

# ATLAS OF THE MOON

(first part)

O. I. Kvaratskhelia<sup>2</sup>, P.A. Chigladze<sup>1,2</sup>, M.L. Tateshvili<sup>1</sup>, A.N. Gelashvili<sup>1</sup>

<sup>1</sup> Samtskhe-Javakheti State University

<sup>2</sup> E. Kharadze Georgian National Astrophysical Observatory

E-mail: kvara.otar@mail.ru ; E-mail: revazchigladze@yahoo.com; E-mail: tateshvili.maia@gmail.com;

E-mail: anagelasvili@rambler.ru

## Abstract

The first steps in the study of the Moon were the Moon explorations by means of manned spacecrafts started in the 1970s. The next step in studying the Moon must be manned expeditions, which will create first temporary bases on the Moon followed by the permanent bases. The problem of the Moon management by a human is associated with two objectives: first, living conditions must be created for the astronauts working at bases and second, the staging ground must be developed for the space flights of the second stage.

Key words: Moon, Albedo, Polarization, Color Index

## 1. Introduction

In the final run, the locations most suitable to build the Moon base are those with a fine ground containing a large amount of titanium dioxide. The primary goal is to study the looseness and maturity of the ground, while another objective is associated with the chemical and mineralogical zoning of the Moon surface.

Our goal is to identify the typical regions by considering the mentioned parameters and regions similar to the landing regions of “Apollo” and “Luna” series spacecrafts and evaluate their distribution on the Moon surface. This scientific work is dedicated to this issue.

## 2. Observations

This atlas has been obtained from many years of observation of the lunar surface from different observatories:

Abastumani Astrophysical Observatory [1,4,8,11], Institute of Astronomy of Kharkiv (Ukraine) [2,3,7,10] and Meudon Observatory (France) [6].

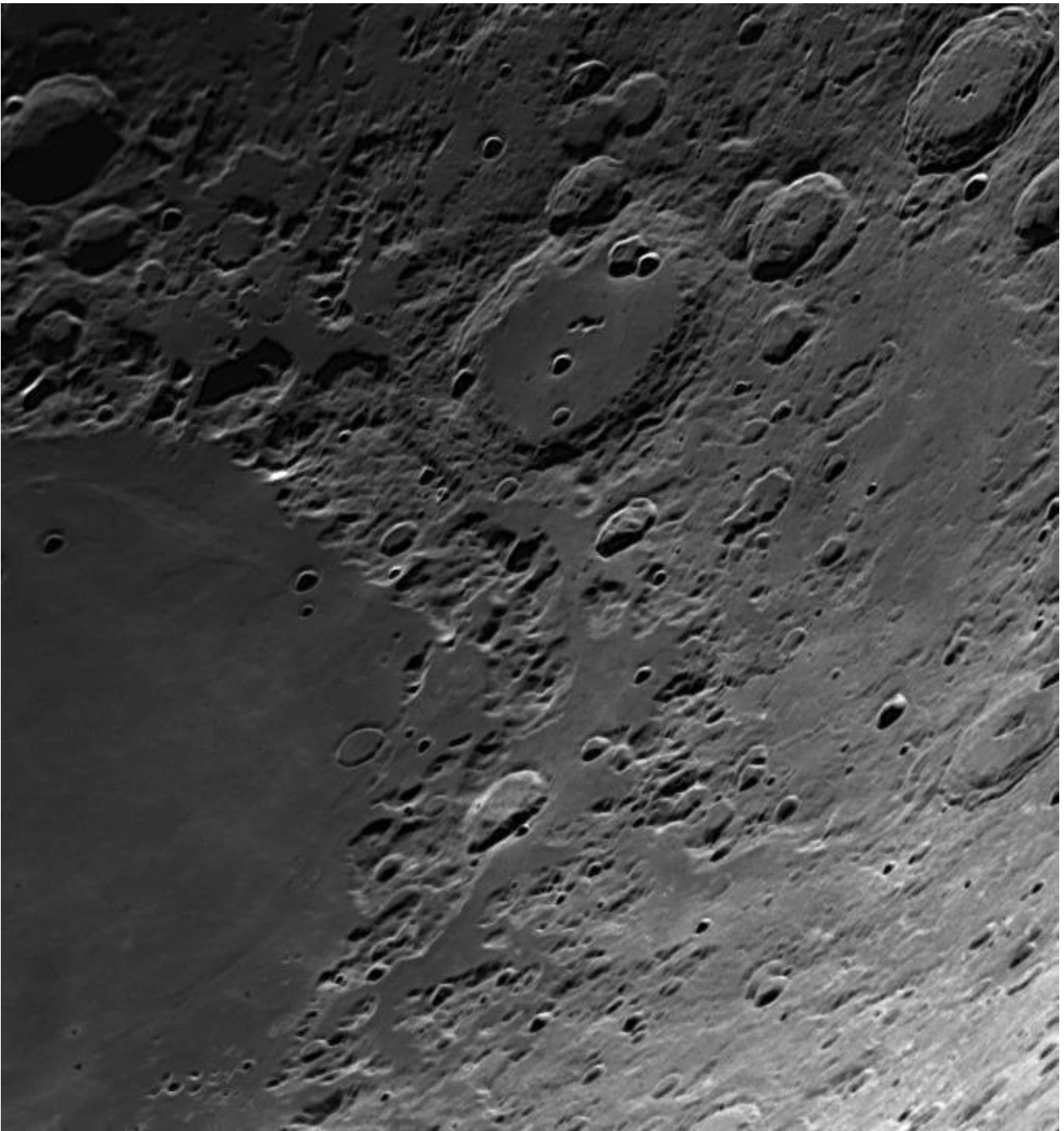
The table is given: Crater name, Latitude, Longitude, Diameter, polarization(min,max), Color Index, Albedo ( $\lambda=6200\text{\AA}$ ) and  $m$  is an Albedo ( $\lambda=5500\text{\AA}$ ).

## 1. Mare Crisium



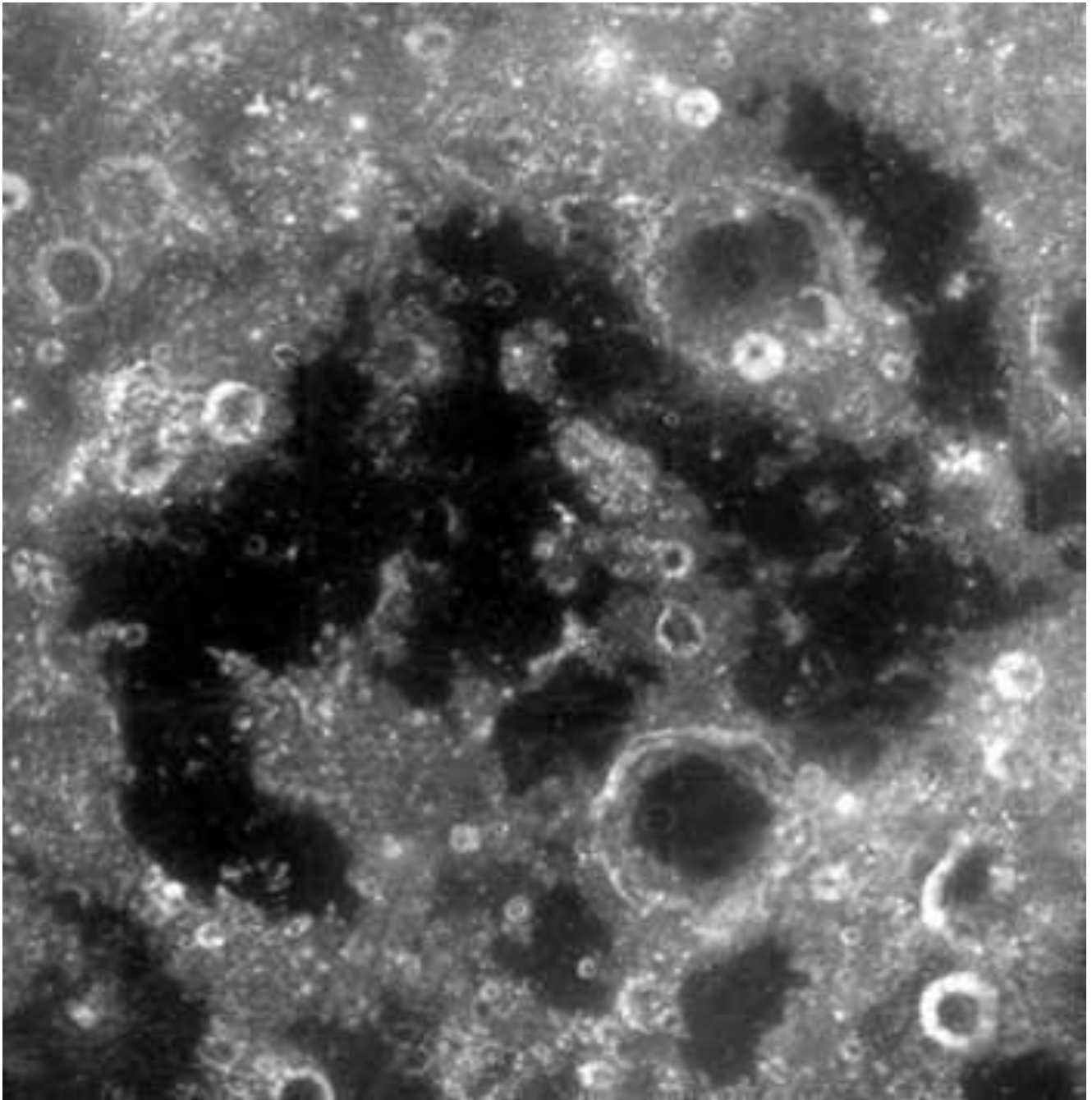
	Latitude	Longitude	Diameter	Polarization		Color Index [2,7]	Albedo [3,7]	m [5,7]
Mare Crisium	17° N	59.1° E	555 km	1.07 min [1,8]	8.80 max [4,8]	1.19	8.60	9.70

## 2. Region East of Mare Crisium



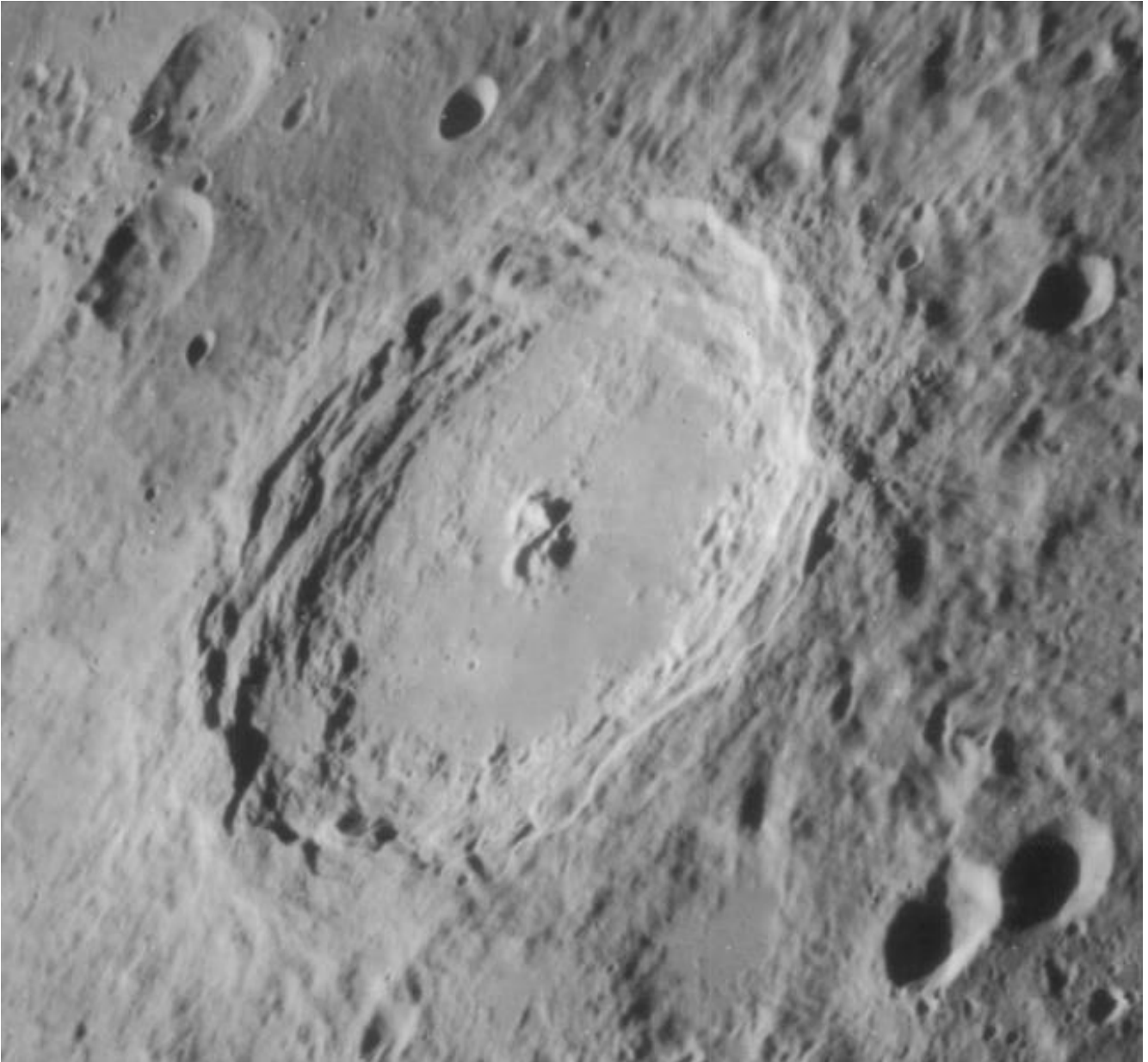
	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Region East of Mare Crisium	22° N	73° E	28 km	1.34	1.22	9.00	14.10

### 3. Mare Undarum



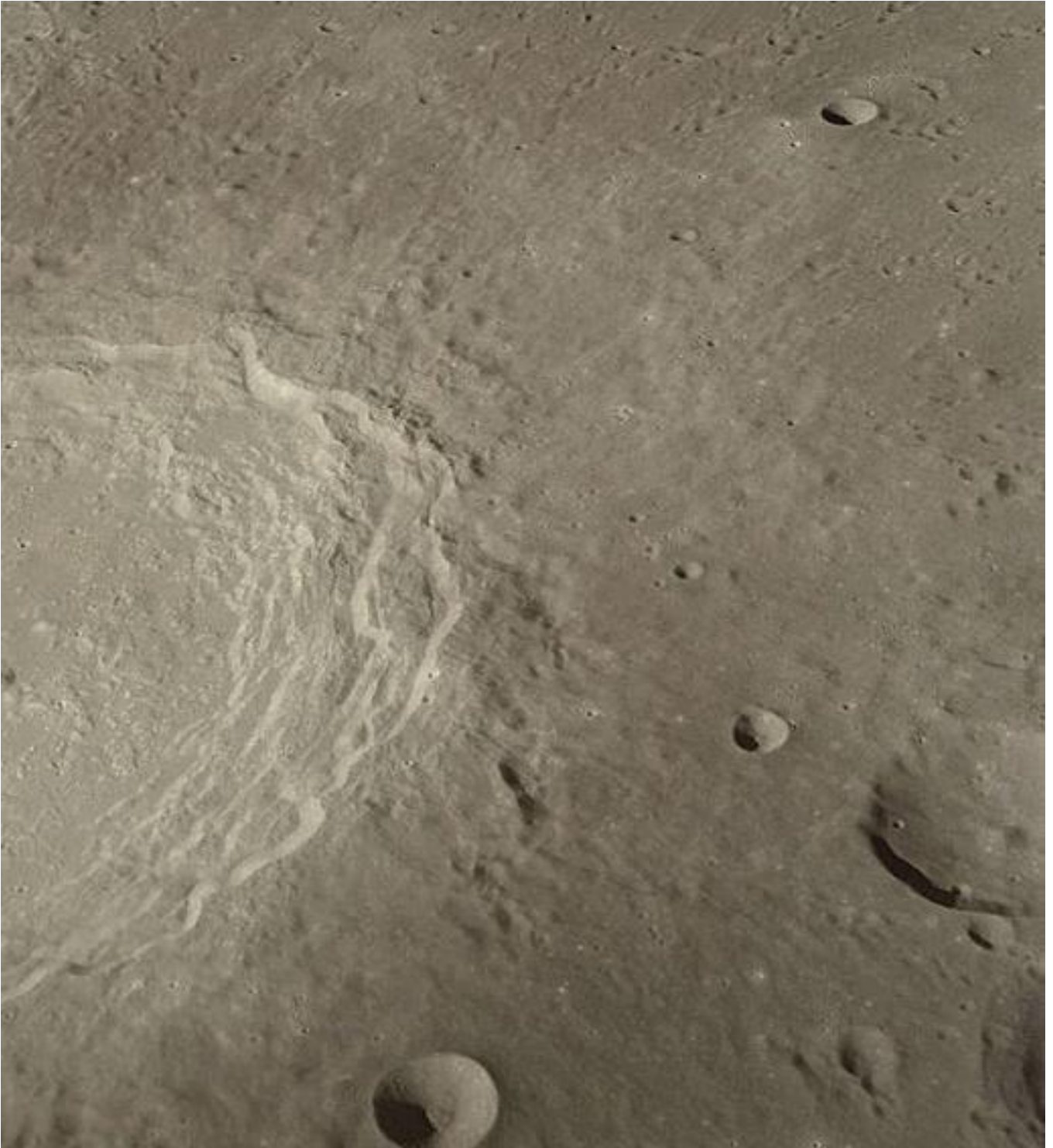
	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Mare Undarum	6.8° N	68.4° E	243 km	1.07	1.24	8.80	9.70

#### 4. Langrenus



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Langrenus	8.9° S	60.9° E	132 km	1.07	1.32	8.60	16.60

## 5. Region East of Langrenus



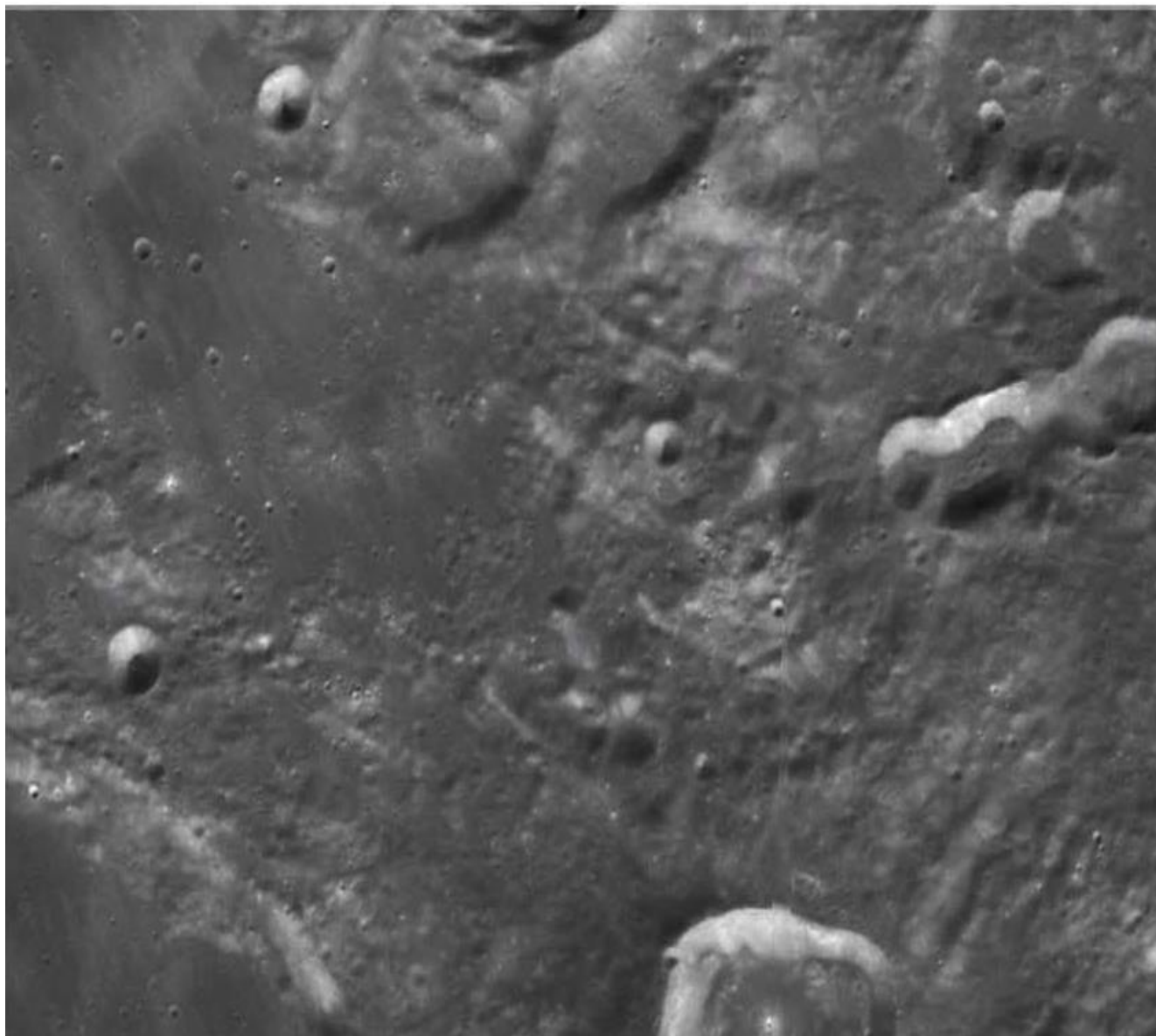
	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Region East of Langrenus	9° S	66.5° E	28 km	1.37	1.32	12.40	14.10

