SET 2

LUNAR MAPS

For Use with the Astronomical League Lunar I Observing Program

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Inverted Image (South Up) Maps

With Selected Expanded Views

Revised 2021 September

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Gainesville, Florida

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Maps Produced by Howard L. Cohen using a LROC (NASA) composite whole moon image with a supplementary full moon image by Howard Eskildsen, Ocala, Florida.

Preface

These maps were created to help star gazers learn more about the moon's surface characteristics by identifying one hundred features listed by the Astronomical League's Lunar Club. The A.L. tabulates these features on their web site and provides a convenient observing form (in pdf format) for recording the lunar observations. (A copy of this form is included at the end of these maps.) Listed features include some naked eye lunar objects plus many binocular and small telescope targets. (All objects can be discerned in a good 60 mm telescope.)

However, observers must use printed maps or use lunar software to identify and find most features. This effort takes time but can have immeasurable benefits for those who really want to study the Moon. Still, inexperienced observers may find this process daunting since most published maps show many hundreds if not thousands of lunar features. Instead, the included sets of maps primarily show and identify only the one hundred A.L. features. Therefore, even novice lunar observers can easily find and identify all features on the A.L. list. This process partially sacrifices the instructive value of having to learn features by looking them up on commercially available maps. Still, by using these maps, more people are likely to take up lunar observing.

In addition, the author has used a photographic image of the Moon based on images acquired by NASA's Lunar Reconnaissance Orbiter for the labeled maps. This composite image more realistically illustrates the Moon that observers will view although the base image shows only one sun angle and one libration. Finally, unlike some maps that use numerical labels for features that require reference to an index, the included maps show all labels on the maps themselves.

For convenience, map sets include some enlarged sections to aid identification of some small features. The included set (**called Set 2**) is produced with *inverted* (south up) maps, common for reflector telescopes. In addition, maps sets (**Sets 1 & 3**) are also available for *erect views* (north up), and *mirror-reversed views* (north up, common for refractors). Using these maps, the author could find and identify all features given for a given phase on the A.L.'s list within fifteen minutes or less observing time. **Recommendation:** Print on "high-quality" printer settings so fine detail shows. **Suggestion:** Insert maps into plastic sheet protectors to reduce absorption from moisture.

See the A.L.'s web site for details on the Lunar Club and other A.L. observing clubs: https://www.astroleague.org.

Howard L. Cohen
Gainesville, Florida
February 2012, September 2021

Contents

	Page
Preface	**3**
Introduction	**5**
Extra Resources	**6**
Naked Eye Objects	**7**
Crescent Moons	8
Imaginary Lunar Figures	9
Set 1: Erect Image Maps (North Up)*	**10**
Whole Image Maps	11
Enlarged Section Maps	23
Appendix 1	**31**
Lunar Feature Glossary	32
Some Maria and Similar Features	33
Index of the 100 A.L. Lunar Program I Features	**34**
Appendix 2: Official A.L. Lunar Program Observing Record Sheets	**35**

***Additional maps also available*: **Set 1** (Erect, North Up); **Set 3** (Mirror-Reversed).

Introduction

The Astronomical League's Lunar Program Introduces Amateur Astronomers to the Moon

RULES AND REGULATIONS To qualify for the **AL's Lunar Program Certificate and pin,** one must be **a member of the Astronomical League** and **observe 100 features** on the Moon. These 100 features are in three groups: 18 naked eye, 46 binocular, and 36 telescopic features. (The A.L. also conducts a more advanced lunar program, Lunar II.) The image map index lists all 100 features.

Any pair of binoculars and any telescope may be used. If you have difficulty observing features at one level, *go to the next higher level.* So, if you have trouble with any of the naked eye objects, move up to binoculars. If you have trouble with any of the binocular objects, then you may move up to a telescope.

OBSERVING FORM The A.L.'s Lunar I observing form lists all 100 features to observe for their Lunar Program. The map appendix includes a copy of this form. For more information go to the AL's website: **astroleague.org/al/obsclubs/lunar/lunar1.html.**

IMAGE MAPS The following pages show full image lunar maps that may help you identify features. The maps show all 100 features but some features may appear on more than one map. A few supplementary features are listed as additional aids. *Small features that may not show well on the full image maps are also shown on supplementary, enlarged maps.* Different maps illustrate features listed by the A.L. for several different lunar phases. However, maps can help identify features visible at other phases. Finally, most full image maps for each phase have two parts to reduce the number of features listed on each map.

THREE SETS OF MAPS This document contains maps only for *inverted views* of the Moon with south up **(Set 2)**. Additional maps are available as separate documents for *normal views* with north up **(Set 2)**, and for *mirror-reversed views* with north up **(Set 3)**.

BASE IMAGES FOR MAPS The lunar maps used are a composite from the NASA **L**unar **R**econnaissance **O**rbiter **C**amera (**LROC**). Actual illumination and libration at the time of observation may differ from what the maps show since the map composite is made from images all shown under similar, moderate solar illumination angles. In addition, an image for an actual Full Moon taken by Howard Eskildsen (Ocala, FL) was also used as a supplementary image to help illustrate example lunar rays, which are most noticeable under high solar illumination. For more information about LROC see: **www.lroc.asu.edu.**

A Few Extra Resources

Commercially Available Lunar Maps and Lunar Software*

(Domains and Availability Change with Time)

MAPS FROM SKY PUBLISHING CORP.

(https://shopatsky.com/collections/maps-globes/maps)

- Moon Map Laminated Item, #59198, Price: $6.95
- Mirror Image Moon Map Laminated, Item #5921X, Price: $6.95
- Sky & Telescope Field Map Of The Moon, Item #59228, Price: $13.95
- Field Map of the Moon (Mirror Image) Item #59295, Price: $13.95
- Chuck Wood's Lunar 100 Card Plastic, Item #L100P, Price: $6.95

SOFTWARE

- Lunar Map Pro 5.0 by RITI, Deluxe Edition: $9.95 (http://eng.riti.com.tw/product/software/05.aspx) – *No Longer Available?*
- LunarPhase Pro: Digital Download $39.95/CDROM $49.95 (https://www.lunarphasepro.com) – *A Favorite, Many Features*
- LunarMap HD for Android: $1.49 (https://play.google.com/store/apps/details?id=mobi.omegacentauri.LunarMap.HD&hl=en_US&gl=US)
- Moon Atlas: for iPhone/iPad: $5.99 (https://apps.apple.com/us/app/moon-atlas/id302171459)
- Virtual Moon Atlas Version 7.0: Free Download (https://ap-i.net/avl/en/start) – *Among the Very Best*
- Google Moon: Online Map – Also many other objects (https://www.google.com/maps/space/moon)
- LROC Quickmap: Online Map (https://quickmap.lroc.asu.edu)

*Prices at time of publication (2021 September).

Naked Eye Objects

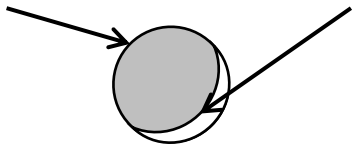
Crescent Moons

Imaginary Figures

MOON: NAKED EYE OBJECTS — CRESCENT MOONS

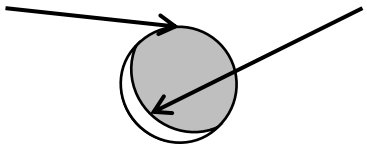
(Northern Hemisphere Views — Reverse Lunar Images for Southern Hemisphere)

Old Moon in New Moon's Arms



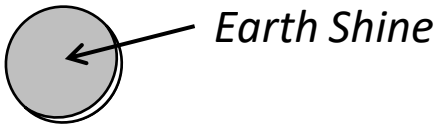
Western Horizon, Early Evening
(Within 72 Hrs of New)

New Moon in Old Moon's Arms



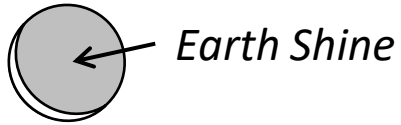
Eastern Horizon, Early Morning
(Within 72 Hrs of New)

Crescent Moon, Waxing



Western Horizon, Early Evening
(Within 40 Hrs of New)

Crescent Moon, Waning



Eastern Horizon, Early Morning
(Within 48 Hrs of New)

Cred. Diagram by HL Cohen (2012)

MOON: NAKED EYE OBJECTS — IMAGINARY LUNAR FIGURES

Man in the Moon

Woman in the Moon

Rabbit in the Moon

Cow Jumping Over Moon

Cred. Diagram by HL Cohen (2012) using A.L. Drawings

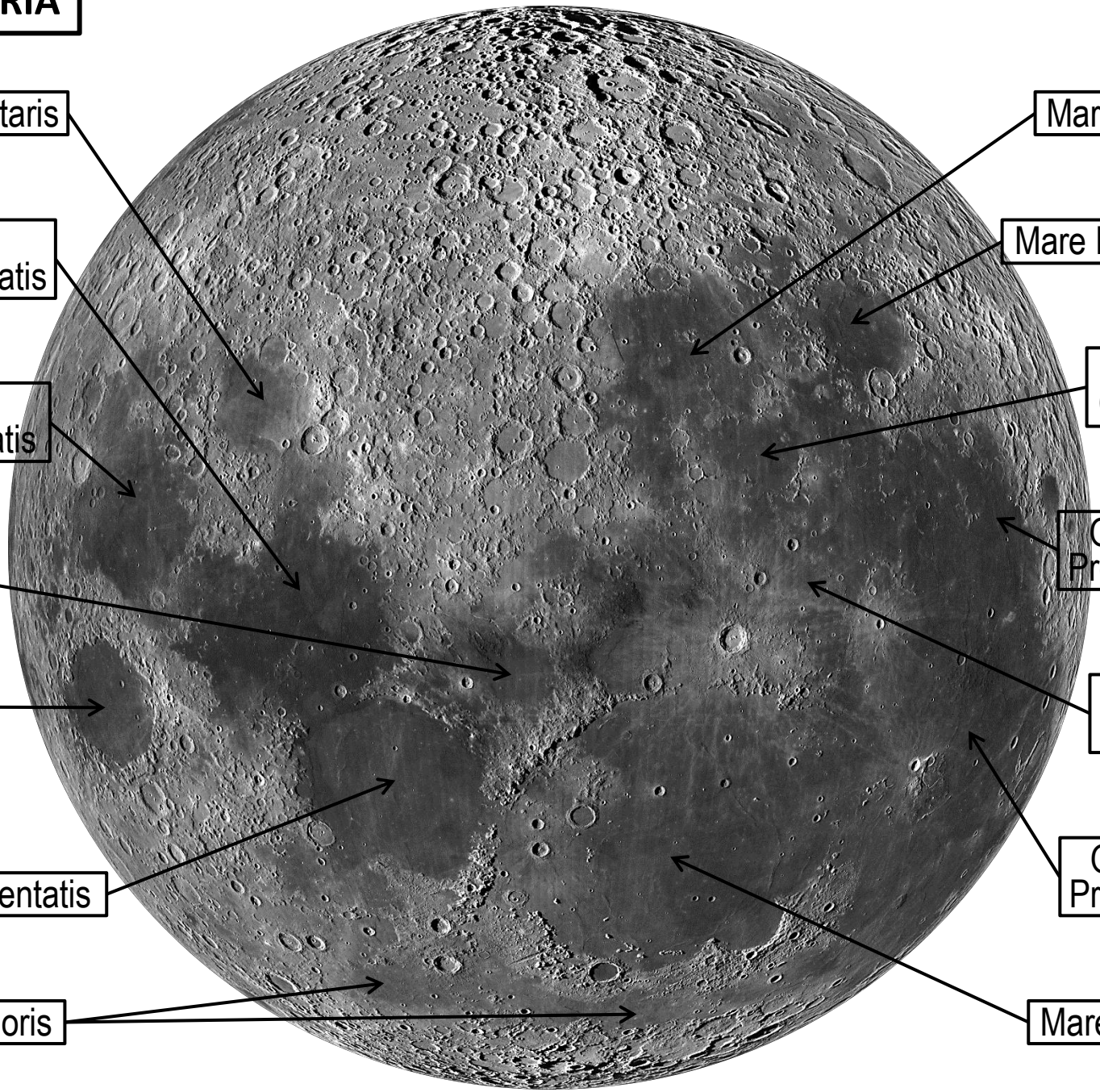
Set II: Full Image Maps

Direct Image Maps

(South Up)

