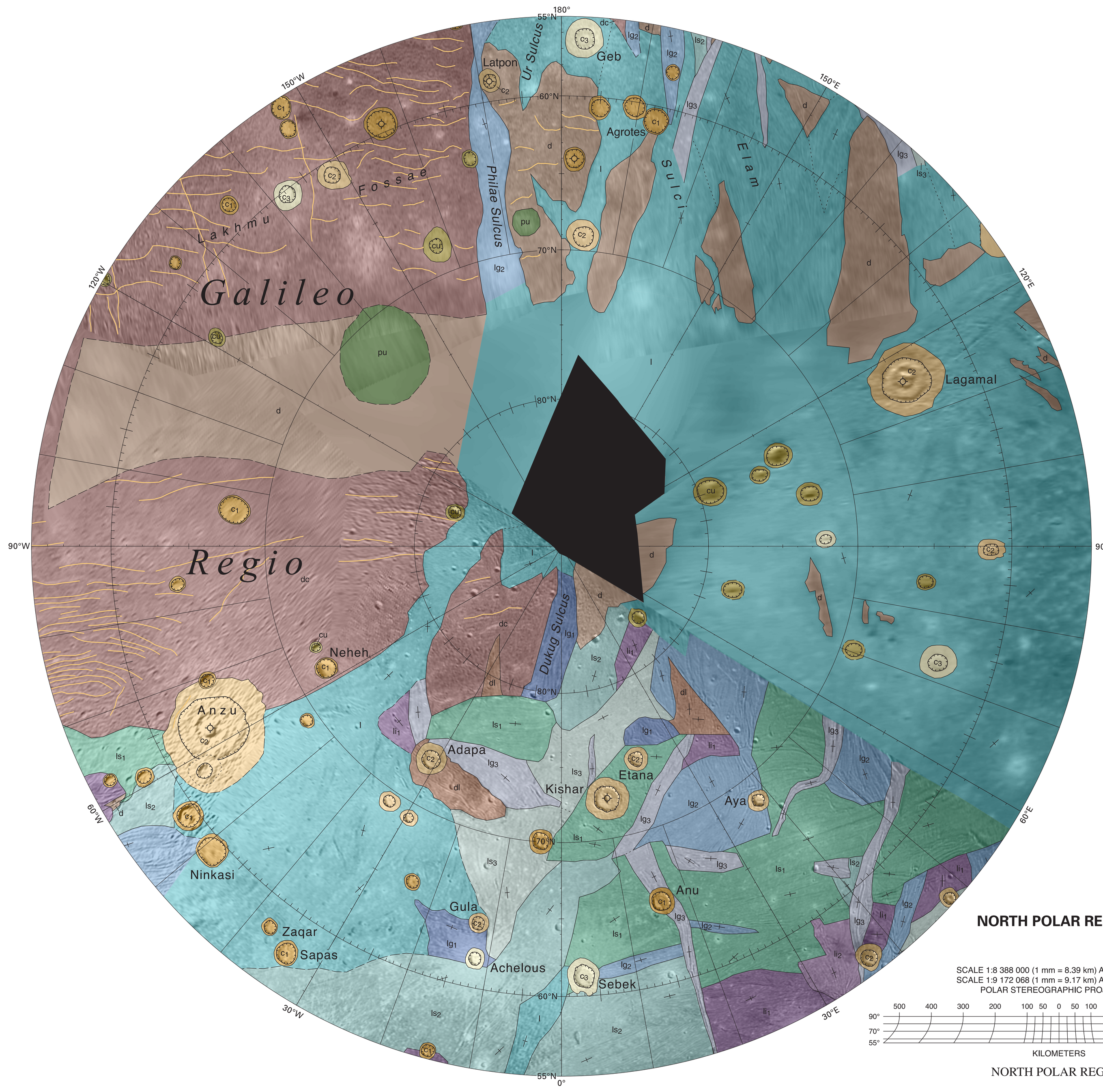
USGS
science for a changing world

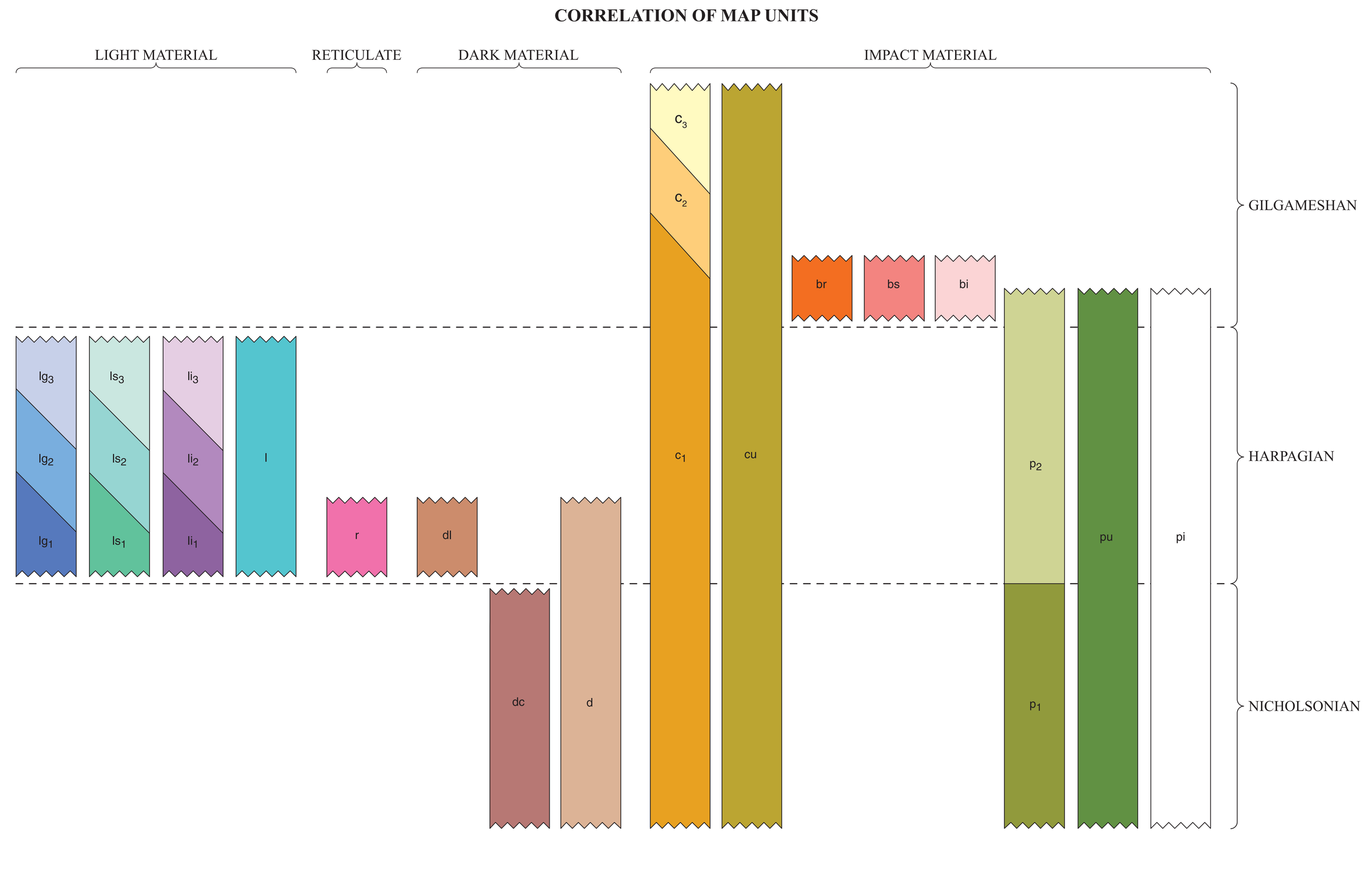
U.S. Department of the Interior
U.S. Geological Survey

