

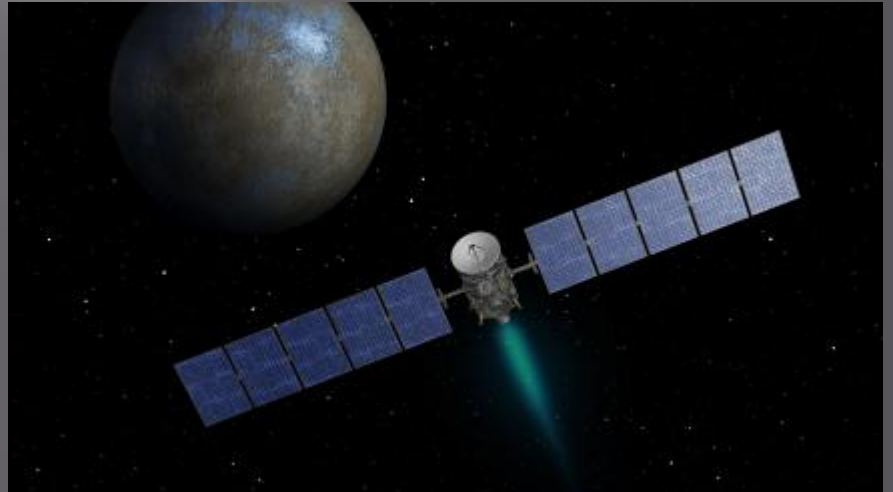
REMOTE SENSING: PROTOPLANETS

Dawn Spacecraft

- Orbits the asteroid belt protoplanets Vesta and Ceres
 - Two different kinds of bodies to be explored in terms of their different properties in the processes early in the formation of the solar system
- Launched by NASA September 2007
- Objective to find information on how the solar system was formed early on

Dawn Spacecraft

- ▣ Carries Three Instruments
 - Visible Camera (visible & near Infrared)
 - Gamma Ray
 - Neutron Spectrometer
 - Total of 21 sensors



<http://www.jpl.nasa.gov/missions/web/dawn.jpg>

Dawn Spacecraft Orbits

“Journey to the Asteroid Belt”

- ▣ First did a fly by of Mars in 2009 – 549 km

Vesta

- ▣ Entered orbit 2011 for 14 months
- ▣ Distance ranges from 1,200,000 – 22,000 km in orbit
- ▣ Resolution of Images range from 112- 2.1 km/px

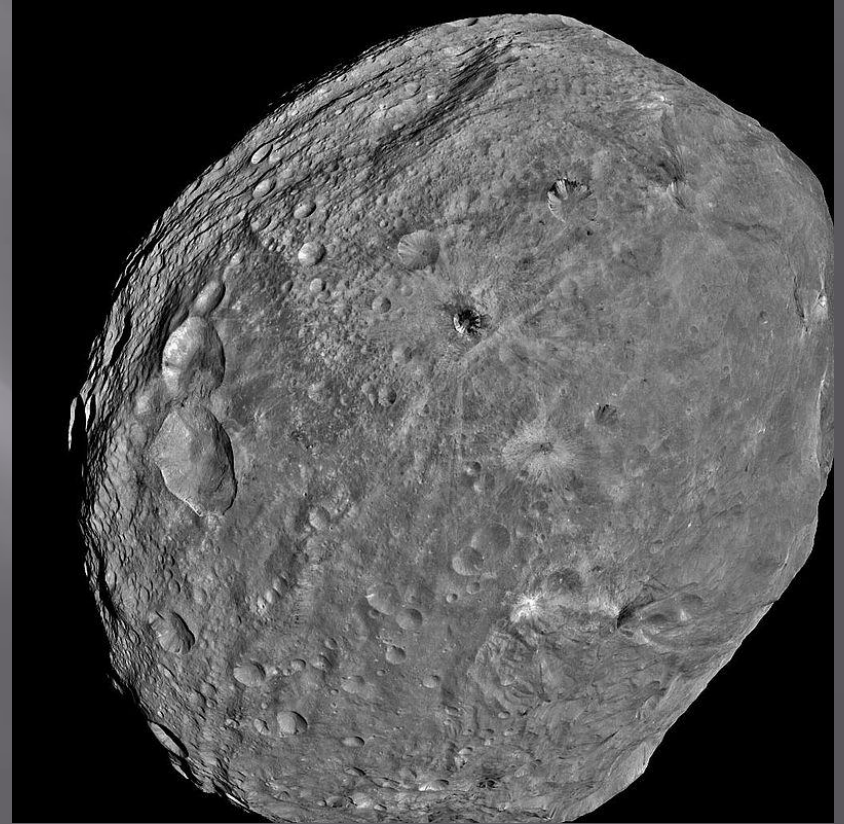
Ceres

- ▣ Entered orbit 2015 – present (end of mission?)
- ▣ Distances ranges from 13,000 – 375 km
- ▣ Resolution of Images range from 1.3 km/px – 35 m/px