MOON: MARIA

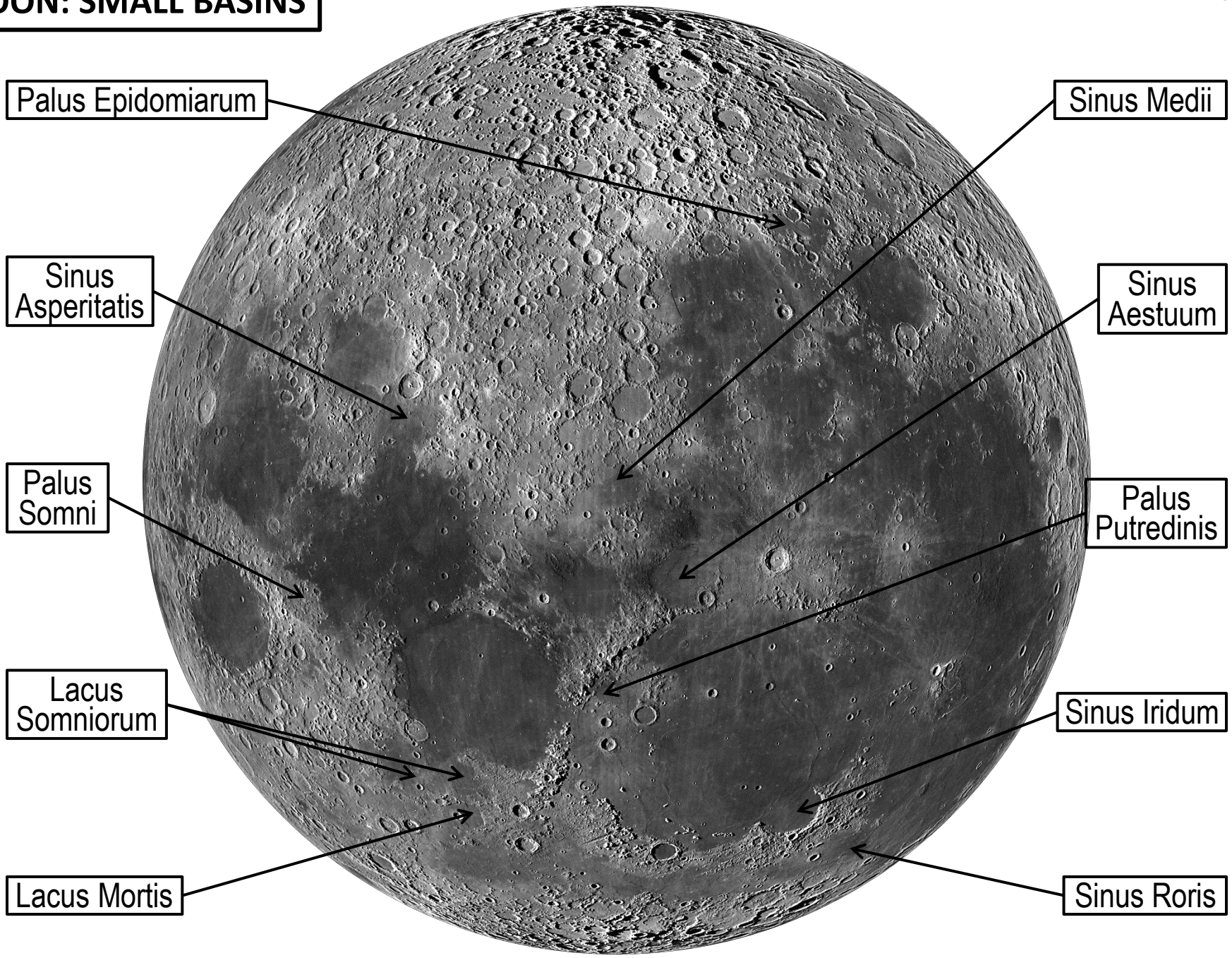
[SOUTH UP]



Cred. Map by HL Cohen (2012) using LROC (NASA) image.

MOON: SMALL BASINS

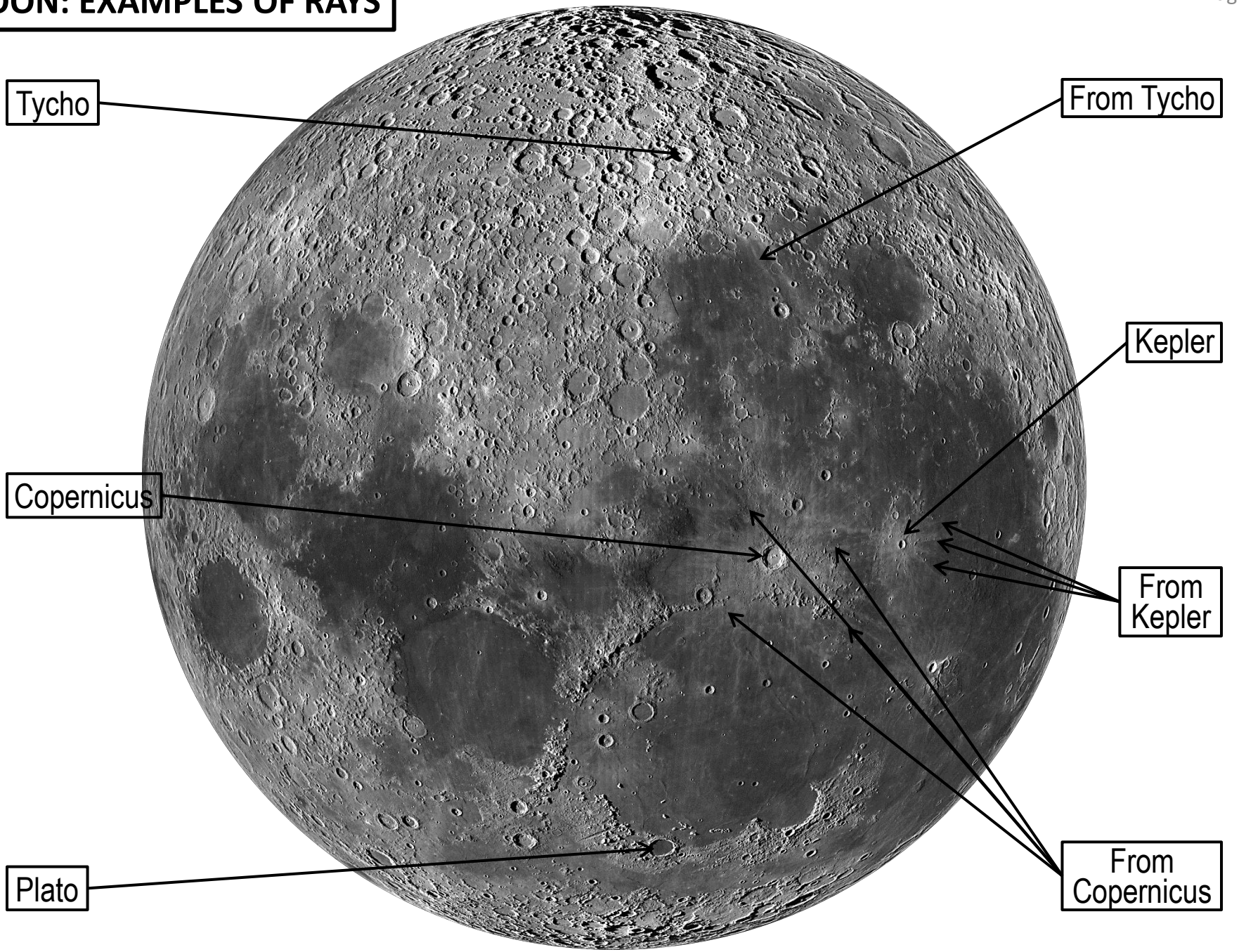
[SOUTH UP]



Cred. Map by HL Cohen (2012) using LROC (NASA) image.

MOON: EXAMPLES OF RAYS

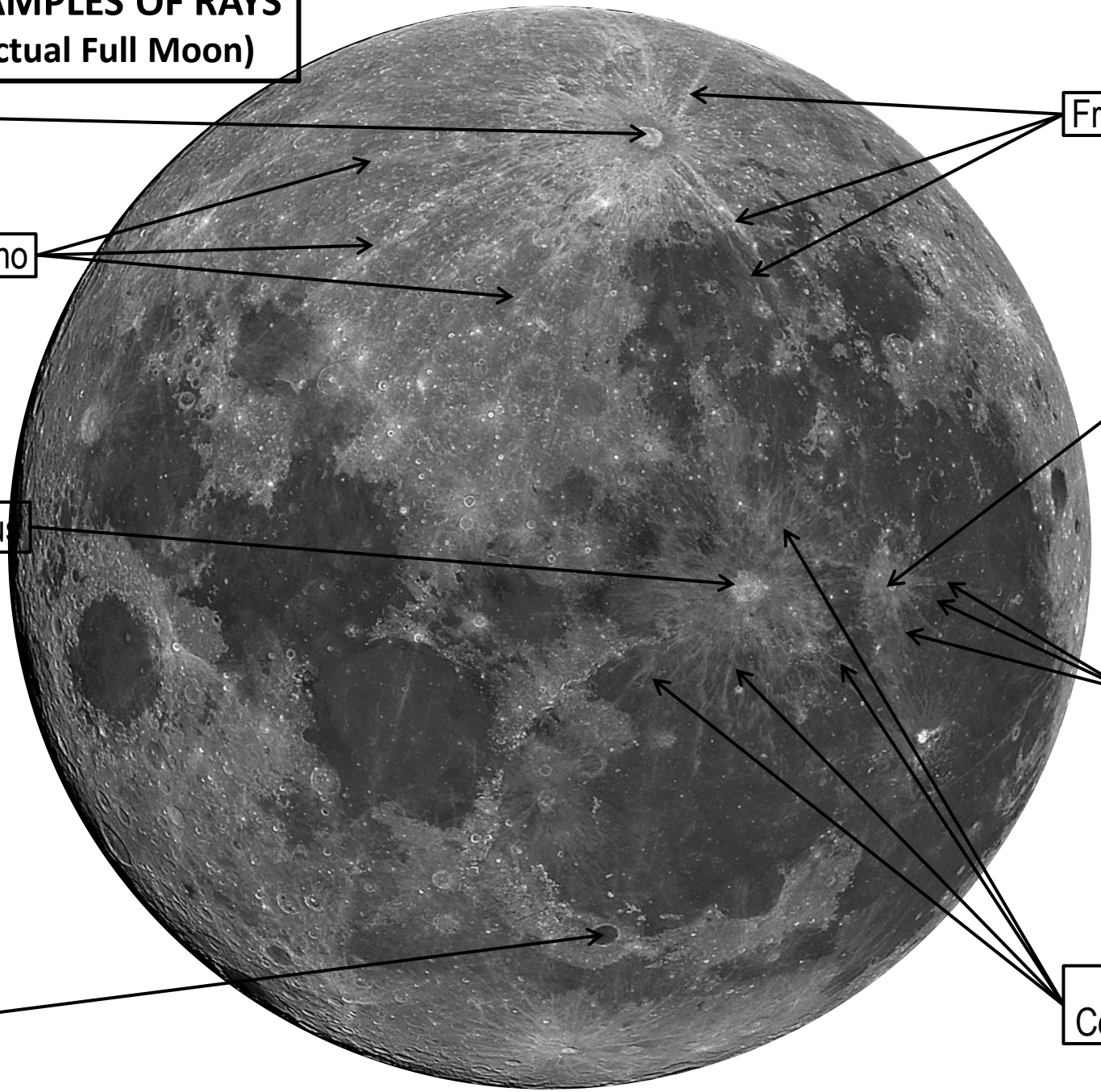
[SOUTH UP]



Cred. Map by HL Cohen (2012) using LROC (NASA) image.

