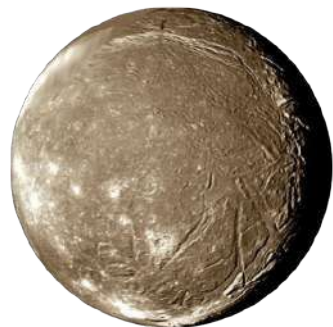




Ariel

Moon of Uranus



Gravity



Rock

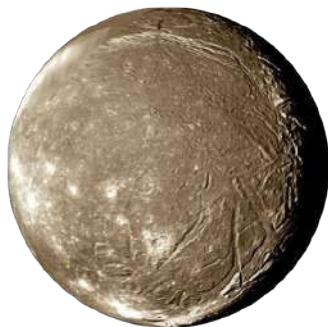


Ice



Ariel

Moon of Uranus



Gravity



Rock



Ice



Callisto

A moon of Jupiter



Gravity



Rock



Ice



Callisto

A moon of Jupiter



Gravity



Rock

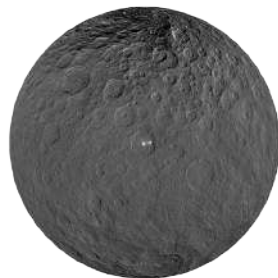


Ice



Ceres

Dwarf planet and
Main Belt Asteroid



Gravity



Rock



Ice



Charon

A moon of Pluto



Gravity



Rock



Ice



Charon

A moon of Pluto



Gravity



Rock



Ice



Dione

A moon of Saturn



Gravity



Rock



Ice

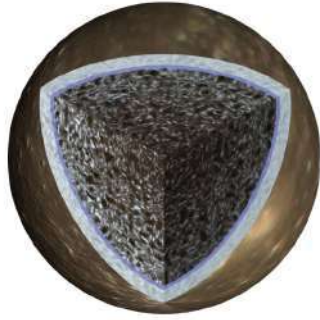
The surface of Callisto observed by the Galileo spacecraft.



SURFACE
The surface of Callisto is made up of a mixture of water ice and rock.

27

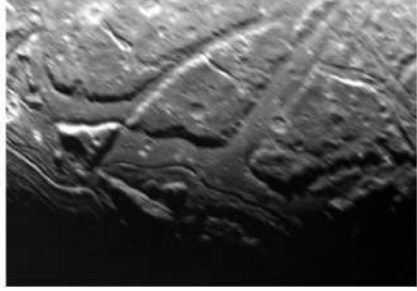
Model of the interior of Callisto.



SUBSURFACE
Callisto may have an underground ocean of salty liquid water.

244

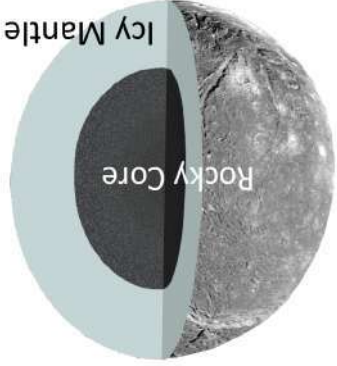
Canyons and craters on Ariel's surface imaged by the Voyager 2 spacecraft.



SURFACE
Ariel's surface is made of water ice and carbon dioxide ice.

15

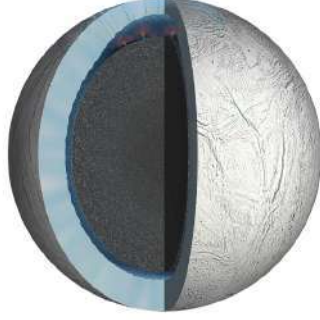
Model of Ariel's interior



SUBSURFACE
Ariel is made of about half rock and half water ice.

133

Model of the interior of Dione.



SUBSURFACE
Dione may contain a deep subsurface ocean of liquid water.