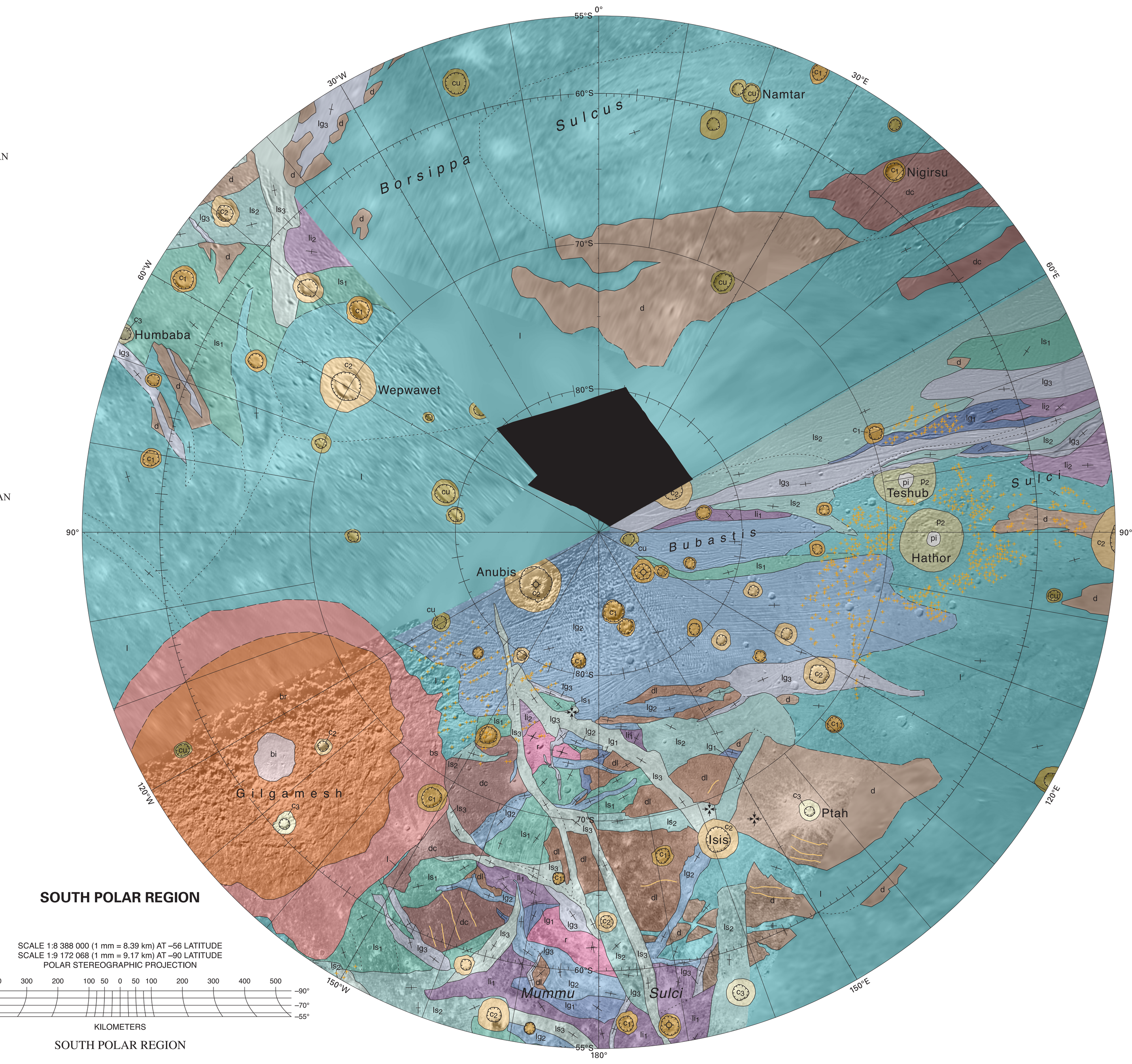
Prepared for the
National Aeronautics and Space Administration

Scientific Investigations Map 3237
Pamphlet accompanies map



CORRELATION OF MAP UNITS





EXPLANATION OF MAP SYMBOLS

Furrow—Individual linear to curvilinear troughs bounded by prominent raised rims on either side, confined to dark cratered units. Generally grouped in fragmentary concentric sets. Cuts across dark cratered material (dc) and crosscut by grooves. *Interpretation*: Remnants of multi-ringed basins caused by large impacts into a relatively thin brittle lithosphere during the Nicholsonian period

Groove—Typically occur as densely packed sets of parallel ridges and troughs. Occasionally occur as single curvilinear troughs. Superposed on light materials, reticulate material (r), and dark lineated material (dl). Only one representative groove structure is shown within each material unit with grooves. *Interpretation*: Created by motion along large normal faults or by extensional necking instabilities. In some places grooves may accommodate strike-slip motion

