USGS Global Geological Map of Europa: A Work in Progress

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USGS Map of Europa

- **History**
  - Doggett et al. 2009
  - Bunte et al. 2015

- **This map**
  - Scale of map is 1:15,000,000
  - Based generally on Bunte et al. map
  - Use USGS Basemap + Geoff Collins “Super Mosaic”
    - Galileo SSI and Voyager data
Mapping Method

- Draw GeoUnit contacts in ArcGIS 10.3
- Turn contacts into polygons (Feature to Polygon)
- Assign units to polygons
Map Units

- Chaos
  - Low Albedo Chaos
  - Mottled Chaos
  - High Albedo Chaos
  - Knobby Chaos
- Ridge
  - Low Albedo Mantling (?)
- Bands
- Ridged Plains
- Crater Units
  - Crater
  - Continuous Crater Ejecta
  - Discontinuous Crater Ejecta
Chaos Units

- Low Albedo Chaos — disrupted terrain with a relatively uniform low albedo appearance
- Mottled Chaos — disrupted terrain with varying albedo, appears patchy
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Chaos Units

- **Mottled Chaos** — disrupted terrain with varying albedo, appears patchy
- **High Albedo Chaos** — disrupted terrain with a relatively uniform high albedo
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Chaos Units

- Knobby Chaos – disrupted terrain with rough and blocky texture. Occurs mostly in the high latitudes.
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Band Unit

- Bands — linear to curvilinear zones with an abrupt albedo change compared to the surrounding terrain. Greater than 15 km in width.
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Ridged Plains Unit

- Ridged Plains — terrain characterized by subparallel to cross-cutting ridges and troughs at an unresolvable scale in the global resolution images. This unit has the greatest geographical distribution of all the units.
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Crater Units

- **Crater** – quasi-circular topographic low with raised rim
- **Continuous Crater Ejecta** – deposits of hummocky material around the crater
- **Discontinuous Crater Ejecta** – deposits of high albedo material associated with crater rays
Crater Units

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Complications

• Examples
  – Incidence and Emission angle differences
  – Image seam mismatch
  – Resolution variety
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Still To Do

• Bands vs. Ridges with Low Albedo Mantling
• Linear Features
  – Thin Bands (<15 km in width)
  – Ridges
  – Cycloids
• Microchaos/Pits/Domes
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Questions and comments are welcome!

We especially would like to thank Trent Hare (Map and Arc help), Cory Fortezzohas (Map and Arc help), Marc Hunter (Arc help), Tammy Becker (Image help) and Geoff Collins (SuperMosaic)
Extra Slides
Our Map
Resolution Map

NORTH POLAR REGION

SOUTH POLAR REGION

No Data

Resolution expressed in kilometers per pixel
North Pole
South Pole
Doggett et al. 2009 Map
Differences

- Chaos Subunits
- Microchaos