129

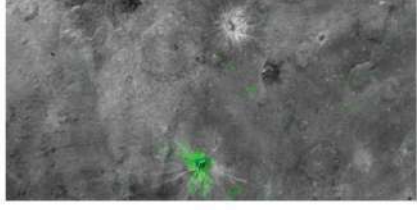
The New Horizons spacecraft discovered a long, deep canyon that encircles Charon.



SURFACE
The surface of Charon is a mixture of ices, including water ice.

15

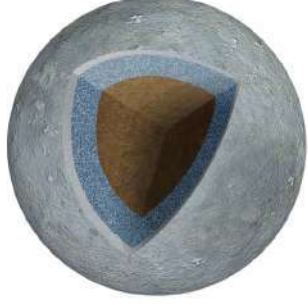
The New Horizons spacecraft imaged water ice in craters on Charon.



SUBSURFACE
Charon has water ice in its subsurface that may once have been liquid.

137

Model of the interior of Ceres.



SUBSURFACE
Ceres may contain a thin outer layer of dust and rock over a deeper layer of salty water ice.

124



Dione

A moon of Saturn



Gravity



Rock



Ice



Earth

The third planet from the Sun



Gravity



Rock



Earth

The third planet from the Sun



Gravity



Rock



Earth

The third planet from the Sun



Gravity



Rock



Enceladus

A moon of Saturn



Gravity



Rock



Ice



Enceladus

A moon of Saturn



Gravity



Rock



Ice



Europa

A moon of Jupiter



Gravity



Rock

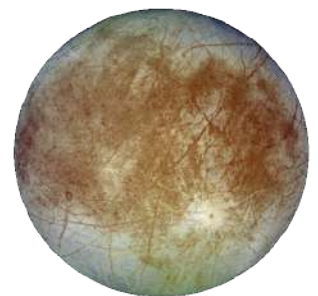


Ice



Europa

A moon of Jupiter



Gravity



Rock



Ice

3

ATMOSPHERE
On average, Earth's atmosphere contains 0.4% water vapor.



Earth's atmosphere observed from the International Space Station.

14

SUBSURFACE
On Earth, water is held underground as liquid water and ice.



Groundwater exposed by digging a hole in the sand.

155

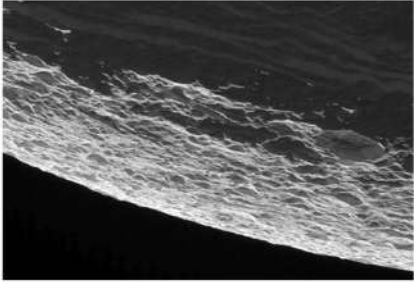
SURFACE
Surface water is present on Earth in the form of oceans, rivers, and glaciers.



True color mosaic of the Earth, based on images from an Earth-observing satellite.

14

SURFACE
Dione has a mostly water ice surface.



The surface of Dione observed by the Cassini spacecraft.

19

SURFACE
The surface of Europa is covered in water ice.



Grooves in the ice on Europa's surface, observed by the Galileo spacecraft.

175

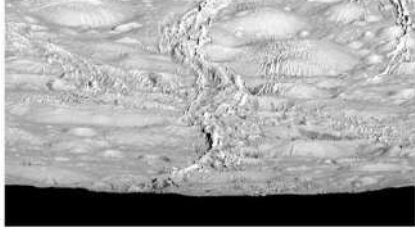
SUBSURFACE
Deep beneath Europa's icy shell may be a layer of liquid water.



Model of the liquid water ocean deep in Europa's subsurface.

9

SURFACE
The surface of Enceladus is covered in water ice.



View of the north pole of Enceladus observed by the Cassini spacecraft.

81

SUBSURFACE
Enceladus may contain a subsurface ocean of liquid water.



Plumes of water vapor and ice erupting from fractures were detected by the Cassini spacecraft.



