MAPPING PLUTO SURFACE AGE BY IMPACT CRATER ANALYSIS

ANDREW SCHMIDT

GIST 332 INTRO TO GIS

12/1/19
Pluto Georeferenced Images

**Legend:**
- Albedo Layer
- Color Layer
- Elevation Layer
- Crater Layer
- Sputnik Layer
- Geography Layer
- Annotated Layer
- Terrain Layer

**Scale bar applies at equator**

**Sources:**
- **Albedo:** https://astrogeology.usgs.gov/search,map/Pluto/NewHorizons/Pluto/NewHorizons_Global_Mosaic_300m_Jul2017
- **Color:** http://www.nasa.gov/sites/default/files/thumbnails/image/pluto_color_mapmosaic.jpg
- **Elevation:** http://pubseschmid.com/images/pluto-mosaic_5048_r-pluto-blue.jpg
- **Sputnik:** https://arsic-cdc.com/content/image/T-32-0-2016105133500X-0-3.jpg
- **Geography:** https://en.wikipedia.org/wiki/Pluto#/media/File:PlutoGeologicalFeaturesMap_color-01.jpg
- **Annotated:** http://en.wikipedia.org/wiki/Pluto#/media/File:PlutoGeologicalFeaturesMap_color-01.jpg

**Terrain:** https://www.nasa.gov/centers/goddard/pin/Pluto/mosaic/PlutoMap/PlutoMapGen/PlutoMapGen.html
ANALYSIS

\[ y = Ax^b \]

\( x \) = diameter (km)

\( y \) = number of craters counted

\( N \) = bins (Incremental: sums for multiples of ten, Cumulative: sums of all craters \( \geq \) bin diameter)

\[ b = B = \frac{(N^*\sum (\ln(x)^*\ln(y))) - \left(\sum (\ln(x))^*\sum (\ln(y))\right)/(N^* (\ln(x))^2)}{(\sum (\ln(x))^2)} \]

\[ a = \frac{\left(\sum (\ln(y)) - (b*\sum (\ln(x)))\right)}{N} \]

\[ A = e^a \]

Least-Squares Regression:

y-intercept = A

slope = -B
MAP 3

RELATIVE AGES

ABSOLUTE AGES

DISCUSSION
CONCLUSION

SOURCES:


7 SINGER, K.N. ET AL, “IMPACT CRATERS ON PLUTO AND CHARON INDICATE A DEFICIT OF SMALL KUIPER BELT OBJECTS [ABSTRACT],” SCIENCE, 01 MAR 2019: VOL. 363, ISSUE 6430, PP. 955-959.