## 6. Endymion



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Endymion	53.6° N	56.5° E	125 km	0.93	1.19	12.40	14.10

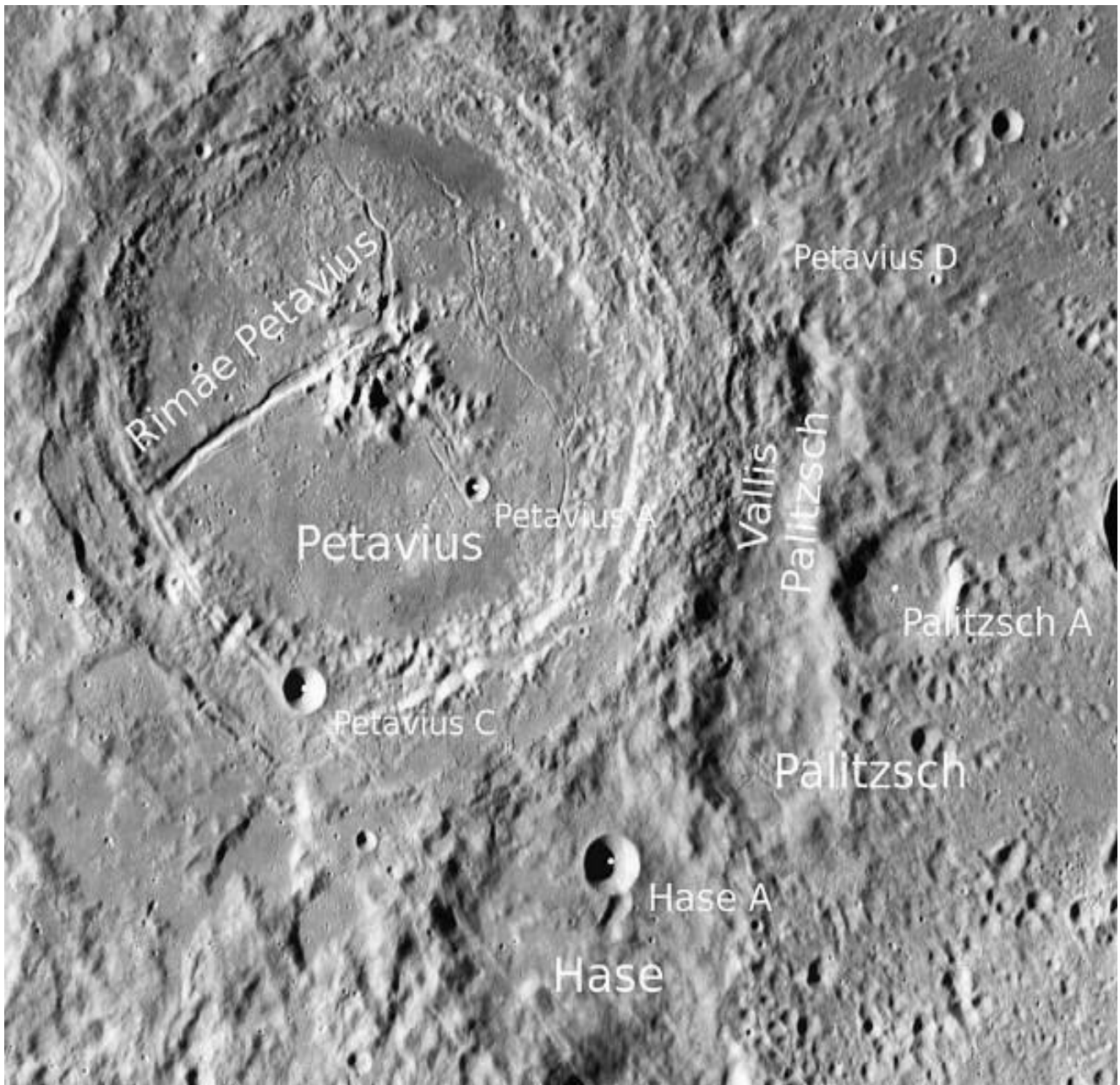
## 7. Region East of Endymion



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Region East of Endymion	56° N	63° E	28 km	1.27	1.17	14.20	14.20



## 8. Petavius



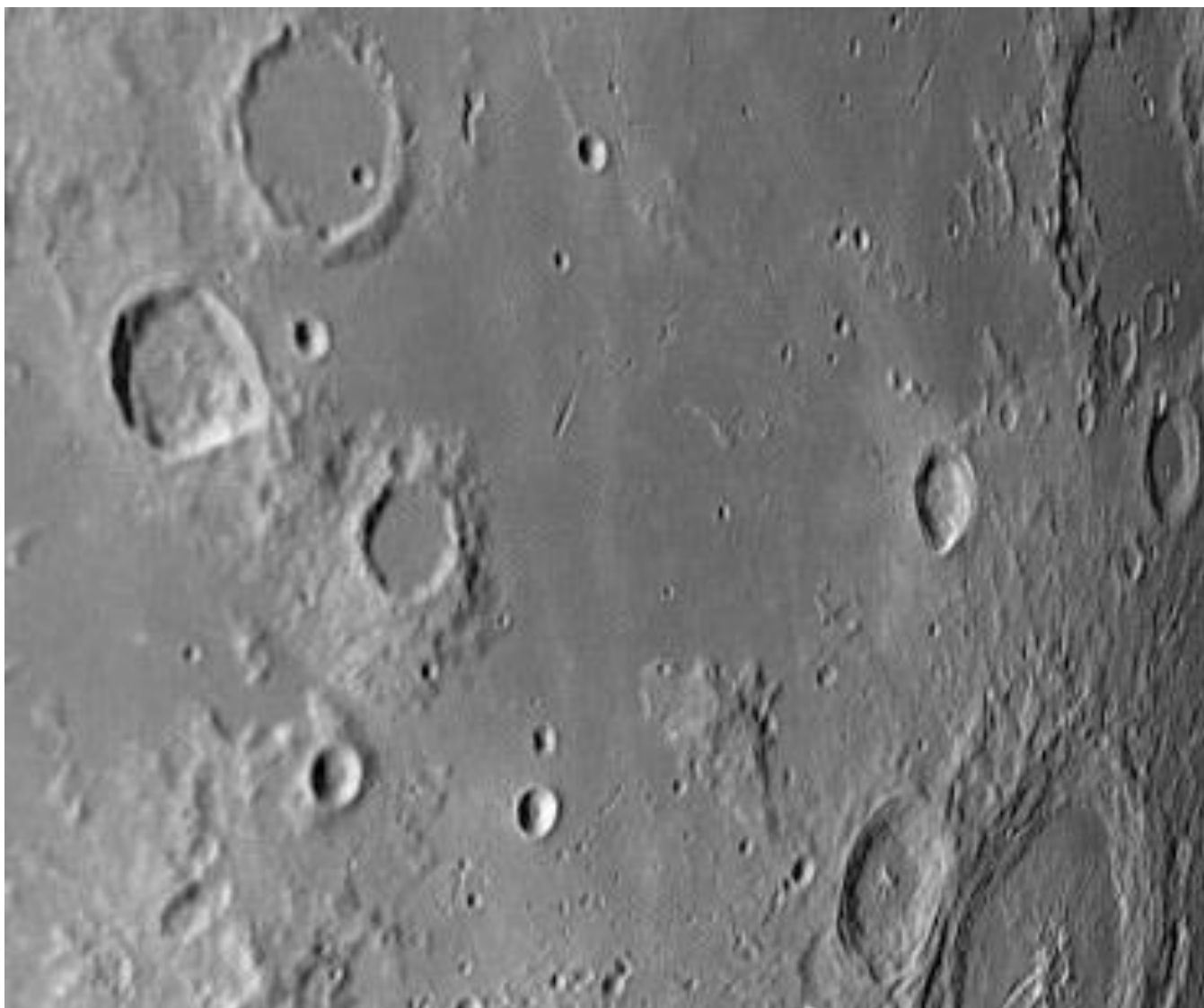
	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Petavius	25.3° S	60.4° E	177 km	0.80	1.29	12.40	16.90

## 9. Region North of Petavius



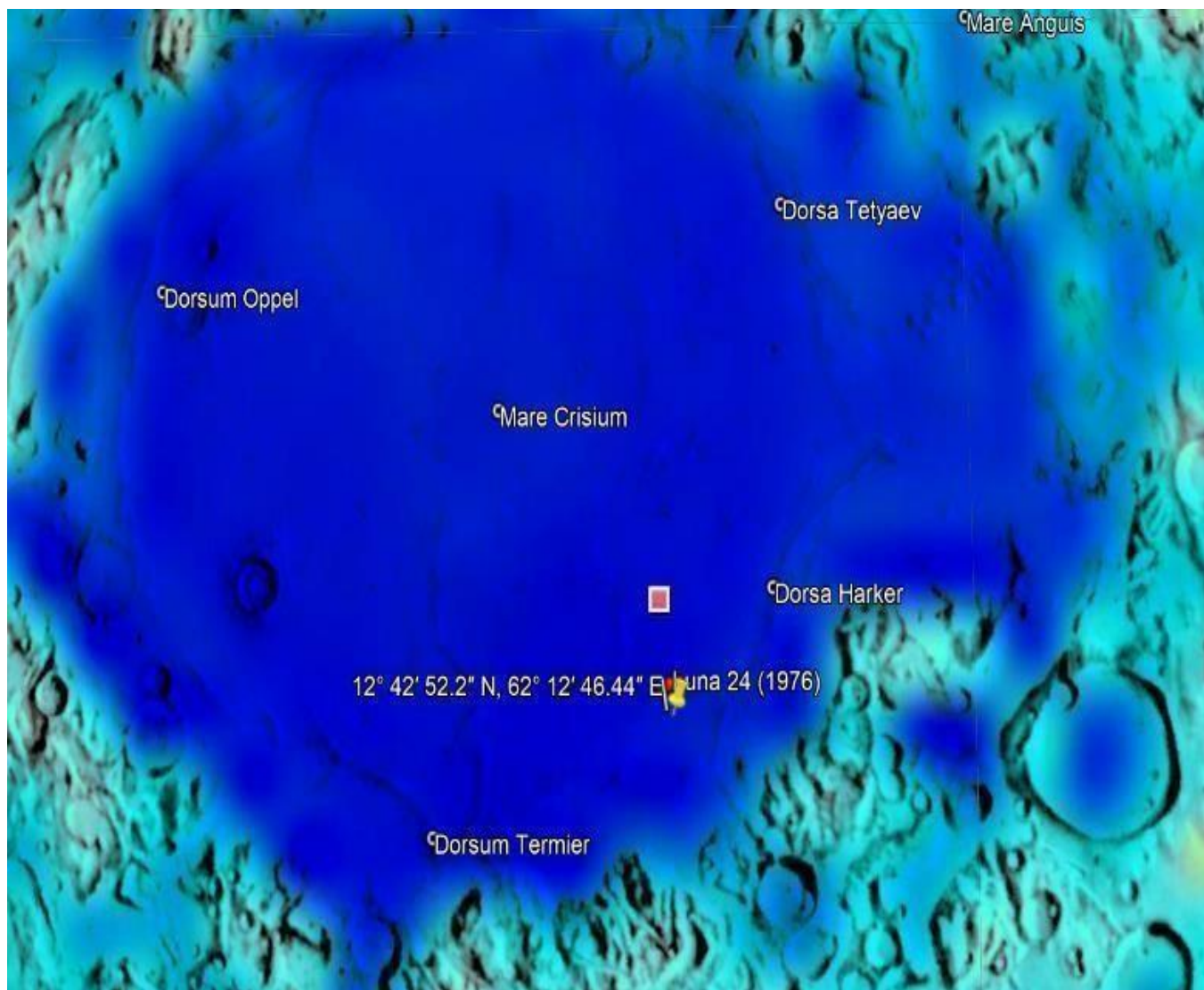
	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Region North of Petavius	21.3°S	62.5°E	28 km	1.36	1.29	9.30	14.10

## 10. Crater North-West from Petavius



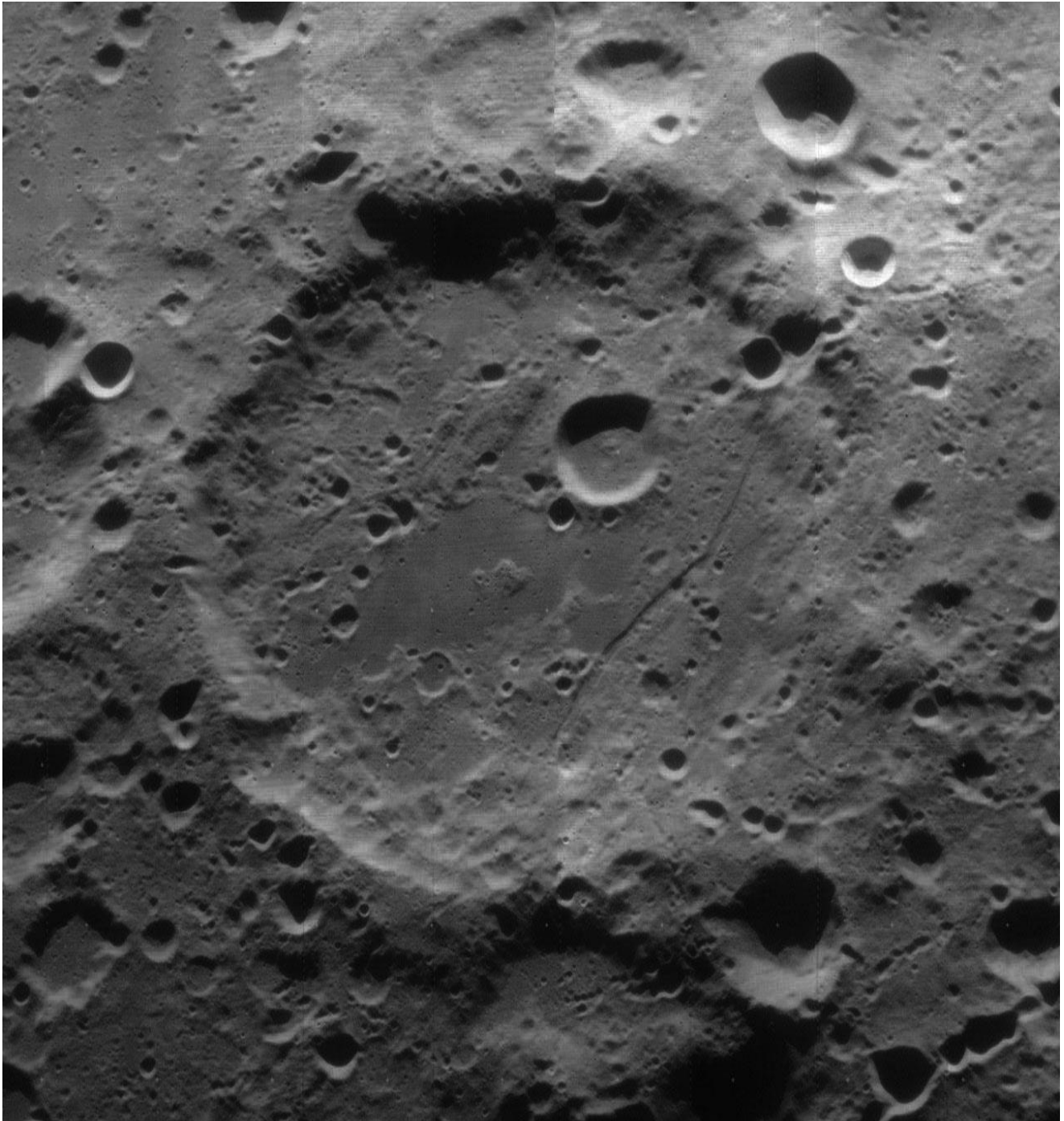
	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Crater, North-West from Petavius	20°S	57.5°E	5 km	0.80	1.29	9.70	17.30

## 11.Luna 24 landing area



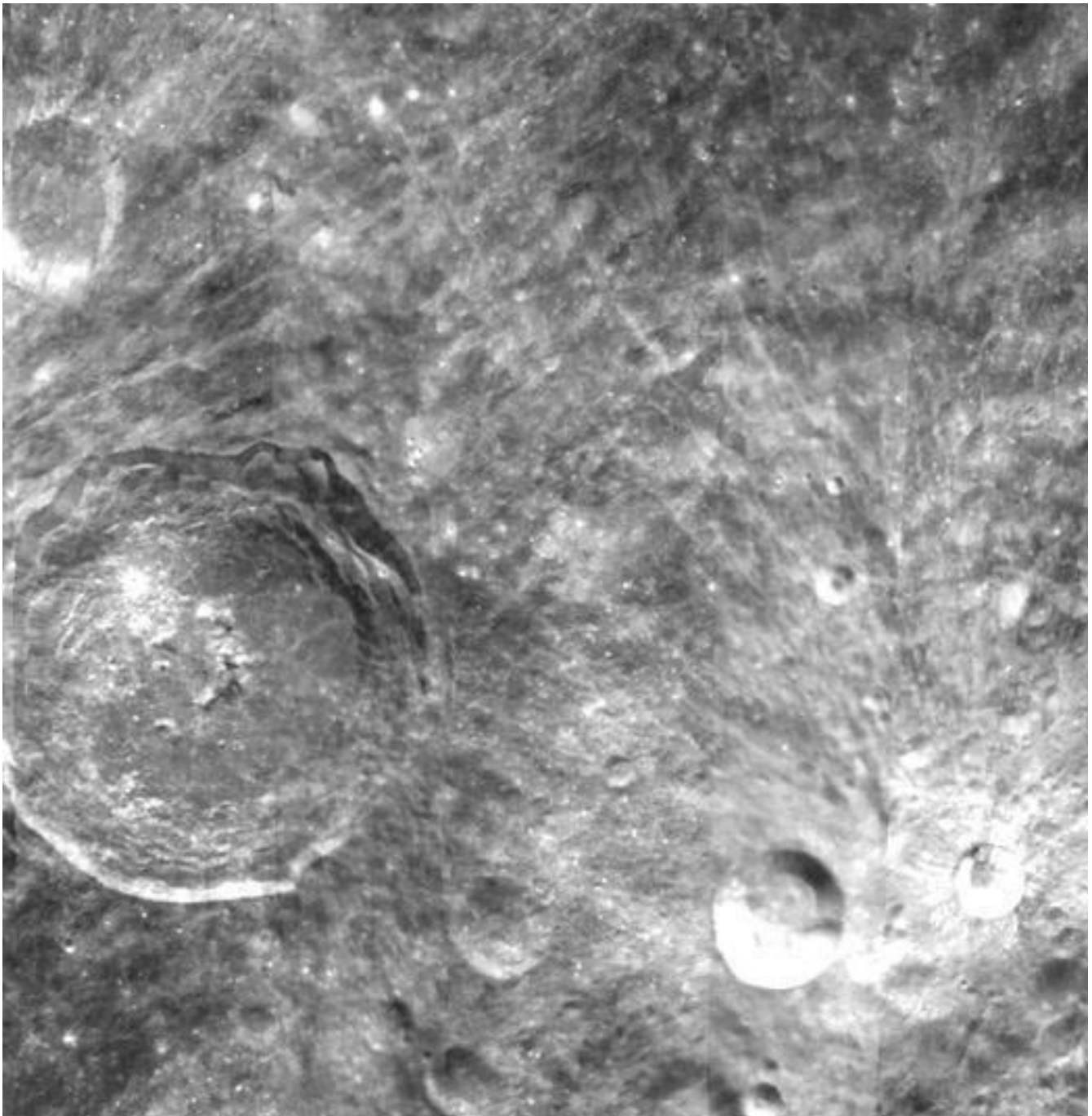
	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Luna 24 landing area	12.71°N	62.21° E	28 km	1.17	1.20	8.80	11.40

## 12. Furnerius



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Furnerius	36.3° S	60.4° E	125 km	1.25	1.29	17.20	17.30

