PRELIMINARY INVESTIGATION OF CRATERS ON CERES

Michael Zeilnhofer and Nadine Barlow

Department of Physics and Astronomy

Northern Arizona University

Overview

- Introduction
- Project Background
- Methodology
- Preliminary Results
- Conclusion

Introduction: Ceres

- Dawn spacecraft went into orbit around Ceres on March 2015
- Prior to this mission it was thought that Ceres had a minimal number of craters (Bland et al., 2013)
- Dawn revealed a heavily cratered surface

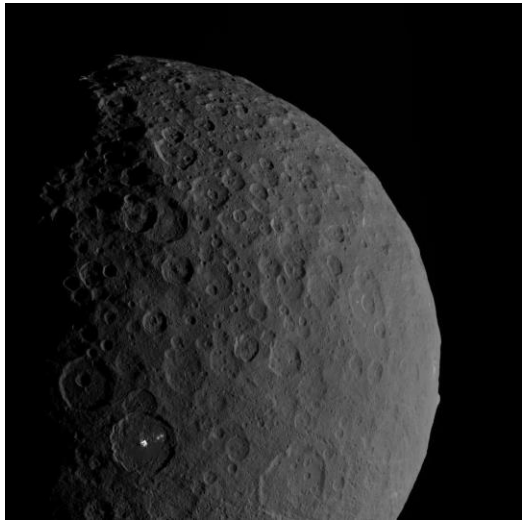


Image Credit: https://solarsystem.nasa.gov/planets/ceres

Project Background

- Reporting all craters ≥1.0-km in diameter
- Investigating central pit and central peak craters to determine surface characteristics of Ceres
- Comparing central pit and central peak data to Mercury, Mars and Ganymede