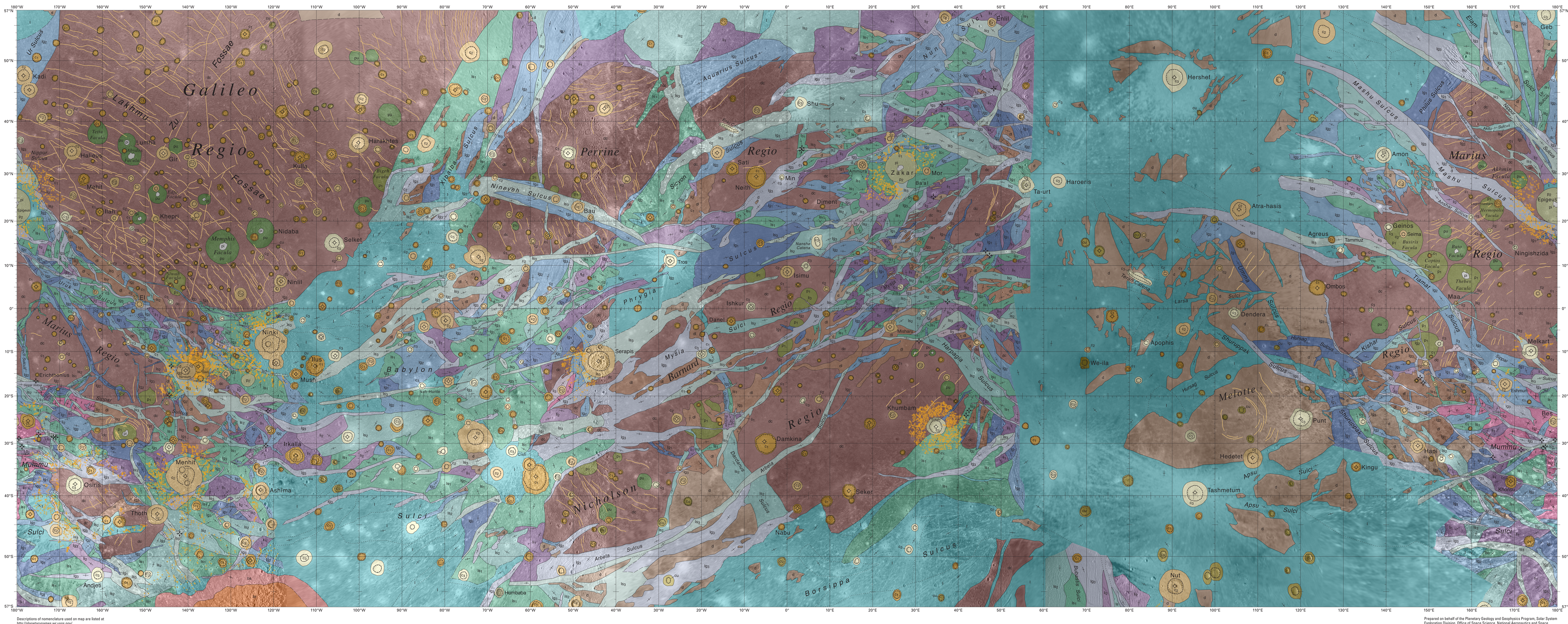
Depression—Flat-floored depressions surrounded by inward-scalloped walls, breached on one side. Typically associated with light subdued materials (ls_3, ls_2, ls_1). *Interpretation*: Possible cryovolcanic source vents for extrusion of clean icy material to form light material units

Crater rim—Roughly circular rim crests surrounding interiors of crater material units. *Interpretation*: Rims of impact craters

Dome—Steep-sided domes with flat tops, occurring in centers of large craters. Commonly surrounded by annular trough. *Interpretation*: Ductile ice extruded from subsurface during modification stage of large impact crater formation

Prominent secondary crater—Fields of uniform small craters surrounding ejecta deposits of large fresh crater material (c_3), large partially degraded crater material (c_2), young palimpsests (p_2), and the Gilgamesh impact basin. Only extensive, prominent fields of secondary craters are mapped. *Interpretation*: Material ejected by recent large impact events, reimpacting the surface beyond the continuous ejecta deposit of the associated crater materials

Contact—Dashed where approximate. Dotted contacts denote internal contacts, in which adjacent units of the same material do not share similar structures (for example, light grooved material units with different groove spacing and orientation). Unit boundaries without contacts (for example, some boundaries of undivided materials) represent changes in quality of imaging coverage and loss of morphological information, rather than actual changes in material units



Descriptions of nomenclature used on map are listed at http://planetarynames.wr.usgs.gov/

