At the dawn of the solar system the solar nebula was rich in radioactive heat sources, a portion of which decayed rapidly within the first few million years.

- Were there chemical variations in the nebular disk?
- How did the formation time affect the outcome?
- What processes have mixed material post-formation?
Ceres and Vesta in Context

Ceres

Vesta

Lutetia

Mathilde

Ida

Eros

Gaspra

Steins

Annefrank

Braille

Itokawa
Dawn at Ceres
Dawn at Ceres

Next Up:

Survey Orbit: 4400 km alt.  
Jun 5 – Jul 1 2015

HAMO: 1470 km alt.  
Aug 4 – Oct 8 2015

LAMO: 375 km alt.  
Dec 1 2015 – Mar 6 2016

HAMO: High Altitude Mapping Orbit  
LAMO: Low Altitude Mapping Orbit
Dawn at Ceres
13500 km Altitude
20x Hubble
Vesta

Rheasilvia

Veneneia
Vesta is a dry igneous body with a veneer of hydrated material.
Imaging Science Experiment (HiRISE) image of Marcia crater, Vesta. Where asteroseismic signature of Marcia crater, Vesta. Where the exogenic material is consistent with the observed degree of preservation of exogenic materials. Pitted terrain may be tied to local surface properties as carbonaceous chondrites can result in the dehydration of hydrated material to the surface by impactors such as comets, asteroids, and impacts. Comets are often observed at comet tails, while asteroids are more common at comet tails. The pitted terrain may yet be discovered on other volatile-poor airless bodies. Other large craters that expose dark breccia mixture are either substantially more degraded or rare on Vesta. Other large craters that expose dark, basaltic terrain may be tied to local surface properties as meteoroid impacts can lead to the evaporation of volatiles. Pitted terrain may yet be discovered on other volatile-poor airless bodies.

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Cornelia Crater on Vesta
Ceres Prediction

Infalls, carbonates, evaporites?

Dirty Ice (rock? Salts?) on top of Frozen Ocean

Hydrated Silicates

Metal-Rich Core and/or Dry Silicates
Siblings?