### 13. Region North-West of Furnerius



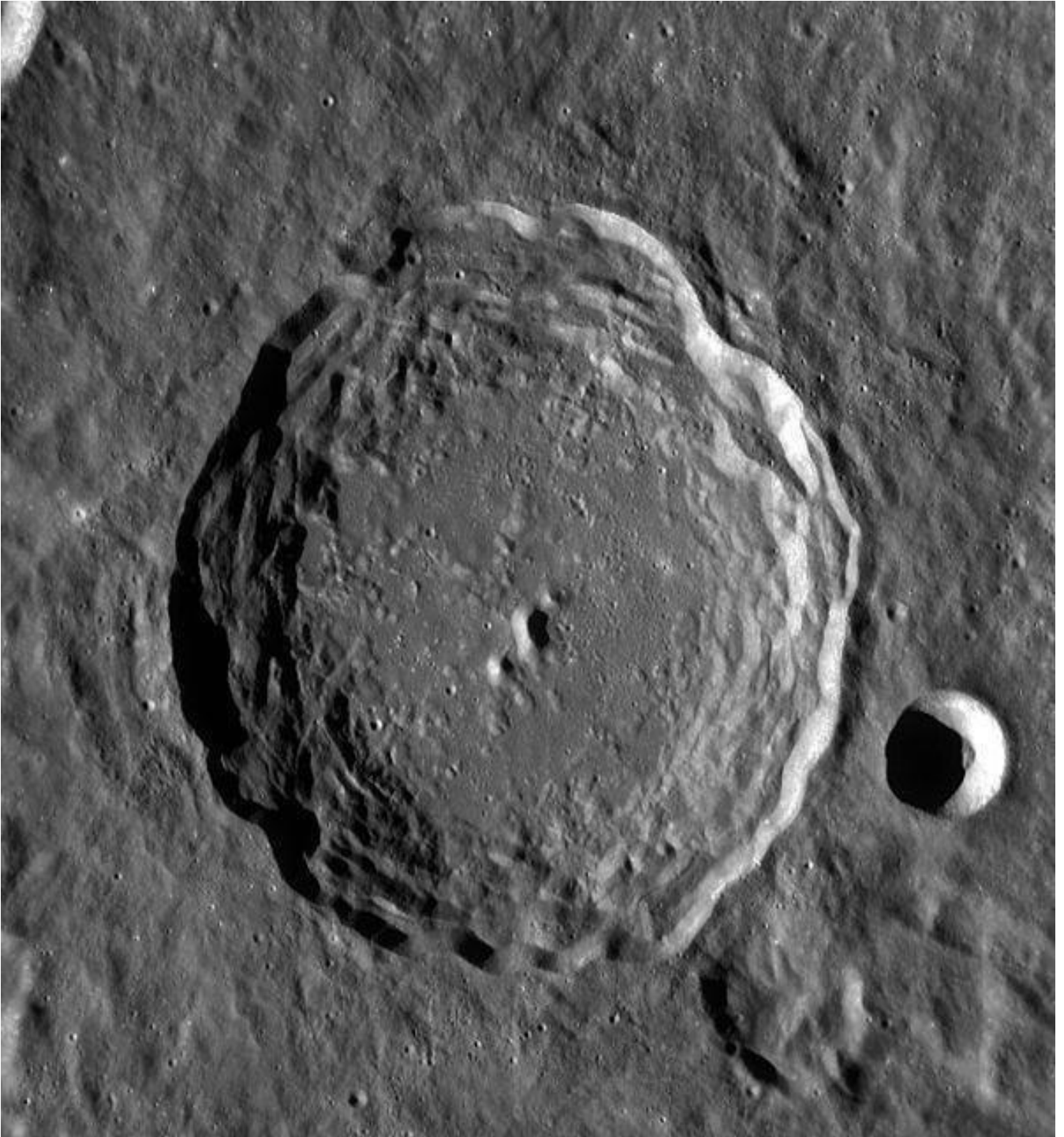
	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Region North- West of Furnerius	33.3°S	57°E	28 km	0.93	1.26	17.20	17.30

## 14.Messala



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Messala	39.2° N	59.9° E	125 km	1.08	1.19	14.20	15.10

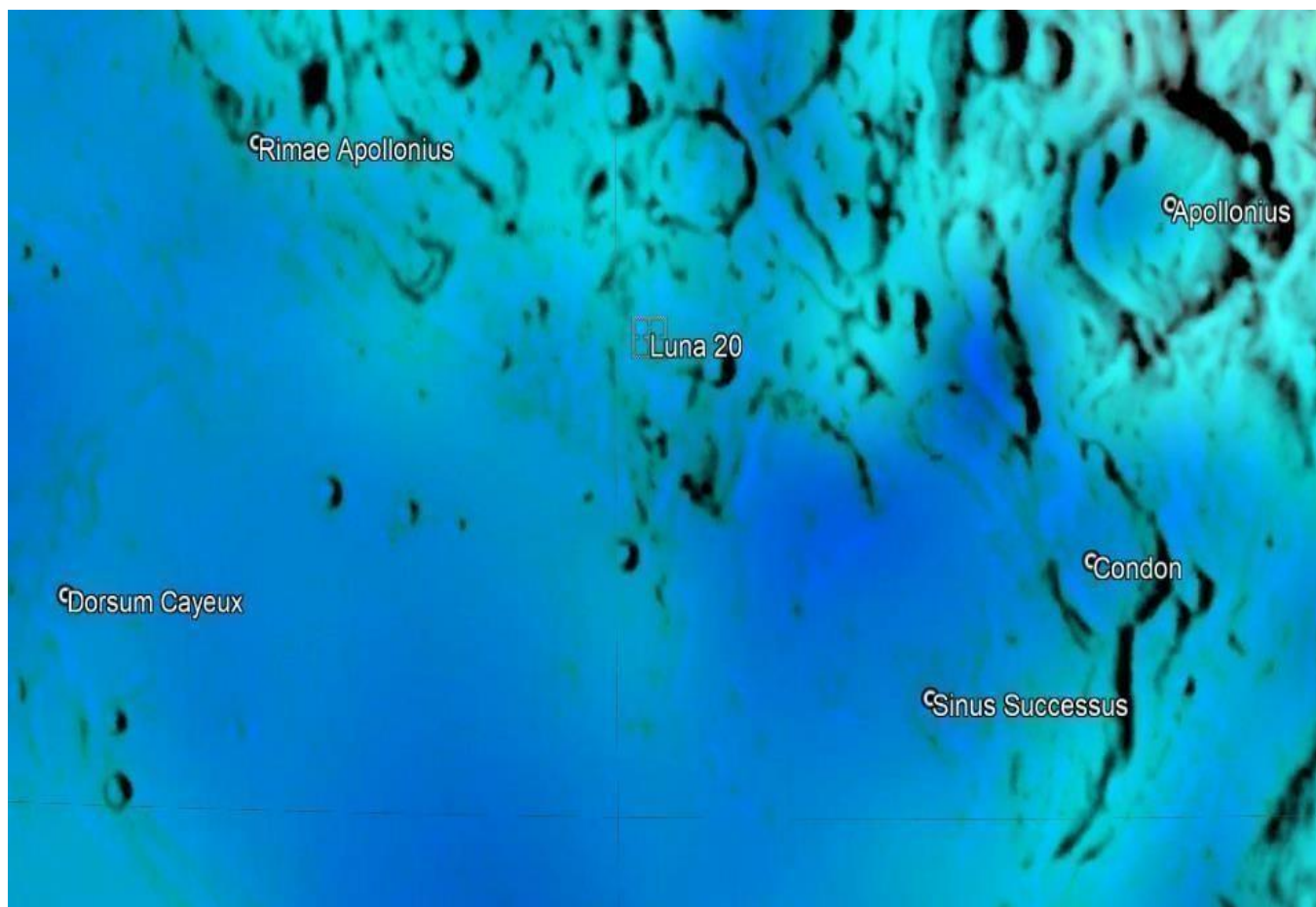
## 15.Geminus



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Geminus	31.5° N	56.7° E	86 km	1.16	1.17	15.20	15.20

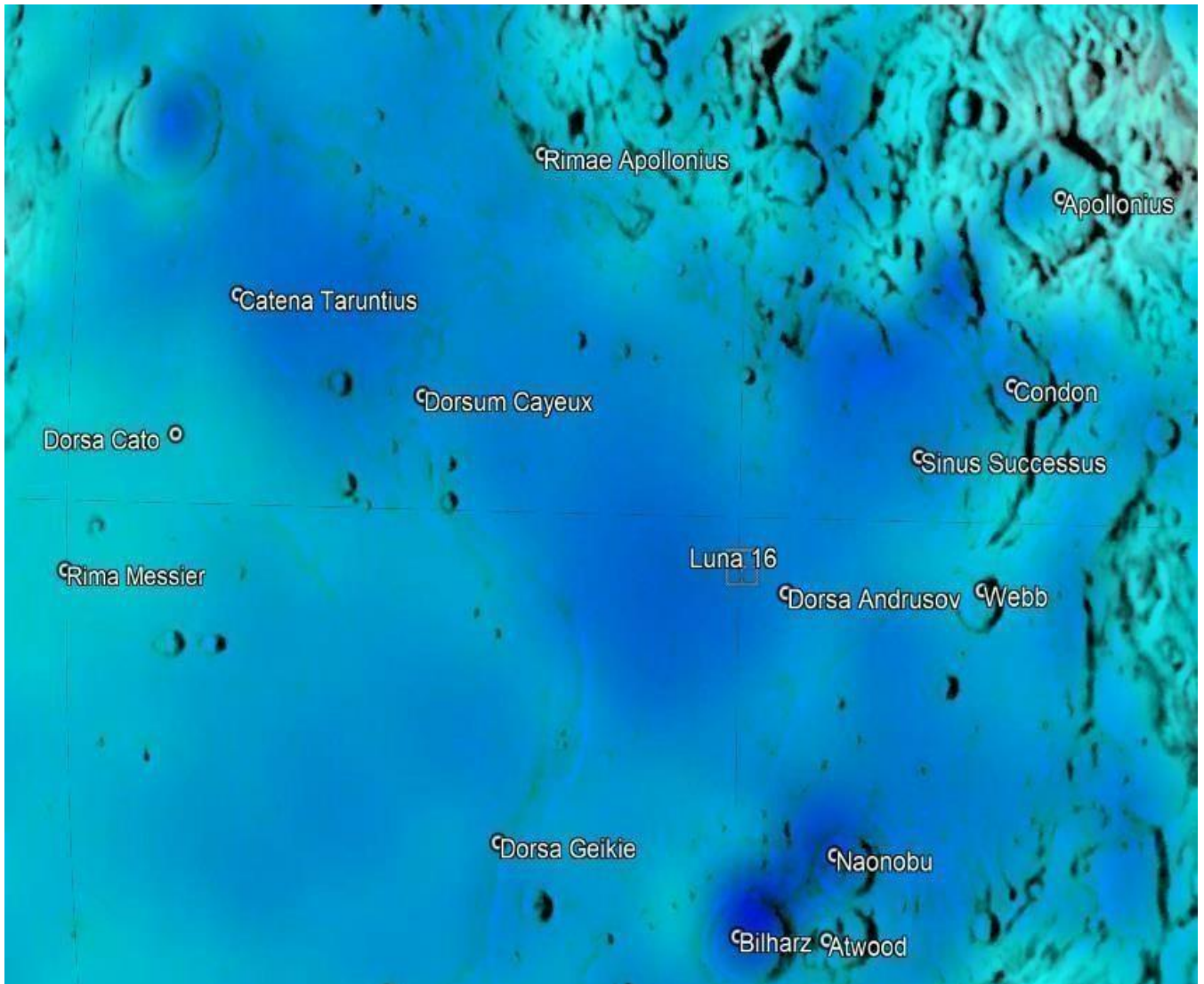


## 16. Luna 20 Landing area



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Luna 20 landing area	3.53° N	56.55° E	28 km	1.21	1.19	7.80	8.90

## 17. Luna 16 landing area



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Luna 16 landing area	0.68° S	56.3° E	28 km	1.25	1.18	7.60	8.90

## 18. Cleomedes



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Cleomedes	27.7° N	55.5° E	126 km	1.14	1.21	12.40	12.50

## 19. Hooke



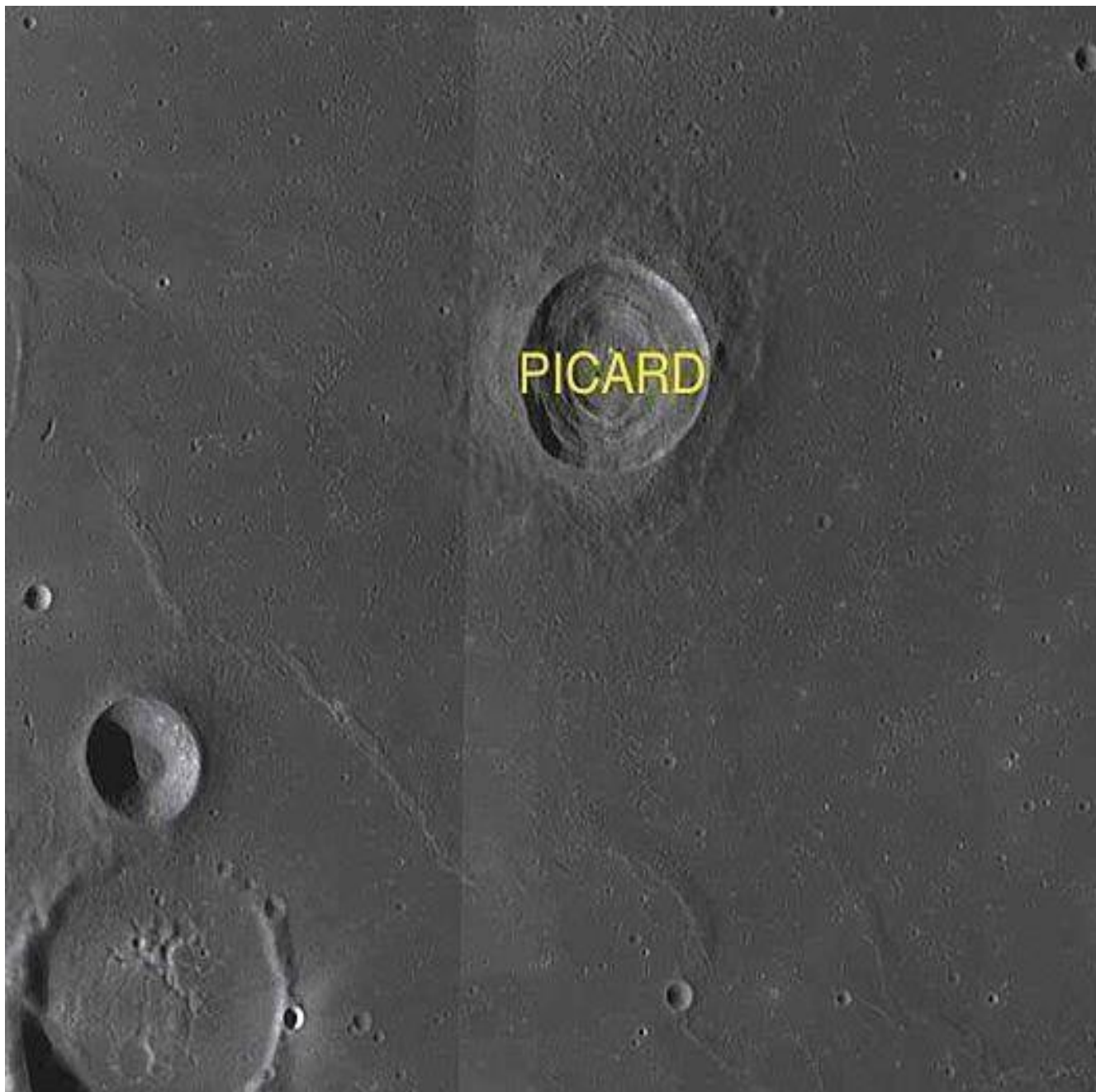
	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Hooke	41.2° N	54.9° E	139 km	1.32	1.22	15.20	15.70

## 20. Peirce



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Hooke	18.3°N	53.5°E	18 km	1.11	1.20	9.00	9.70

## 21. Picard



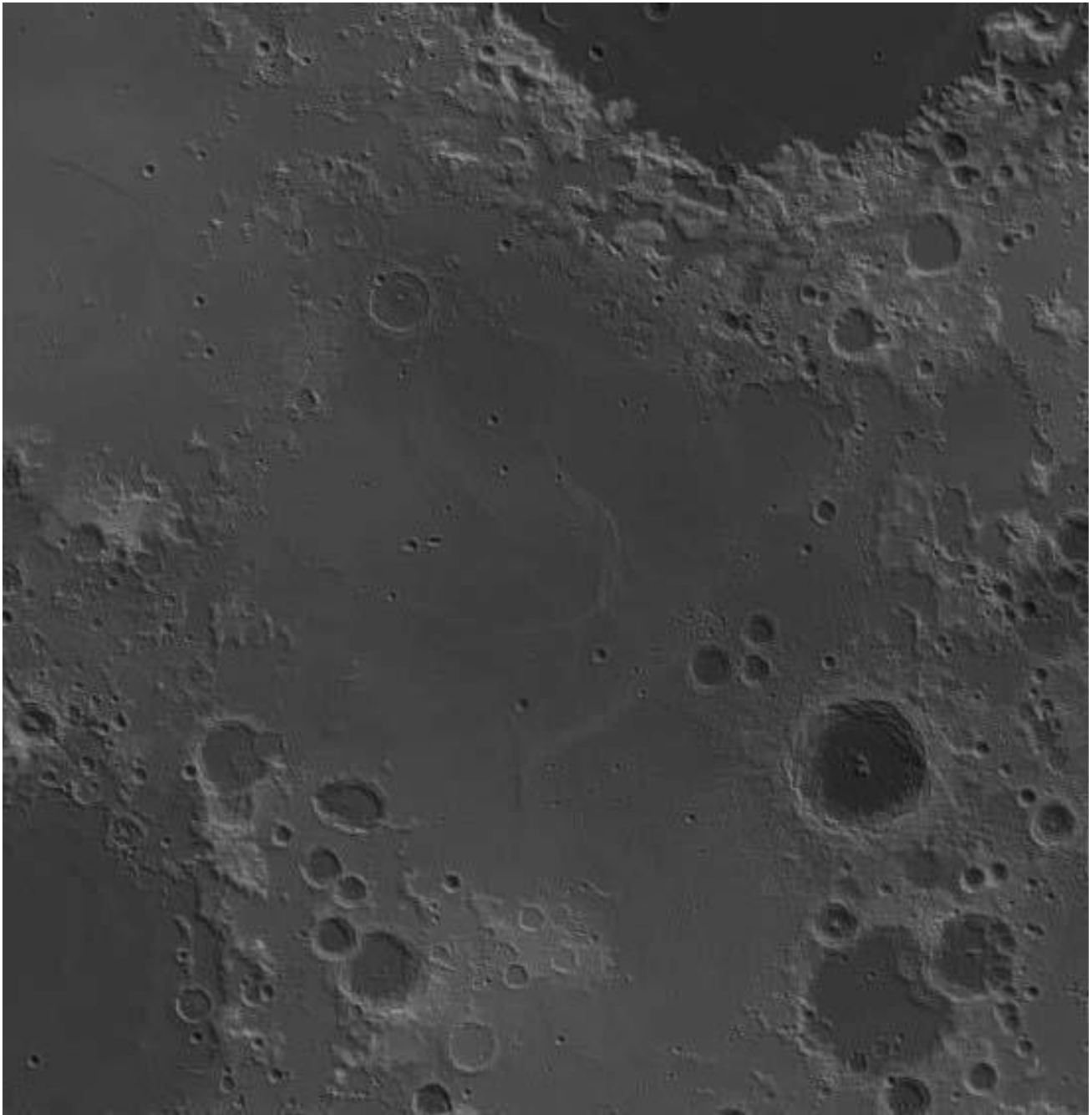
	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Picard	14.57°N	54.72°E	23 km	1.13	1.19	9.30	9.70

22. Mare Crisium (North from Picard )



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Mare Crisium (North from Picard )	16.2° S	53.7° E	28 km	1.16	1.36	9.70	13.50

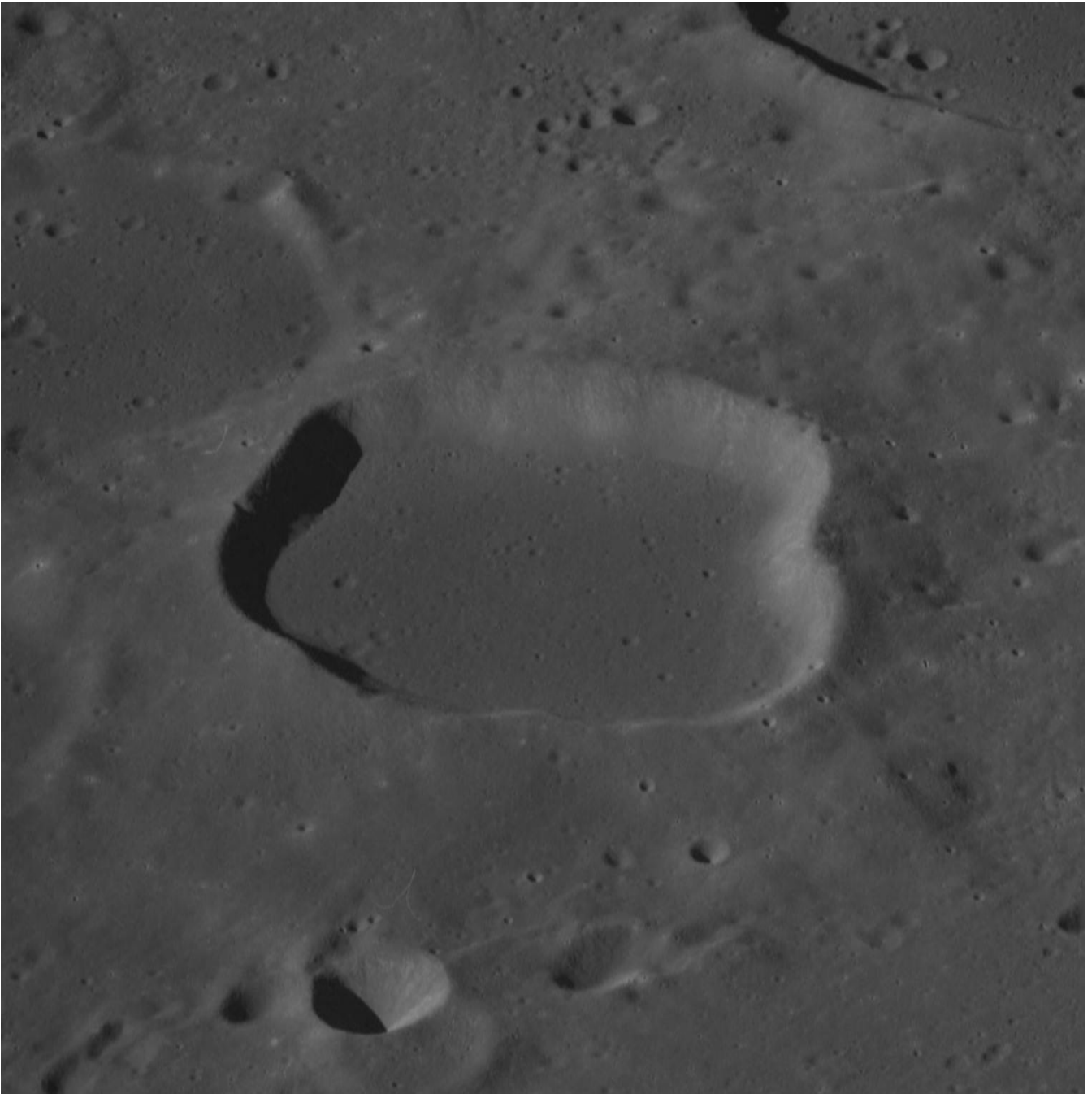
### 23. Mare Fecunditatis (South region)