DESCRIPTION OF MAP UNITS

UNIT LABEL	UNIT NAME AND DESCRIPTION	INTERPRETATION	UNIT RELATIONS	TYPE EXAMPLE (basemap resolution) 500 km	TYPE EXAMPLE (high resolution) 50 km
	LIGHT MATERIALS				
	Light grooved materials—Relatively high to moderate albedo material dominated by closely packed groove structures. Groove structures share similar spacing and orientation within each area of light grooved material	Formed by tectonic deformation of preexisting material units, which could have been light subdued material or possibly dark material. Tectonic deformation predominantly caused by extension of crust		11°N, 168°W	11°N, 168°W
lg_3	**Young light grooved material**—Light grooved material crosscutting intermediate light materials (lg_2, ls_2, li_2) and old light materials (lg_1, ls_1, li_1)	Light material deformed by grooves during later part of Harpagian Period	*Top boundary*: Older than c_3, c_2, br, bs, bi. May be older than c_1, cu, p_2, pi, pu. Locally contemporaneous with ls_3 and li_3. May be locally contemporaneous with l *Bottom boundary*: Locally younger than lg_2, ls_2, li_2. Because crosscutting relations only provide local to regional age information, may be contemporaneous with distant lg_2, ls_2, li_2. May be younger than l, c_1, cu, p_2, pi, pu. Younger than p_1, lg_1, ls_1, li_1, r, dl, dc, d		
lg_2	**Intermediate light grooved material**—Light grooved material crosscut by young light materials (lg_3, ls_3, li_3) and crosscutting old light materials (lg_1, ls_1, li_1)	Light material deformed by grooves during middle part of Harpagian Period	*Top boundary*: Older than c_3, c_2, br, bs, bi. May be older than l, c_1, cu, p_2, pi, pu. Locally older than lg_3, ls_3, li_3. Because crosscutting relations only provide local to regional age information, may be contemporaneous with distant lg_3, ls_3, li_3. Locally contemporaneous with ls_2 and li_2. May be locally contemporaneous with l *Bottom boundary*: Locally younger than lg_1, ls_1, li_1, r, dl. Because crosscutting relations only provide local to regional age information, may be contemporaneous with distant lg_1, ls_1, li_1, r, dl, d. May be younger than l, c_1, cu, p_2, pi, pu. Younger than p_1, and dc		
lg_1	**Old light grooved material**—Light grooved material crosscut by intermediate light materials (lg_2, ls_2, li_2) and young light materials (lg_3, ls_3, li_3)	Light material deformed by grooves during early part of Harpagian Period	*Top boundary*: Older than c_3, c_2, br, bs, bi, lg_3, ls_3, li_3. May be older than l, c_1, cu, p_2, pi, pu. Locally older than lg_2, ls_2, li_2. Because crosscutting relations only provide local to regional age information, may be contemporaneous with distant lg_2, ls_2, li_2. Locally contemporaneous with ls_1, li_1, r, dl. May be locally contemporaneous with l and d *Bottom boundary*: May be younger than d, c_1, cu, pi, pu. Younger than p_1, dc		
	Light subdued materials—Relatively high to moderate albedo material characterized by smooth surface with faint lineaments. Lineaments share similar spacing and orientation within each area of light subdued material. Boundaries of subdued units commonly defined by groove structures	May be formed by cryovolcanic extrusion of clean ice from the interior of Ganymede. Some subdued areas may form through crustal spreading. Limited tectonic deformation compared to light grooved material. May be dominated by structural features below the resolution of the images. This unit appears to be more typical of the early stages of light terrain formation		16°S, 50°E	16°S, 50°E
ls_3	**Young light subdued material**—Light subdued material crosscutting intermediate light materials (lg_2, ls_2, li_2) and old light materials (lg_1, ls_1, li_1)	Light material emplaced during later part of Harpagian Period	*Top boundary*: Older than c_3, c_2, br, bs, bi. May be older than c_1, cu, p_2, pi, pu. Locally contemporaneous with lg_3 and li_3. May be locally contemporaneous with l *Bottom boundary*: Locally younger than lg_2, ls_2, li_2. Because crosscutting relations only provide local to regional age information, may be contemporaneous with distant lg_2, ls_2, li_2. May be younger than l, c_1, cu, p_2, pi, pu. Younger than p_1, lg_1, ls_1, li_1, r, dl, dc, d		
ls_2	**Intermediate light subdued material**—Light subdued material that is crosscut by young light materials (lg_3, ls_3, li_3) and crosscuts old light materials (lg_1, ls_1, li_1)	Light material emplaced during middle part of Harpagian Period	*Top boundary*: Older than c_3, c_2, br, bs, bi. May be older than l, c_1, cu, p_2, pi, pu. Locally older than lg_3, ls_3, li_3. Because crosscutting relations only provide local to regional age information, may be contemporaneous with distant lg_3, ls_3, li_3. Locally contemporaneous with lg_2 and li_2. May be locally contemporaneous with l *Bottom boundary*: Locally younger than lg_1, ls_1, li_1, r, dl. Because crosscutting relations only provide local to regional age information, may be contemporaneous with distant lg_1, ls_1, li_1, r, dl, d. May be younger than l, c_1, cu, p_2, pi, pu. Younger than p_1, and dc		
ls_1	**Old light subdued material**—Light subdued material that is crosscut by young light materials (lg_3, ls_3, li_3) and intermediate light materials (lg_2, ls_2, li_2)	Light material emplaced during early part of Harpagian Period	*Top boundary*: Older than c_3, c_2, br, bs, bi, lg_3, ls_3, li_3. May be older than l, c_1, cu, p_2, pi, pu. Locally older than lg_2, ls_2, li_2. Because crosscutting relations only provide local to regional age information, may be contemporaneous with distant lg_2, ls_2, li_2. Locally contemporaneous with lg_1, li_1, r, dl. May be locally contemporaneous with l and d *Bottom boundary*: May be younger than d, c_1, cu, pi, pu. Younger than p_1, dc		
	Light irregular materials—Relatively high to moderate albedo material with mixture of smooth surfaces and grooves. Grooves have irregular orientations and spacing. Light irregular unit could be divided into smaller areas of grooved and subdued material at sizes smaller than minimum outcrop size at scale of map	Complex history of deformation concentrated in small areas. Component small grooved and subdued areas originate in same manner as grooved light material and subdued light material		34°N, 174°E	34°N, 174°E
