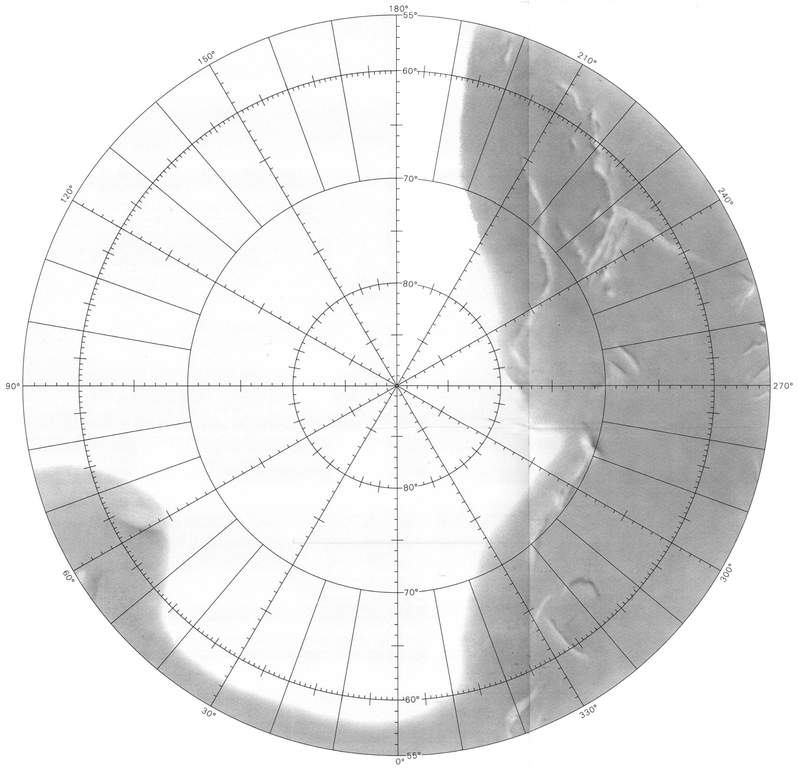
DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared for the
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION



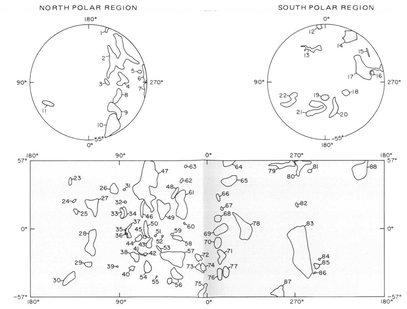
SCALE 1:8 388 000 (1 mm = 8.39 km) AT ±55° LATITUDE
POLAR STEREOGRAPHIC PROJECTION

KILOMETERS

500 400 300 200 100 50 0 50 100 200 300 400 500

90° 80° 70° 60° 55°

NORTH POLAR REGION



NOTES ON INTERPRETATION

Shading on the three map projections on this sheet indicates areas where relief information was available. However, such information was sparse or ambiguous, in the 88 areas outlined above. In some areas, Voyager 1 images are inconsistent both among themselves and in relation to Voyager 2 images. Most of the following notes apply only to sheet 2 (shaded relief only), but on sheet 1 (shaded relief and surface markings), some albedo image data are also inconsistent. Apparent discrepancies between relief on the two sheets are caused by the highly interpretive nature of the relief-only version. (Voyager 1 images are identified by the suffix "J1"; Voyager 2 images, by the suffix "J2".)

Many low-resolution images from both Voyager 1 and Voyager 2 were examined for relief along the limb and terminator. Portrayal of the area between long. 30° and 90° relied heavily on the "volcano watch" series of images taken during the Voyager 2 mission.