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Mare Fecunditatis (South region)	18°S	53°E	28 km	1.24	1.36	12.40	12.50

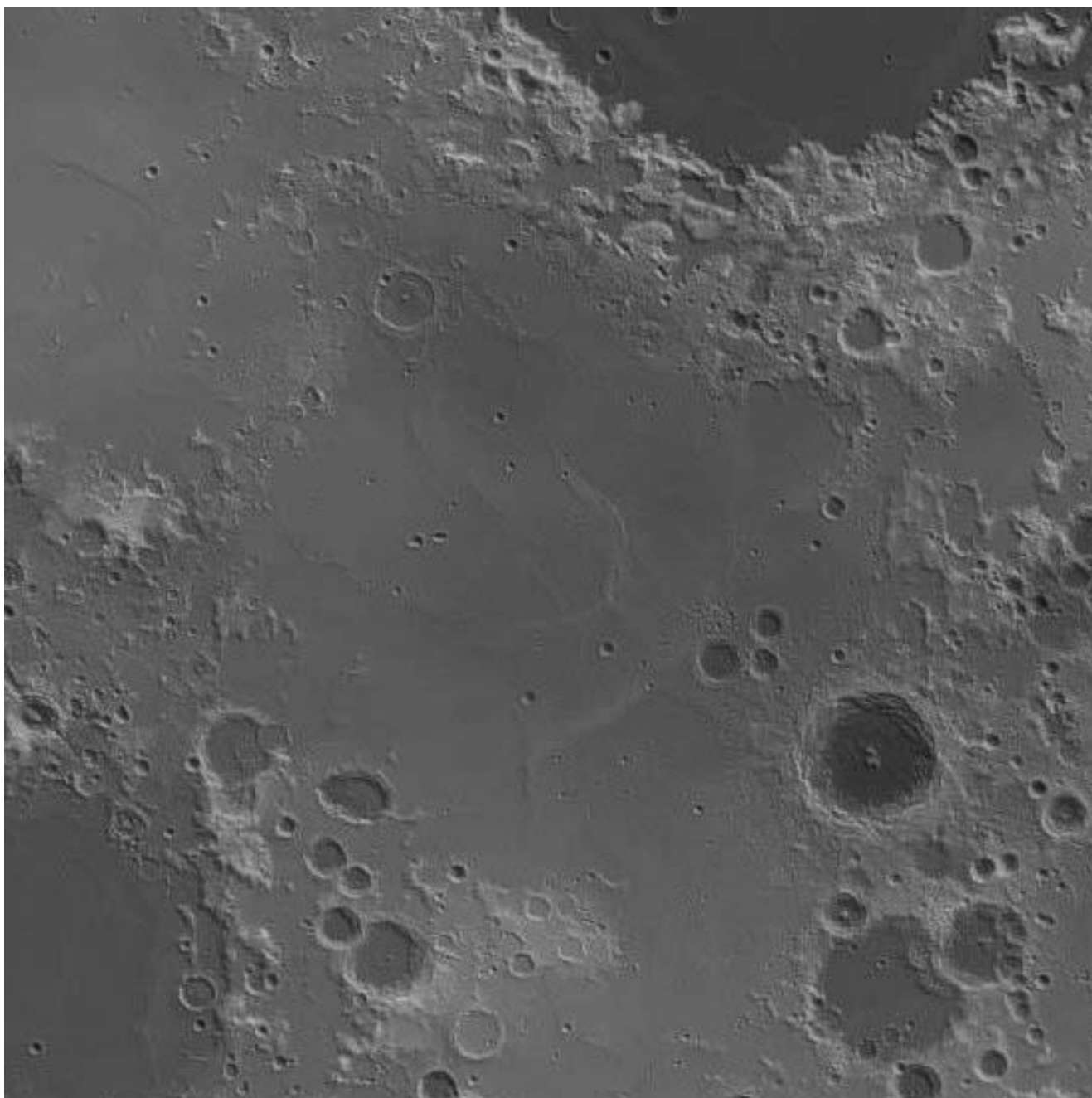


## 24. Crater South from Crozier



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Crater South from Crozier	14°S	51.5°E	12 km	1.08	1.32	13.30	15.10

## 25. Mare Fecunditatis



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Mare Fecunditatis	7.8°S	51.3°E	840 km	1.12	1.22	8.60	9.70

## 26. Mare Fecunditatis (S W region)



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Mare Fecunditatis (S W region)	8°S	49°E	28 km	1.12	1.24	9.70	9.70

## 27.Messier



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Messier	1.9°S	47.6°E	9 × 11 km	1.00	1.22	8.80	9.70

## 28. Proclus



	Latitude	Longitude	Diameter	Polarization		Color Index [2,7]	Albedo [3,7]	m [5,7]
Proclus	16.1° N	46.8° E	28 km	0.62 min [1,8]	5.2 max [4,8]	1.22	12.40	15.70

## 29. Region between Proclus and Macrobius



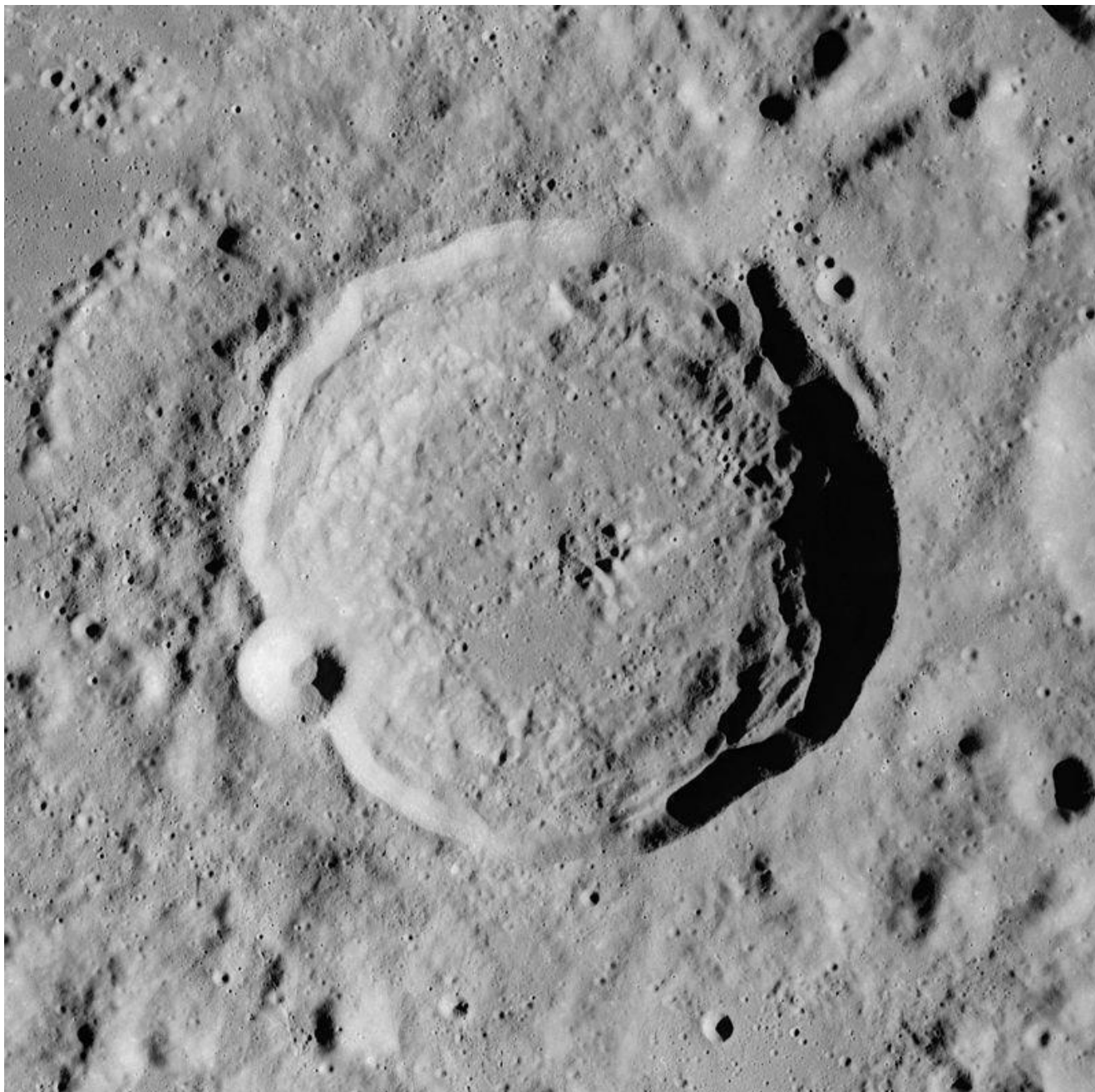
	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Region between Proclus and Macrobius	18.2°N	46.4°E	28 km	1.05	1.26	17.20	17.30

### 30.Pickering



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Pickering	2.88° S	6.99° E	15 km	1.00	1.17	15.20	15.70

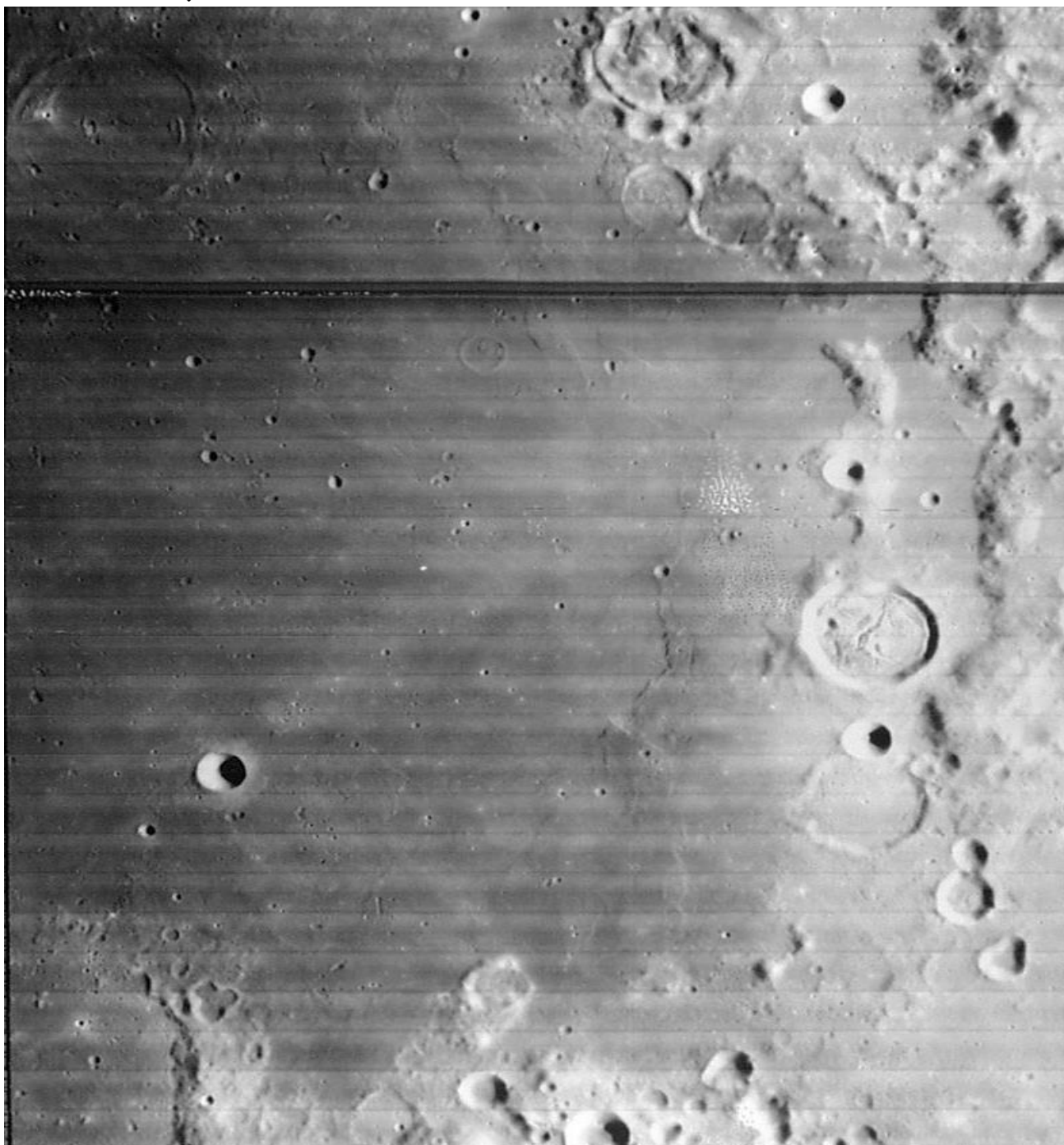
### 31. Macrobius



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Macrobius	21.3° N	46.0° E	64 km	1.05	1.22	15.20	13.50

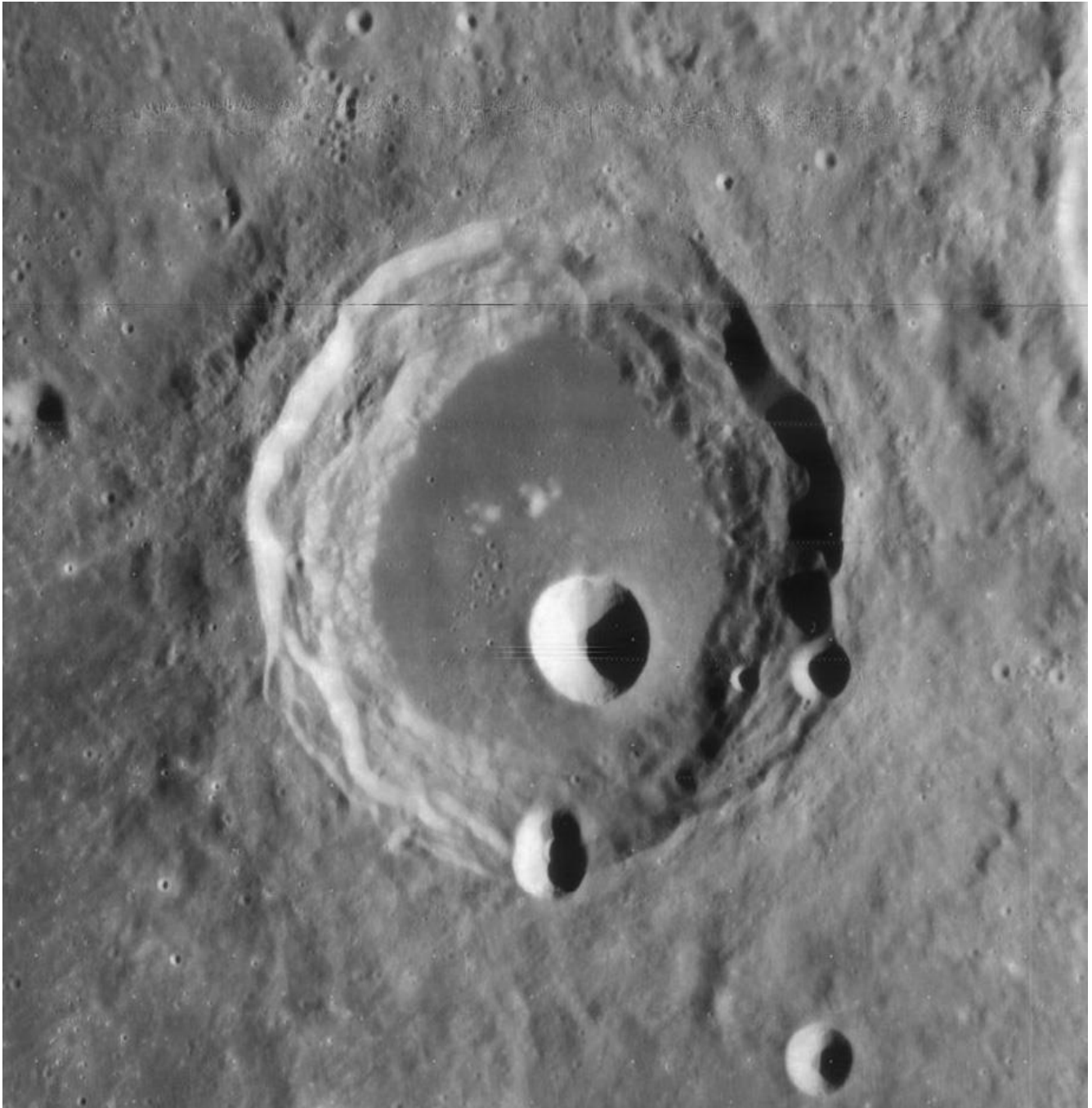


### 32. Montes Pyrenaeus



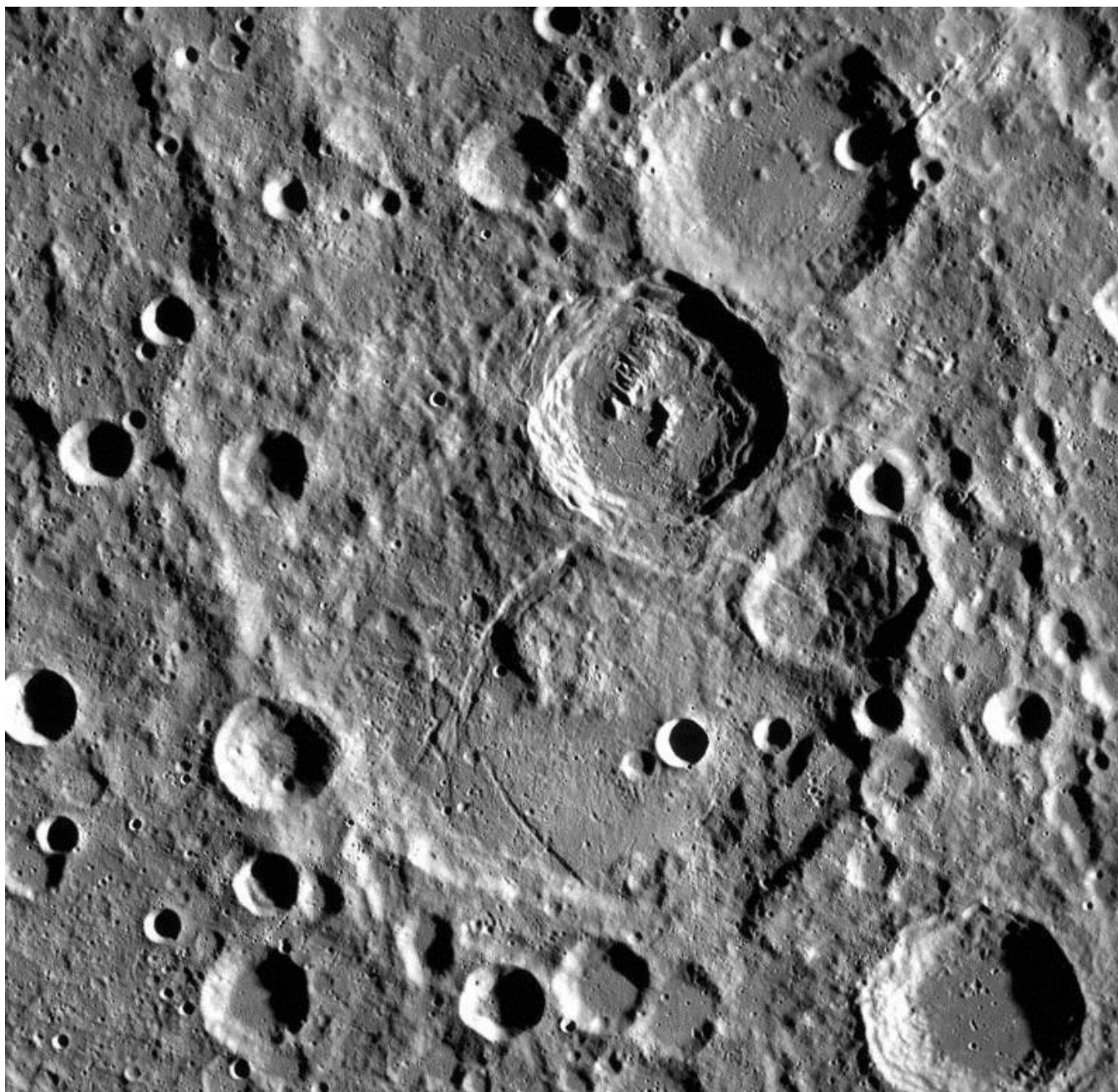
	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Montes Pyrenaeus	15.6° S	41.2° E	167 km	1.22	1.32	12.40	16.90

### 33. Hercules



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Hercules	46.7° N	39.1° E	69 km	0.88	1.24	13.30	13.50