li_3	**Young light irregular material**—Light irregular material crosscutting intermediate light materials (lg_2, ls_2, li_2) and old light materials (lg_1, ls_1, li_1)	Light material emplaced and deformed by grooves during later part of Harpagian Period	*Top boundary*: Older than c_3, c_2, br, bs, bi. May be older than c_1, cu, p_2, pi, pu. Locally contemporaneous with lg_3 and ls_3. May be locally contemporaneous with l		
li_2	**Intermediate light irregular material**—Light irregular material that is crosscut by young light materials (lg_3, ls_3, li_3) and crosscuts old light materials (lg_1, ls_1, li_1)	Light material emplaced and deformed by grooves during middle part of Harpagian Period	*Top boundary*: Older than c_3, c_2, br, bs, bi. May be older than l, c_1, cu, p_2, pi, pu. Locally older than lg_3, ls_3, li_3. Because crosscutting relations only provide local to regional age information, may be contemporaneous with distant lg_3, ls_3, li_3. Locally contemporaneous with lg_2 and ls_2. May be locally contemporaneous with l *Bottom boundary*: Locally younger than lg_1, ls_1, li_1, r, dl. Because crosscutting relations only provide local to regional age information, may be contemporaneous with distant lg_1, ls_1, li_1, r, dl, d. May be younger than l, c_1, cu, p_2, pi, pu. Younger than p_1 and dc		
li_1	**Old light irregular material**—Light irregular material that is crosscut by young light materials (lg_3, ls_3, li_3) and intermediate light materials (lg_2, ls_2, li_2)	Light material emplaced and deformed by grooves during early part of Harpagian Period	*Top boundary*: Older than c_3, c_2, br, bs, bi, lg_3, ls_3, li_3. May be older than l, c_1, cu, p_2, pi, pu. Locally older than lg_2, ls_2, li_2. Because crosscutting relations only provide local to regional age information, may be contemporaneous with distant lg_2, ls_2, li_2. Locally contemporaneous with lg_1, ls_1, r, dl. May be locally contemporaneous with l and d *Bottom boundary*: May be younger than d, c_1, cu, pi, pu. Younger than p_1, dc		
	OTHER LIGHT MATERIALS				
l	**Light undivided material**—Relatively high to moderate albedo material imaged under sufficiently poor viewing conditions such that morphological differences between grooved, subdued, and irregular units cannot be distinguished	Mixture of other light material units described above	*Top boundary*: Older than c_3, c_2, br, bs, bi. May be older than lg_2, ls_2, li_2, c_1, cu, p_2, pi, pu. May be contemporaneous with lg_3, ls_3, li_3 *Bottom boundary*: May be contemporaneous with lg_1, ls_1, li_1, r, dl. May be younger than d, c_1, cu, pi, pu. Younger than p_1, dc		
	RETICULATE MATERIAL				
r	**Reticulate material**—Material of highly variable albedo extensively modified by two dominant sets of topographic grooves. Grooves are typically oriented at nearly orthogonal angles. Associated with old light materials (lg_1, ls_1, li_1) and dark lineated material (dl)	Mixture of former bright and dark material units overprinted by moderate tectonic deformation in two directions	*Top boundary*: Older than c_3, c_2, br, bs, bi, lg_3, ls_3, li_3. May be older than l, c_1, cu, p_2, pi, pu. Locally older than lg_2, ls_2, li_2. Because crosscutting relations only provide local to regional age information, may be contemporaneous with distant lg_2, ls_2, li_2. Locally contemporaneous with lg_1, ls_1, li_1, dl. May be locally contemporaneous with l and d *Bottom boundary*: May be younger than d, c1, cu, pi, pu. Younger than p_1, dc	28°S, 174°E	28°S, 174°E
	DARK MATERIALS				
dl	**Dark lineated material**—Relatively low albedo material dominated by sets of parallel or irregular grooves. Associated with old light materials (lg_1, ls_1, li_1) and reticulate material (r)	Dark cratered material deformed by tectonic processes in early Harpagian. Grooves are probably extensional faults	*Top boundary*: Older than c_3, c_2, br, bs, bi, lg_3, ls_3, li_3. May be older than l, c_1, cu, p_2, pi, pu. Locally older than lg_2, ls_2, li_2. Because crosscutting relations only provide local to regional age information, may be contemporaneous with distant lg_2, ls_2, li_2. Locally contemporaneous with lg_1, ls_1, li_1, r. May be locally contemporaneous with l and d *Bottom boundary*: May be younger than d, c_1, cu, pi, pu. Younger than p_1, dc	24°S, 42°E	24°S, 42°E
dc	**Dark cratered material**—Relatively low albedo material with moderate to high crater densities. Includes smooth dark patches and brighter hummocks at local scale. Superposed by and crosscut by all other units and features. Furrow structures are found on some dark cratered material	Oldest preserved surface on Ganymede. Extensively modified by impact features and, in places, cut by sets of furrows. Dark surface appears to be refractory lag deposit left behind by sublimation degradation	*Top boundary*: Older than c_3, c_2, br, bs, bi, lg_3, ls_3, li_3, lg_2, ls_2, li_2, lg_1, ls_1, li_1, l, r, dl, p_2. May be older than d, c_1, cu, pi, pu *Bottom boundary*: May be contemporaneous with d, c_1, cu, p_1, pi, pu	15°S, 22°E	15°S, 22°E
d	**Dark undivided material**—Relatively low albedo material imaged under sufficiently poor viewing conditions such that morphological differences between cratered and lineated materials cannot be distinguished	Mixture of dark cratered material and dark lineated material described above	*Top boundary*: Older than c_3, c_2, br, bs, bi, lg_3, ls_3, li_3, lg_2, ls_2, li_2. May be older than c_1, cu, p_2, pi, pu. May be locally contemporaneous with lg_1, ls_1, li_1, r, dl, l *Bottom boundary*: May be contemporaneous with dc, c_1, cu, p_1, pi, pu		
	IMPACT-RELATED MATERIALS				
	Crater materials—Material making up rims, interiors, and visible continuous ejecta deposits of craters. Only craters larger than 30 km diameter are mapped. Discontinuous ejecta and rays are not mapped	Formed by hypervelocity impacts of exogenous material into surface of Ganymede			
c_3	**Fresh crater material**—Craters exhibiting strong albedo contrast with surrounding terrain. Craters have continuous ejecta deposits and readily observable rays	Youngest and least degraded impact craters	*Top boundary*: Formation ongoing. May be contemporaneous with cu *Bottom boundary*: Possibly younger than or contemporaneous with cu. Unit degrades to form c_2, therefore must be locally younger than c_2. Due to variations in lighting angles and uncertainty in bright ray degradation timescales, may be contemporaneous with distant c_2. Younger than c_1, br, bs, bi, p_2, p_1, pi, pu, lg_3, ls_3, li_3, lg_2, ls_2, li_2, lg_1, ls_1, li_1, l, r, dl, dc, d	62°N, 12°W	62°N, 12°W