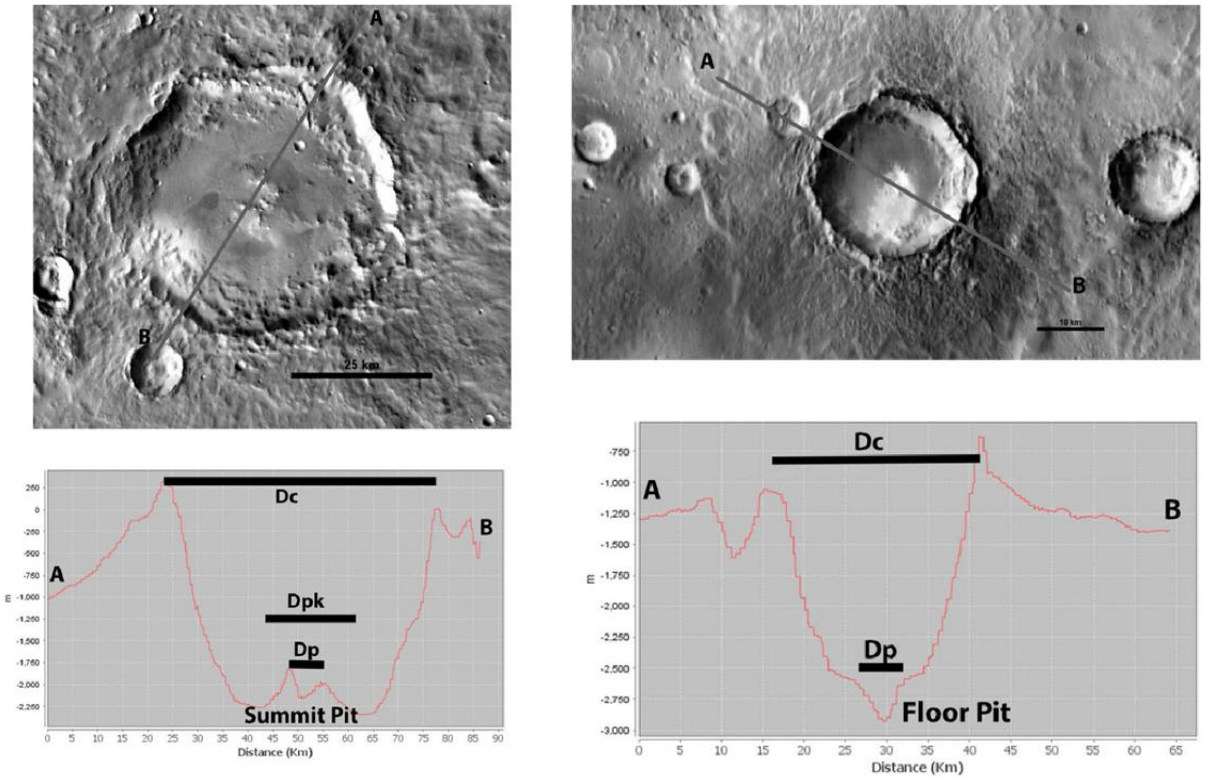


Image Credit: Barlow et al. 2017

Methodology

- Data were attained from the Dawn spacecraft's Framing Camera with a resolution of ~400 m/pixel

- The Java Mission-planning and Analysis for Remote Sensing (JMARS) with the global mosaic of Ceres was used

