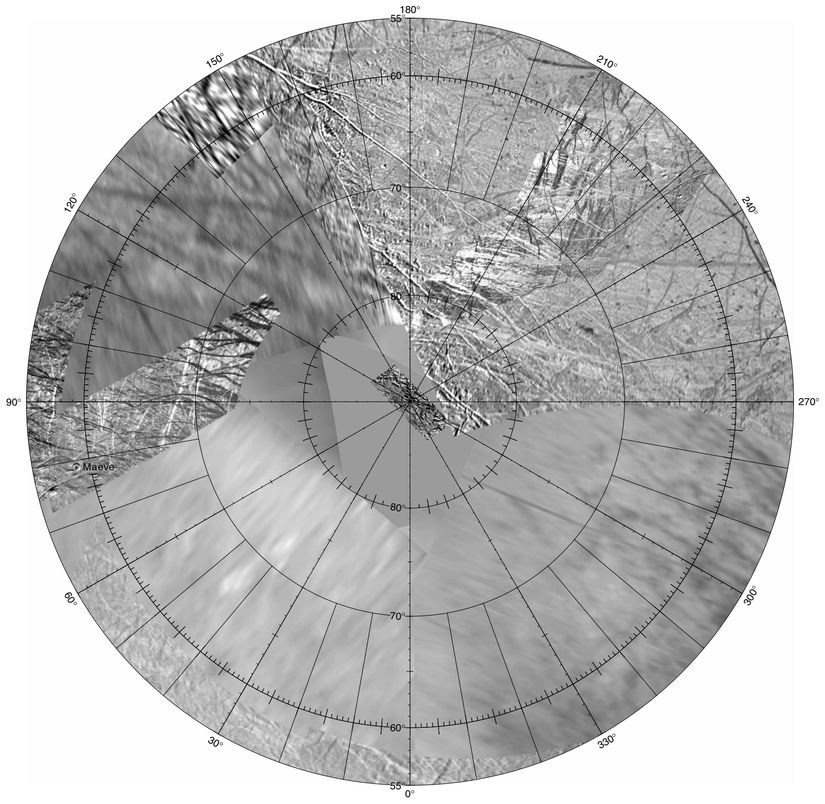
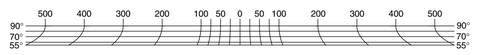
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared for the
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