c_2	**Partially degraded crater material**—Craters exhibiting albedo contrast with surrounding terrain, with continuous ejecta deposits but lacking rays	Impact craters of intermediate age, only moderately degraded	*Top boundary*: May be older than cu. Unit is degraded form of c_3, therefore must be locally older than c_3. Due to variations in lighting angles and uncertainty in bright ray degradation timescales, may be contemporaneous with distant c_3 *Bottom boundary*: May be younger than cu. Unit degrades to form c_1, therefore must be locally younger than c_1. Due to variations in lighting angles and resolution, may be contemporaneous with distant c_1. May be younger than br, bs, bi. Younger than p_2, p_1, pi, pu, lg_3, ls_3, li_3, lg_2, ls_2, li_2, lg_1, ls_1, li_1, l, r, dl, dc, d	64°N, 12°W	64°N, 12°W
c_1	**Degraded crater material**—Craters with interior albedo matching surrounding terrain, and no evident rays or continuous ejecta deposits	Oldest and most degraded impact craters	*Top boundary*: Older than c_3. May be older than cu, br, bs, bi. Unit is degraded form of c_2, therefore must be locally older than c_2. Due to variations in lighting angles and resolution, may be contemporaneous with distant c_2 *Bottom boundary*: May be younger than or contemporaneous with p_2, p_1, pi, pu, lg_3, ls_3, li_3, lg_2, ls_2, li_2, lg_1, ls_1, li_1, l, r, dl, dc, d	16°S, 24°E	16°S, 24°E
cu	**Undivided crater material**—Craters imaged under sufficiently poor viewing conditions such that differences between degraded, partially degraded, and fresh craters cannot be distinguished	Mixture of other crater material units described above	*Top boundary*: May be older than c_3, c_2, c_1, br, bs, bi, p_2, p_1, pi, pu, lg_3, ls_3, li_3, lg_2, ls_2, li_2, lg_1, ls_1, li_1, l, r, dl, dc, d *Bottom boundary*: May be younger than c_3, c_2, c_1, br, bs, bi, p_2, p_1, pi, pu, lg_3, ls_3, li_3, lg_2, ls_2, li_2, lg_1, ls_1, li_1, l, r, dl, dc, d		
	Basin materials—Materials making up Gilgamesh basin	Formed by largest impact on Ganymede since Nicholsonian Period			
bs	**Smooth basin material**—Outer annulus of material surrounding center of Gilgamesh. Exhibits smoothly mottled texture. Fields of secondary craters appear outside outer limit of smooth basin material	Continuous ejecta deposits surrounding Gilgamesh impact basin	*Top boundary*: Older than c_3. May be older than c_2, c_1, cu. Contemporaneous with br and bi *Bottom boundary*: Contemporaneous with br and bi. May be younger than c_2, c_1, cu, p_2, pi, pu. Younger than p_1, lg_3, ls_3, li_3, lg_2, ls_2, li_2, lg_1, ls_1, li_1, l, r, dl, dc, d	54°S, 133°W	54°S, 133°W
br	**Rugged basin material**—Inner annulus of material surrounding center of Gilgamesh. Composed of hummocky terrain punctuated by large angular massifs. Also includes quasi-concentric discontinuous ridges. Outer boundary defined by large inward-facing scarp	Collapsed rim and interior of Gilgamesh impact basin	*Top boundary*: Older than c_3. May be older than c_2, c_1, cu. Contemporaneous with bs and bi *Bottom boundary*: Contemporaneous with bs and bi. May be younger than c_2, c_1, cu, p_2, pi, pu. Younger than p_1, lg_3, ls_3, li_3, lg_2, ls_2, li_2, lg_1, ls_1, li_1, l, r, dl, dc, d	59°S, 129°W	59°S, 129°W
bi	**Basin interior plains material**—Low dome of smooth material in center of Gilgamesh. Outer boundary defined by discontinuous inward-facing scarp	Ductile ice extruded from subsurface during modification stage of Gilgamesh impact basin	*Top boundary*: Older than c_3. May be older than c_2, c_1, cu. Contemporaneous with br and bs *Bottom boundary*: Contemporaneous with br and bs. May be younger than c_2, c_1, cu, p_2, pi, pu. Younger than p_1, lg_3, ls_3, li_3, lg_2, ls_2, li_2, lg_1, ls_1, li_1, l, r, dl, dc, d	63°S, 123°W	63°S, 123°W
	Palimpsest materials—High to moderate albedo material forming flat, circular to slightly elliptical deposits. Interior texture may be smooth to hummocky. Commonly displays internal concentric rings	Large impact craters formed during time of high heat flow and rapid viscous relaxation between Nicholsonian Period and early Gilgameshan Period		14°N, 157°E	14°N, 157°E
p_2	**Young palimpsest material**—Palimpsests superposed on light material units. May also be simultaneously superposed on dark material units	Large impact craters formed during Harpagian Period or early Gilgameshan Period	*Top boundary*: Older than c_3 and c_2. May be older than c_1, cu, br, bs, bi. Locally contemporaneous with pi. May be contemporaneous with pu *Bottom boundary*: May be younger than pu, pi, lg_3, ls_3, li_3, lg_2, ls_2, li_2, lg_1, ls_1, li_1, l, r, dl, d. Younger than p_1 and dc		
p_1	**Ancient palimpsest material**—Palimpsests superposed on dark material units and crosscut by adjacent light material units	Large impact craters formed during Nicholsonian Period	*Top boundary*: Older than c_3, c_2, br, bs, bi, p_2, lg_3, ls_3, li_3, lg_2, ls_2, li_2, lg_1, ls_1, li_1, l, r, dl. May be older than c_1, cu, pu, d. May be contemporaneous with dc *Bottom boundary*: May be younger than or contemporaneous with c_1, cu, pu, dc, d. Locally contemporaneous with pi		
pu	**Undivided palimpsest material**—Palimpsests not in contact with light material units, so relative age cannot be determined	Mixture of young and ancient palimpsest materials described above	*Top boundary*: Older than c_3 and c_2. May be older than c_1, cu, br, bs, bi. Locally contemporaneous with pi. May be contemporaneous with p_2 *Bottom boundary*: May be younger than or contemporaneous with p_1, lg_3, ls_3, li_3, lg_2, ls_2, li_2, lg_1, ls_1, li_1, l, r, dl, dc, d		
pi	**Palimpsest interior plains material**—Roughly circular patches of smooth material occurring in centers of some palimpsests	Ductile ice extruded from subsurface during modification of impact craters that formed palimpsests	*Top boundary*: Older than c_3 and c_2. May be older than c_1, cu, br, bs, bi. Locally contemporaneous with p_2 or pu *Bottom boundary*: May be younger than or contemporaneous with c_1, cu, lg_3, ls_3, li_3, lg_2, ls_2, li_2, lg_1, ls_1, li_1, l, r, dl, dc, d. Locally contemporaneous with p_1 or pu	14°N, 157°E	14°N, 157°E