MOON: EXAMPLES OF RAYS
(Shown on Actual Full Moon)

[SOUTH UP]

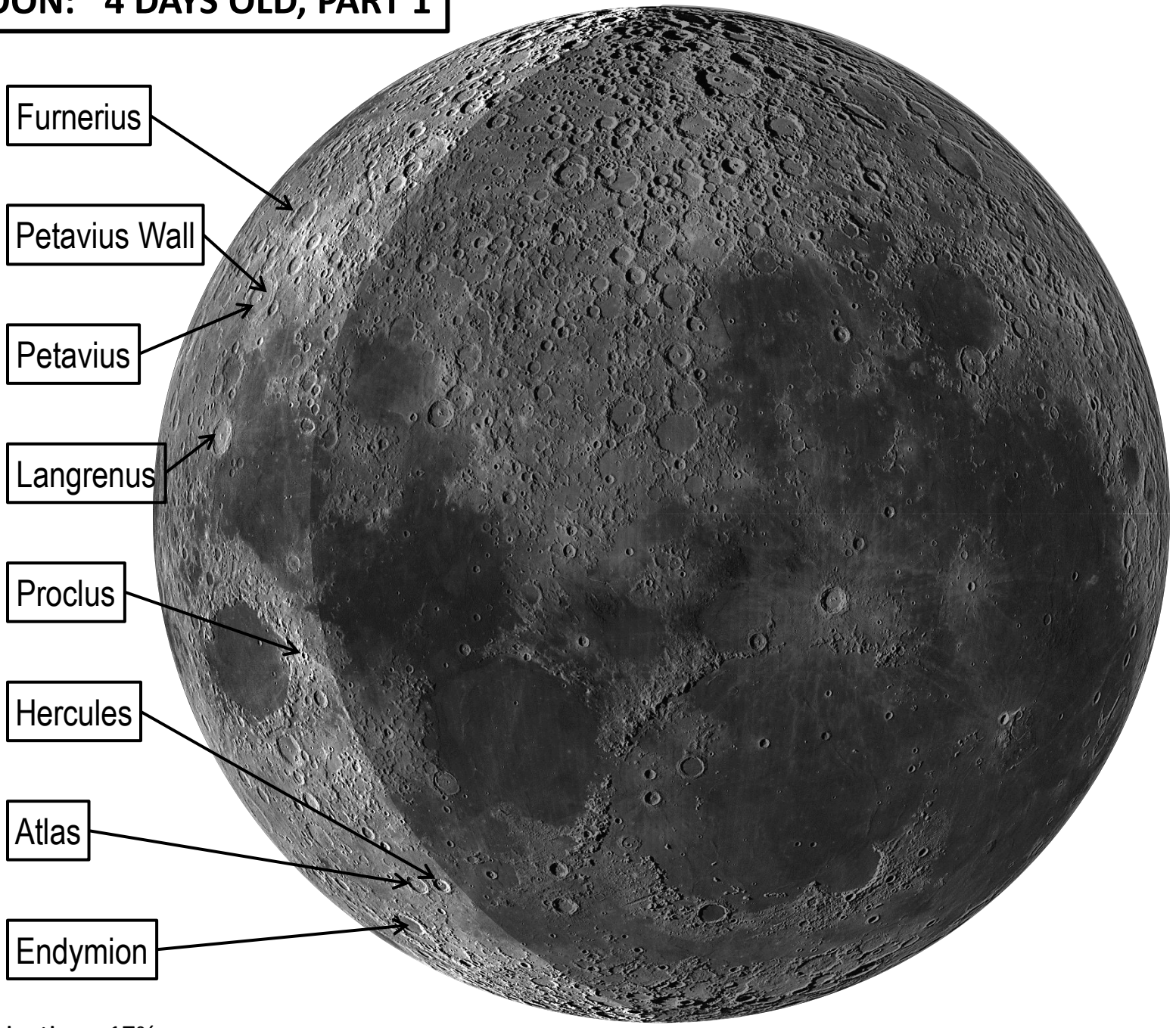


Illumination ~99.6%

Cred. Map by HL Cohen (2012) using image by Howard Eskildsen

MOON: ~4 DAYS OLD, PART 1

[SOUTH UP]

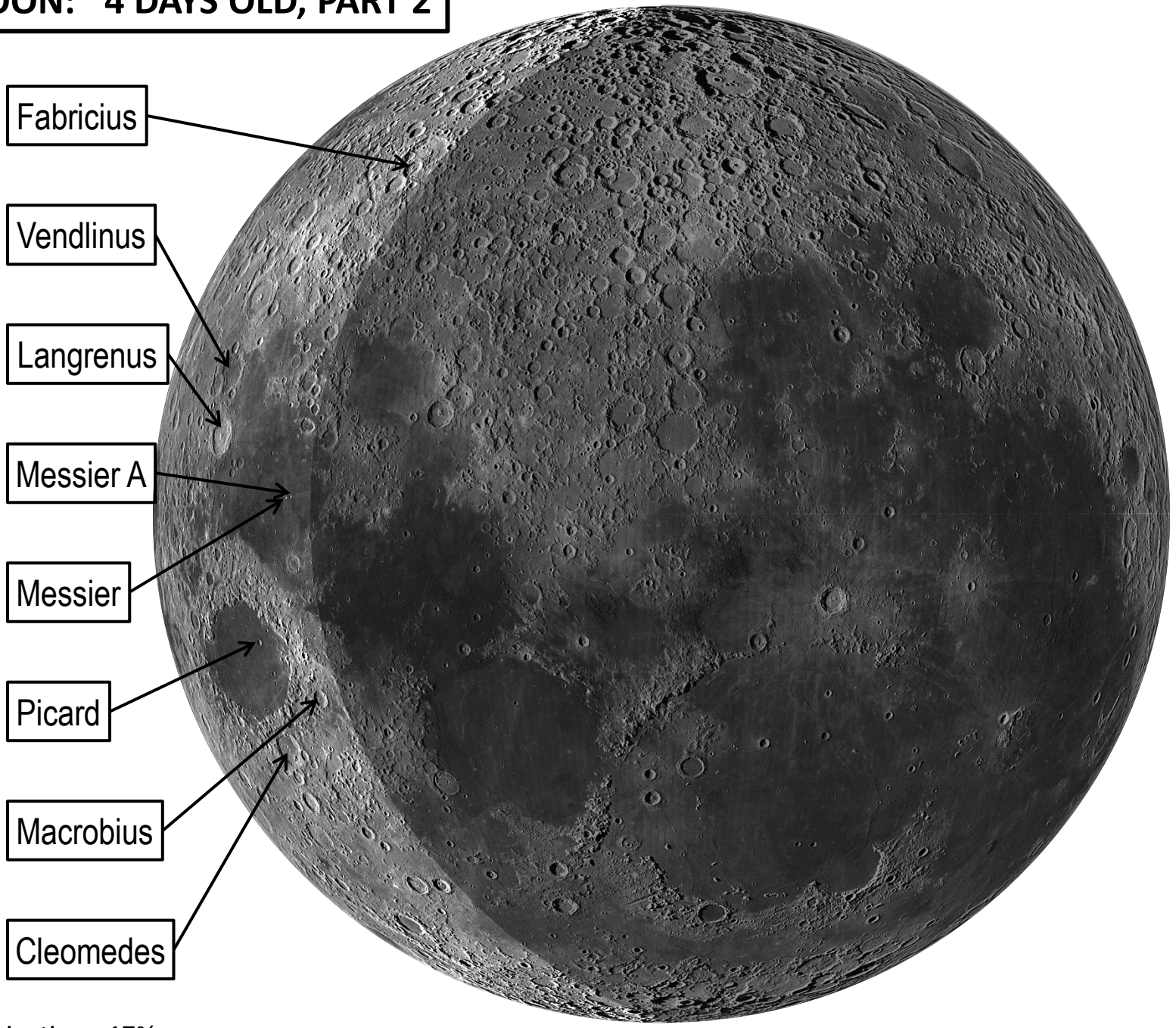


Illumination ~17%

Cred. Map by HL Cohen (2012) using LROC (NASA) image.

MOON: ~4 DAYS OLD, PART 2

[SOUTH UP]

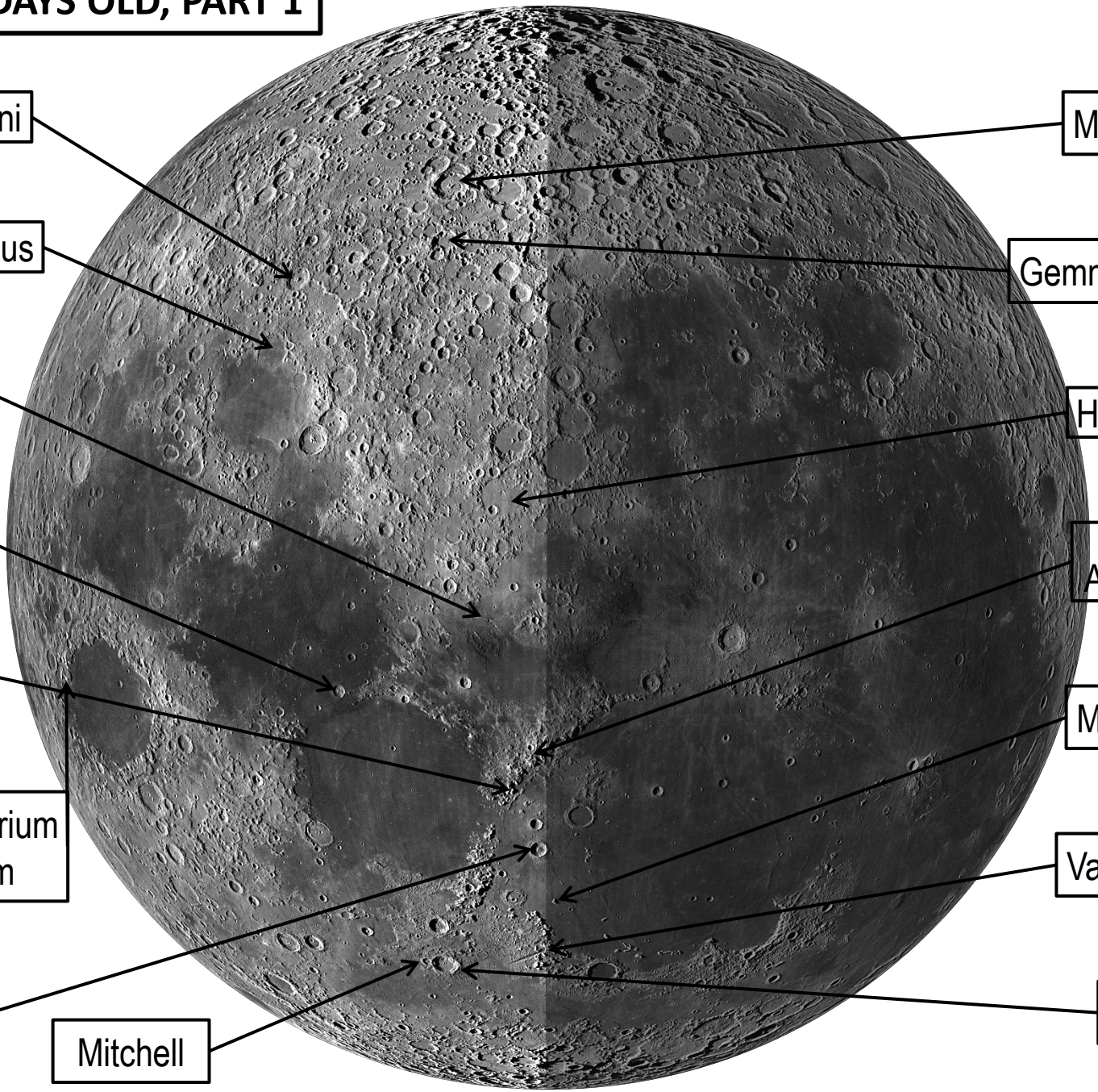


Illumination ~17%

Cred. Map by HL Cohen (2012) using LROC (NASA) image.

MOON: ~7 DAYS OLD, PART 1

[SOUTH UP]

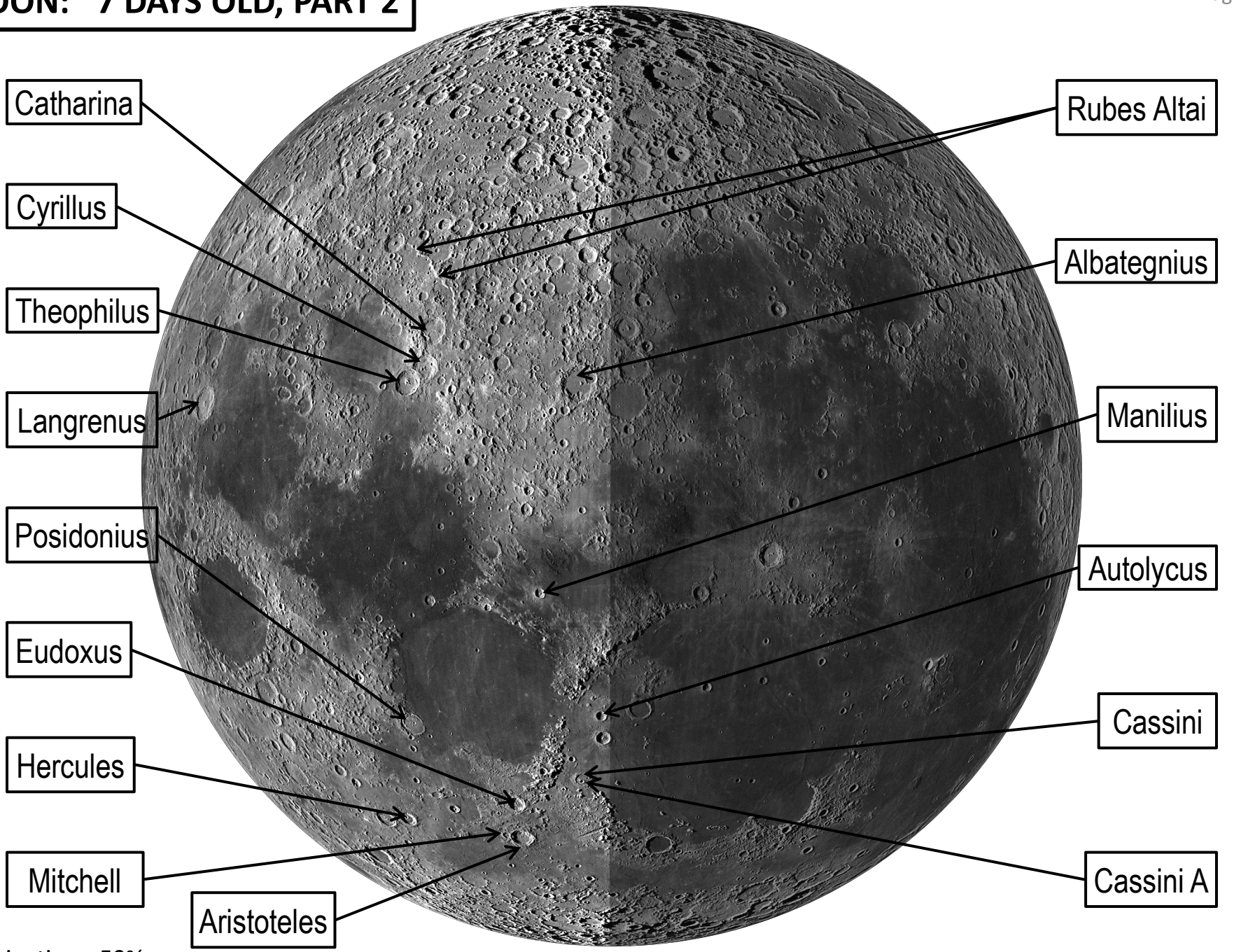


Illumination ~50%

Cred. Map by HL Cohen (2012) using LROC (NASA) image.

