Asteroid 101

Stony meteorites

- Most common type of meteorite, generally composed of 75%- 90% silicon-based minerals, 10-25% nickel-iron alloy, and some traces of iron sulfide.
- These account for 94% of observed meteorite falls, and are divided into two categories:
- Chondrites- these are nearly spherical, and contains mostly of silicon. They are the most common type of stony meteorite.
- Achondrites- these originate from different planetary bodies, such as asteroids, planets, or moons and were reformed from molten fragments into space as another result of collision.

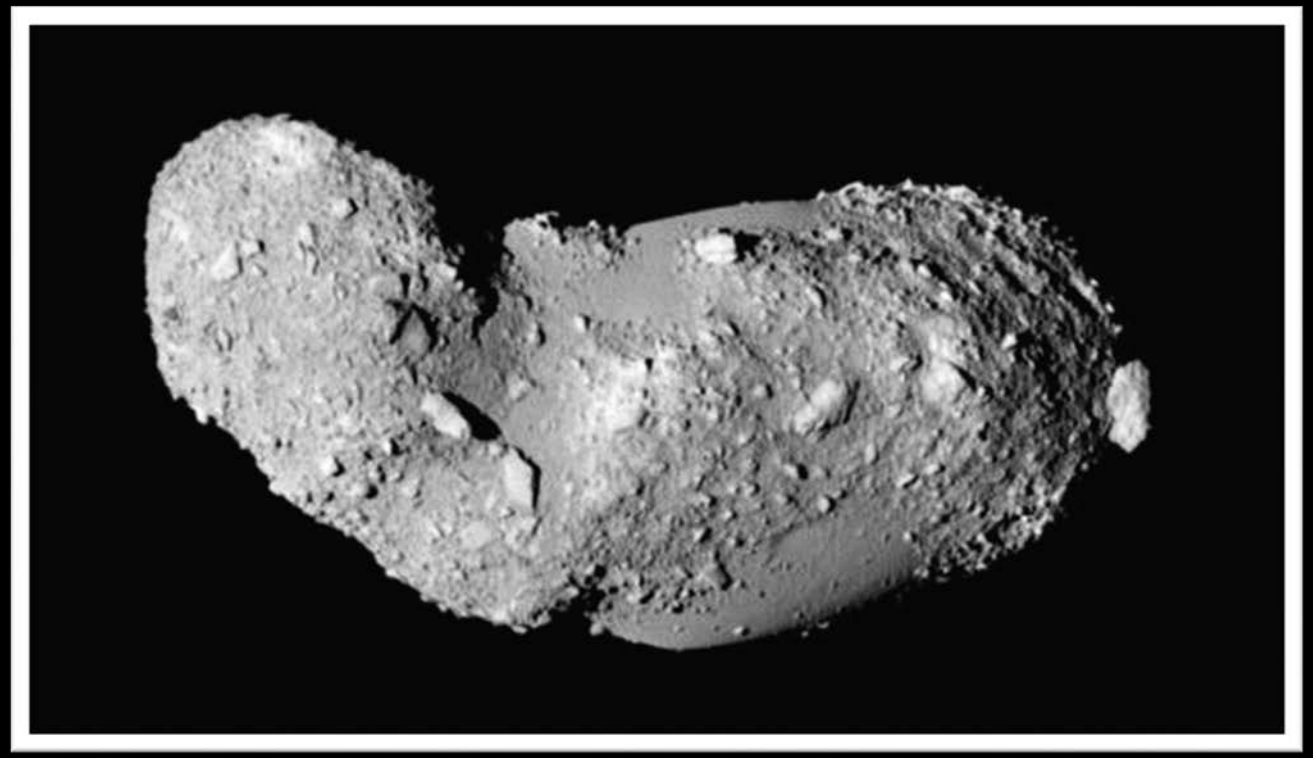
Stony Iron Meteorites

- These have even amounts of silicates and nickel-iron alloy divided into two groups:
- Pallasite- these are believed to form between silicate mantle, or outer shell, and molten core of a different asteroid. The primary silicate mineral is olivine.
- Mesoiderite- these contain nearly equal amounts of metal and silicates. Fewer than 150 mesosiderites have been identified. These are most likely to be formed by collisions of metal-rich and silicate-rich asteroid.