Ganymede

A moon of Jupiter



Gravity



Rock



Ice



Ganymede

A moon of Jupiter



Gravity



Rock



Ice



Iapetus

A moon of Saturn



Gravity



Rock



Ice



Iapetus

A moon of Saturn



Gravity



Rock

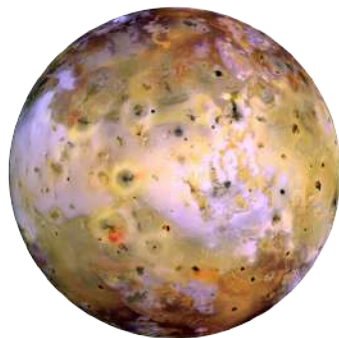


Ice



Io

A moon of Jupiter



Gravity



Rock



Jupiter

The fifth planet from the Sun



Gravity



Gas



Mars

The fourth planet from the Sun



Gravity



Rock



Mars

The fourth planet from the Sun

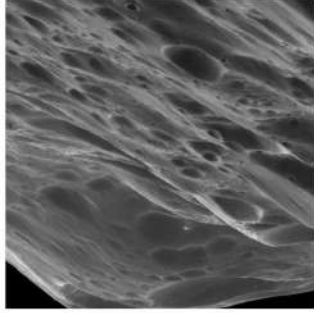


Gravity



Rock

SURFACE
lapetus' surface is mostly made of water ice.



High mountains and impact craters observed by the Cassini spacecraft.

17

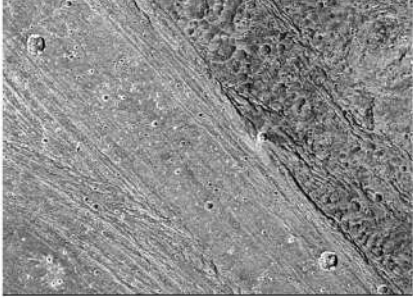
SUBSURFACE
Based on its density, Iapetus is made of mostly water ice.



Image from the Cassini spacecraft shows a mysterious high ridge that runs along the moon's equator.

153

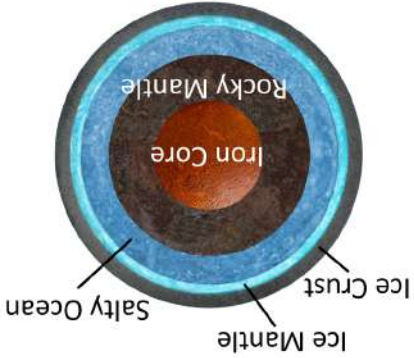
SURFACE
Water ice is widespread on the surface of Ganymede.



Ganymede's icy crust observed by the Galileo spacecraft.

32

SUBSURFACE
Ganymede may have an ocean of liquid water deep in the subsurface.



Model of the interior of Ganymede.

285

SURFACE
Water ice is found on Mars at the polar caps.



Image of the martian north polar cap acquired by the Mars Orbiter Camera.

42

SUBSURFACE
Water ice is found on Mars as ground ice and glacial deposits.



The Phoenix Mars lander discovered ground ice while digging troughs near the north pole.

22

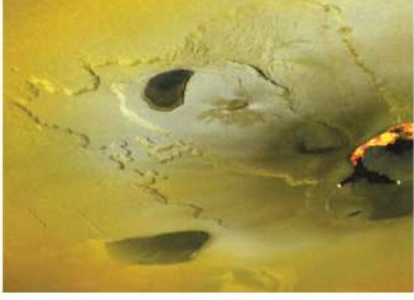
ATMOSPHERE
Jupiter's atmosphere contains traces of water vapor.



The Juno spacecraft orbiting Jupiter is investigating how much water is in its atmosphere.

77

SURFACE
Io is the most volcanically active body in the solar system, but has no water.



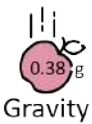
Active volcanic processes were observed on Io by the Galileo spacecraft.