## 34. Janssen



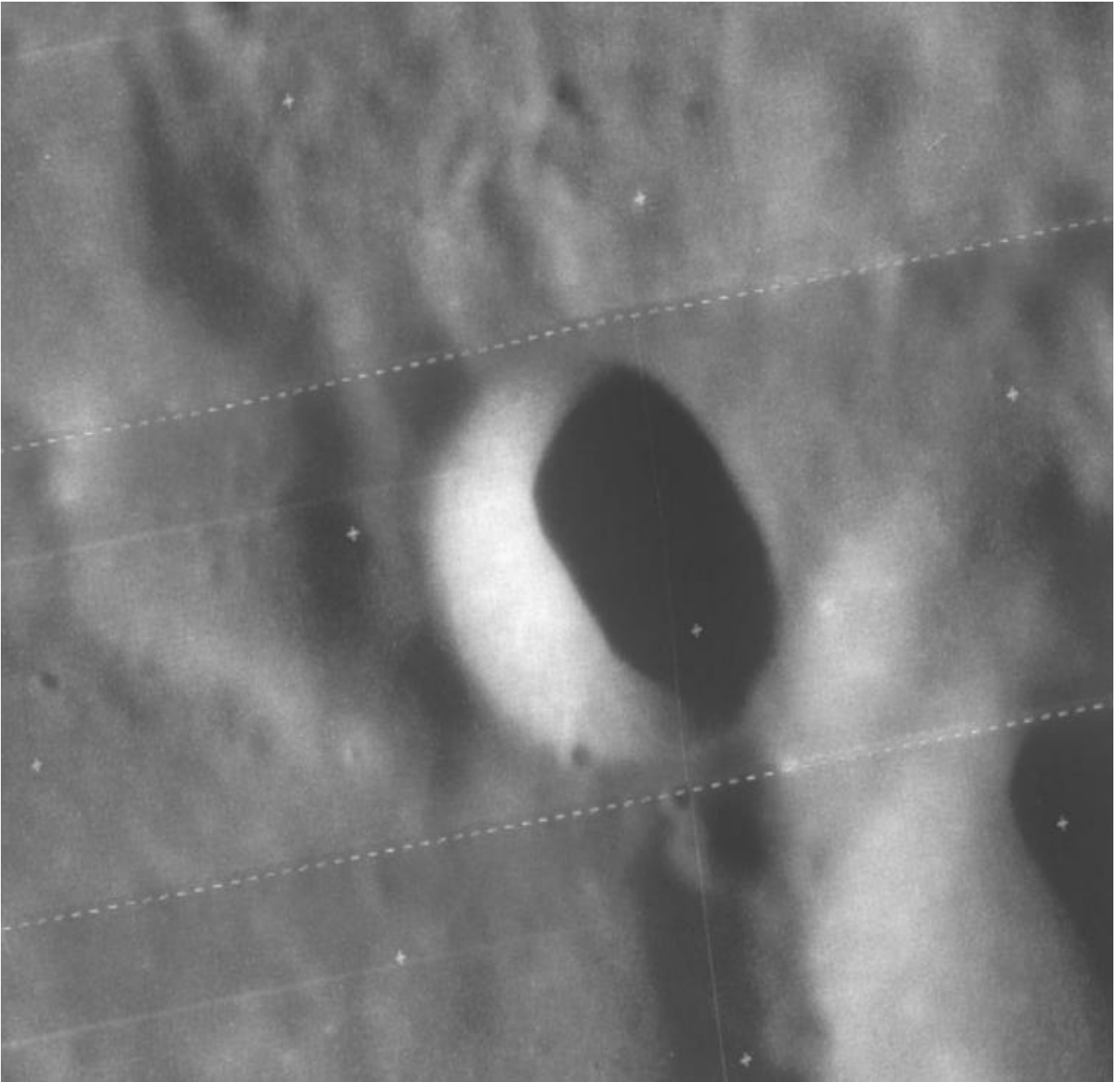
	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Janssen	44.96° S	40.82° E	190 km	1.17	1.26	13.30	16.60

### 35. Gutenberg



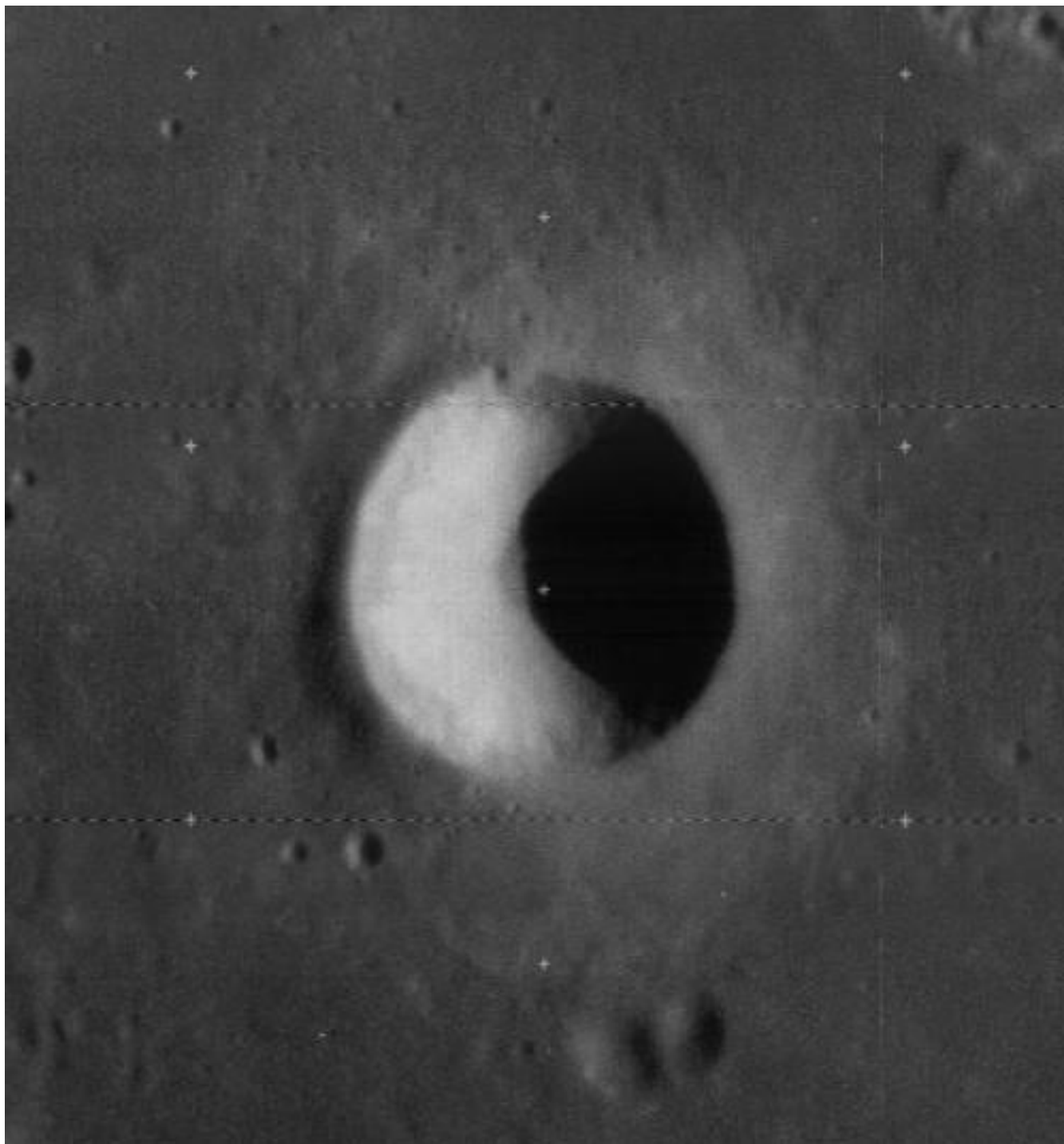
	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Gutenberg	8.6° S	41.2° E	74 km	1.19	1.26	15.20	15.10

### 36. Crater east from Piccolomini



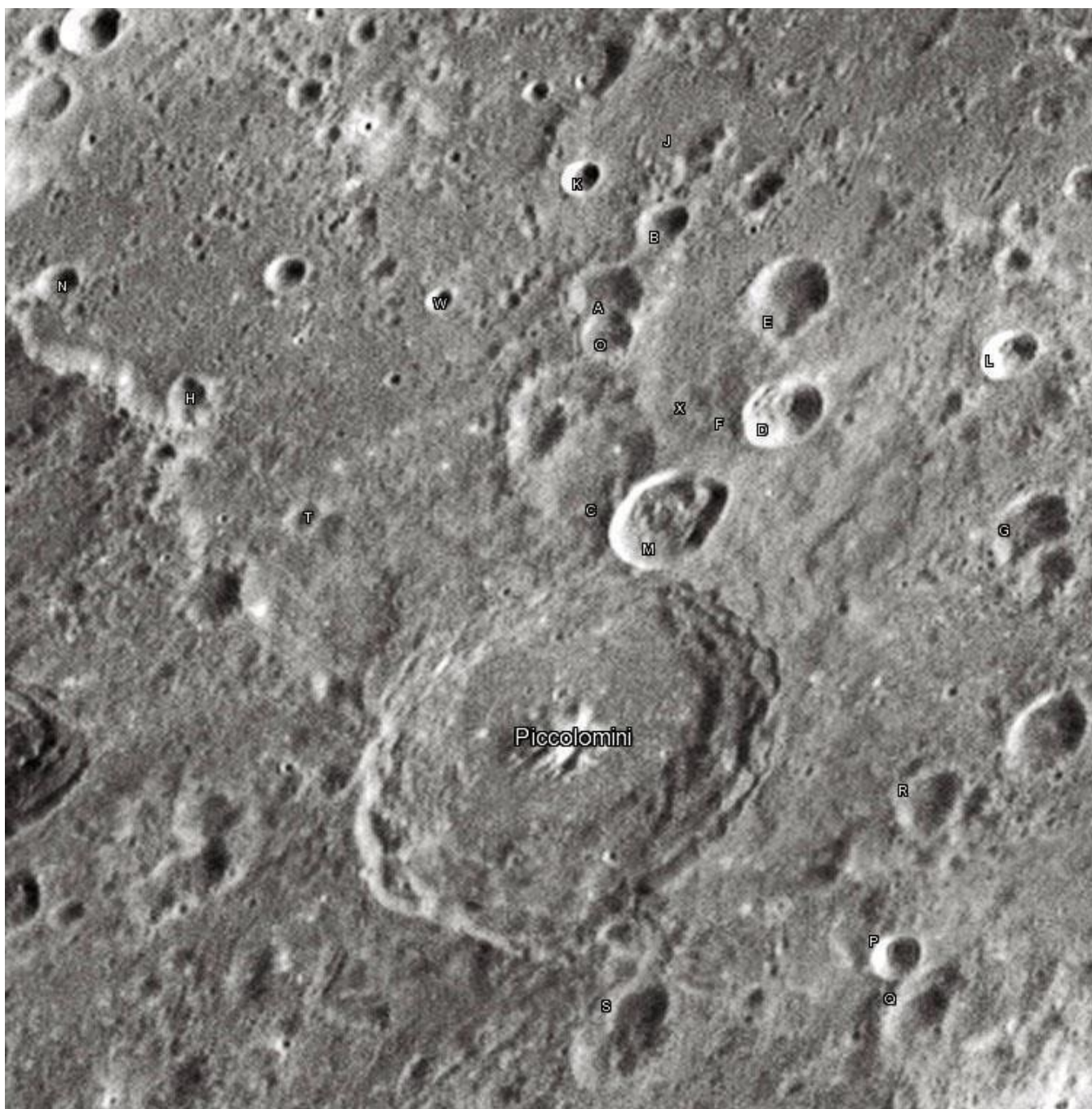
	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Crater East from Piccolomini	30.7°S	36°E	28 km	1.33	1.36	15.20	16.90

37. Rosse



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Rosse	17.8°S	35°E	12 km	1.05	1.26	10.90	11.70

### 38. Piccolomini



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Piccolomini	29.7° S	32.3° E	88 km	1.33	1.29	15.20	16.90

### 39. Crater South from Baily



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Crater South from Baily	48.4°N	31.3°E	12 km	1.19	1.32	9.60	11.70



40. Mare Frigoris North-East region



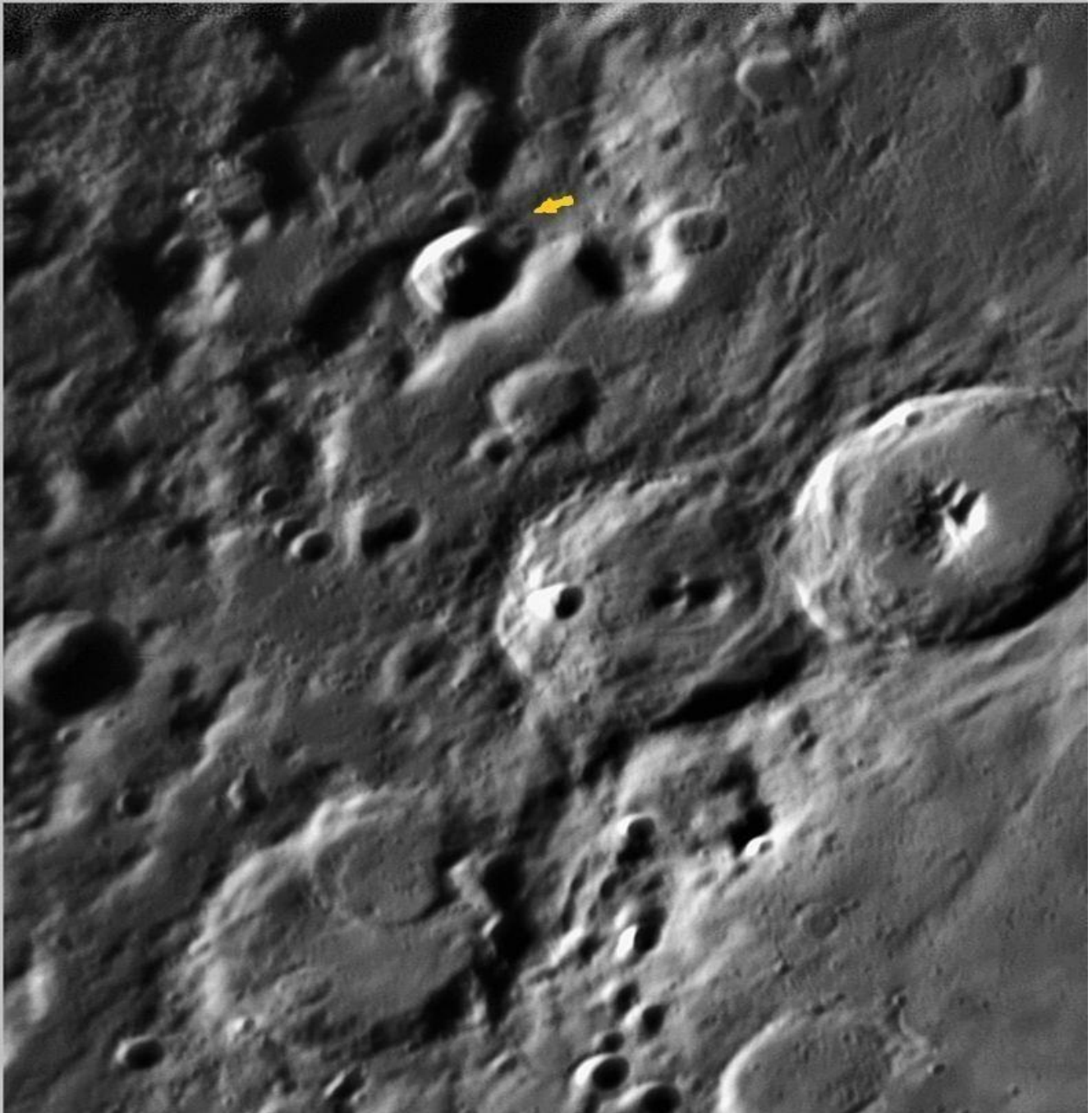
	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Mare Frigoris North-East region	56° N	28° E	28 km	1.09	1.29	10.90	10.90

## 41. Theophilus



	Latitude	Longitude	Diameter	Polarization		Color Index [2,7]	Albedo [3,7]	m [5,7]
Theophilus	11.4° S	26.4° E	100 km	0.82 min [1,8]	4.7 max [4,8]	1.11	17.20	17.30

42. Creter Weast from Theophilus



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Creter Weast from Theophilus	10.5° S	23.5° E	28 km	1.01	1.22	17.20	15.70

### 43. Creter Weast from Cyrillus



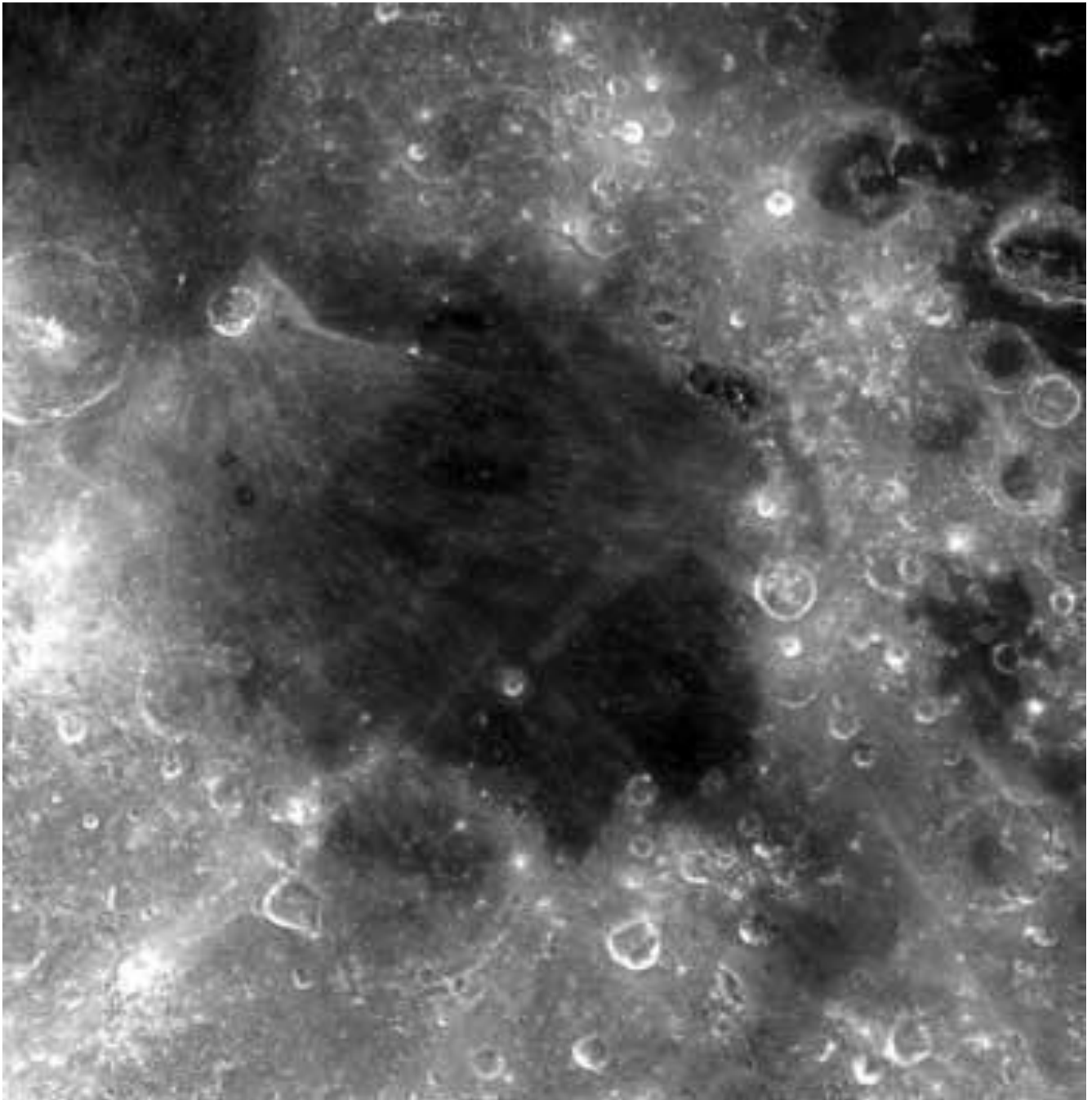
	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Creter Weast from Cyrillus	11.5° S	21.8° E	28 km	0.80	1.20	18.50	18.60

