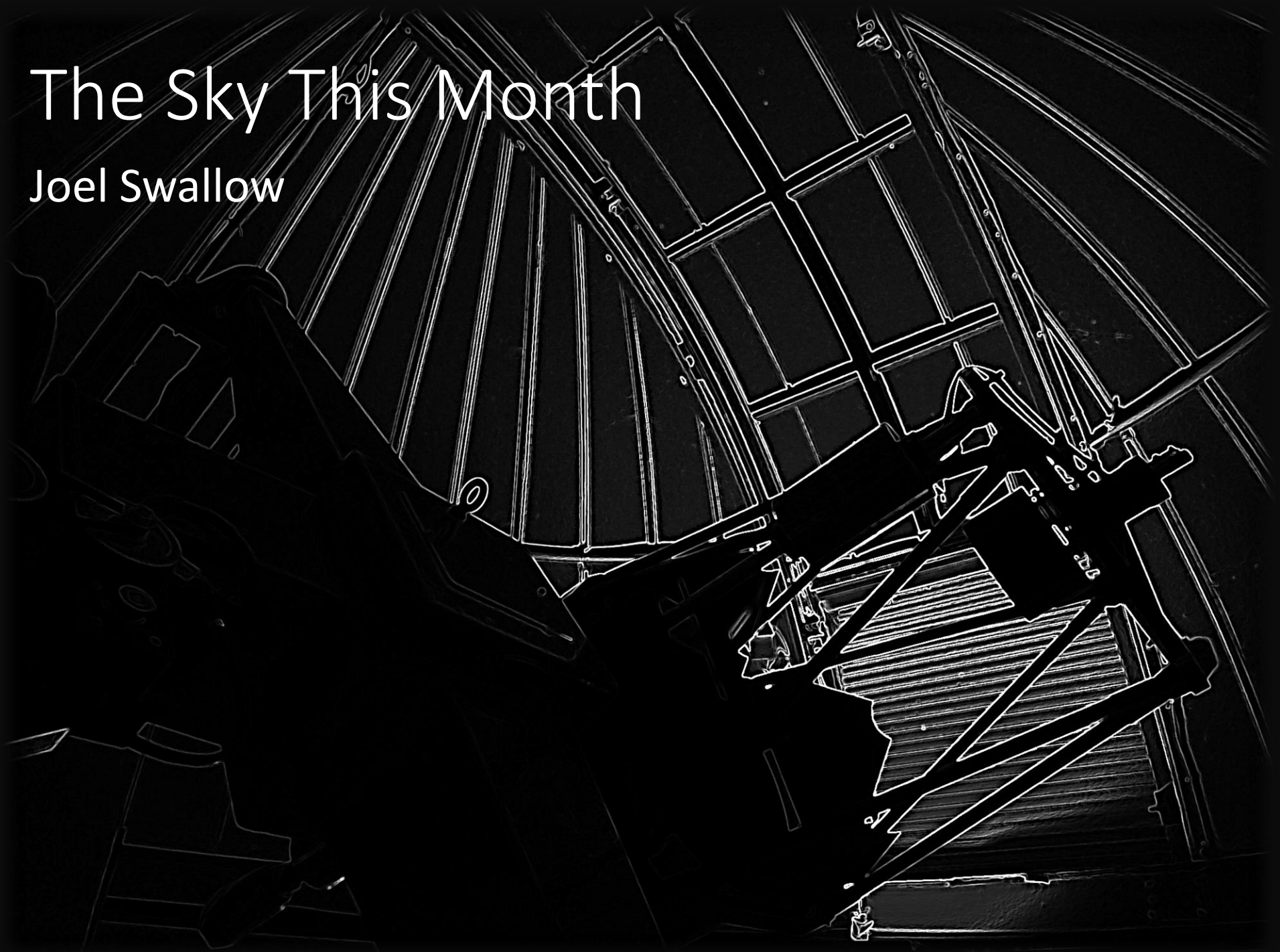
The Sky this Month : summary

- Supermoon on 14th of December , but better to look when not full to see details!
- Lots of planets around this month – a good chance to see Mercury.
- Finding your way around the sky
- Double Stars



The Sky This Month

Joel Swallow





Time for Astronomy!

	23 rd November	30 th November	7 th December	14 th December	21 st December
Sunrise	7:44	7:55	08:04	8:11	8:16
Sunset	16:04	15:58	15:54	15:54	15:56
Astronomical Twilight Ends	18:06	18:02	18:01	18:01	18:03