0



Mars

The fourth planet from the Sun



Gravity

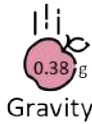
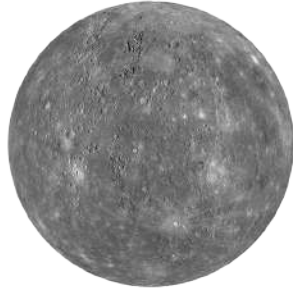


Rock



Mercury

The first planet from the Sun



Gravity

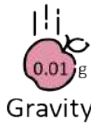


Rock



Mimas

A moon of Saturn



Gravity



Rock

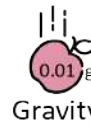
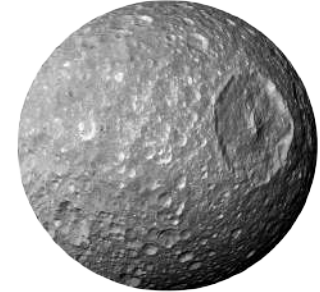


Ice



Mimas

A moon of Saturn



Gravity



Rock

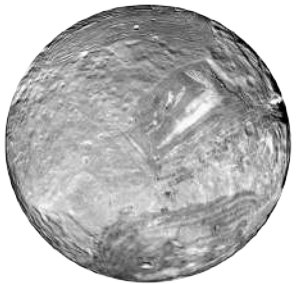


Ice



Miranda

A moon of Uranus



Gravity



Rock

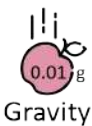
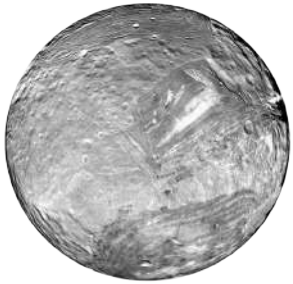


Ice



Miranda

A moon of Uranus



Gravity



Rock



Ice



Moon

Earth's moon



Gravity



Rock



Neptune

The eighth planet from the Sun



Gravity



Ice

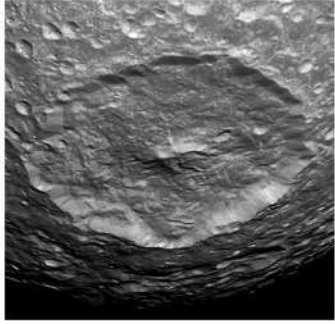


Gas

9

SURFACE

Mimas' surface is mostly water ice.



Herschel impact crater, 130 km across, observed by the Cassini spacecraft.

79

SUBSURFACE

Based on its density, Mimas is made of mostly water ice.

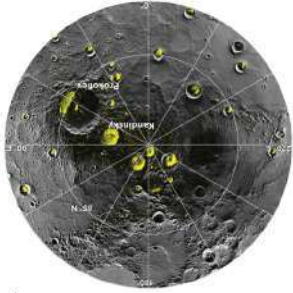


Enhanced color image captured by the Cassini spacecraft shows different colors that may be caused by different ices.

16

SURFACE

Water ice is present on Mercury in permanently shadowed craters near the poles.



Yellow areas, mapped using radar, represent polar deposits that might contain pockets of water ice.

2

ATMOSPHERE

Mars' atmosphere contains traces of water, often visible as water-ice clouds.

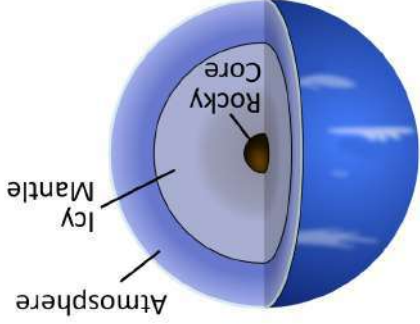


Clouds observed by the Opportunity rover at Endurance crater.

197

SUBSURFACE

Neptune is thought to have an icy mantle beneath its atmosphere.