44. Ross



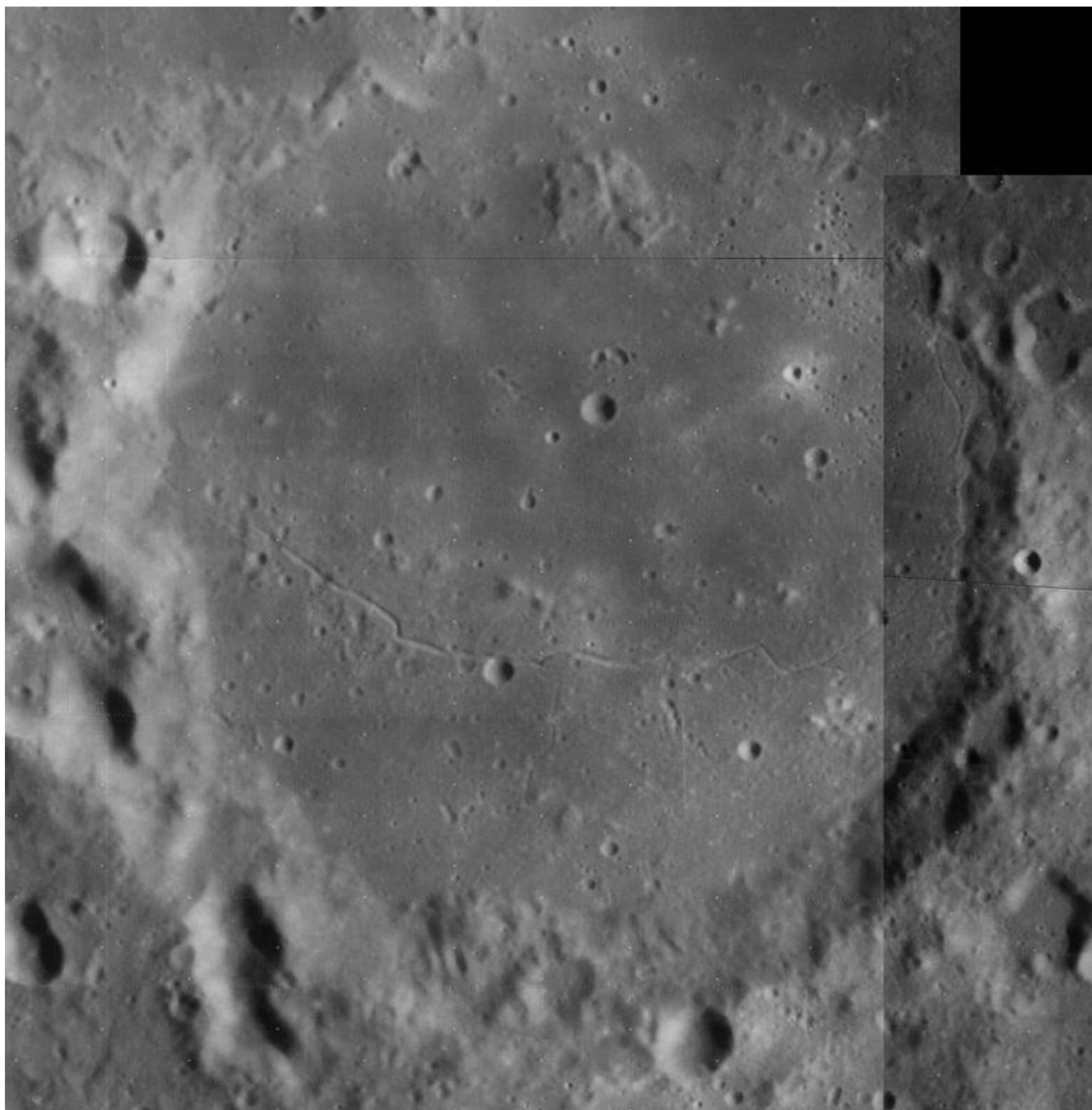
	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Ross	11.7° N	21.7° E	24 km	1.28	1.09	15.20	7.50

45. Mare Nectaris



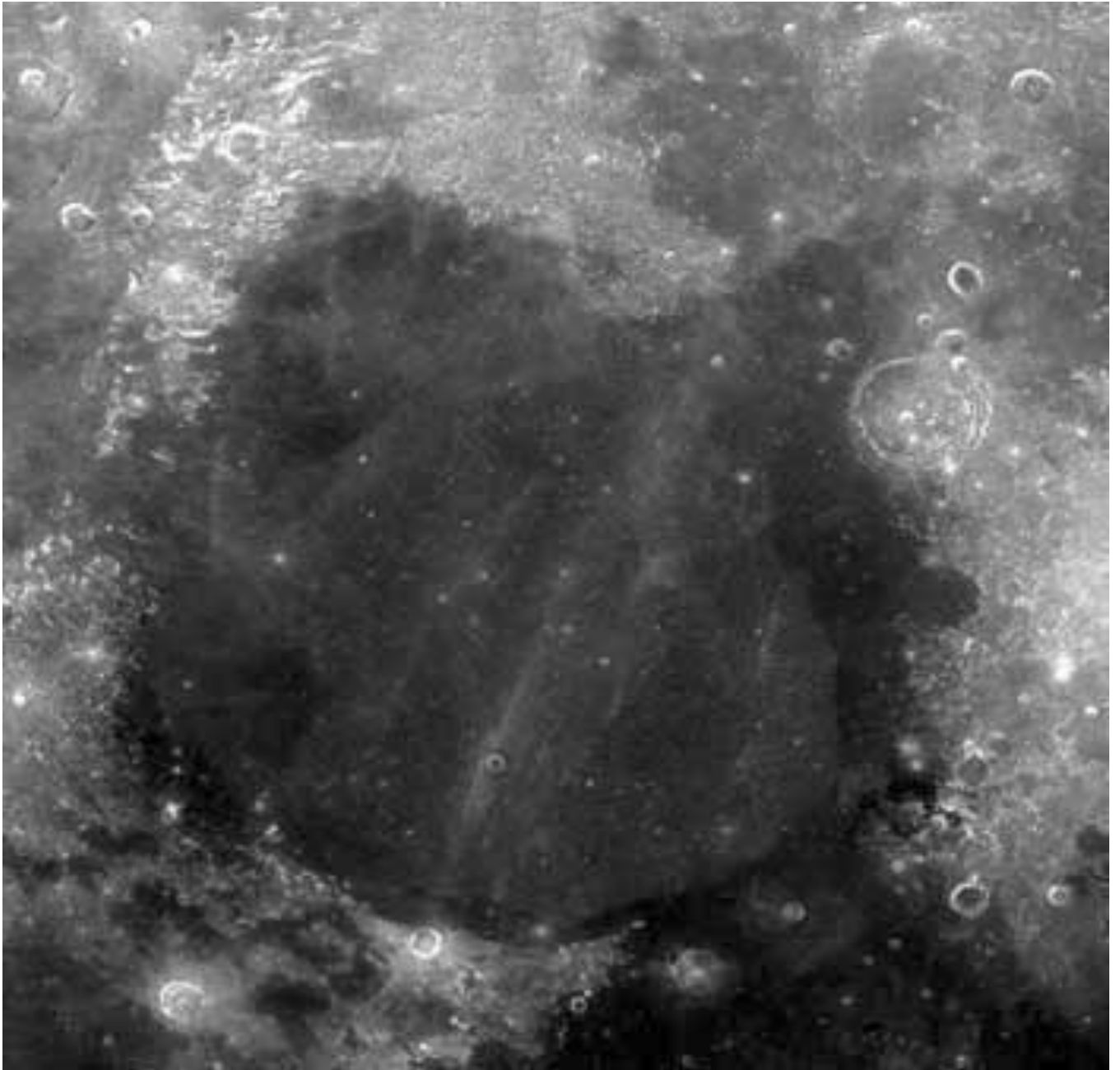
	Latitude	Longitude	Diameter	Polarization		Color Index [2,7]	Albedo [3,7]	m [5,7]
Mare Nectaris	15.2° S	34.6° E	340 km	1.22 min [1,8]	7.6 max [4,8]	1.24	9.70	11.40

## 46. Fracastorius



	Latitude	Longitude	Diameter	Polarization		Color Index [2,7]	Albedo [3,7]	m [5,7]
Fracastorius	21.2° S	33° E	124 km	1.19 min [1,8]	5.0 max [4,8]	1.26	10.30	13.50

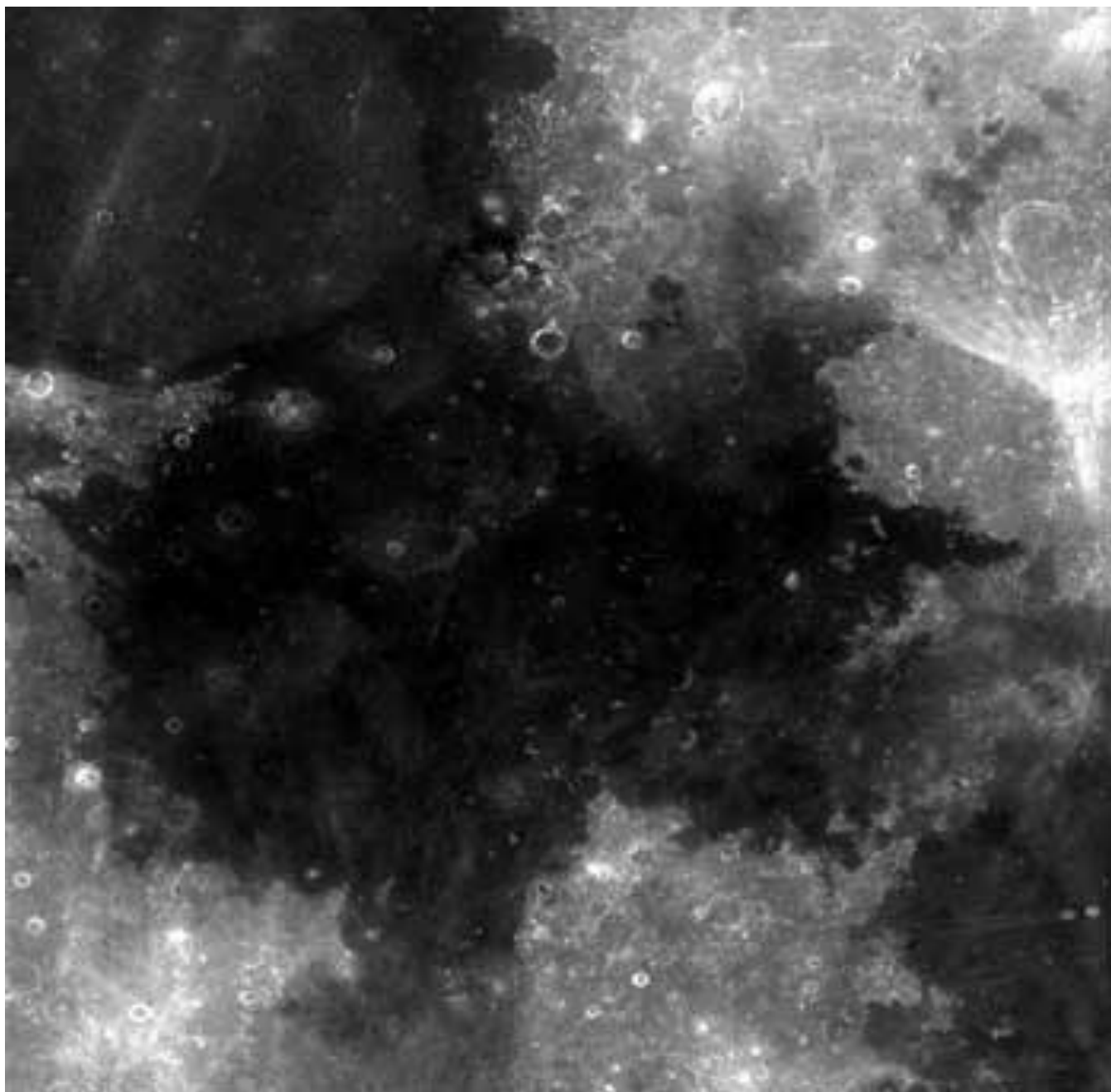
## 47. Mare Serenitatis



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Mare Serenitatis	28° N	17.5° E	674 km	1.32	1.10	12.40	9.70

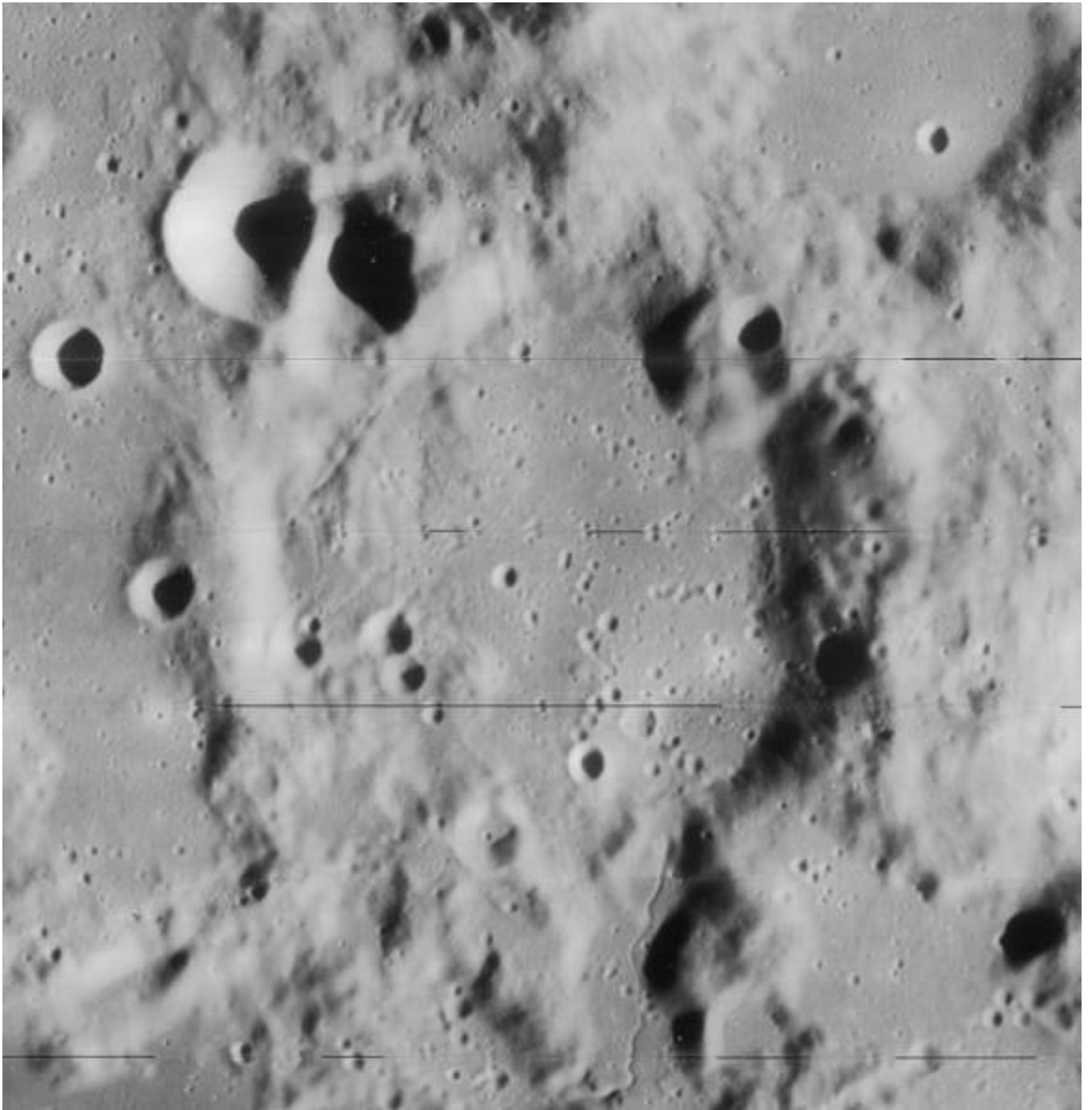


## 48. Mare Tranquillitatis



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Mare Tranquillitatis	8.5° N	31.4° E	873 km	1.17	1.09	7.40	8.90

49. Lehmann



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Lehmann	40° S	56° W	53 km	1.38	1.24	14.20	11.40

50. Apollo 17 landing area



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Apollo 17 landing area	20.19°N	30.77° E	28 km	1.14	1.18	11.60	11.40

## 51. Posidonius



	Latitude	Longitude	Diameter	Polarization		Color Index [2,7]	Albedo [3,7]	m [5,7]
Posidonius	31.8° N	29.9° E	95 km	1.09 min [1,8]	5.2 max [4,8]	1.22	12.40	13.50

## 52. Burg



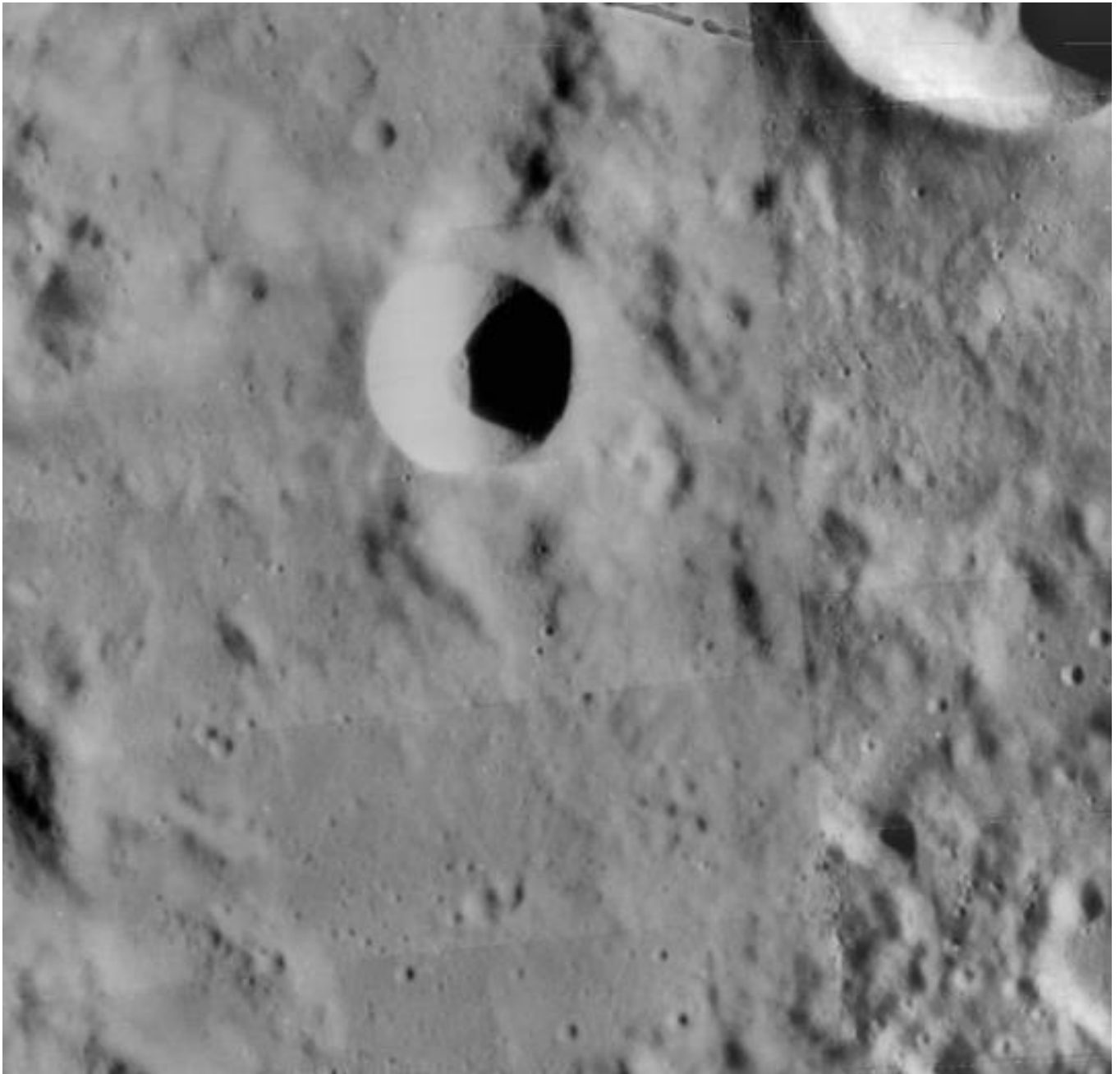
	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Burg	45° N	28.2° E	40 km	1.14	1.29	14.20	11.40

54. Creter1 Weast from Alfraganus



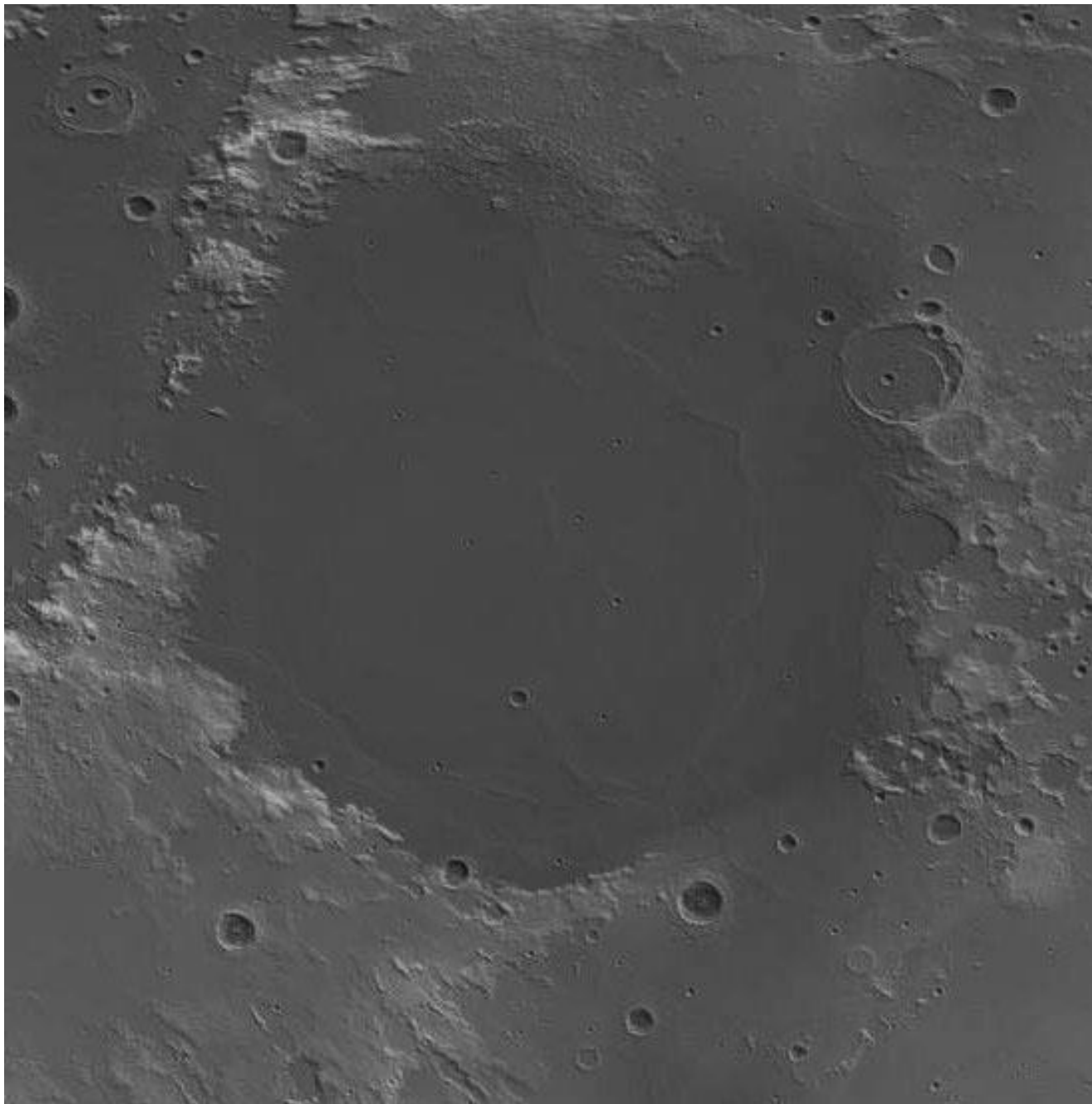
	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Creter1 Weast from Alfraganus	1.7° S	19.3° E	28 km	0.92	1.15	12.40	13.50