MOON: ~7 DAYS OLD, PART 2

[SOUTH UP]

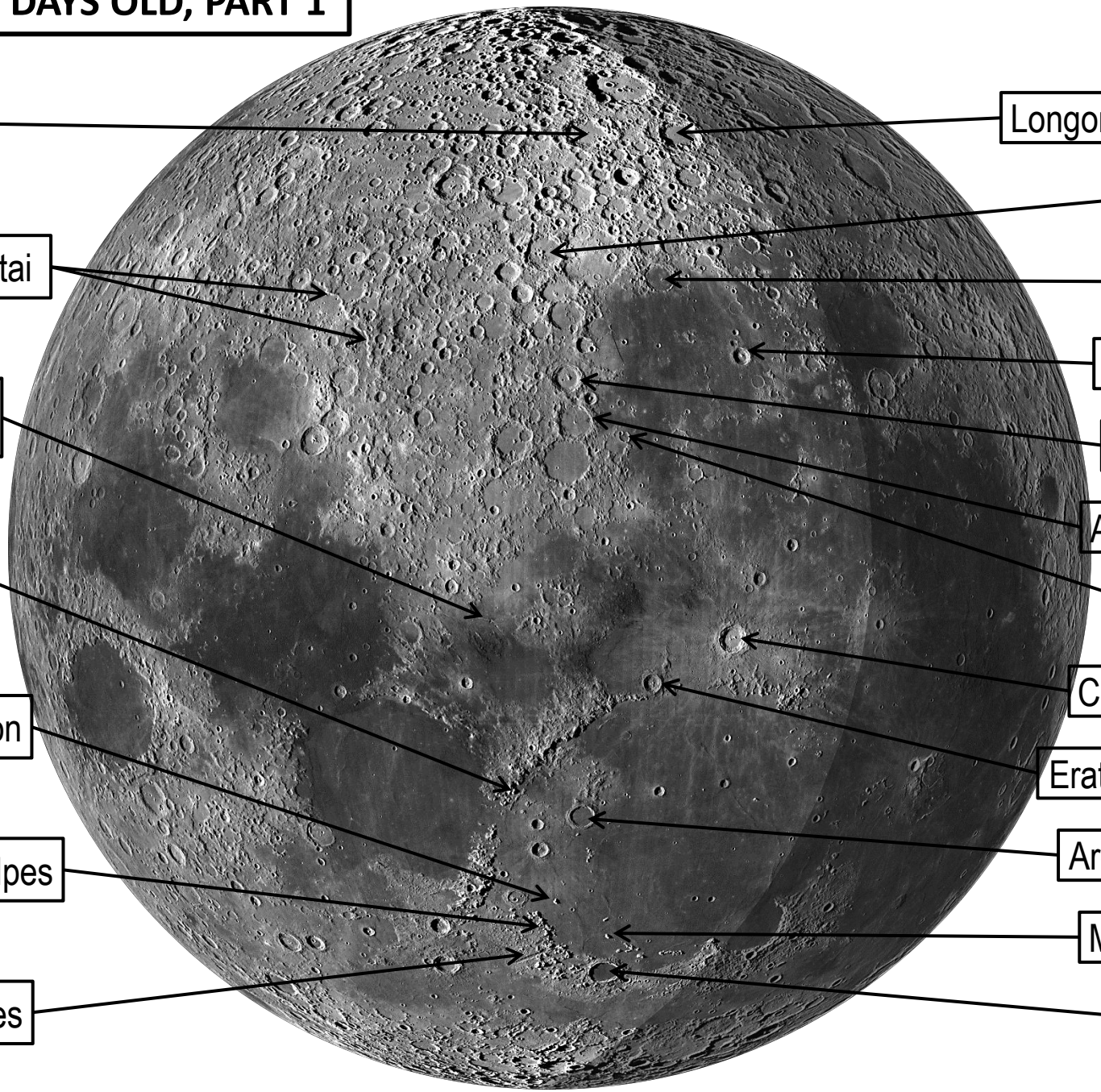


Illumination ~50%

Cred. Map by HL Cohen (2012) using LROC (NASA) image.

MOON: ~10 DAYS OLD, PART 1

[SOUTH UP]

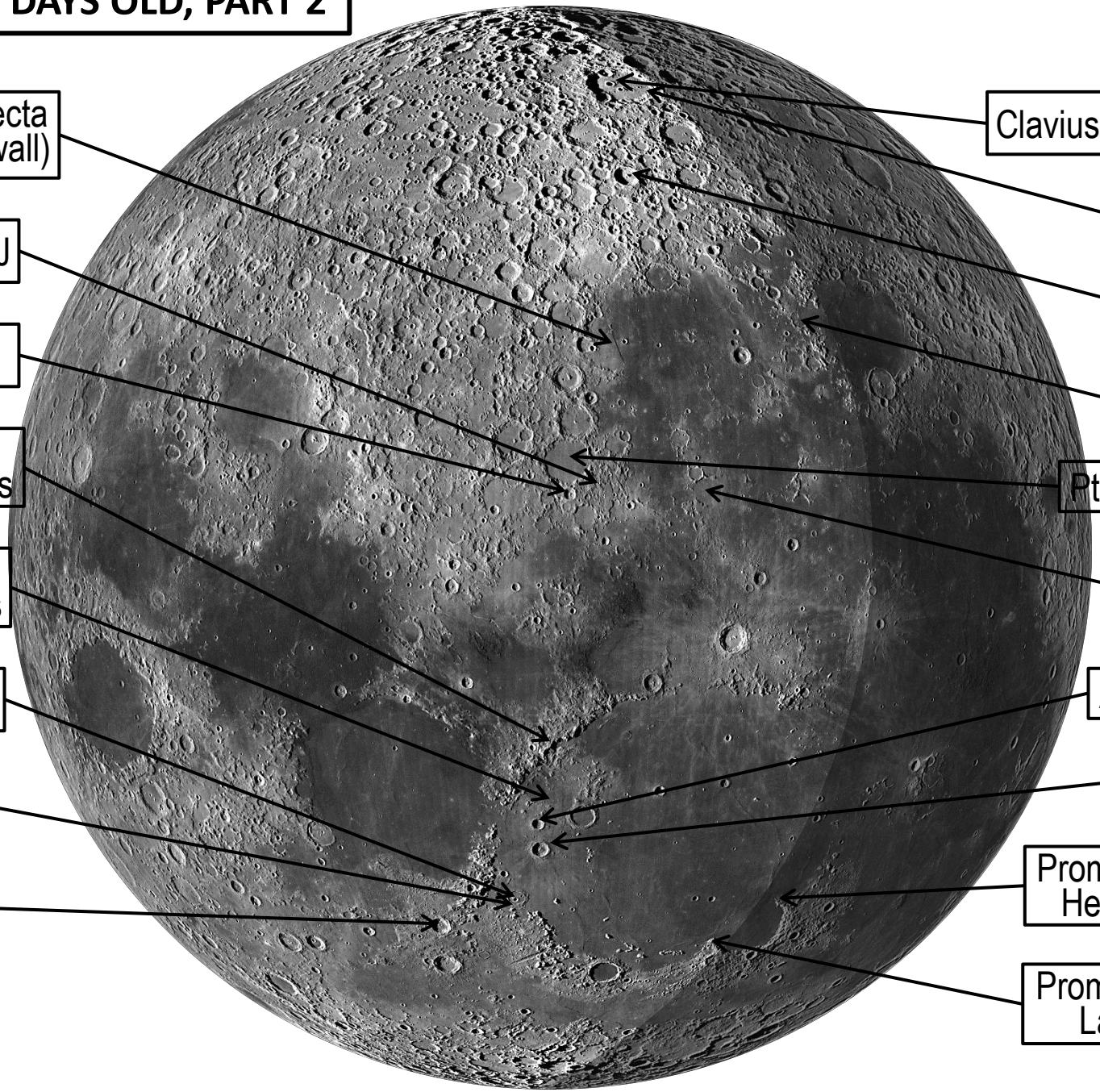


Illumination ~70%

Cred. Map by HL Cohen (2012) using LROC (NASA) image.

MOON: ~10 DAYS OLD, PART 2

[SOUTH UP]

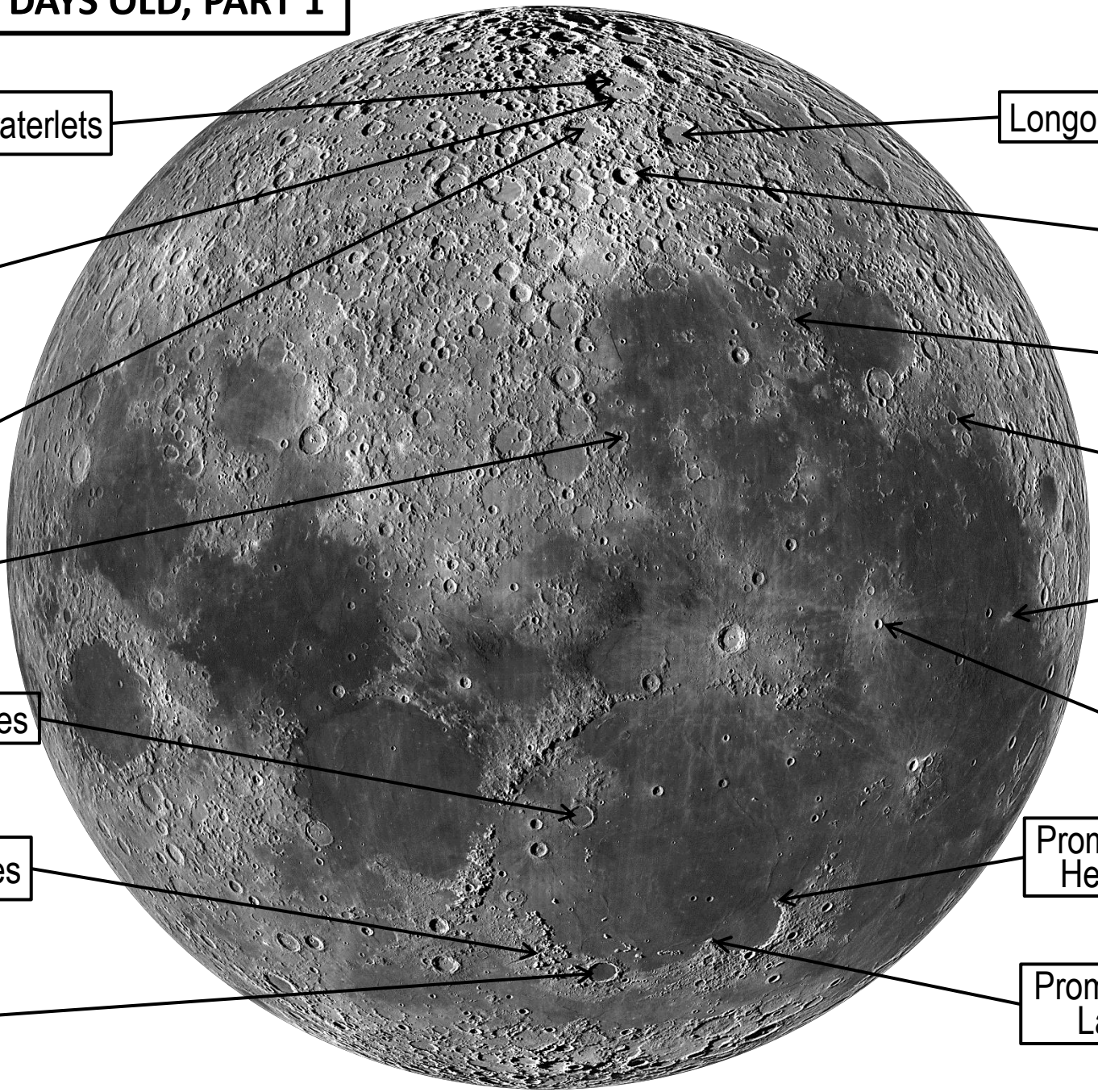


Illumination ~70%

Cred. Map by HL Cohen (2012) using LROC (NASA) image.