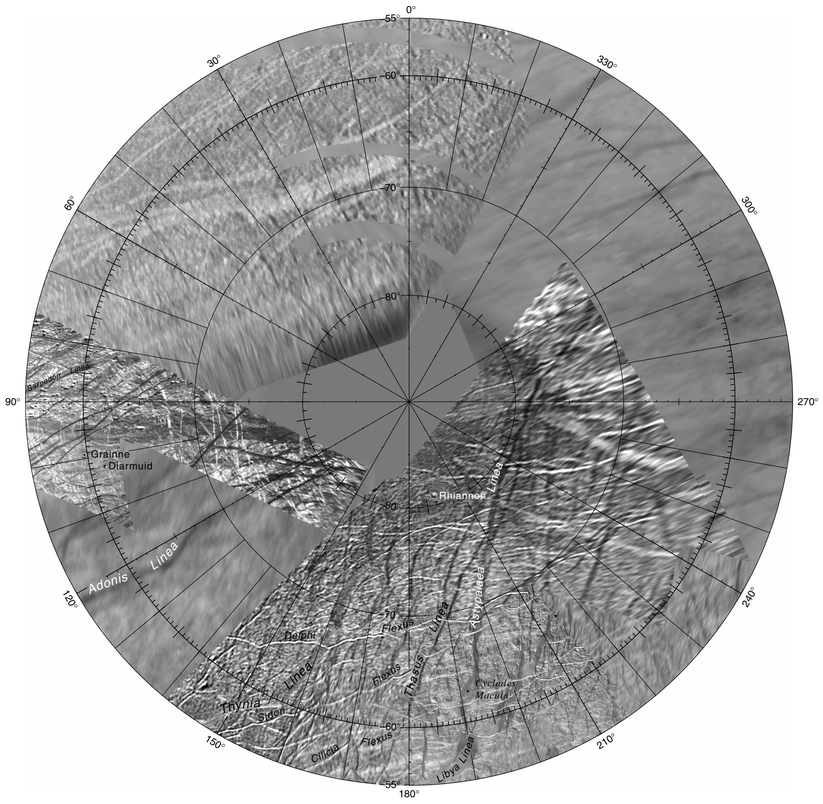
GEOLOGIC INVESTIGATION SERIES I–2757
ATLAS OF JOVIAN SATELLITES: EUROPA



SCALE 1:8 388 000 (1 mm = 8.39 km) AT 56° LATITUDE
POLAR STEREOGRAPHIC PROJECTION



NORTH POLAR REGION



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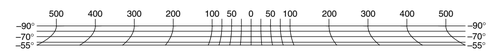
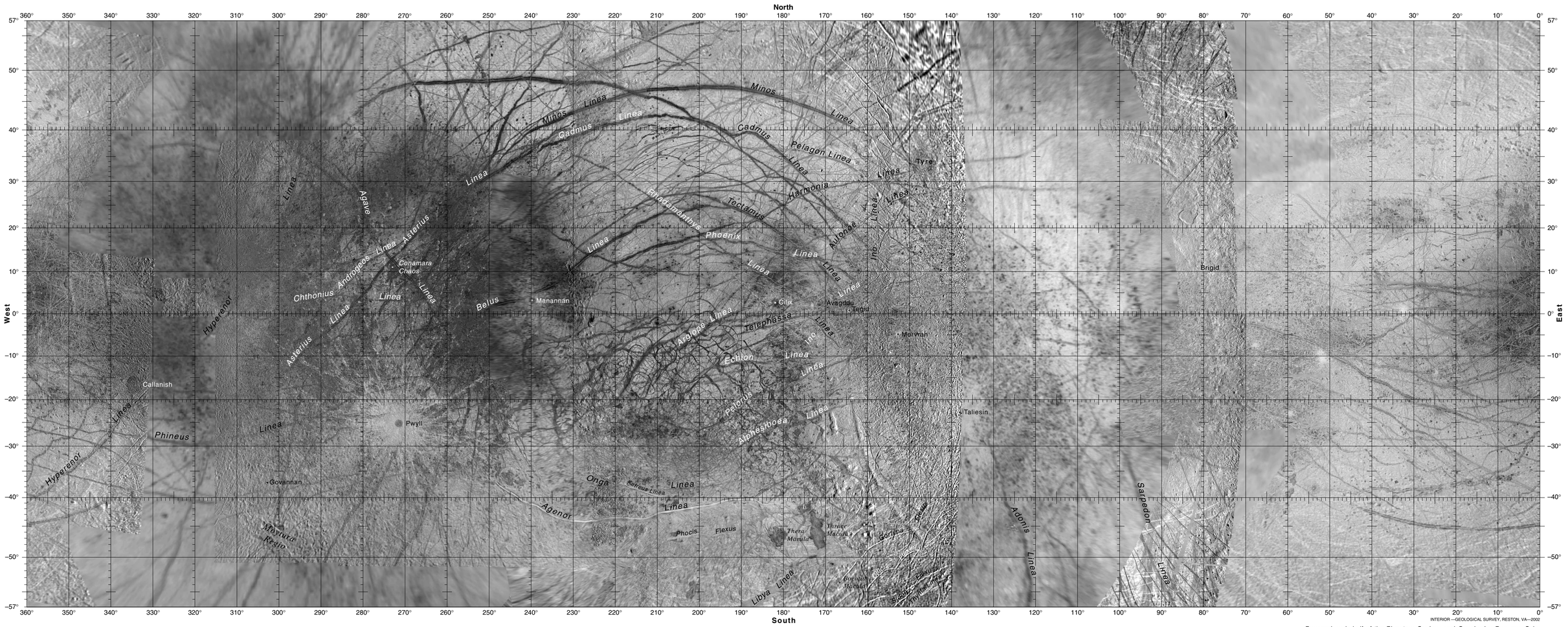
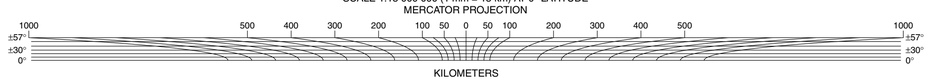