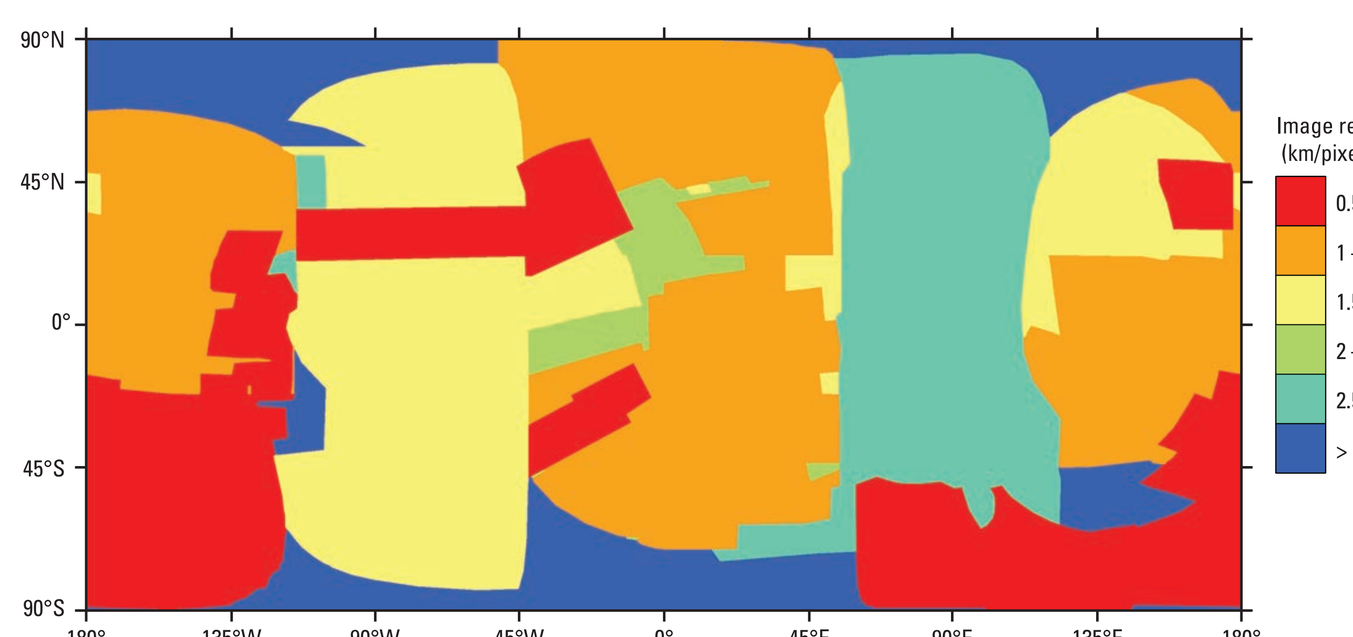


Figure 1. Map showing resolution of source images included in the base mosaic used for mapping Ganymede. Warm tones (red and orange) show areas covered by higher resolution images, cool tones (blue and green) show areas covered by lower resolution images.

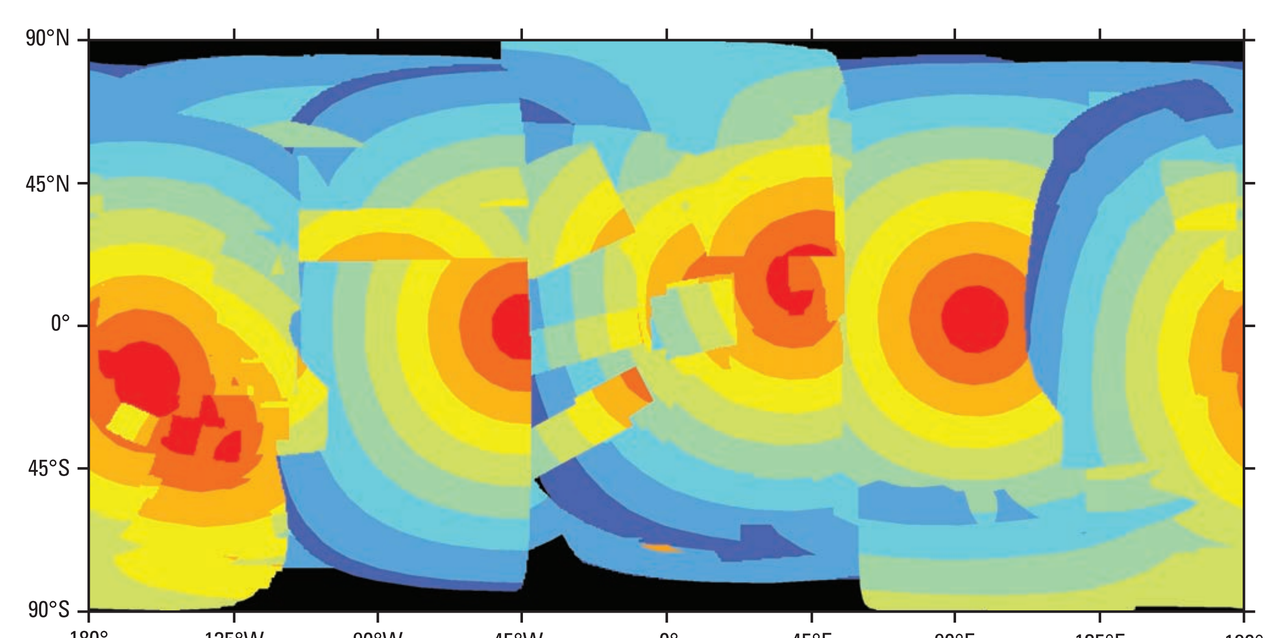


Figure 2. Map showing emission angle of source images included in the base mosaic used for mapping Ganymede. Warm tones (red and orange) show areas with near-nadir viewing angles, cool tones (blue and green) show areas viewed obliquely near the limb.