NORTH POLAR MAP

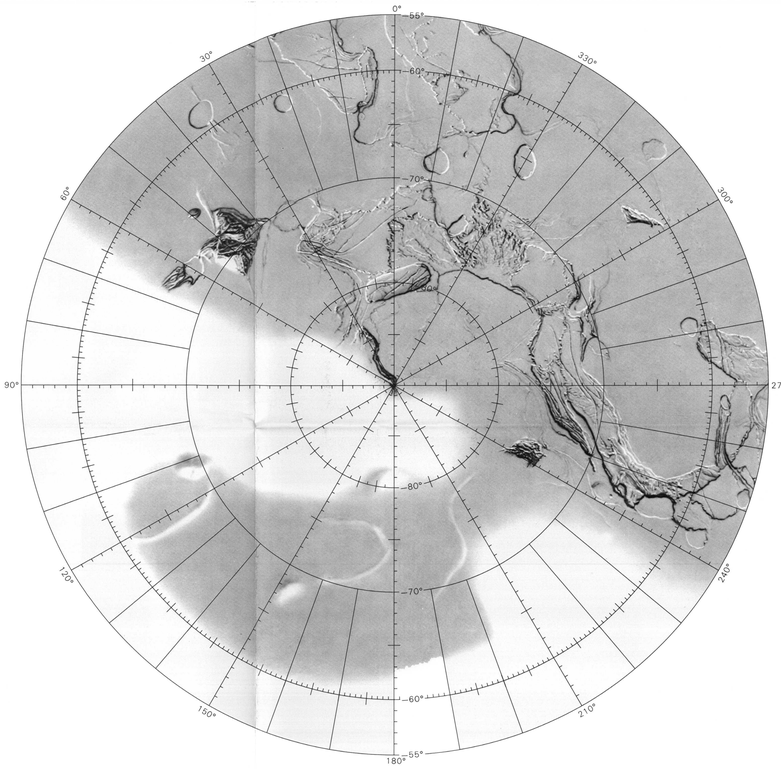
1. Relief: 1376J1–1.
2. Relief: compare 975, 1109, and 1376J1–1 with 793 and 803J1–1.
3. Relief: 82 and 86J1+0.
4. Relief: 1787J1–1.
5. The approximate position of one of two protuberances can be seen on the limb in 745, 748, 751, and 754J2–1 (Voyager 2). See note 81 on the Mercator map.
6. Relief: 975 and 1376J1–1.
7. Relief: 975 and 1787J1–1.
8. Relief: 1392, 1775, and 1787J1–1.
9. Relief: 1109J1–1.
10. Relief: compare 1392J1–1 with 1775J1–1.
11. Relief: 207 and 343J2+0.

SOUTH POLAR MAP

12. This region is lighter than the surrounding area in 65, 67, 75, 77, and 79J1+0 and darker in 196, 218, and 232J1+0. Changes in albedo details are visible.
13. Reversed light and dark albedo in 232 and 234J1+0 when compared with 79 and 157J1+0. The feature was barely visible in 194, 196, and 198J1+0.
14. Reversed light and dark albedo when 77, 79, 87, 89, and 145J1+0 are compared with 196 and 232J1+0. More structure in 196 and 232J1+0.
15. Feature is light in 89 and 101J1+0 and dark in 196J1+0.
16. Caldera interior is light in 101 and 113J1+0 and dark in 196 and 230J1+0.
17. Reversed light and dark features: compare 101, 141, and 143J1+0 with 230J1+0.
18. Relief from 795J1–1 ties into this feature.
19. Relief: 969 and 1107J1–1.
20. Relief: 969, 1107, and 1366J1–1.
21. Relief: 795, 965, 969, and 1105J1–1.
22. Relief: 548 and 795J1–1.