SOUTH POLAR REGION



INTERIOR—GEOLOGICAL SURVEY, RESTON, VA—2002

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



Prepared on behalf of the Planetary Geology and Geophysics Program, Solar System Exploration Division, Office of Space Science, National Aeronautics and Space Administration

Manuscript approved for publication October 17, 2001

NOTES ON BASE

This sheet is one in a series of maps of the Galilean satellites of Jupiter at a nominal scale of 1:15,000,000. This series is based on data from the Galileo Orbiter Solid-State Imaging (SSI) camera and the Voyager 1 and 2 spacecraft.

PROJECTION

Mercator and Polar Stereographic projections used for this map of Europa are based on a sphere having a radius of 1,562.09 km. The scale is 1:8,388,000 at ±56° latitude for both projections. Longitude increases to the west in accordance with the International Astronomical Union (1971; Davies and others, 1996). Latitude is planetographic.

CONTROL

The process of creating a geometric control network began with selecting control points on the individual images, making pixel measurements of their locations, using reseau locations to correct for geometric distortions, and converting the measurements to millimeters in the focal plane. These data are combined with the camera focal lengths and navigation solutions as input to a photogrammetric triangulation solution (Davies and others, 1998; Davies and Katayama, 1981). The solution used here was computed at the RAND Corporation in June 2000. Solved parameters include the radius (given above) of the best-fitting sphere, the coordinates of the control points, the three orientation angles of the camera at each exposure (right ascension, declination, and twist), and an angle (W_0) that defines the orientation of Europa in space. W_0—in this solution 36.022°—is the angle along the equator to the east, between the 0° meridian and the equator's intersection with the celestial equator at the standard epoch J2000.0. This solution places the crater Cilix at its defined longitude of 182° west (Davies and others, 1996).

MAPPING TECHNIQUE

This global map base uses the best image quality and moderate resolution coverage supplied by Galileo SSI and Voyager 1 and 2 (Batson, 1987; Becker and others, 1998; 1999; 2001). The digital map was produced using Integrated Software for Imagers and Spectrometers (ISIS) (Eliason, 1997; Gaddis and others, 1997; Torson and Becker, 1997). The individual images were radiometrically calibrated and photometrically normalized using a Lunar-Lambert function with empirically derived values (McEwen, 1991; Kirk and others, 2000). A linear correction based on the statistics of all overlapping areas was then applied to minimize image brightness variations. The image data were selected on the basis of overall image quality, reasonable original input resolution (from 20 km/pixel for gap fill to as much as 40 m/pixel), and availability of moderate emission/incidence angles for topography and albedo. Although consistency was achieved where possible, different filters were included for global image coverage as necessary: clear/blue for Voyager 1 and 2; clear, near-IR (757 nm), and green (559 nm) for Galileo SSI. Individual images were projected to a Sinusoidal Equal-Area projection at an image resolution of 500 m/pixel. The final constructed Sinusoidal projection mosaic was then reprojected to the Mercator and Polar Stereographic projections included on this sheet.

NOMENCLATURE

Names on this sheet are approved by the International Astronomical Union (IAU, 1980, 1986, 1999, and 2001). Names have been applied for features clearly visible at the scale of this map; for a complete list of nomenclature of Europa, please see http://planetarynames.wr.usgs.gov. Font color was chosen only for readability.

Je 15M CMN: Abbreviation for Jupiter, Europa (satellite): 1:15,000,000 series, controlled mosaic (CM), nomenclature (N) (Greeley and Batson, 1990).