MOON: ~14 DAYS OLD, PART 1

[SOUTH UP]

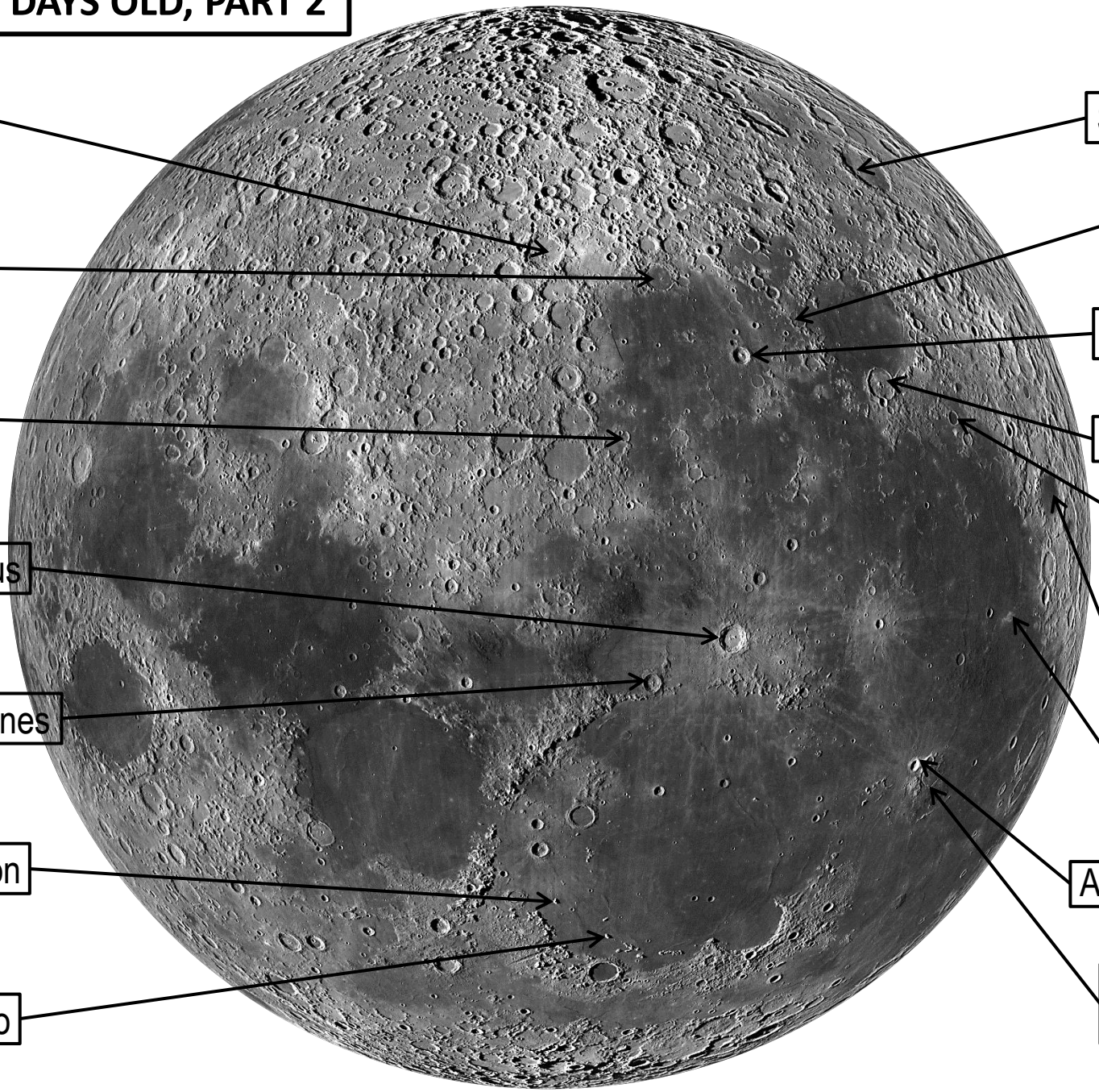


Illumination ~100%

Cred. Map by HL Cohen (2012) using LROC (NASA) image.

MOON: ~14 DAYS OLD, PART 2

[SOUTH UP]



Illumination ~100%

Cred. Map by HL Cohen (2012) using LROC (NASA) image.

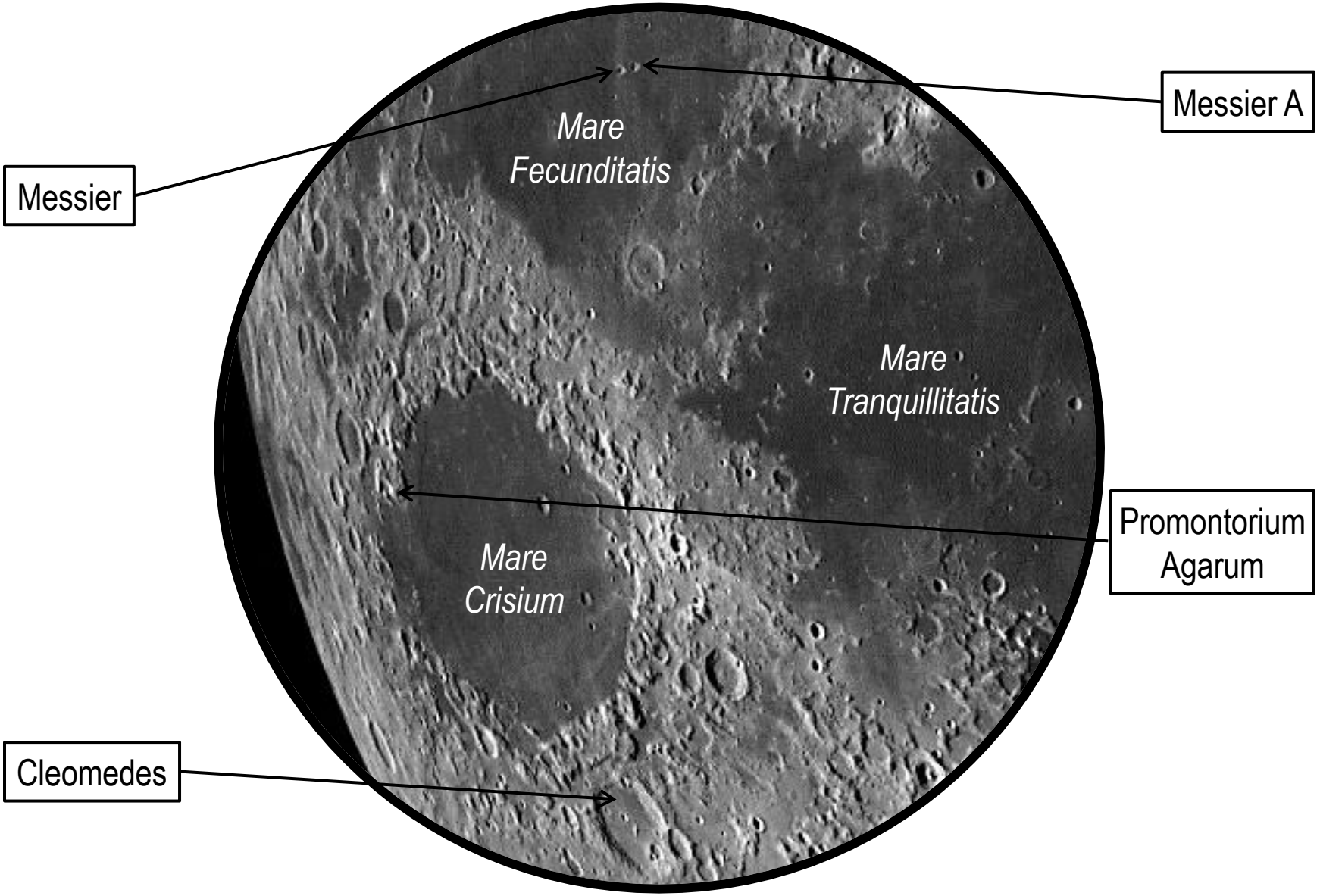
Set II: Enlarged Image Maps

Inverted Image Maps

(South Up)

MOON: ~4 DAYS OLD, SECT. 1

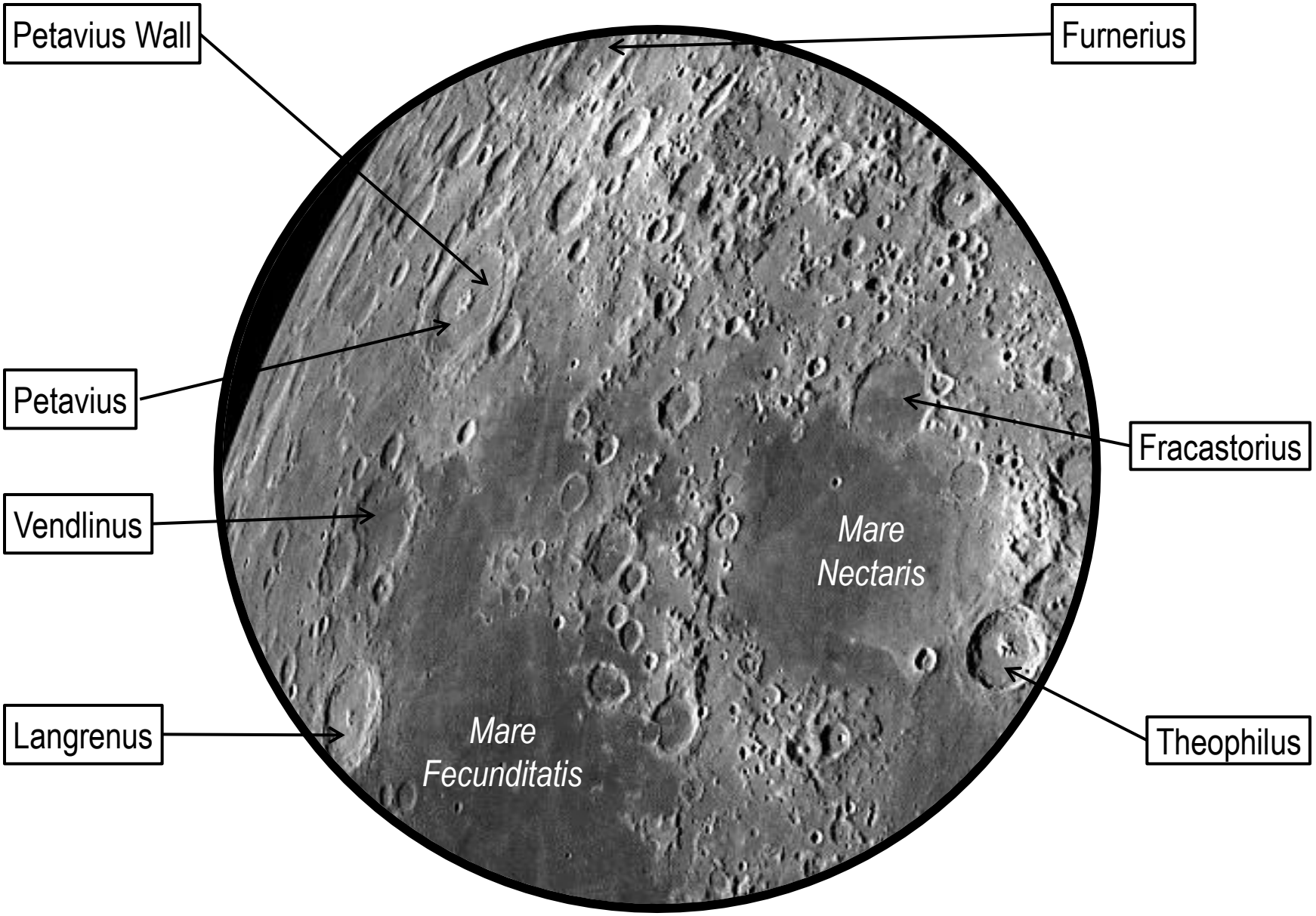
[SOUTH UP]



Cred. Map by HL Cohen (2012) using LROC (NASA) image.