MERCATOR MAP

23. Relief: 965J1–1.
24. Relief: 965J1–1.
25. Relief: 965J1–1.
26. Relief: 542 and 548J2+0.
27. Relief: 791, 793, and 803J1–1.
28. Relief: 791, 793, 801, and 803J1–1.
29. Relief: 791J1–1.
30. Relief: 965 and 969J1–1.
31. Bright: 429J2+0.
32. Relief: 542J1–1.
33. Relief: 542 and 546J1–1.
34. Relief: 369, 393, 417, 441, and 465J2+0.
35. Relief: 542 and 546J1–1.
36. Very bright feature: 331, 417, and 465J2+0 (not visible in Voyager 1 images).
37. Relief: 393, 417, 441, 465, and 489J2+0.
38. Surface coloration patterns show differences in 33 and 117J2+0 when compared with Voyager 1 images.
39. Darker in 724J2–2 than in Voyager 1 images.
40. Area much darker in 25J2+0 through 441J2+0 when compared with Voyager 1 images.
41. Relief: 369 and 393J2+0.
42. Feature is bright in 33 and 114J2+0; dark in Voyager 1 images.
43. Relief: composite of 179 and 192J1+0 with 33, 167, 207, 279, and 282J2+0.
44. Relief: 417 and 489J2+0.
45. Light here in 33 through 369J2+0 in contrast to Voyager 1 images.
46. Relief: 393 and 417J2+0.
47. Relief: 255, 287, 295, and 417J2+0.
48. Relief: combination of 88 and 92J1–1 with 25 and 33J2+0.
49. Relief: 199 and 215J2+0.
50. Relief: 369, 393, and 417J2+0.
51. Caldera: 179J1–0.
52. Caldera: 179 and 181J1–0.
53. Relief: 167, 199, and 207J2+0.
54. Relief: 192J1+0 and 279J2+0. Suggested on 287, 299, and 315J2+0.
55. Location of Masubi eruption.
56. Relief: 25, 33, and 114J2+0 verify high-resolution portrayal.
57. Relief: 25, 33, and 114J2+0 verify interpretation from 61 and 63J1+0.
58. Relief: 61J1+0 and 25J2+0.
59. Relief: 61 and 179J1+0.
60. Relief: 25J2+0.
61. Relief shown is a combination of raised terrain seen in 1, 132, 179, and 181J1+0 (Voyager 1) with relief shown in 25J2+0 (Voyager 2).
62. Relief: 25J2+0.
63. Relief: 25J2+0.
64. Relief: 1392J1–1, 134 and 173J1+0.
65. Relief: 1392J1–1.
66. Relief: 1392J1–1.
67. Relief: 1384J1–1.
68. Relief: 214J1+0.
69. Relief: 1384 and 1392 J1–1 combined with 214J1+0.
70. Shields verified by 1384 and 1392J1–1.
71. Relief: 1384J1–1.
72. Light and dark flows markedly different in 63 and 182J1+0.
73. Variable surface colorations: compare 63 and 65J1+0 with 184J1+0.
74. Dark flow visible in 184J1+0 is absent in 63, 65, and 76J1+0.
75. Feature is lighter than surrounding area in 65, 67, 75, 77, and 79J1+0, and darker in 196, 218, and 232J1+0. Fine scale variations in albedo are apparent.
76. Light and dark areas are reversed in 197 and 199J1+0 when compared with 75J1+0.
77. Flows more clearly defined (darker?) in 197 and 199J1+0 when compared with 75J1+0.
78. Relief: 1113J1–1.
79. Relief: 975 and 1787J1–1.
80. Relief: compare 975J1–1, with 1376J1–1. Details are suggested in 82 and 86J1+0.
81. A protuberance is visible at this latitude just behind the terminator (~ 260°) and on the limb in images 745, 748, 751, and 754J2–1 (Voyager 2). Although the reconstructed color image suggests relief, 1787J1–1 and 27J1+0 (Voyager 1) show none. A similar feature in the same frames is noted for the map of the north pole.
82. Prominent relief shown in 745J2–1 is superimposed on high-resolution images 1783J1–1, 23, 27, and 35J1+0.
83. 745J2–1 verifies relief interpreted from high-resolution images.
84. Possible eruption: diffuse light feature at cone location in 226J1+0 (filtered).
85. Reversed light and dark albedo: compare 226J1+0 with 121J1+0 and 123J1+0.
86. Light areas with diffuse edges appear to be in the atmosphere: compare 121 and 123J1+0 with 207 and 226J1+0 and with reconstructed color image from 1368J1–1 series.
87. Changes in appearance of surface coloration: compare 1111J1–1 and 196J1+0 with 101J1+0.
88. Relief: 1376J1–1.