Global Geologic Map of Ganymede

By

Geoffrey C. Collins[1], G. Wesley Patterson[2,3], James W. Head[3], Robert T. Pappalardo[4], Louise M. Prockter[2], Baerbel K. Lucchitta[5], and Jonathan P. Kay[1]

2013

[1]Wheaton College
[2]Applied Physics Laboratory
[3]Brown University
[4]Jet Propulsion Laboratory
[5]U.S. Geological Survey

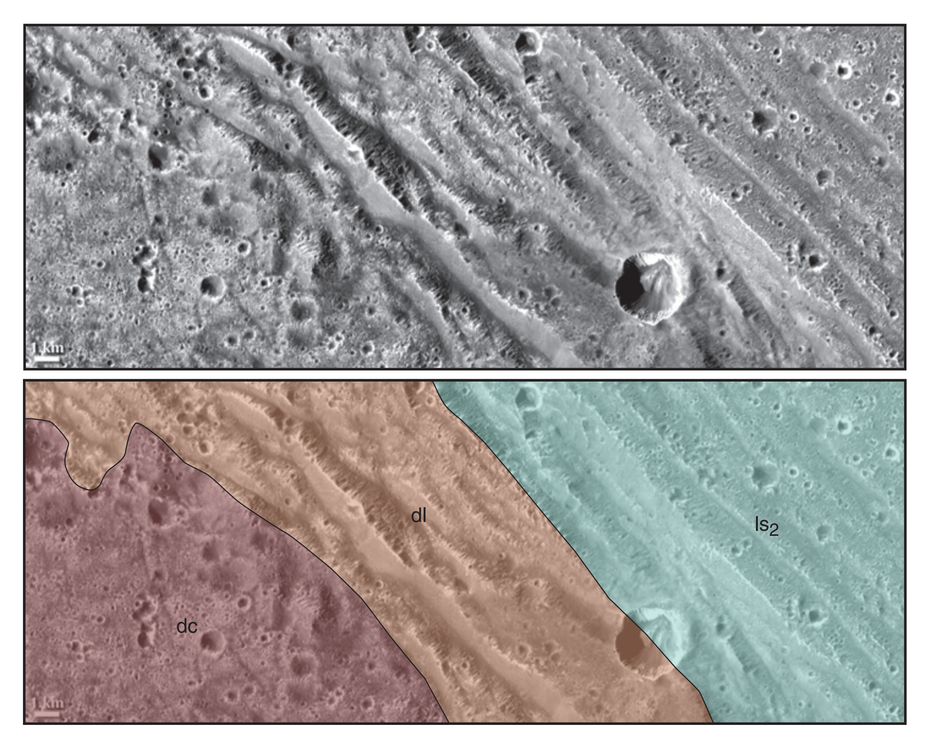


Figure 3. *Top,* Image showing the boundary between Nicholson Regio (left) and Harpagia Sulcus (right), the type example of the transition from dark to light materials. Numerous faulted blocks mark the transition in the center, which is observed as a deep groove on the global image mosaic. Galileo observation 28GSBRTDRK01, located near lat 9° S., long 39° E.; north is to the top of the image; and illumination is from the left side of the image. *Bottom*, Map of corresponding geological units at the Nicholson-Harpagia boundary. The dark cratered material (dc) of Nicholson Regio is crosscut and resurfaced by dark lineated material (dl) and intermediate light subdued material (ls_2) in Harpagia Sulcus. The outcrop of dark lineated material shown on this image is too small to be included in the global map.

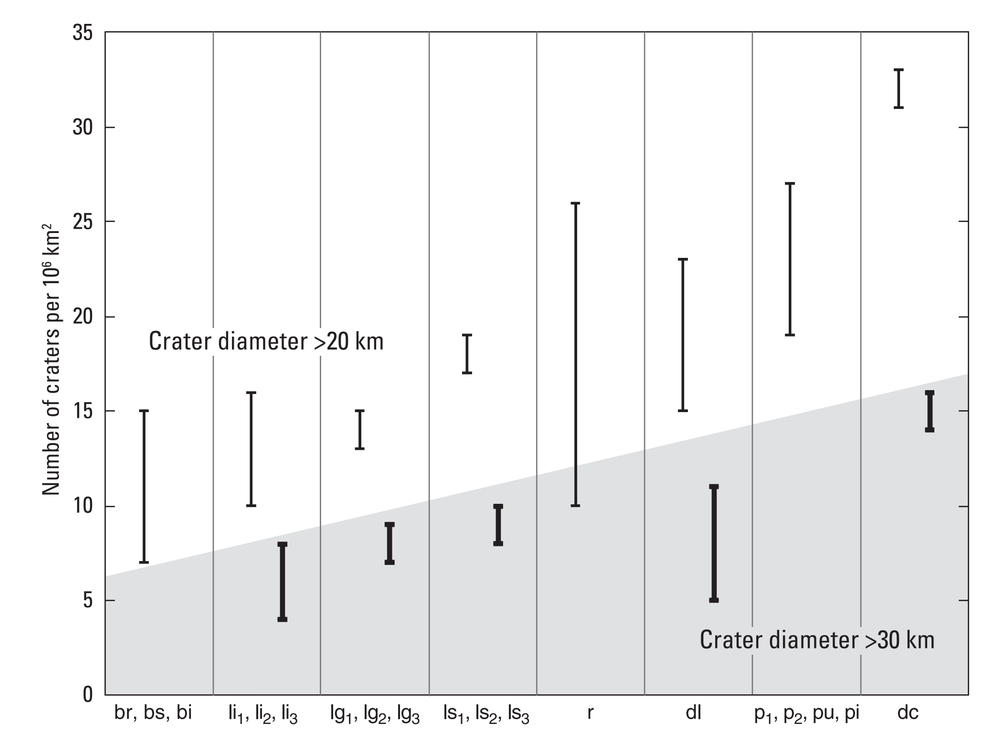


Figure 4. Graph showing number of craters per million square kilometers on each group of material units. Units are grouped for better statistics; many individual material units cover too small an area to use large craters to determine age relations. On the shaded bottom portion of the graph, error bars are shown for crater counts using only the craters shown on the map, which are all larger than 30 km diameter. The data shows that dark cratered material is clearly older than all other materials, but the other materials are difficult to separate in age by crater density. The unshaded upper portion of the graph shows the same results, but including craters larger than 20 km diameter. Due to the geographic mismatch between the distribution of material units and the distribution of high-resolution images, there may be some systematic errors in the 20-km data. See Patterson and others (2010) for further discussion.

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

Edited by J.L. Zigler; cartography by Kathryn Nimz

Manuscript approved for publication November 12, 2012

For sale by U.S. Geological Survey, Information Services, Box 25286, Federal Center, Denver, CO 80225, 1–888–ASK–USGS

Suggested citation: Collins, G.C., Patterson, G.W., Head, J.W., Pappalardo, R.T., Prockter, L.M., Lucchitta, B.K., and Kay, J.P., 2013, Global geologic map of Ganymede: U.S. Geological Survey Scientific Investigations Map 3237, scale 1:15,000,000, http://pubs.usgs.gov/sim/3237/.

Printed on recycled paper