MOON: ~4 DAYS OLD, SECT. 2

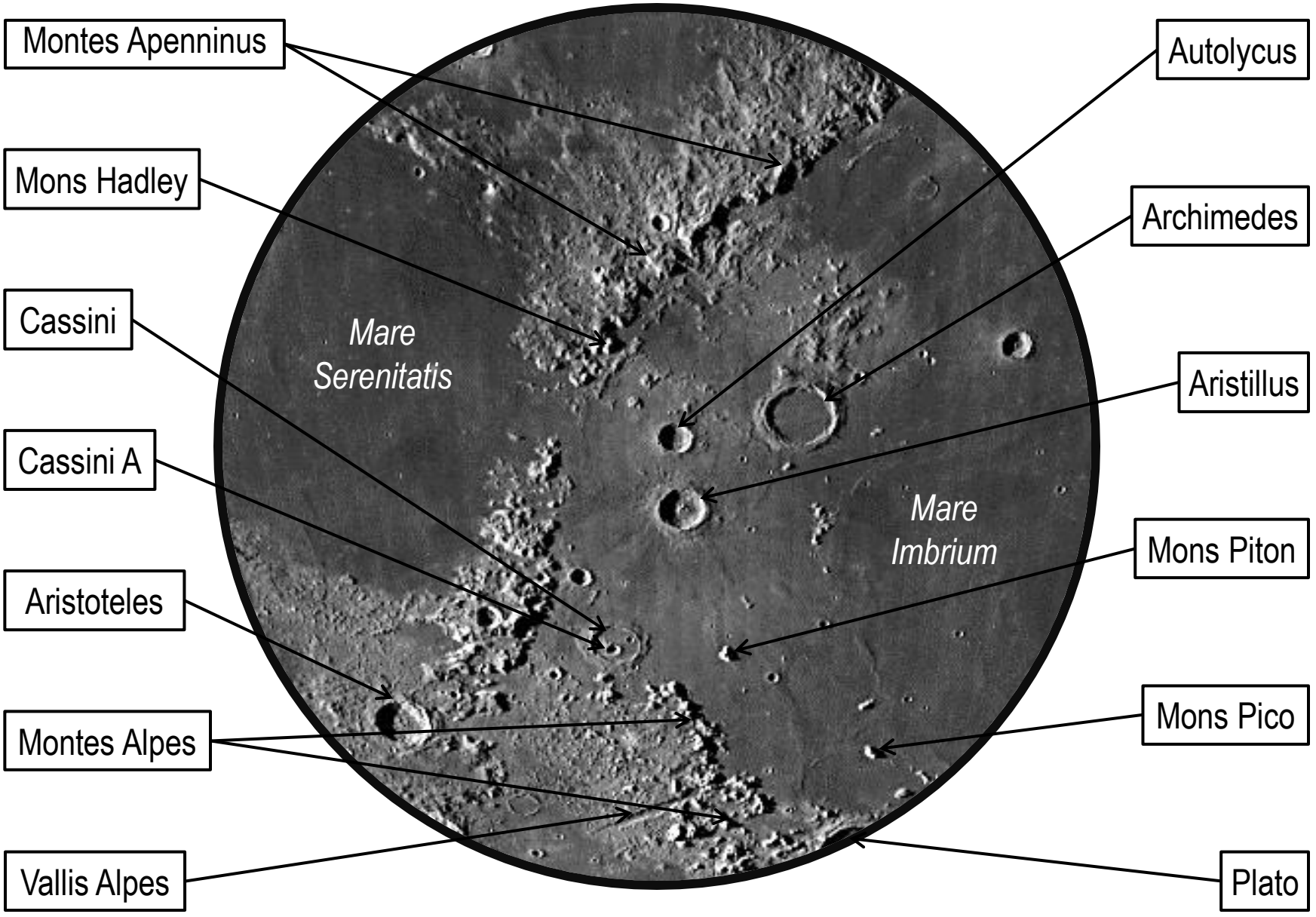
[SOUTH UP]



Cred. Map by HL Cohen (2012) using LROC (NASA) image.

MOON: ~10 DAYS OLD—SECT. #1

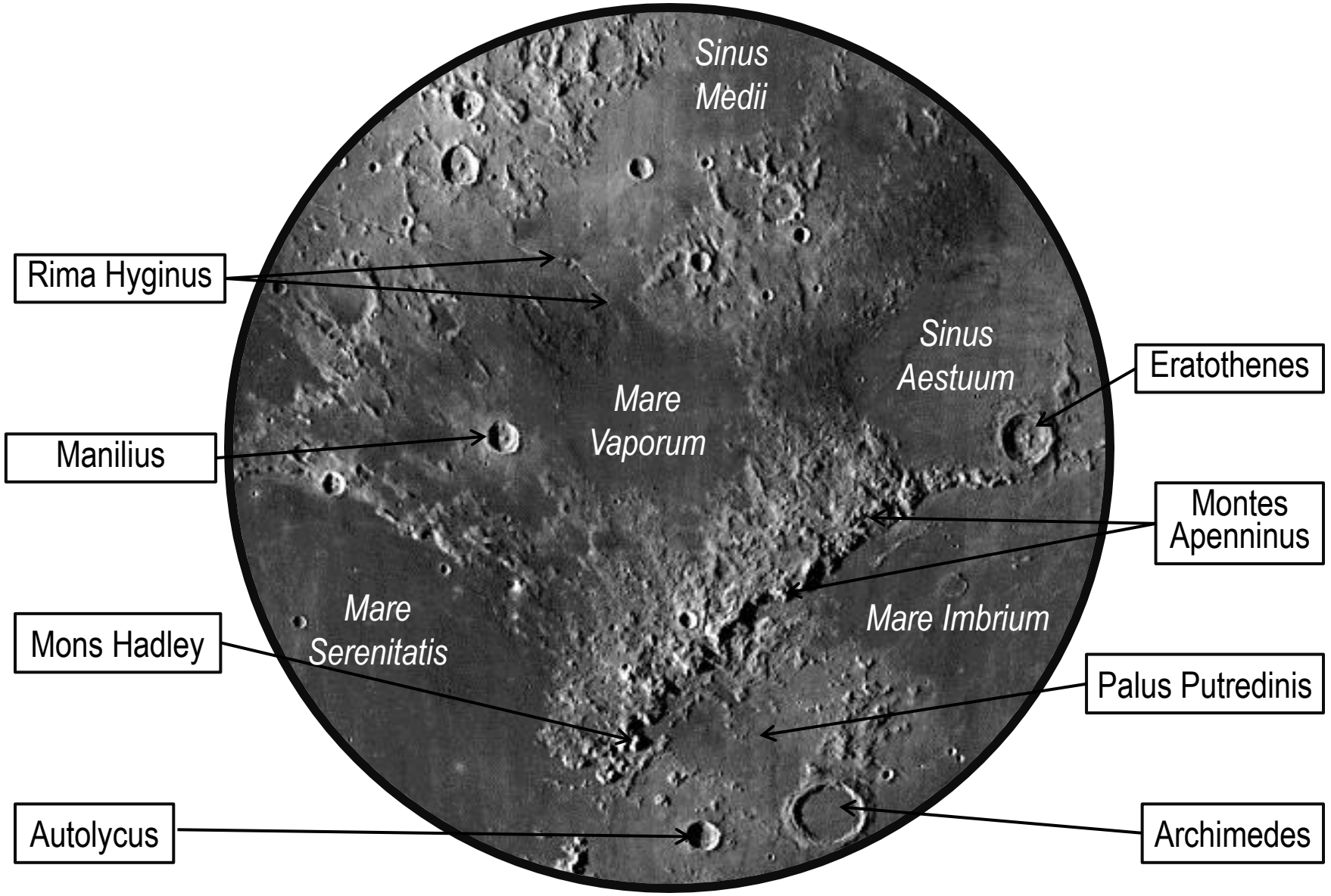
[SOUTH UP]



Cred. Map by HL Cohen (2012) using LROC (NASA) image.

MOON: ~10 DAYS OLD—SECT. #2

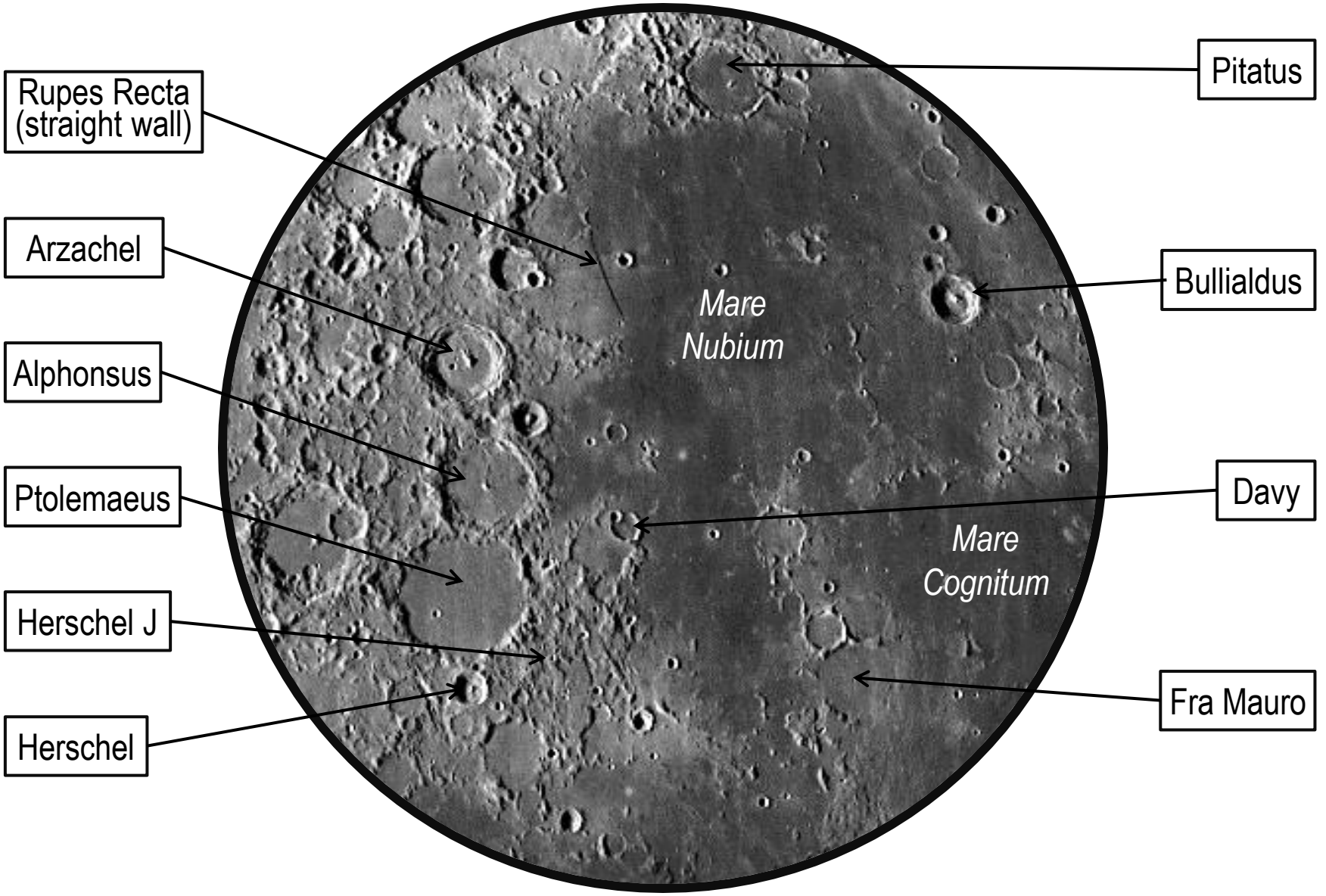
[SOUTH UP]



Cred. Map by HL Cohen (2012) using LROC (NASA) image.