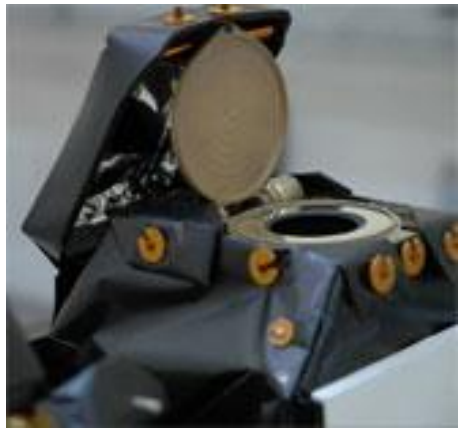


Image Credit: NASA JPL

Global Mosaic of Ceres

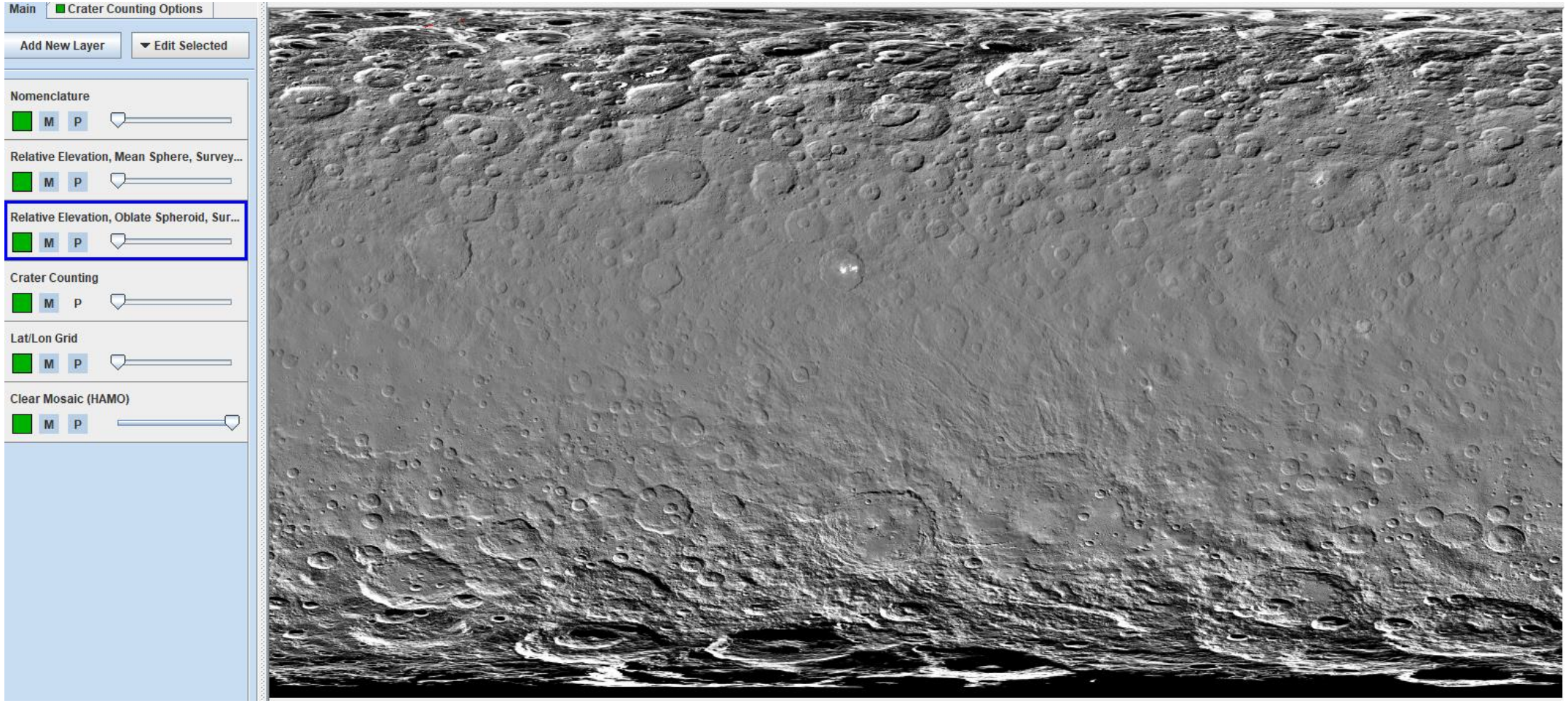
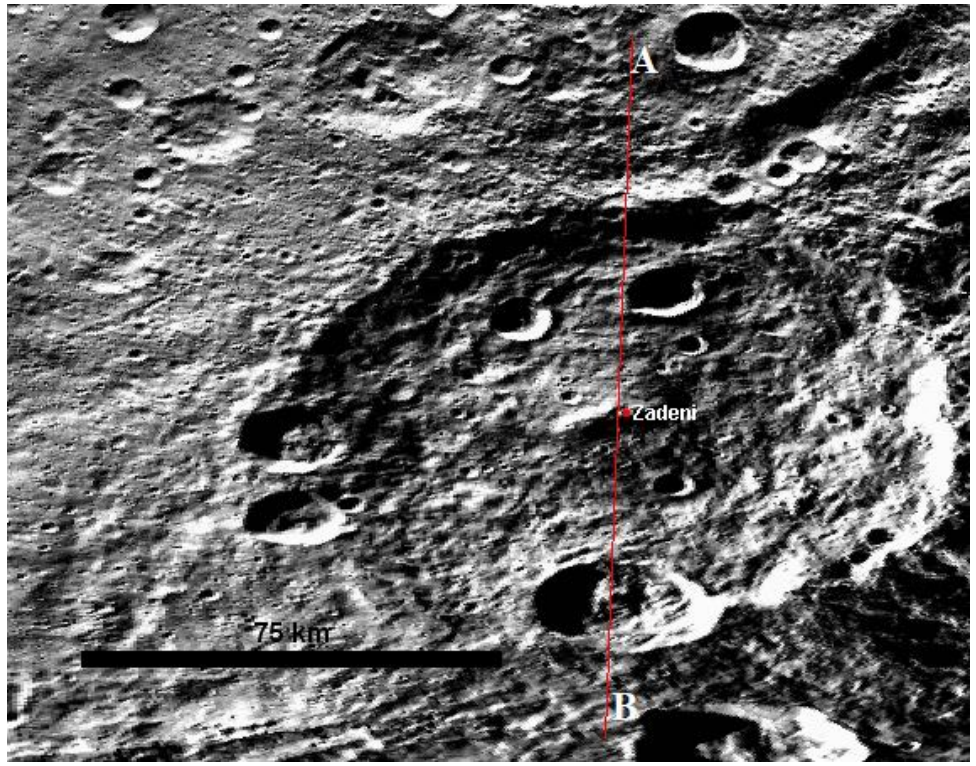
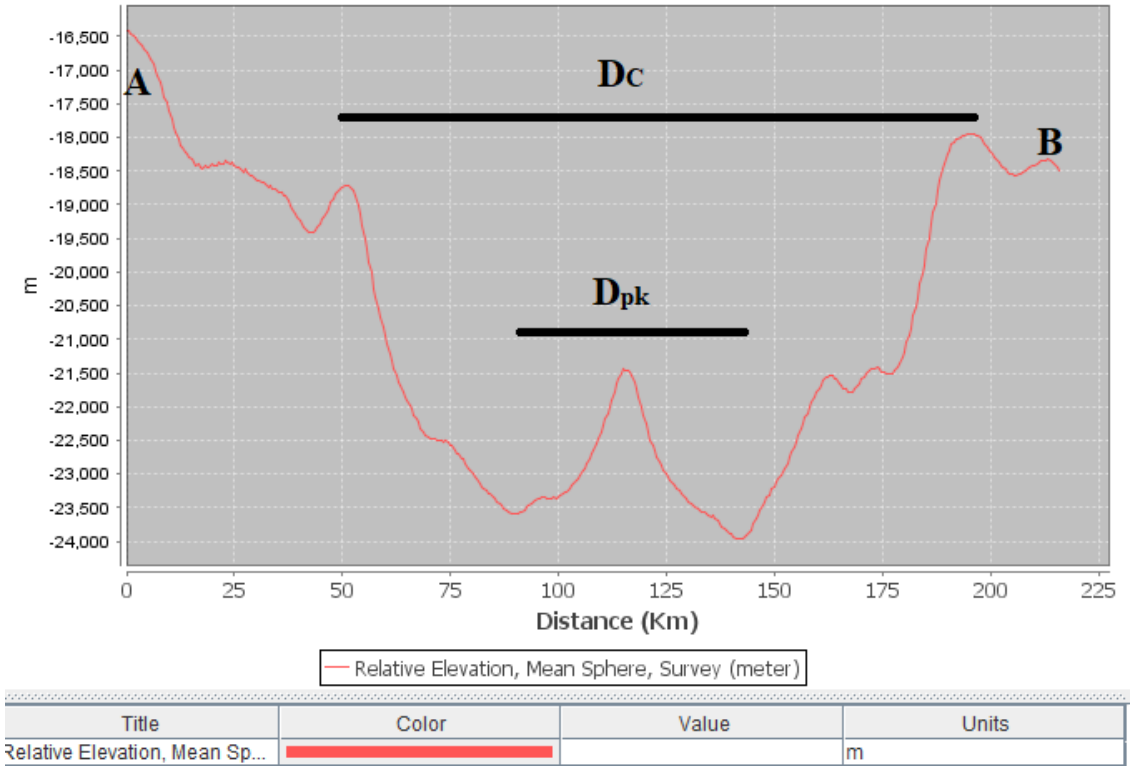