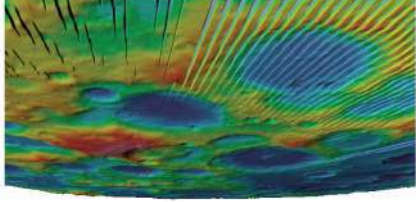


Model of the interior of Neptune.

4

SURFACE

Earth's Moon has small amounts of water frozen in permanently shadowed craters.

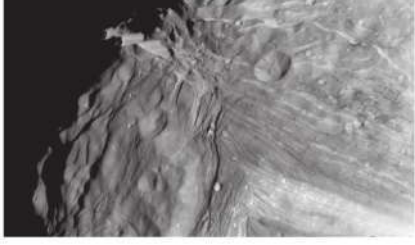


Topographic image of Moon's South Pole, from the Lunar Reconnaissance Orbiter mission, shows craters that are never exposed to sunlight.

10

SURFACE

The surface of Miranda is covered in water ice.

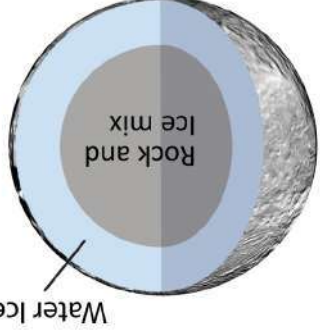


The surface of Miranda observed by the Voyager 2 spacecraft.

86

SUBSURFACE

The density of Miranda suggests that it is mostly water ice.



Model of the interior of Miranda.



Oberon

A moon of Uranus



Gravity



Rock



Ice



Oberon

A moon of Uranus



Gravity



Rock



Ice



Pluto

A dwarf planet in the Kuiper Belt



Gravity



Rock



Ice



Pluto

A dwarf planet in the Kuiper Belt



Gravity



Rock

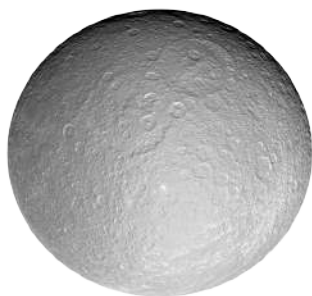


Ice



Rhea

A moon of Saturn



Gravity



Rock

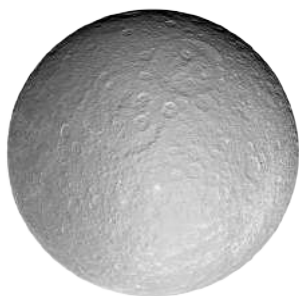


Ice



Rhea

A moon of Saturn



Gravity



Rock



Ice



Saturn

The sixth planet from the Sun



Gravity



Gas



Saturn

The sixth planet from the Sun



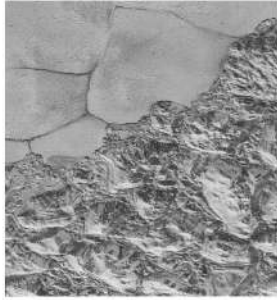
Gravity



Gas

21

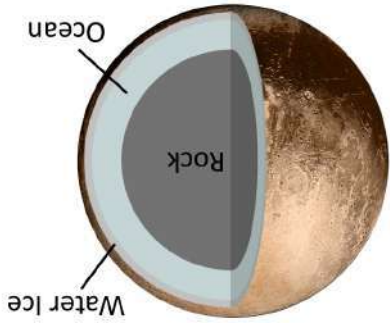
SURFACE
Pluto's surface is covered by a mix of nitrogen-rich ices and water ice.



Large blocks of water ice form mountains, observed by the New Horizons spacecraft.

187

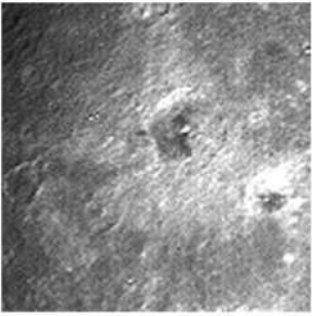
SUBSURFACE
Pluto is thought to have a subsurface ocean, about 100 kilometers deep.