Iron Meteorites

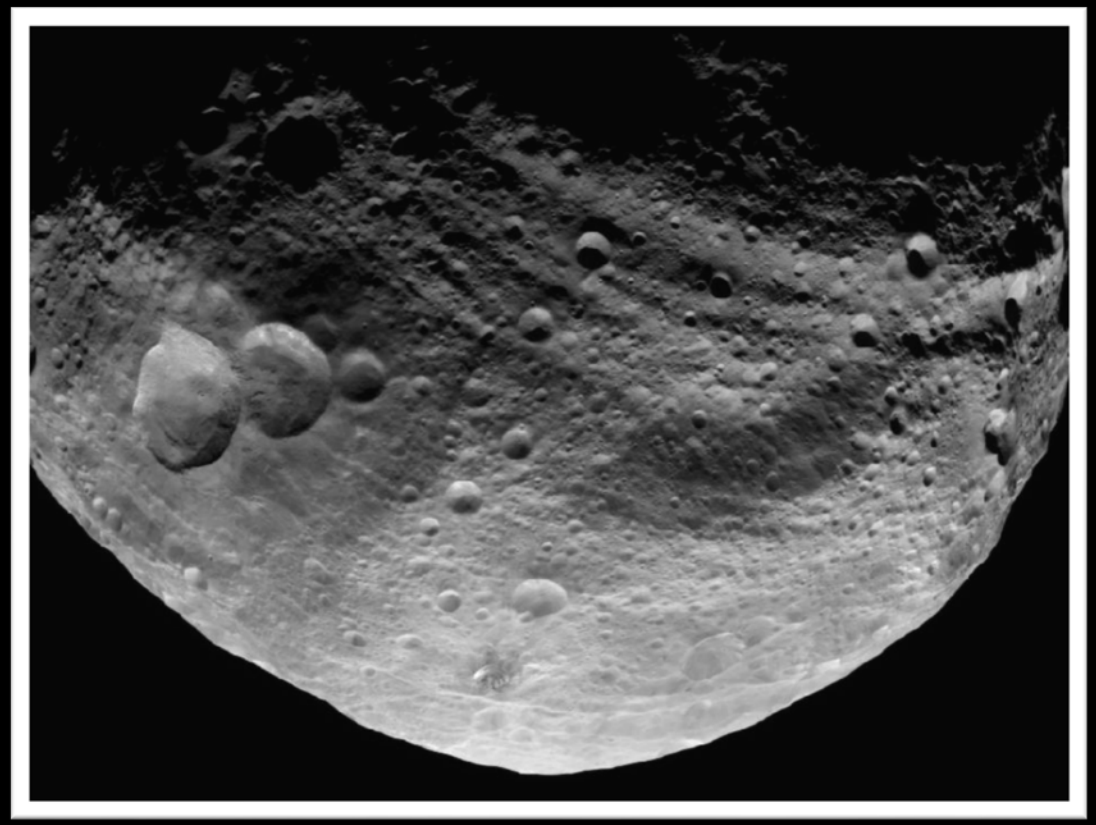
- Most likely to have originated in the cores of large asteroids.
  - Composed almost entirely of nickel-iron alloy.
  - Most easily recognized meteorites when compared to others.

Image 1: 25143 Itokawa



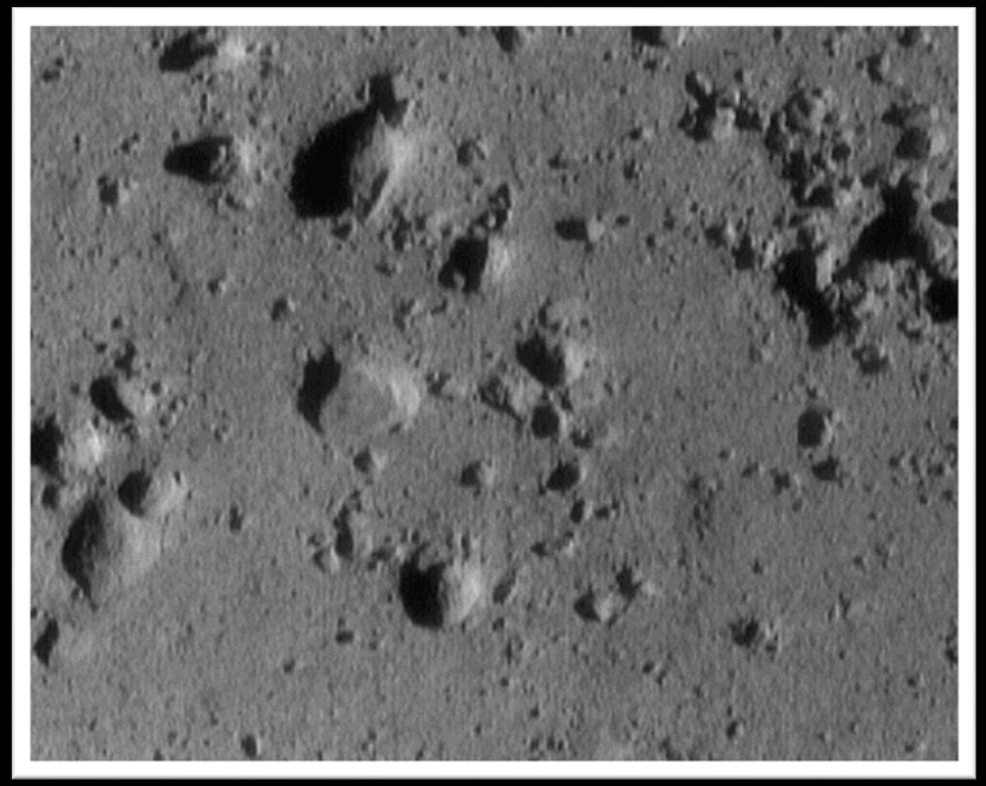
- S-type (Silicaceous) - bright; orbit is near mars, and common
- No craters and an irregular shape
- Boulders most likely formed through impacts of other space rocks
- Space weathered due to lack of cratering

Image 2: 4 Vesta Dawn



- A spherical shape, smooth, and with craters.
- V-type- borders S-type; edges blend into backgrounds density.
- Ridges indicate volcanic activity
- Impact craters appear to be complex craters

Image 3: 433 Eros



- No craters, smooth, irregular shape and boulders
- S-type- bright; orbit is near mars, and common
- Surface covered in regolith