Image Credit: JMARS

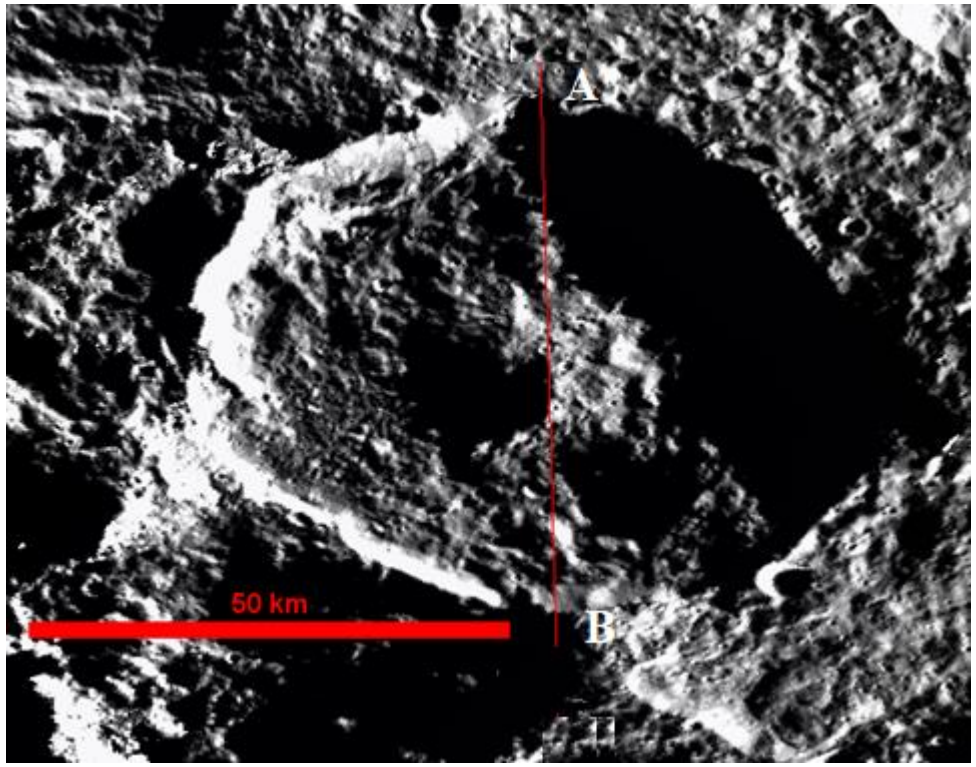
Central Peak Crater

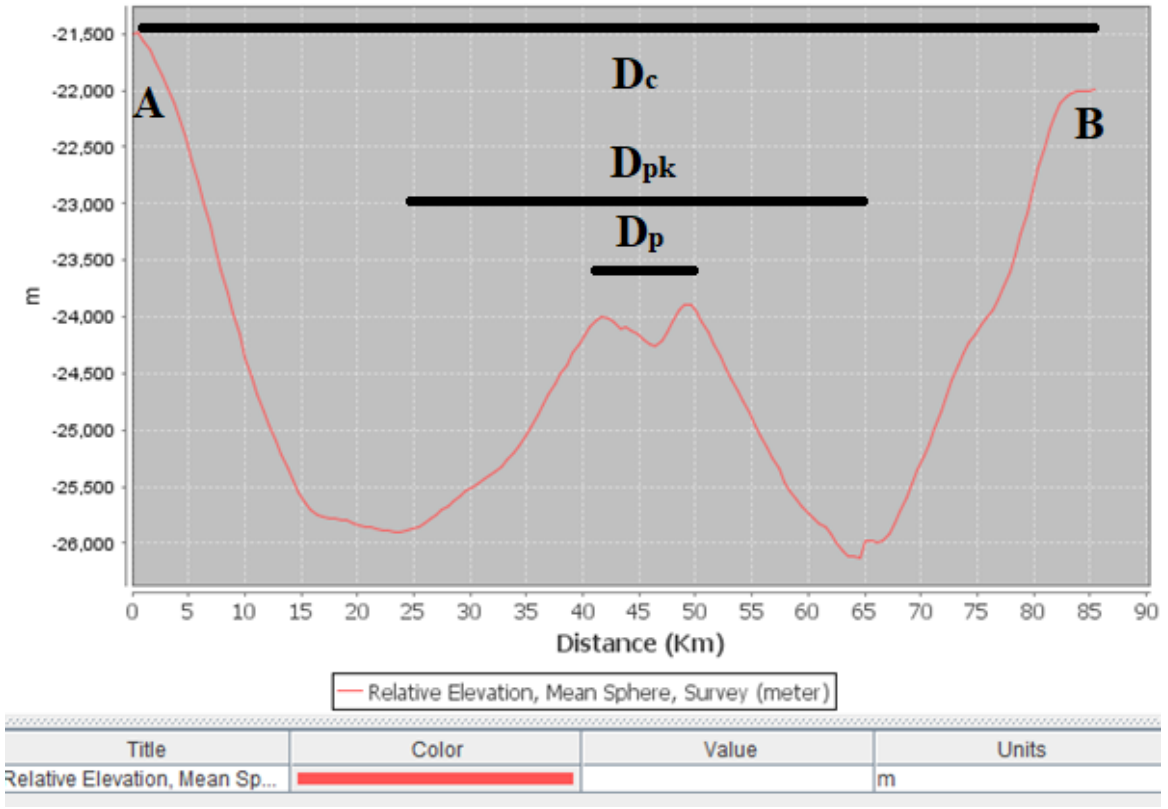




Zadeni crater with a diameter of 129.3 km centered at 70.36° S 38.34° E

Summit Pit Crater



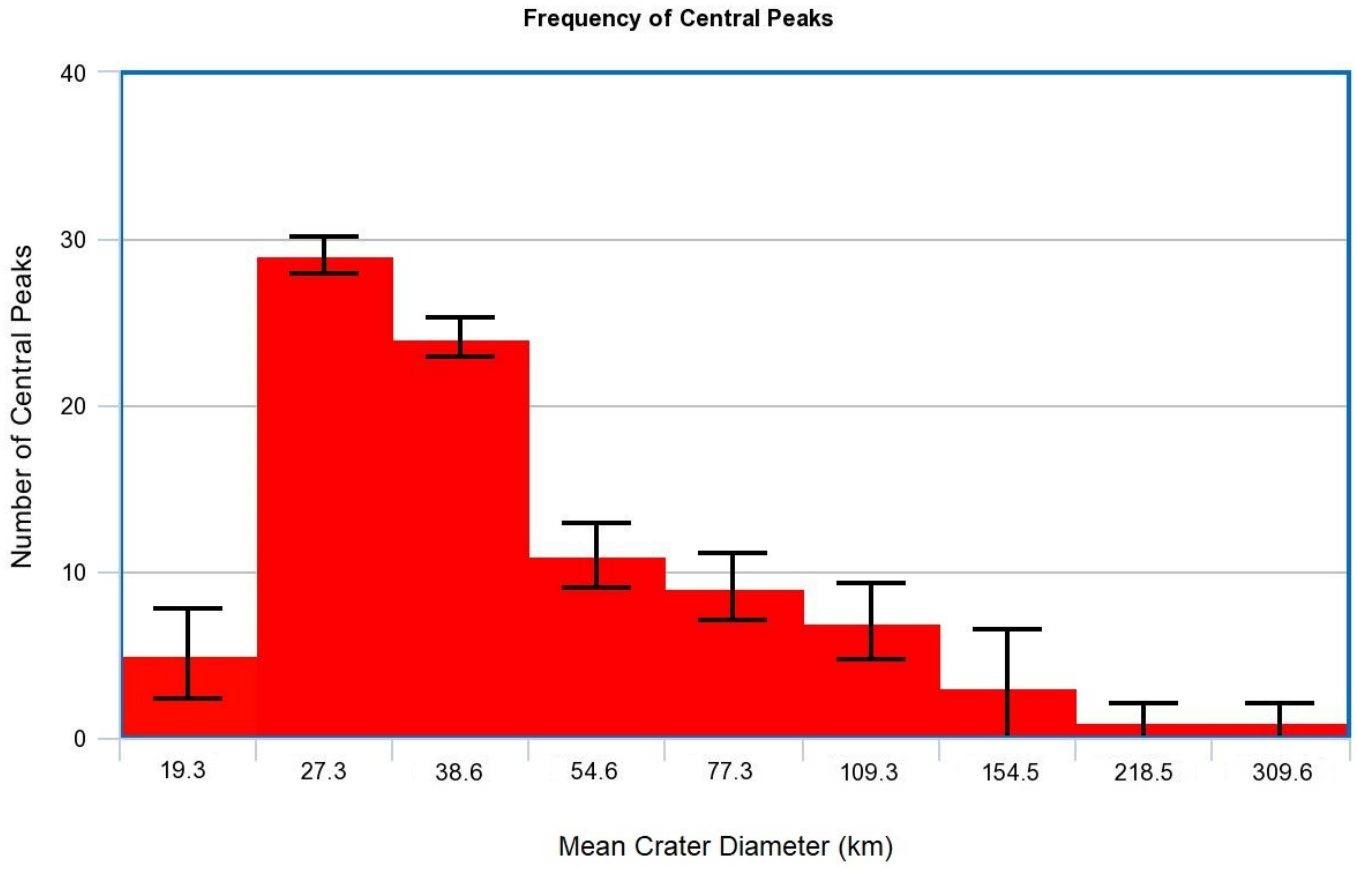


A 80.0 km crater centered at 76.31° S 223.69° E

Preliminary Results

- 18,988 craters in the southern hemisphere were cataloged
- The craters ranged from 83.22° S – 0° N 0° – 360° E
- 88 central peaks and 2 summit pits were recorded

Central Peak Data



Central Peak Comparison

	Mercury[1]	Mars[1]	Ganymede[1]	Ceres
Number of craters	1764	1682	1080	88
Crater Diameter Range (km)	8.2-251.3	5.0-156.3	7.5-48.6	17.6-260.0
Median Crater Diameter (km)	38.4	10.3	15.2	36.7
Peak Diameter Range (km)	0.8-63.0	0.3-44.5	2.1-23.8	0.5-25.0
Median Peak Diameter Range (km)	5.5	3.4	5.7	5.0
D_{pk}/D_c	0.04-0.60	0.04-0.76	0.11-0.75	0.03-0.29
Median D_{pk}/D_c	0.16	0.32	0.37	0.12

1: Barlow et al., 2017

Conclusion

- A large number of central peak craters and very few central pit craters
- A D_{pk}/D_c close to that of central peak craters on Mercury
- These results suggest that the southern hemisphere crust on Ceres has a target strength closer to that of rocky material than ice which is consistent to the large number of craters preserved on the surface

References

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