SCALE 1:8 388 000 (1 mm = 8.39 km) AT ±55° LATITUDE
POLAR STEREOGRAPHIC PROJECTION

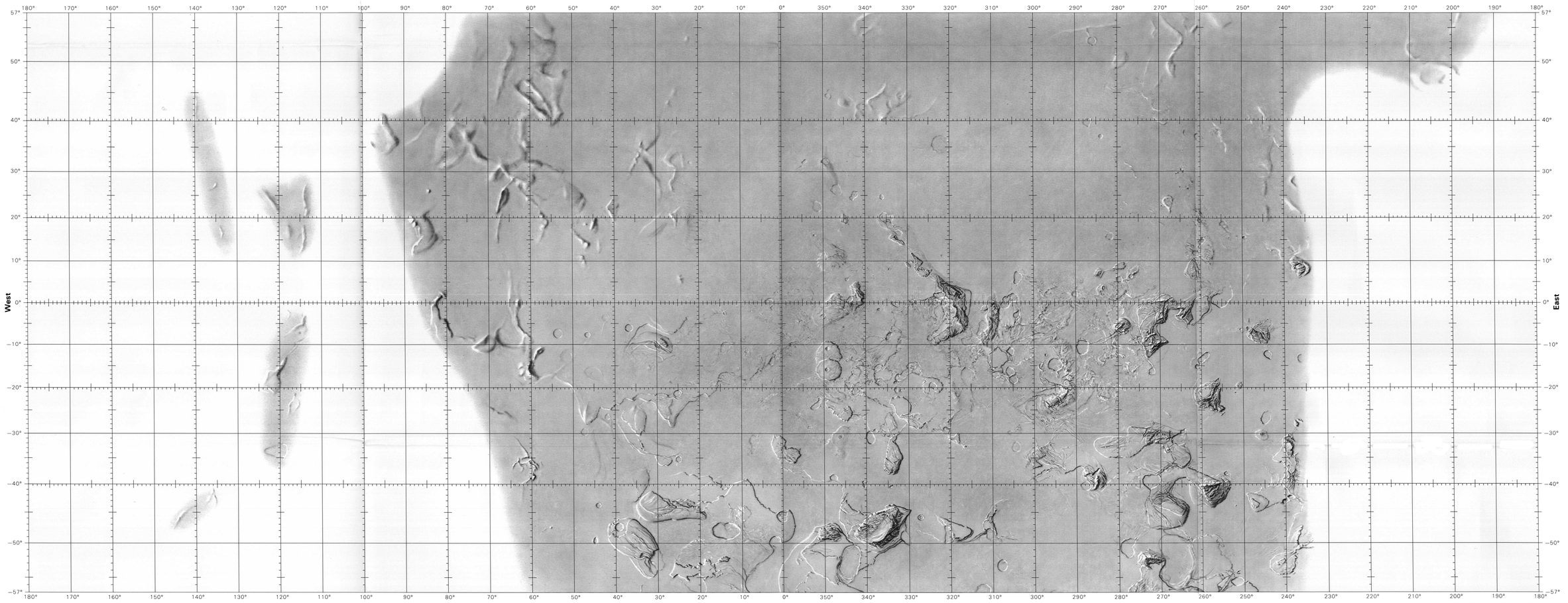
KILOMETERS

500 400 300 200 100 50 0 50 100 200 300 400 500

90° 80° 70° 60° 55°

SOUTH POLAR REGION

North



South

SCALE 1:15 000 000 (1 mm = 15 km) AT 0° LATITUDE
MERCATOR PROJECTION

KILOMETERS

1000 900 800 700 600 500 400 300 200 100 50 0 50 100 200 300 400 500 600 700 800 900 1000

±57° ±50° ±40° ±30° ±20° ±10° 0°

SHADED RELIEF MAP OF IO

Ji 15M 1R

By

Patricia M. Bridges

1987

NOTES ON BASE

This sheet is one in a series of maps that cover the surfaces of the Galilean satellites of Jupiter at a nominal scale of 1:15,000,000 (Batson and others, 1980). Sources for the series were Voyager 1 and 2 images and 1:5,000,000-scale airbrush maps. Essential features of the mapping are noted below.

CARTOGRAPHIC CONTROL

Mercator and Polar Stereographic projections used for the maps of Io are based on a sphere with a radius of 1815 km and a common scale of 1:8,388,000 at lat ±56°. Longitude increases to the west in accordance with astronomical convention. Planimetric control was derived by photogrammetric triangulation using Voyager 1 and 2 pictures (Davies and Katayama, 1981). The meridians are numbered according to the ephemeris position of the prime meridian of Io (Davies and Katayama, 1981; IAU, 1980).

MAPPING TECHNIQUE

This map is an experimental rendition intended to show the surface landforms on Io as accurately as they can be inferred from Voyager image data. Over most of the map area, rigorous interpretation was precluded by the very high illumination angles over most of the surface relief, which accentuate albedo variations and subdue evidence of surface relief, and by the wide variations in image resolution. Much of the image analysis and airbrush portrayal must be considered highly speculative. Sizes, shapes, and positions of relief features were taken from sheet 1 of this set. Details of the relief features were interpreted from many computer enhancements of high-resolution Voyager 1 pictures through the use of portrayal and interpretation techniques described by Inge (1972) and Inge and Bridges (1976). Surface relief is shown as if illuminated from the west.

Ji 15M 1R: Abbreviation for Jupiter, Io (satellite); 1:15,000,000 series; first edition, shaded relief (R).

REFERENCES

Batson, R. M., Bridges, P. M., Inge, J. L., Isbell, Christopher, Masursky, Harold, Strobell, M. E., and Tyner, R. L., 1980, Mapping the Galilean satellites of Jupiter with Voyager data: Photogrammetric Engineering and Remote Sensing, v. 46, no. 10, p. 1303–1312.

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Inge, J. L., 1972, Principles of lunar illustration: Aeronautical Chart and Information Center Reference Publication RP-72-1, 60 p.

Inge, J. L., and Bridges, P. M., 1976, Applied photointerpretation for airbrush cartography: Photogrammetric Engineering and Remote Sensing, v. 42, no. 6, p. 749–760.

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NOTE TO USERS

Users noting errors or omissions are urged to indicate them on the map and to forward it to U.S. Geological Survey, Building 4, Room 454, 2255 North Gemini Drive, Flagstaff, AZ 86001. A replacement copy will be returned.