Vesta - Images

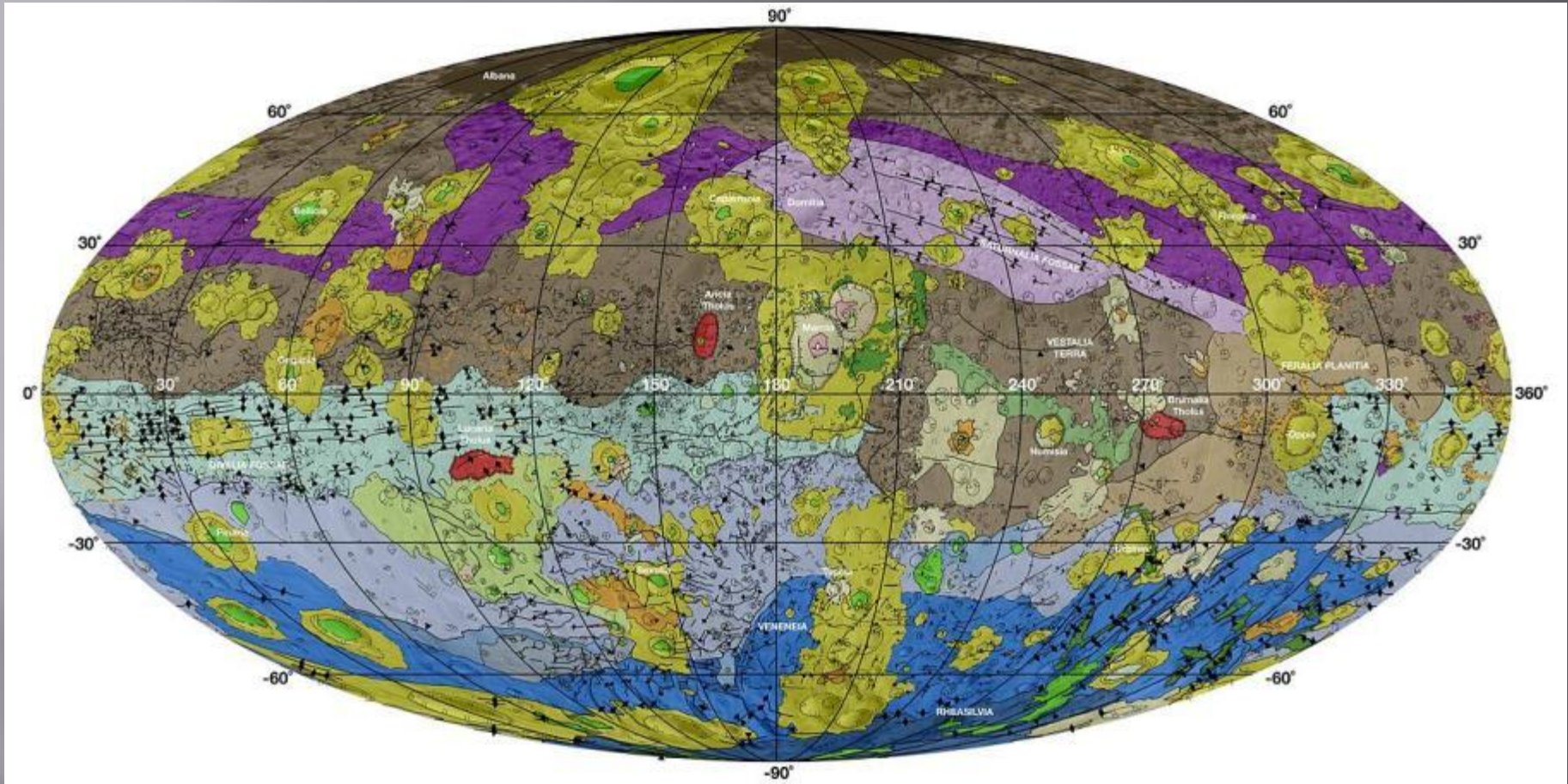


July 17, 2011 – 16,000 km



July 24, 2011 – 5,200 km

Map of Vesta

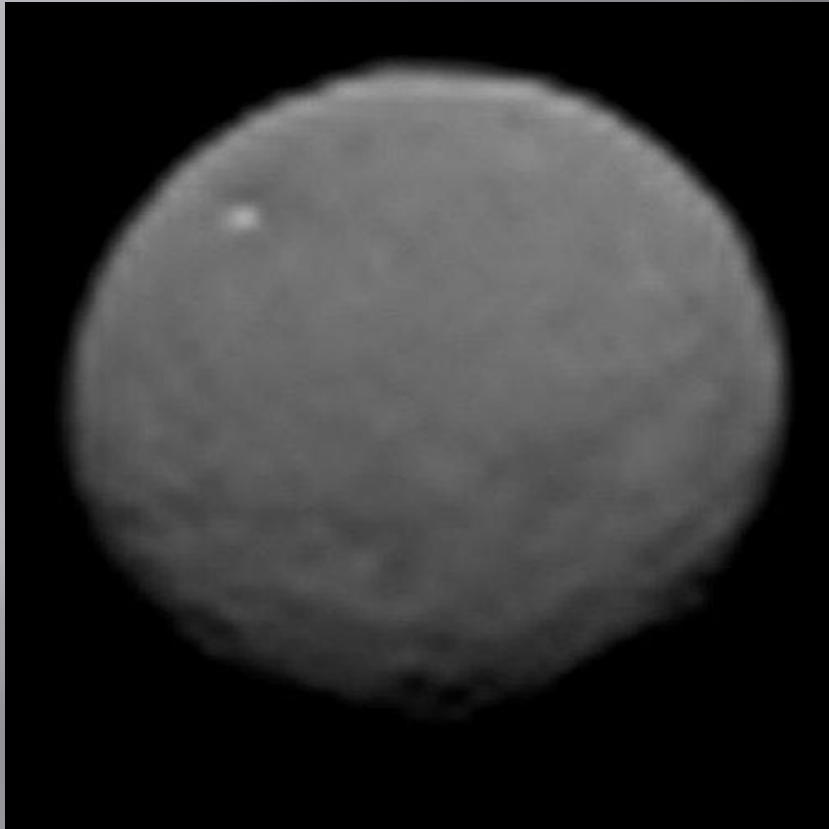


Brown – oldest more heavily cratered areas

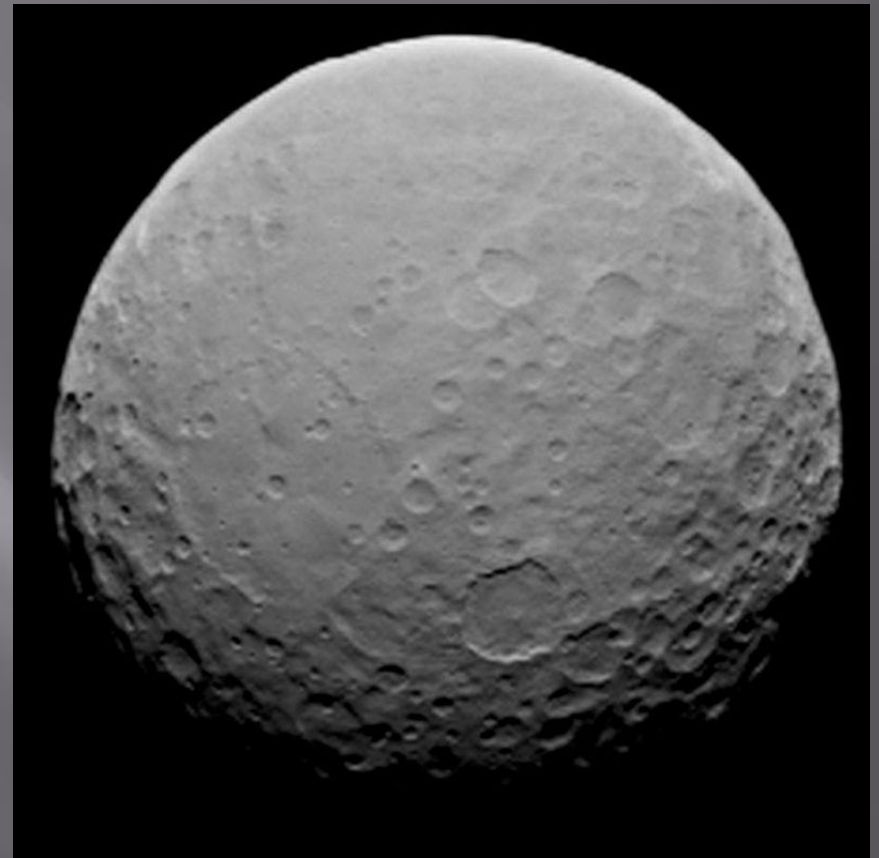
Purple / blue – terrains modified by Veneneia and Rheasilvia impacts

Geological Map of Vesta November 17,
2014 <http://www.jpl.nasa.gov/spaceimages/details.php?id=PIA18788>

Ceres - Images



Jan. 25, 2015 – 237,000 km



Feb 19, 2015 – 29,000 km

By NASA/JPL-Caltech/UCLA/MPS/DLR/IDA -
<http://photojournal.jpl.nasa.gov/catalog/PIA19172>, Public Domain,
<https://commons.wikimedia.org/w/index.php?curid=38076511>

Links

NASA:

http://www.nasa.gov/mission_pages/dawn/main/index.html

Bright Spots on Ceres

https://www.youtube.com/watch?v=z_qRno-J2tl

- Suggest there is ice and salt

Articles

Color and Albedo Heterogeneity of Vesta from Dawn

<http://science.sciencemag.org/content/336/6082/700>

Dawn Mission to Vesta and Ceres: Symbiosis between Terrestrial Observations and Robotic Exploration

<http://link.springer.com/article/10.1007/s11038-007-9151-9>