54. Creter2 Weast from Alfraganus



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Creter2 Weast from Alfraganus	6° S	18.3° E	28 km	0.92	1.19	17.20	18.60

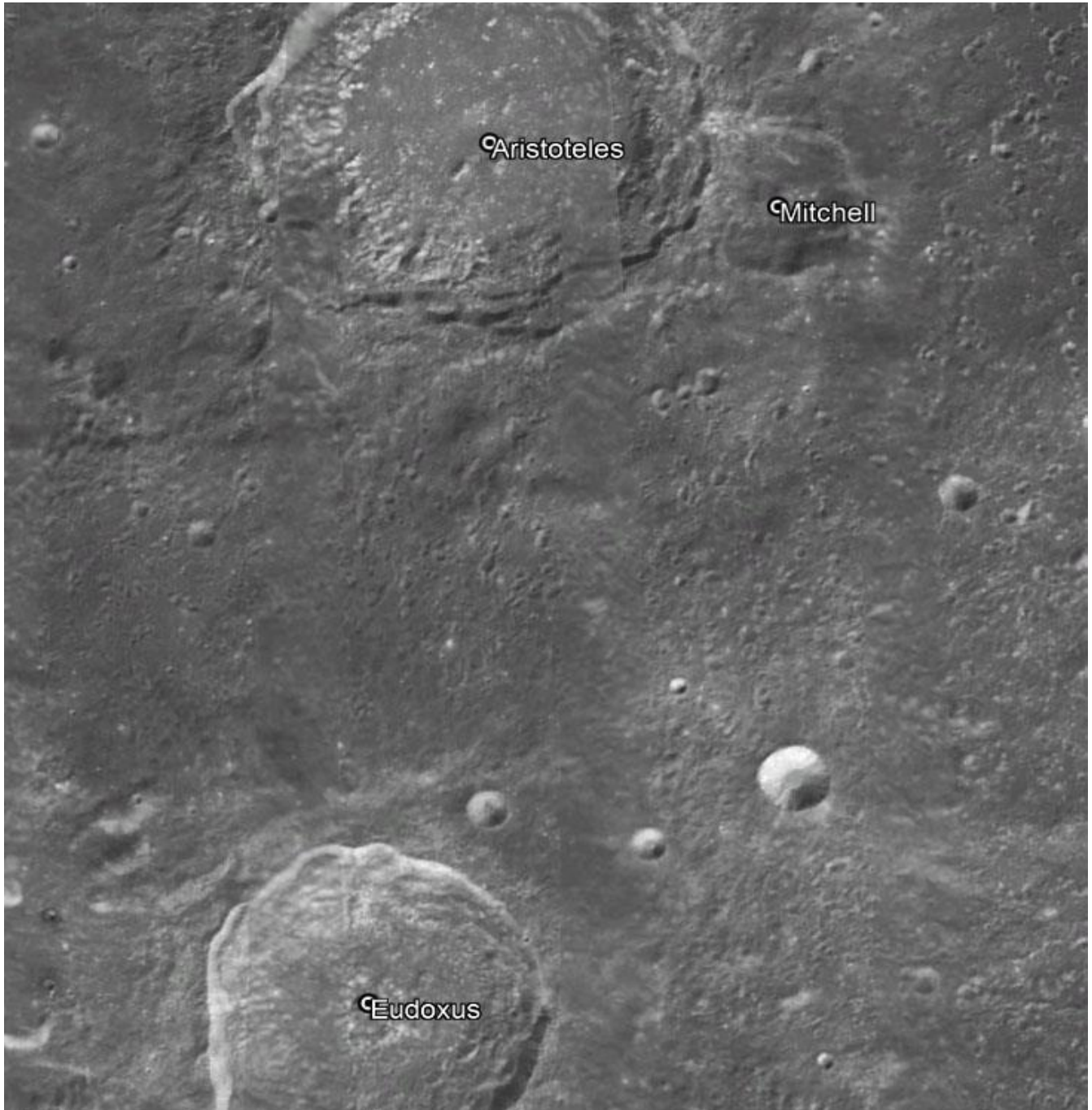
55. Crater North from Mare Serenitatis



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Crater North from Mare Serenitatis	39° S	17.2° E	28 km	1.39	1.26	14.20	16.60



## 56. Region between Aristoteles and Eudoxus



Region between	Latitude	Longitude	Diameter	Polarization		Color Index [2,7]	Albedo [3,7]	m [5,7]
	Aristoteles and Eudoxus	46.7° N	17° E	28 km	1.15 min [1,8]	12.5 max [4,8]	1.29	15.20

57. Mare Serenitatis (S-W from Bessel)



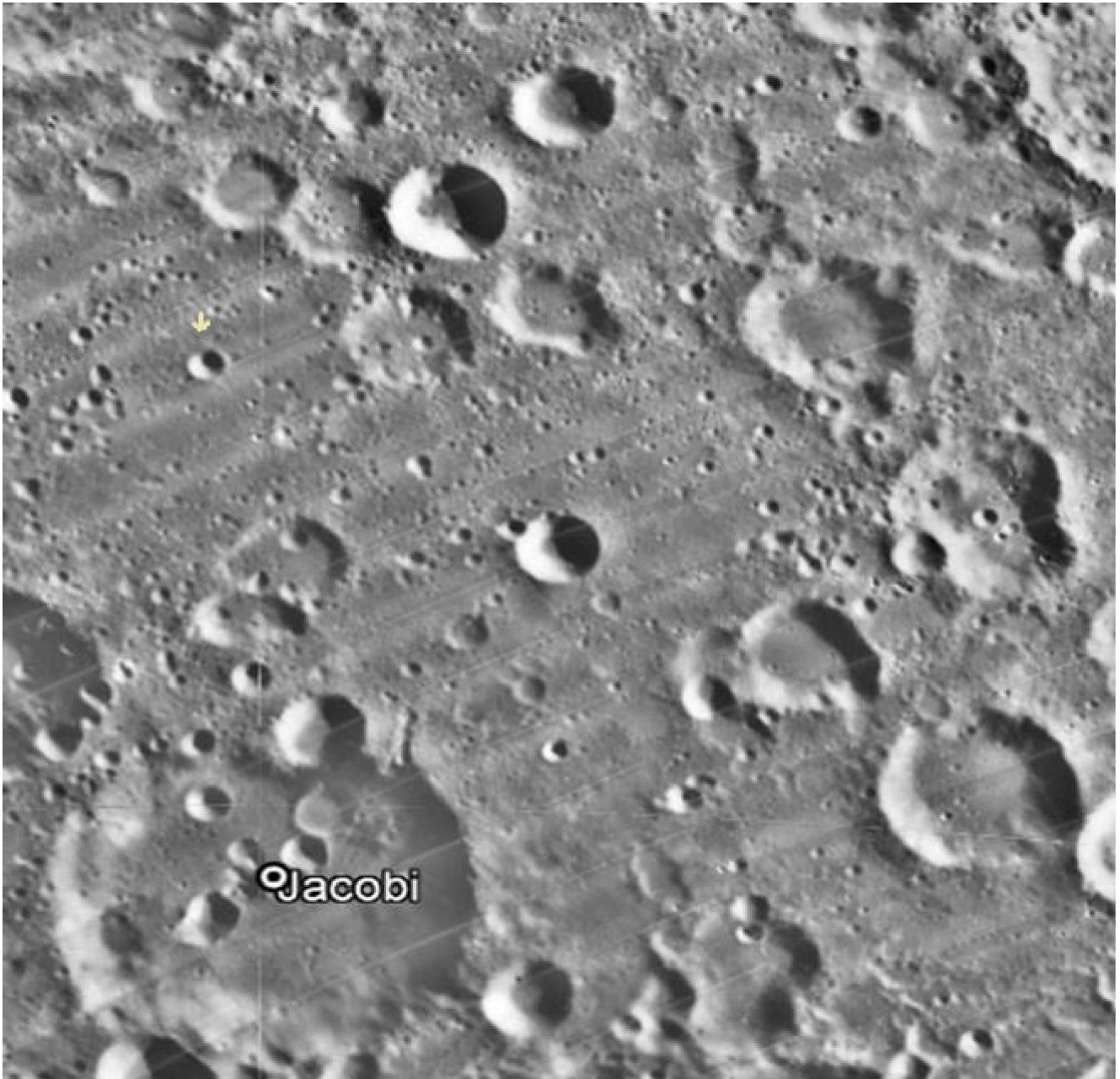
	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Mare Serenitatis (S-W from Bessel)	19° N	17° E	28 km	1.12	1.19	8.40	8.90

58. Crater North from Manilius



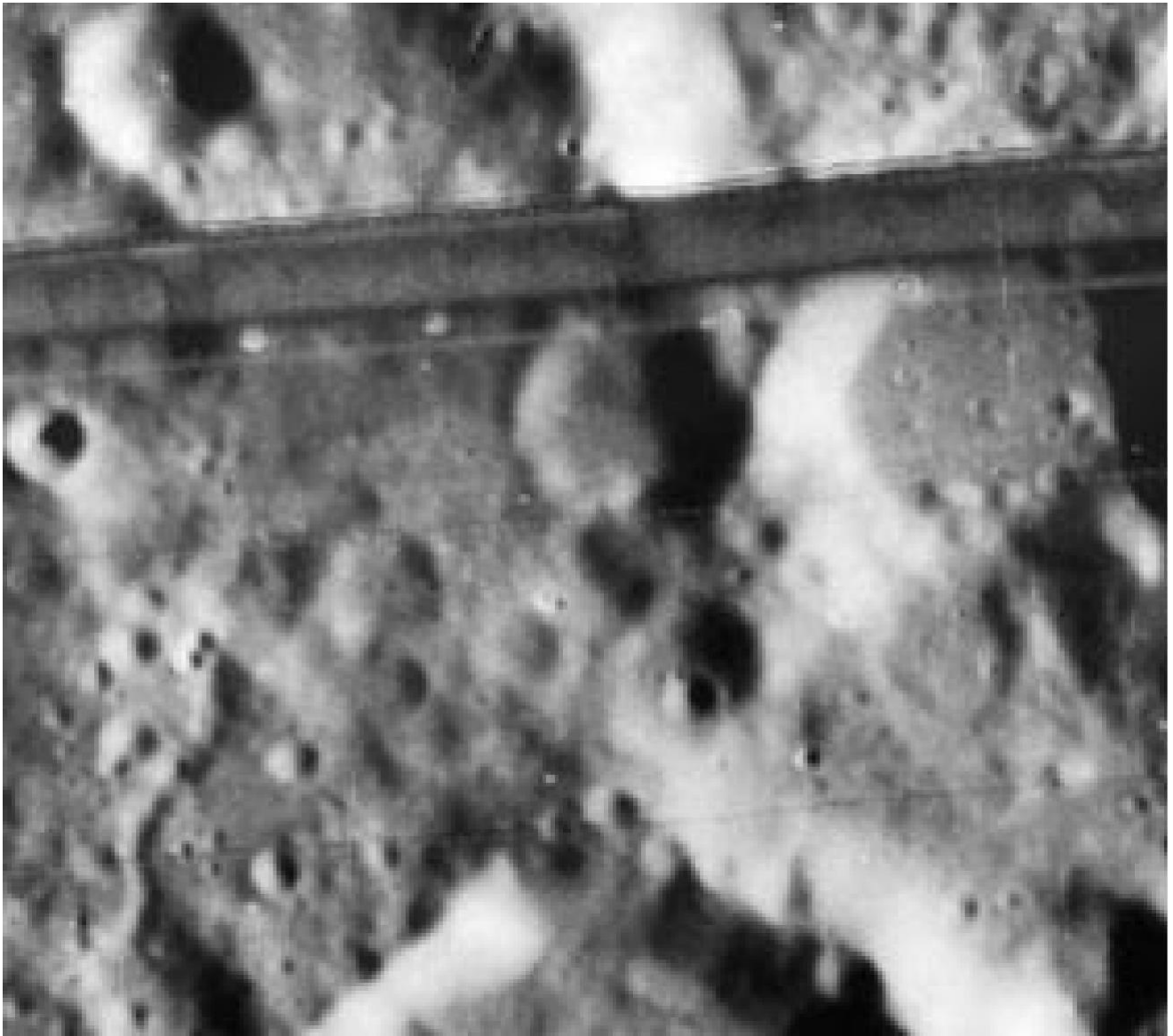
	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Crater North from Manilius	17.5°N	11.3°E	12 km	1.38	1.18	8.40	10.90

59. Crater North from Jacobi



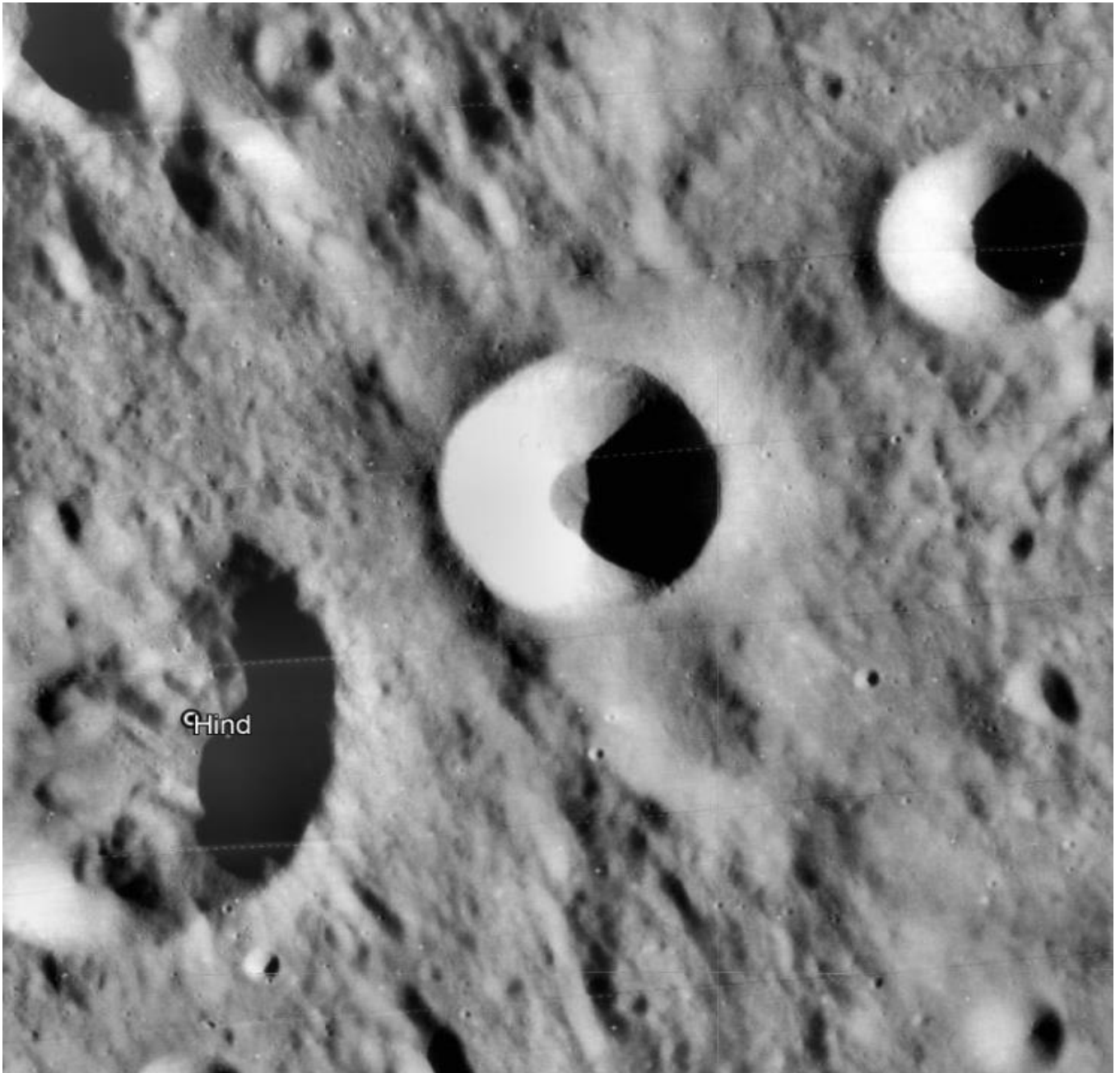
	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Crater North from Jacobi	53.5°S	11°E	12 km	1.21	1.36	16.20	16.90

60. Crater South from Ritchey



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Crater South from Ritchey	12.3°S	9.2°E	12 km	1.22	1.24	9.3	12.500

61. Crater North from Hind



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Crater North from Hind	7.3°S	8.3°E	5 km	0.96	1.20	15.20	14.10

## 62. Crater East from Horrocks



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Crater East from Horrocks	4.0°S	7.5°E	5 km	1.16	1.22	15.20	14.10

63. Crater North-East from Horrocks



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Crater North-East from Horrocks	3.0°S	7.0°E	5 km	1.18	1.22	15.20	15.70