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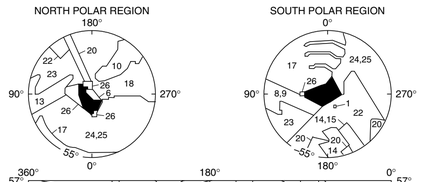
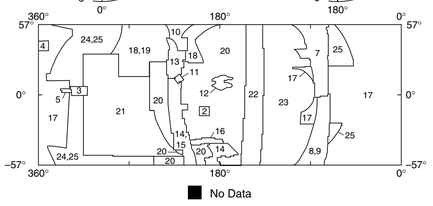
NORTH POLAR REGION



SOUTH POLAR REGION



Footprint of the Galileo and Voyager image observation boundaries

1– **17ESRHIANN01**
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2– **C3ESWEDGES01**
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3– **E4ESMACSTR01**
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4– **25ESDARKBP01**
s0527275700
5– **25ESMOTTER01**
s0527275900
6– **25ESNRTHPL01**
s0527272726
s0527272713
s0527272700
7– **15ESREGMAP02**
s0449974200
s0449974213
s0449974214
s0449974226
s0449974239
s0449974252
s0449974265
s0449974266
s0449974278
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s0449974326
s0449974339
s0449974352
s0449974365
s0449974378
s0449974401
s0449974413
s0449974426
s0449974427
s0449974439
8– **17ESREGMAP02**
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s0466676739
s0466676752
s0466676765
s0466676778
s0466676800
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s0449961901
s0466676879
s0466676900
s0449961913
s0466676901
s0449961914
s0466676913
s0466676914
9– **17ESREGMAP03**
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10– **19ESNORLAT01**
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s0484884713
s0484884726
s0484884727
11– **19ESREGMAP01**
s0484884500
12– **19ESSTRAT01**
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13– **15ESREGMAP01**
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15– **19ESNERTRM01**
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16– **17ESAGENOR01**
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17– **25ESGLOBAL01**
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19– **G1ESEUTERM01**
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s0440984913
s0440984914
21– **E4ESGLOMAP01**
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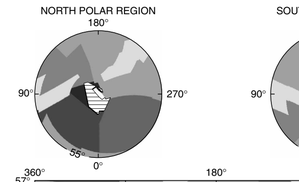
s0374649013
s0374649026
s0374649039
s0374649052
22– Voyager 2
c2064925
c2064913
c2064937
c2064949
c2065001
c2065143
c2065046
c2065022
c2065203
c2065211
c2065050
c2065155
c2065159
c2065215
c2065219
23– **17ESGSHAPE01**
s0466581865
s0466581866
24– **G2ESPHOTOM01**
s0360063913
25– **C9ESGLOBAL01**
s0401727700
26– Voyager 1 & 2 Low Resolution Frames (not visible except in extreme polar areas)
c1632318
c1633452
c1634216
c1634918
c1636027
c1636900
c2061159
c2062524

Listed above are the images that were used to create the photomosaic. Bold entries represent Galileo observation names, which are areas of Europa that were targeted for scientific investigation. The numbers and letters included in the observation names are in a standard format (NNTIOOOOOOSS) where NN=orbit number, T=target (Europa in this case), I=instrument, OOOOOO=science targeting objective, and SS=sequence number. The numbers connected with these bold observation names correlate to the numbers on the index to the left and are listed in order of descending resolution. The 's' and 'c' entries represent spacecraft clock times, which are used as unique archival identifiers for each image; they are listed in the order they were mosaicked.

NORTH POLAR REGION



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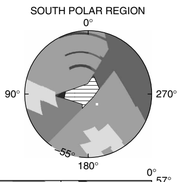

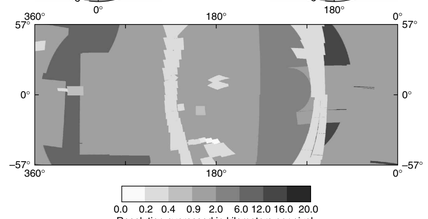

Index showing approximate resolution of images included in the mosaic

NOTE TO USERS

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

CONTROLLED PHOTOMOSAIC MAP OF EUROPA

Je 15M CMN

2002

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