MOON: ~10 DAYS OLD—SECT. #3

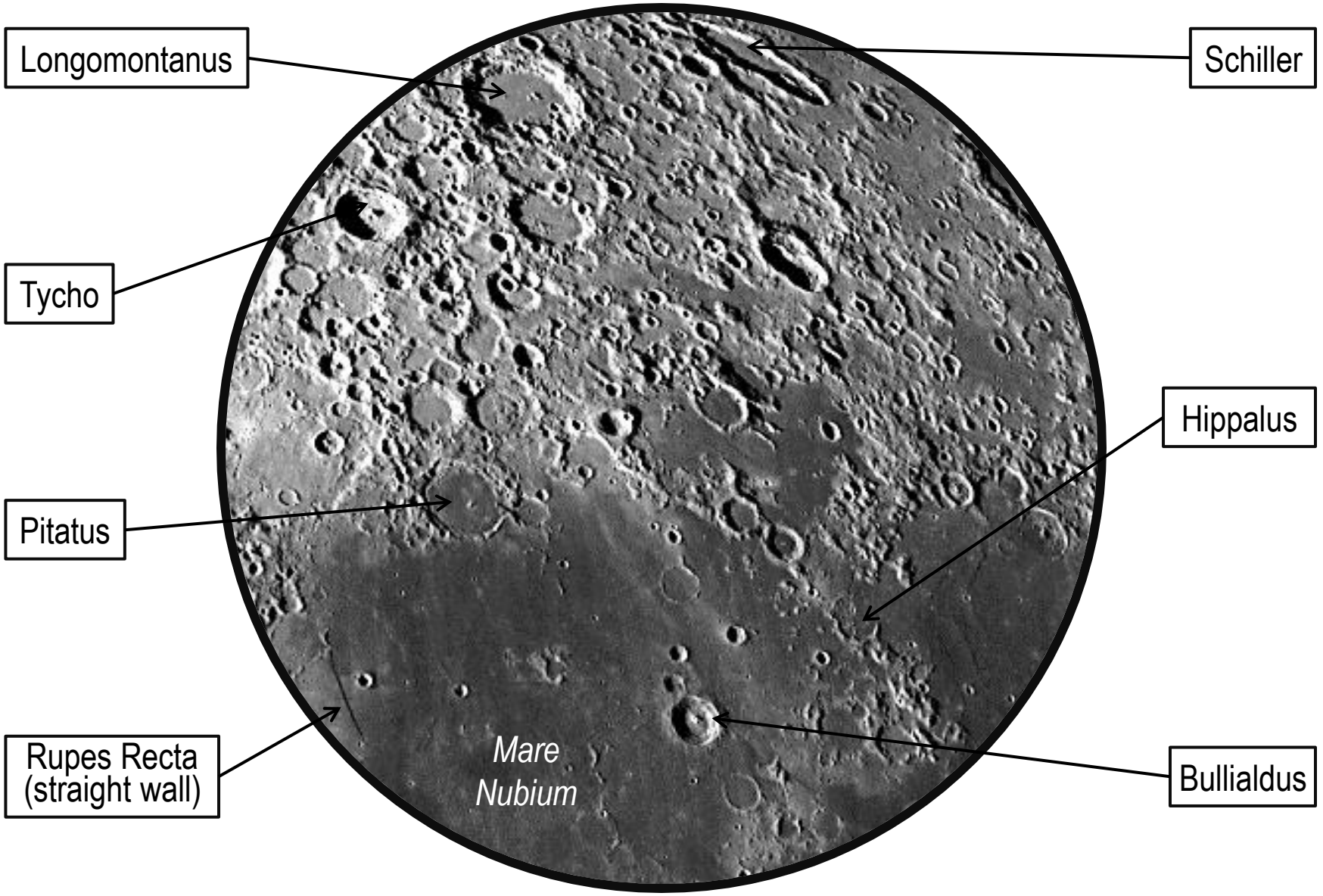
[SOUTH UP]



Cred. Map by HL Cohen (2012) using LROC (NASA) image.

MOON: ~10 DAYS OLD—SECT. #4

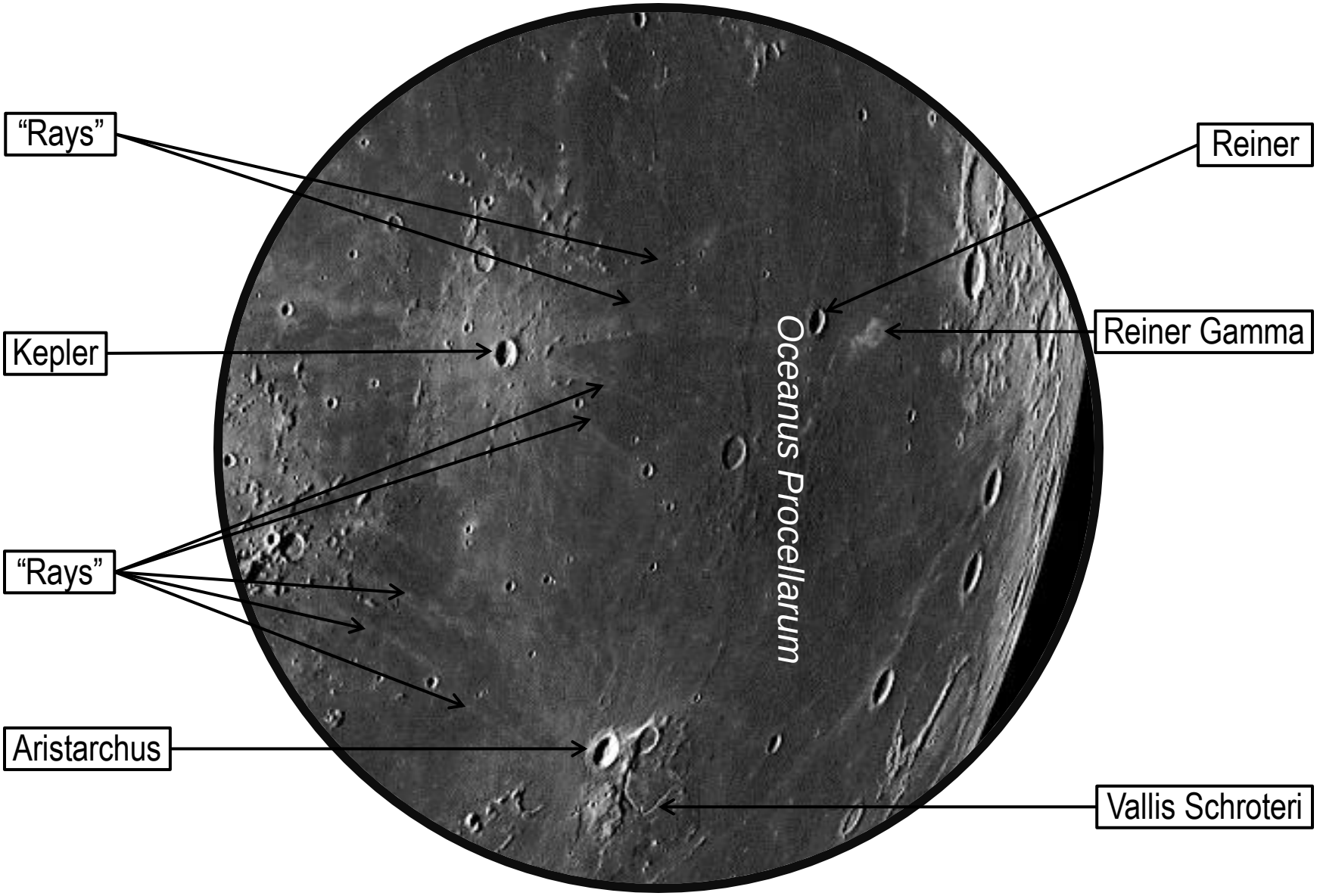
[SOUTH UP]



Cred. Map by HL Cohen (2012) using LROC (NASA) image.

MOON: ~14 DAYS OLD—SECT. #1

[SOUTH UP]



Cred. Map by HL Cohen (2012) using LROC (NASA) image.

Appendix

– Lunar Feature Glossary –

– Some Maria and Similar Features –

Lunar Feature Glossary

basin	large, bowl-shaped depression probably of impact origin
caldera	large crater formed by volcanic explosion or by collapse of a volcanic cone
catina	(pl. *catinae*) crater chain
cliff	high, steep, or overhanging face of rock
craterlets	small craters
craters	bowl-shaped depression or basin usually of impact origin
domes	rounded hill probably of volcanic origin often capped with small crater
graben	elongated depression or channel caused by vertical geologic faults
lacus	(pl. *laci;* Latin *lake*) dark, isolated irregular patch
libration	slow apparent lunar oscillation in latitude (abt. 7°) and longitude (abt. 8°); allows 59% of surface to be seen
mare	(pl. *maria;* Latin *sea*) large dark basin
mons	(Latin *mountain*) a mountain; sometimes the walls of large basins
montes	mountain range or group of mountains
oceanus	large dark region (cf. mare)
palus	(pl. *pali;* Latin swamp or marsh) small plain (or "marsh")
peak	pointed mountain summit
promontory	high ridge
ray	light-colored, linear features extending radial from (usually younger) lunar craters; conspicuous near Full Moon
rille	(alt. *rima)* well-defined, long, narrow valley or cleft with sides approximately parallel
	– **arcuate rille** curved rille, often concentric; confined within circular mare
	– **sinuous rille** long, winding steep walled valley; often discontinuous; likely lava channels; V-shape
	– **strait (linear) rille** strait rille that appears to be a linear *graben*; flat floors
rima	(pl. *rimae*) a rille, crack or fissure (see *rille*)
rupes	(pl. *rupes*) a lunar *scarp*
scarp	(*escarpment*) steep slope or long cliff often from faulting or erosion
sinus	(*bay*, pl. *sini*) indentation in edge of high ground; protrusion from dark area
valles	(*valley*) elongated lowland between mountain ranges, hills, or uplands

Some Marian & Similar Features

(Most named for water bodies — not all on A.L. Lunar I Feature List)

- Lacus Mortis (Lake of Death)
- Lacus Somniorum (Lake of Dreams)
- Mare Anguis (Sea of Snake)
- Mare Australe (Southern Sea)
- Mare Crisium (Sea of Crisis)
- Mare Fecunditatis (Sea of Fertility)
- Mare Frigoris (Sea of Cold)
- Mare Humboldtianum (Sea of Humboldt)
- Mare Humorum (Sea of Moisture)
- Mare Imbrium (Sea of Rain)
- Mare Insularum (Sea of Islands)
- Mare Nectaris (Sea of Nectar)
- Mare Nubium (Sea of Clouds)
- Mare Sernitatis (Sea of Serenity)

- Mare Smythii (Smyth's Sea)
- Mare Spumans (Foaming Sea)
- Mare Tranquillitatis (Sea of Tranquility)
- Mare Vaporum (Sea of Vapors)
- Mare Undarum (Sea of Waves)
- Oceanus Procellarum (Ocean of Storms)
- Palus Epidemiarium (Marsh of Disease)
- Palus Nebularum (Marsh of Mists)
- Palus Putredinus (Marsh of Rot)
- Palus Somni (Marsh of Sleep)
- Sinus Aestuum (Seething Bay)
- Sinus Iridium (Bay of Rainbows)
- Sinus Medii (Central Bay)
- Sinus Roris (Bay of Dew)

INDEX OF THE 100 A.L. LUNAR I FEATURES

(Bold Page Numbers: Features on Full Image Maps; Non-Bold Page Numbers: Features on Enlarged Maps)

1. Albategnius, **18**
2. Alphonsus, **19,** 28
3. Archimedes **19, 21,** 26, 27
4. Aristarchus, **22,** 30
5. Aristillus, **17, 20,** 26
6. Aristoteles, **17, 20,** 26
7. Arzachel, **19,** 28
8. Atlas, **15**
9. Autolycus, **18, 20,** 26, 27
10. Billy, **21, 22**
11. Bullialdus, **19, 22,** 28, 29
12. Cassini, **18,** 26
13. Cassini A, **18, 20,** 26
14. Catharina, **18, 20**
15. Clavius, **20, 21**
16. Clavius craterlets, **20, 21**
17. Cleomedes, **16,** 24
18. Copernicus, **13, 14, 19, 22**
19. Crescent Moon, Waning, **8** (Within 48 Hrs of New)
20. Crescent Moon, Waxing , **8** (Within 40 Hrs of new)
21. Cyrillus, **18**
22. Davy, **19, 21, 22,** 28
23. Endymion, **15**
24. Eratosthenes, **19, 22,** 27
25. Eudoxus, **18, 20**
26. Fabricius, **16**
27. Fra Mauro, **20,** 28
28. Fracastorius, **17,** 25
29. Furnerius, **15,** 25
30. Gassendi, **22**
31. Gemma Frisius, **17**
32. Grimaldi, **22**
33. Hercules, **15, 18,** 28
34. Herschel, J., **20,** 28
35. Hippalus, **20, 21, 22,** 29
36. Hipparchus, **17**
37. Kepler, **13, 14, 21,** 30
38. Lacus Mortis, **12**
39. Langrenus, **15, 16, 18,** 25
40. Longomontanus, **19, 21,** 29
41. Lunar Rays, **13, 14,** 30
42. Macrobius, **16**
43. Maginus, **19, 21**
44. Manilius, **18,** 27
45. Mare Crisium, **11,** 24
46. Mare Fecunditatis, **11,** 24, 25
47. Mare Frigoris, **11**
48. Mare Humorum, **11**
49. Mare Imbrium, **11,** 26, 27
50. Mare Nectaris, **11,** 25
51. Mare Nubium, **11,** 28, 29
52. Mare Serenitatis, **11,** 26, 27
53. Mare Tranquillitatis, **11,** 24
54. Mare Vaporum , **11,** 27
55. Maurolycus, **17**
56. Messier/Messier A, **16,** 24
57. Mitchell, **18**
58. Mons Hadley, **17, 19,** 26, 27
59. Mons Pico, **19, 22,** 26
60. Mons Piton, **17, 19, 22,** 26
61. Montes Alpes, **19,** 26
62. Montes Apenninus, **17, 20,** 26, 27
63. Moon, Cow Jumping Over, **9**
64. Moon, Man in the, **9**
65. Moon, Rabbit in the, **9**
66. Moon, Woman in th , **9**
67. New Moon in Old Moon's Arms, **8** (Within 72 Hrs of new)
68. Oceanus Procellarum, **11**
69. Old Moon in New Moon's Arms, **8** (Within 72 Hrs of new)
70. Palus Epidemiarum, **12**
71. Palus Putredinis, **12, 20,** 27
72. Palus Somnii, **12**
73. Petavius, **15,** 25
74. Petavius Wall, **15,** 25
75. Picard, **16**
76. Piccolomini, **17**
77. Pitatus, **19, 22,** 28, 29
78. Plato, **14, 19, 21,** 26
79. Plinius, **17**
80. Posidonius, **18**
81. Proclus, **15**
82. Promontorium Agarum, **17,** 24
83. Promontorium Heraclides, **20, 21**
84. Promontorium Laplace, **20, 21**
85. Ptolemaeus, **20,** 28
86. Reiner Gamma, **21, 22,** 30
87. Rima Hyginus, **17, 19,** 27
88. Rupes Altai, **18, 19**
89. Rupes Recta (straight wall), **20,** 28, 29
90. Schickard, **22**
91. Sinus Aestuum, **12,** 27
92. Sinus Iridum, **12**
93. Sinus Medii, **12,** 27
94. Sinus Roris, **12**
95. Theophilus, **18,** 25
96. Tycho, **13, 14, 20, 21,** 29
97. Vallis Alpes, **17, 19,** 21, 26
98. Vallis Schroteri, **22,** 30
99. Vendelinus, **16,** 25
100. Walter, **19, 22**