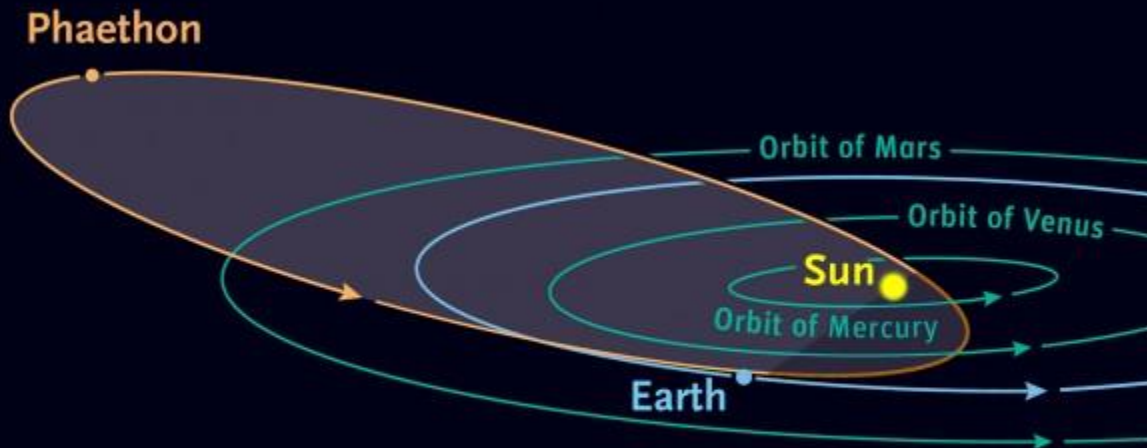


Meteor watch



The Geminids : 13/14 December

- Radiant in Gemini
- Originate from Asteroid 3200 Phaethon (sometimes called a “rock comet”)



14/12/16 1:00 am



The Geminids : 13/14 December

- Great meteor shower, one of best in the year! expect **100 meteors/hour** in a dark sky location.
- Best to observe ~2am...
- BUT the moon is spoiling our view AGAIN!
- **Look out for Jupiter**, rising about 2 am.



14/12/16 1:00 am



Meteor Showers Coming Soon...

- Dec 2016: **Ursids**
 - Radiant in **Ursa Major**
 - peak 21/22 Dec.
 - 5-10 meteors/hour
 - Debris from comet 8P/Tuttle (discovered in 1790)
- Jan 2017: **Quadrantids**
 - Radiant is in **Bootes**.
 - peak 3/4 Jan.
 - 40 meteors/hour
 - Good moon conditions! Moon sets after midnight leaving great view of the shower!
 - associated with an asteroid – 2003 EH1.



The Planets this Month

- **Mercury** – At Greatest Eastern Elongation on December 11th.
- **Venus** – Low on the southern Horizon in the evening sky.
- **Mars** – Low on the southern Horizon in the evening sky.
- **Jupiter** – Prominent before dawn in the East/South East, rising ~4 hours before sunrise. Close to Spica in Virgo. Gets close to Moon on 24/25 Nov.
- **Saturn** – Edges closer to sunset and is lost in the glare of the sun!
- **Uranus** – Nice and high in the sky through most of the night, rising in NE and setting in SW. Binocular object, mag. +5.7.
- **Neptune** – Currently undergoing retrograde motion in the constellation Aquarius, lower in the sky and dim, mag. +7.8.



Photo Credit

1. <http://www.moongiant.com/phase/11/23/2016>
2. <http://2.bp.blogspot.com/-QOv4LMCCwpQ/VFgWCG4QR7I/AAAAAAAAACYc/RW6r8JaN1v0/s1600/full%2Bbeaver%2Bmoon.jpg>
3. https://i.ytimg.com/vi/gH96u_HzfJ4/hqdefault.jpg
4. <https://tragicocomedia.files.wordpress.com/2014/01/planets-including-kb.jpg>
5. <http://en.es-static.us/upl/2012/09/big-dipper-labeled-Ken-Christison-9-30-2013.jpg>
6. <https://www.nasa.gov/sites/default/files/thumbnails/image/as15-88-11866orig.jpg>
7. http://www.nasa.gov/sites/default/files/images/367208main_road2apollo-22b_full.jpg
8. <http://www.nasa.gov/sites/default/files/images/nasaLogo-570x450.png>
9. <http://spaceflight.nasa.gov/gallery/images/apollo/apollo16/hires/s72-36293.jpg>
10. https://upload.wikimedia.org/wikipedia/commons/9/96/Apollo_landing_sites.jpg
11. <http://www.almanac.com/blog/astronomy/astronomy/2016-perseid-meteor-shower>
12. http://en.es-static.us/upl/2015/12/Phaethon_orbit-e1449144562950.jpg
13. https://upload.wikimedia.org/wikipedia/it/0/04/30-31_Cygni.jpg
14. http://www.perezmedia.net/beltofvenus/archives/images/2011/img2011101501_Albiro_lg.jpg
15. http://www.perezmedia.net/beltofvenus/archives/images/2006/img2006072005_EtaCass.jpg
16. http://www.perezmedia.net/beltofvenus/archives/images/2005/img2005011602_DeltaORI.jpg
17. <http://earthsky.org/astronomy-essentials/visible-planets-tonight-mars-jupiter-venus-saturn-mercury>
18. <http://strangesounds.org/2016/11/supermoon-pictures-taken-around-the-world-on-november-14-2016.html>
19. <http://strangesounds.org/2016/11/supermoon-pictures-taken-around-the-world-on-november-14-2016.html>
20. <http://s5.favim.com/610/140915/amazing-awesome-beautiful-beauty-Favim.com-2072825.jpg>
21. <https://indagadores.files.wordpress.com/2013/06/apogeo-luna.png>
22. <http://www.pa.msu.edu/people/frenchj/moon/apollo15site.jpg>