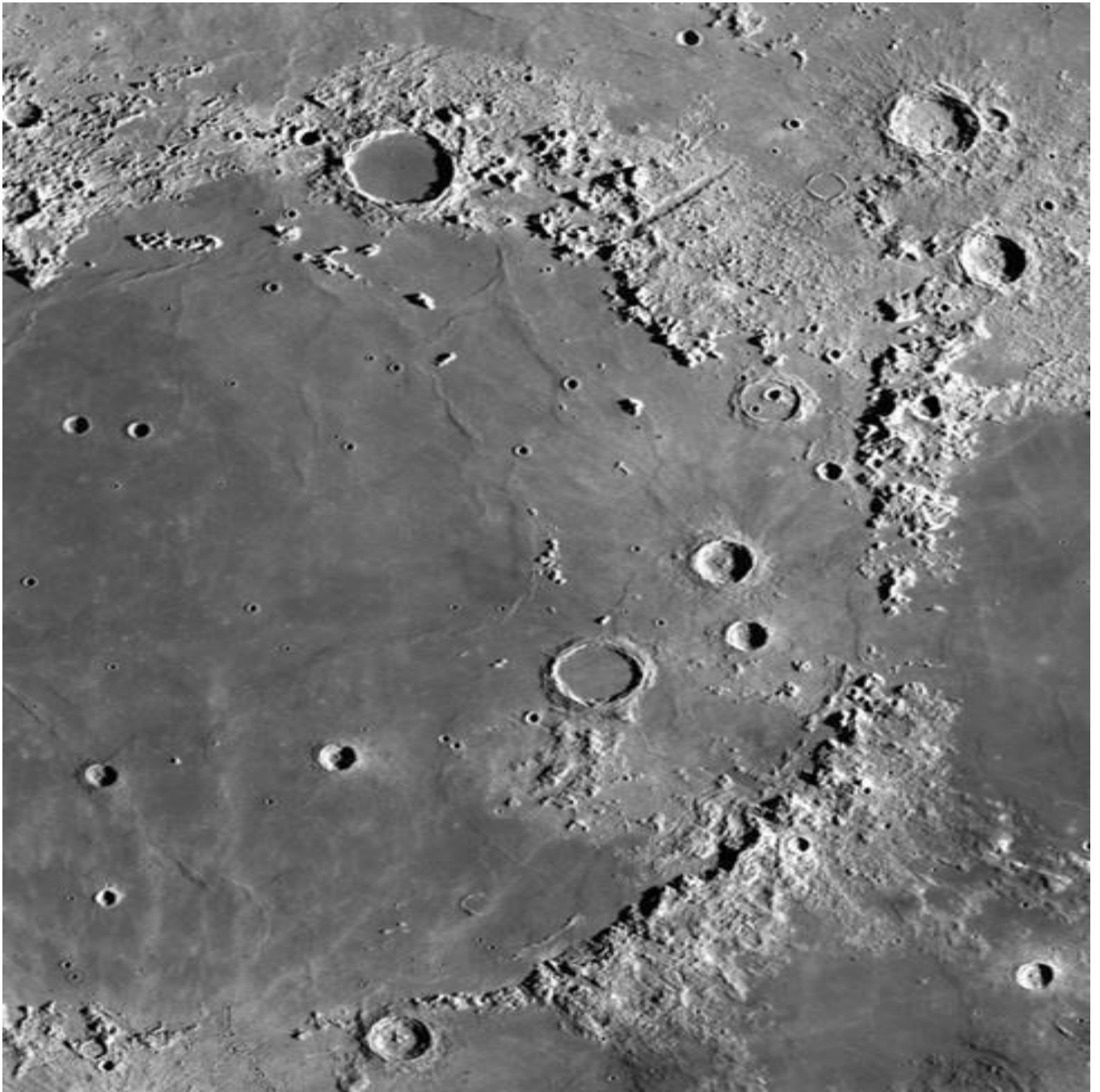


## 64. Mare Frigoris



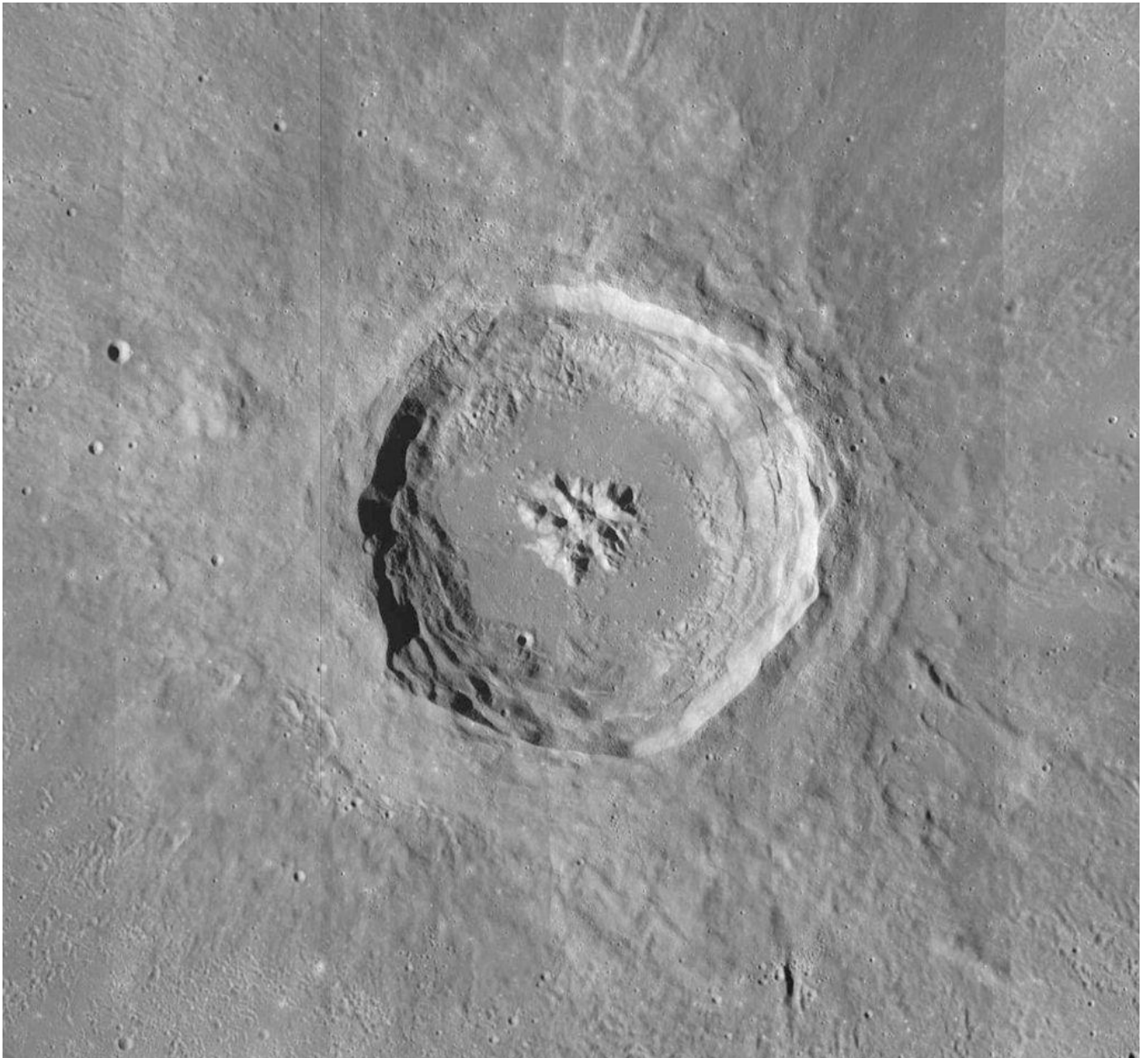
	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Mare Frigoris	56° N	1.4° E	1446 km	1.30	1.18	13.30	13.50

65. Mare Imbrium (North from Autolycus)



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Mare Imbrium (North from Autolycus)	32° N	1.3° E	28 km	1.16	1.20	12.40	12.50

## 66. Aristillus



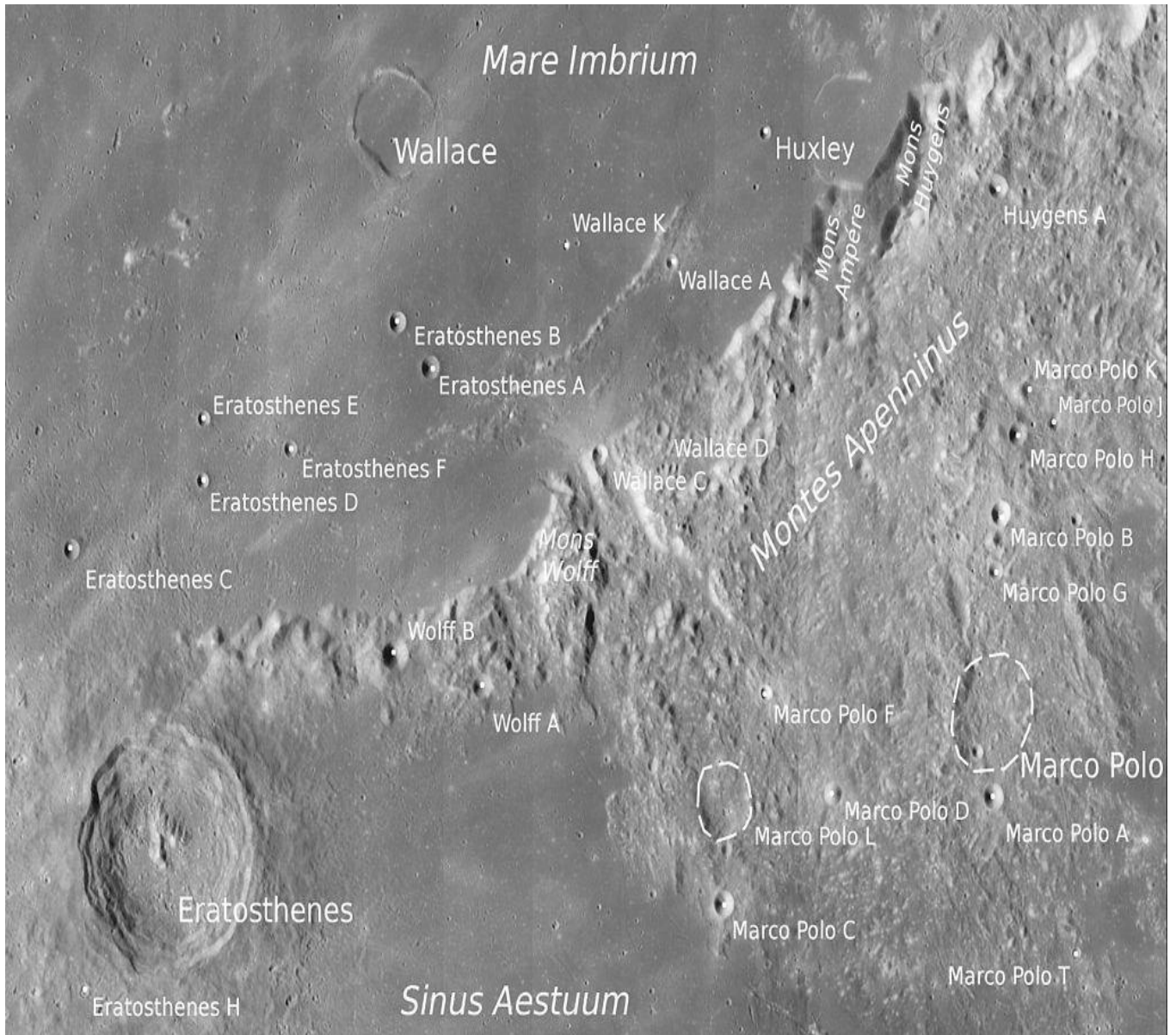
	Latitude	Longitude	Diameter	Polarization		Color Index [2,7]	Albedo [3,7]	m [5,7]
Aristillus	33.7°N	1°E	55 km	1.11 min [1,8]	8.90 max [4,8]	1.19	11.60	11.70

67. Crater North-East from Maginus



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Crater North-East from Maginus	48.7°S	1.5°W	12 km	1.19	1.24	18.50	19.80

## 68. Montes Apenninus



	Latitude	Longitude	Elevation	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Montes Apenninus	18.9° N	3.7° W	5400 metres	1.31	1.22	12.40	13.50

69. Crater South from Deslandres



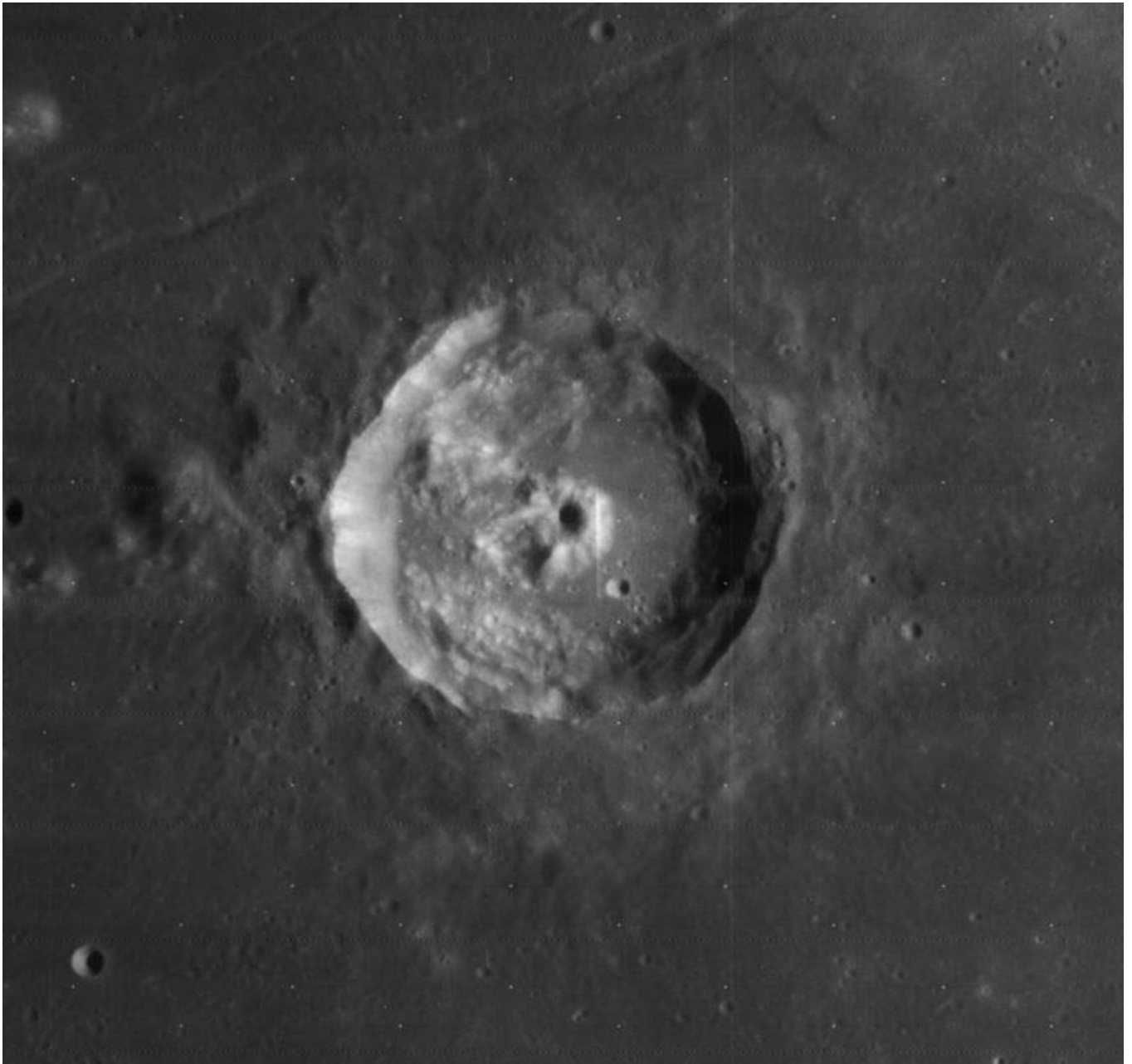
	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Crater South from Deslandres	37°S	4°W	12 km	1.03	1.20	23.20	18.60

## 70. Cyrillus



	Latitude	Longitude	Diameter	Polarization		Color Index [2,7]	Albedo [3,7]	m [5,7]
Cyrillus	13.2° S	24° E	98 km	0.85 min [1,8]	3.80 max [4,8]	1.11	18.50	19.80

## 71. Plinius



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Plinius	15.4° N	23.7° E	43 km	1.05	1.06	12.40	11.40

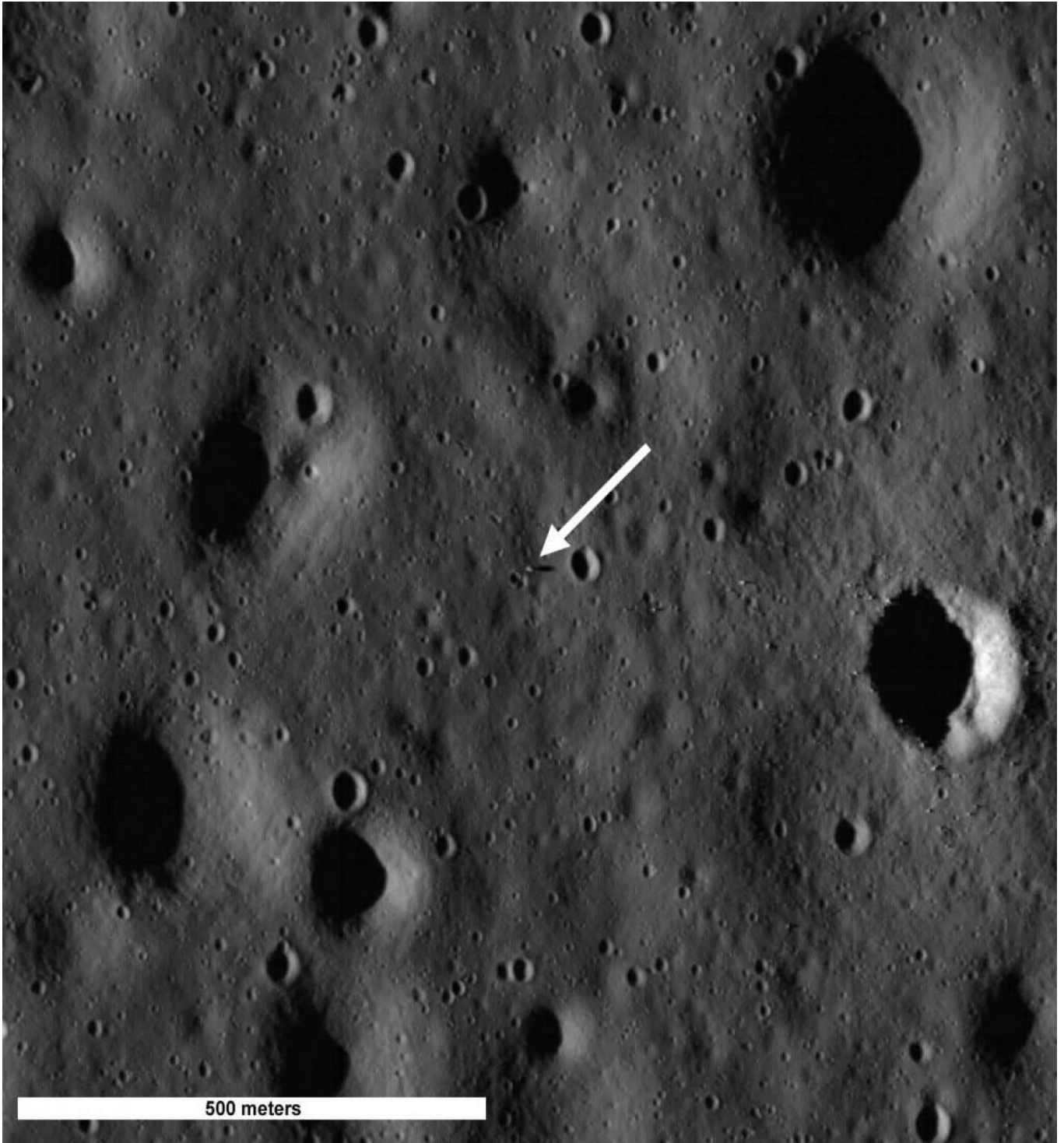


## 72. Catharina



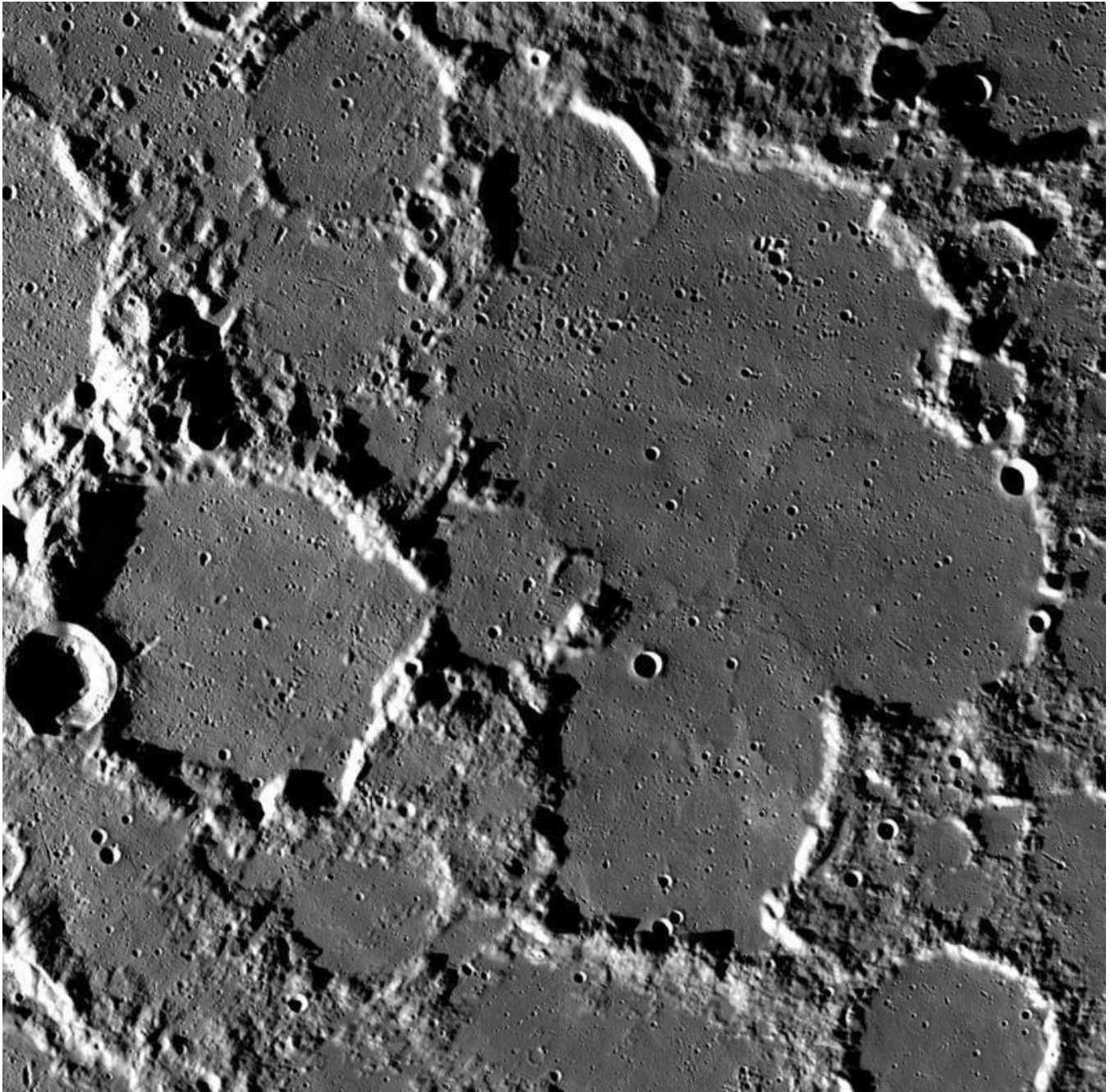
	Latitude	Longitude	Diameter	Polarization		Color Index [2,7]	Albedo [3,7]	m [5,7]
Catharina	18° S	23.6° E	100 km	1.01 min [1,8]	4.20 max [4,8]	1.22	17.20	17.30

73. Apollo 11 landing area



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Apollo 11 landing area	0.67° N	23.47° E	28 km	1.20	1.13	8.60	8.90

## 74. Meton



	Latitude	Longitude	Diameter	Polarization min[1,8]	Color Index [2,7]	Albedo [3,7]	m [5,7]
Meton	73.8° N	19.2° E	122 km	1.16	1.22	18.5	16.90

### 3. Conclusions

The analysis will be at the end of the second part.

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# Data: Latitude, Longitude, Diameter, Moon fragment of taken

[https://en.wikipedia.org/wiki/List\\_of\\_craters\\_on\\_the\\_Moon](https://en.wikipedia.org/wiki/List_of_craters_on_the_Moon)

[https://en.wikipedia.org/wiki/List\\_of\\_maria\\_on\\_the\\_Moon](https://en.wikipedia.org/wiki/List_of_maria_on_the_Moon)