A.L. Lunar Program

Complete Information at
https://www.astroleague.org/al/obsclubs/lunar/lunar1.html

Official A.L. Lunar Check List Follows

Download Excel Version From

https://www.astroleague.org/files/u220/Lunar%20Checklist.xlsx

X	FEATURE	DATE	TIME	SEEING	TRANSP.	LATITUDE	LONGITUDE
Naked-Eye Objects				E, VG, G, F, P	1 (worst) to 6 (best)		
(Within 72 Hrs of new)							
[ ]	Old Moon in New Moon's Arms	_____	_____	_____	_____	_____	_____
[ ]	New Moon in Old Moon's Arms	_____	_____	_____	_____	_____	_____
(Within 40 Hrs of new)							
[ ]	Crescent Moon, Waxing	_____	_____	_____	_____	_____	_____
[ ]	Crescent Moon, Waning	_____	_____	_____	_____	_____	_____
(When full)							
[ ]	Man in the Moon	_____	_____	_____	_____	_____	_____
[ ]	Woman in the Moon	_____	_____	_____	_____	_____	_____
[ ]	Rabbit in the Moon	_____	_____	_____	_____	_____	_____
(When gibbous)							
[ ]	Cow Jumping Over the Moon	_____	_____	_____	_____	_____	_____
Maria							
[ ]	Crisium	_____	_____	_____	_____	_____	_____
[ ]	Fecunditatis	_____	_____	_____	_____	_____	_____
[ ]	Serenitatis	_____	_____	_____	_____	_____	_____
[ ]	Tranquillitatis	_____	_____	_____	_____	_____	_____
[ ]	Nectaris	_____	_____	_____	_____	_____	_____
[ ]	Imbrium	_____	_____	_____	_____	_____	_____

X	FEATURE	DATE	TIME	SEEING	TRANSP.	LATITUDE	LONGITUDE
Naked-Eye Objects				E, VG, G, F, P	1 (worst) to 6 (best)		
Maria (continued)							
[ ]	Frigoris	_____	_____	_____	_____	_____	_____
[ ]	Nubium	_____	_____	_____	_____	_____	_____
[ ]	Humorum	_____	_____	_____	_____	_____	_____
[ ]	Oceanus Procellarum	_____	_____	_____	_____	_____	_____

X	FEATURE	DATE	TIME	SEEING	TRANSP.	LATITUDE	LONGITUDE
Binocular Objects				E, VG, G, F, P	1 (worst) to 6 (best)		
Instruments Used _____							
[ ]	Lunar Rays	_____	_____	_____	_____	_____	_____
[ ]	Sinus Iridum	_____	_____	_____	_____	_____	_____
[ ]	Sinus Medii	_____	_____	_____	_____	_____	_____
[ ]	Sinus Roris	_____	_____	_____	_____	_____	_____
[ ]	Palus Somnii	_____	_____	_____	_____	_____	_____
[ ]	Palus Epidemiarum	_____	_____	_____	_____	_____	_____
[ ]	Mare Vaporum	_____	_____	_____	_____	_____	_____
Craters - ~4 Days old							
[ ]	Langrenus	_____	_____	_____	_____	_____	_____
[ ]	Vendelinus	_____	_____	_____	_____	_____	_____

X	FEATURE	DATE	TIME	SEEING	TRANSP.	LATITUDE	LONGITUDE
Binocular Objects				E, VG, G, F, P	1 (worst) to 6 (best)		
Craters - ~4 Days old (continued)							
[ ]	Petavius	_____	_____	_____	_____	_____	_____
[ ]	Cleomedes	_____	_____	_____	_____	_____	_____
[ ]	Atlas	_____	_____	_____	_____	_____	_____
[ ]	Hercules	_____	_____	_____	_____	_____	_____
[ ]	Endymion	_____	_____	_____	_____	_____	_____
[ ]	Macrobius	_____	_____	_____	_____	_____	_____
~7 Days old							
[ ]	Piccolomini	_____	_____	_____	_____	_____	_____
[ ]	Theophilus	_____	_____	_____	_____	_____	_____
[ ]	Cyrillus	_____	_____	_____	_____	_____	_____
[ ]	Catharina	_____	_____	_____	_____	_____	_____
[ ]	Posidonius	_____	_____	_____	_____	_____	_____
[ ]	Fracastorius	_____	_____	_____	_____	_____	_____
[ ]	Aristoteles	_____	_____	_____	_____	_____	_____
[ ]	Eudoxus	_____	_____	_____	_____	_____	_____
[ ]	Cassini	_____	_____	_____	_____	_____	_____

X	FEATURE	DATE	TIME	SEEING	TRANSP.	LATITUDE	LONGITUDE
Binocular Objects				E, VG, G, F, P	1 (worst) to 6 (best)		
Craters - ~7 Days old (continued)							
[ ]	Hipparchus	_____	_____	_____	_____	_____	_____
[ ]	Albategnius	_____	_____	_____	_____	_____	_____
[ ]	Aristillus	_____	_____	_____	_____	_____	_____
[ ]	Autolycus	_____	_____	_____	_____	_____	_____
[ ]	Maurolycus	_____	_____	_____	_____	_____	_____
~10 Days old							
[ ]	Plato	_____	_____	_____	_____	_____	_____
[ ]	Archimedes	_____	_____	_____	_____	_____	_____
[ ]	Ptolemaeus	_____	_____	_____	_____	_____	_____
[ ]	Alphonsus	_____	_____	_____	_____	_____	_____
[ ]	Arzachel	_____	_____	_____	_____	_____	_____
[ ]	Walther	_____	_____	_____	_____	_____	_____
[ ]	Maginus	_____	_____	_____	_____	_____	_____
[ ]	Tycho	_____	_____	_____	_____	_____	_____
[ ]	Clavius	_____	_____	_____	_____	_____	_____
[ ]	Eratosthenes	_____	_____	_____	_____	_____	_____

X	FEATURE	DATE	TIME	SEEING	TRANSP.	LATITUDE	LONGITUDE
Binocular Objects				E, VG, G, F, P	1 (worst) to 6 (best)		
Craters - ~10 Days old (continued)							
[ ]	Longomontanus	_____	_____	_____	_____	_____	_____
[ ]	Copernicus	_____	_____	_____	_____	_____	_____
[ ]	Bullialdus	_____	_____	_____	_____	_____	_____
[ ]	Aristarchus	_____	_____	_____	_____	_____	_____
[ ]	Gassendi	_____	_____	_____	_____	_____	_____
~14 Days old							
[ ]	Kepler	_____	_____	_____	_____	_____	_____
[ ]	Grimaldi	_____	_____	_____	_____	_____	_____

X	FEATURE	DATE	TIME	SEEING	TRANSP.	LATITUDE	LONGITUDE
Telescopic Objects				E, VG, G, F, P	1 (worst) to 6 (best)		
Instruments Used	_____						
[ ]	Sinus Aestuum	_____	_____	_____	_____	_____	_____
[ ]	Lacus Mortis	_____	_____	_____	_____	_____	_____
[ ]	Palus Putredinis	_____	_____	_____	_____	_____	_____
[ ]	Promontorium Laplace	_____	_____	_____	_____	_____	_____
[ ]	Promontorium Heraclides	_____	_____	_____	_____	_____	_____
[ ]	Promontorium Agarum	_____	_____	_____	_____	_____	_____

X	FEATURE	DATE	TIME	SEEING	TRANSP.	LATITUDE	LONGITUDE
Telescopic Objects (continued)				E, VG, G, F, P	1 (worst) to 6 (best)		
[ ]	Montes Alpes	_____	_____	_____	_____	_____	_____
[ ]	Montes Apenninus	_____	_____	_____	_____	_____	_____
[ ]	Mons Hadley	_____	_____	_____	_____	_____	_____
[ ]	Mons Piton	_____	_____	_____	_____	_____	_____
[ ]	Mons Pico	_____	_____	_____	_____	_____	_____
[ ]	Rupes Altai	_____	_____	_____	_____	_____	_____
[ ]	Rima Hyginus	_____	_____	_____	_____	_____	_____
[ ]	Vallis Schroteri	_____	_____	_____	_____	_____	_____
[ ]	Vallis Alpes	_____	_____	_____	_____	_____	_____
[ ]	Rupes Recta (straight wall)	_____	_____	_____	_____	_____	_____
Craters - ~4 days old							
[ ]	Picard	_____	_____	_____	_____	_____	_____
[ ]	Furnerius	_____	_____	_____	_____	_____	_____
[ ]	Petavius Wall	_____	_____	_____	_____	_____	_____
[ ]	Messier/Messier A	_____	_____	_____	_____	_____	_____
[ ]	Proclus	_____	_____	_____	_____	_____	_____

X	FEATURE	DATE	TIME	SEEING	TRANSP.	LATITUDE	LONGITUDE
Telescopic Objects				E, VG, G, F, P	1 (worst) to 6 (best)		
Craters - ~4 days old (continued)							
[ ]	Fabricius	_____	_____	_____	_____	_____	_____
~7 Days old							
[ ]	Plinius	_____	_____	_____	_____	_____	_____
[ ]	Mitchell	_____	_____	_____	_____	_____	_____
[ ]	Cassini A	_____	_____	_____	_____	_____	_____
[ ]	Manilius	_____	_____	_____	_____	_____	_____
[ ]	Gemma Frisius	_____	_____	_____	_____	_____	_____
~10 Days old							
[ ]	Davy	_____	_____	_____	_____	_____	_____
[ ]	Pitatus	_____	_____	_____	_____	_____	_____
[ ]	Billy	_____	_____	_____	_____	_____	_____
[ ]	Fra Mauro	_____	_____	_____	_____	_____	_____
[ ]	Clavius craterlets	_____	_____	_____	_____	_____	_____
[ ]	Hippalus	_____	_____	_____	_____	_____	_____
[ ]	J Herschel	_____	_____	_____	_____	_____	_____
~14 Days old							
[ ]	Schickard	_____	_____	_____	_____	_____	_____
[ ]	Reiner Gamma	_____	_____	_____	_____	_____	_____

X	FEATURE	DATE	TIME	SEEING	TRANSP.	LATITUDE	LONGITUDE
Optional Objects - each counts as 2 observations				E, VG, G, F, P	1 (worst) to 6 (best)		
Naked Eye:							
[ ]	Estimate first quarter phase within eight hours.	_____	_____	_____	_____	_____	_____
[ ]	Estimate third quarter phase within eight hours.	_____	_____	_____	_____	_____	_____
[ ]	Estimate full moon within thirty-six hours.	_____	_____	_____	_____	_____	_____
[ ]	Plot moon's position against the stars for three consecutive days.	_____	_____	_____	_____	_____	_____
[ ]	Compare the size of the full moon on the horizon with the full moon on the meridian using a dime held at arm's length.	_____	_____	_____	_____	_____	_____
[ ]	Find the thinnest phase by which you can read newsprint.	_____	_____	_____	_____	_____	_____
Binocular:							
[ ]	Sketch libration - use Mare Crisium or Grimaldi for examples.	_____	_____	_____	_____	_____	_____
[ ]	Sketch a lunar map - use any scale for binoculars only.	_____	_____	_____	_____	_____	_____
Telescopic:							
[ ]	Plot the moon's hourly motion against the stars for two hours or more.	_____	_____	_____	_____	_____	_____
[ ]	Measure the height of a lunar mountain - need to calculate the sun's elevation at the mountain and estimate the shadow length - try Mt. Piton.	_____	_____	_____	_____	_____	_____