Model of the interior of Pluto.

17

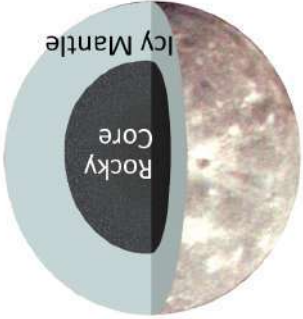
SURFACE
Oberon's surface is mostly water ice.



Oberon's surface imaged by the Voyager 2 spacecraft.

154

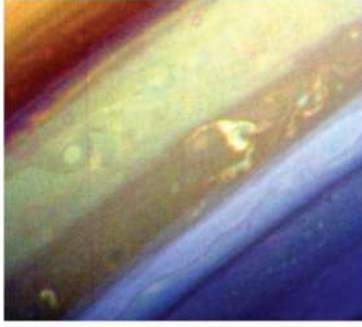
SUBSURFACE
Based on its density, Oberon is made of about half rock and half water ice.



Oberon may have a rocky core and an icy mantle, but much is still unknown.

72

ATMOSPHERE
Saturn's atmosphere contains trace water vapor.



Enhanced color image of Saturn's atmosphere observed by the Cassini spacecraft.

91

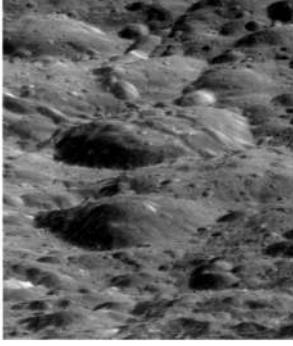
RINGS
Saturn's rings are mostly made of water ice.



Color variations in Saturn's rings as seen by the Cassini spacecraft.

16

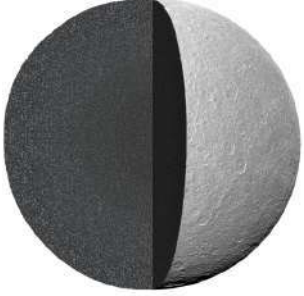
SURFACE
Rhea's surface is mostly made of water ice.



Rhea's cratered surface observed by the Cassini spacecraft.

141

SUBSURFACE
Based on its density, Rhea is made of mostly water ice.

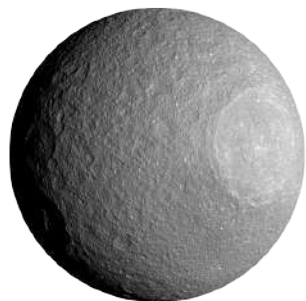


Rhea's internal structure is unknown. It may not be divided into layers.



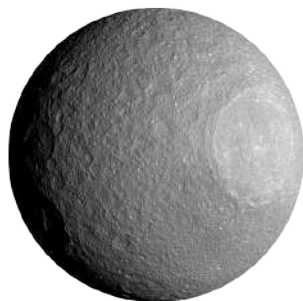
Tethys

A moon of Saturn



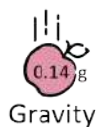
Tethys

A moon of Saturn



Titan

A moon of Saturn



Titan

A moon of Saturn



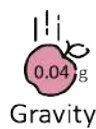
Titan

A moon of Saturn



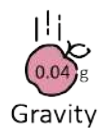
Titania

A moon of Uranus



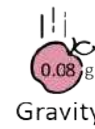
Titania

A moon of Uranus



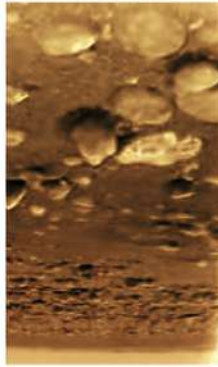
Triton

A moon of Neptune



28

Titan's surface is a mix of water ice and hydrocarbon ice.



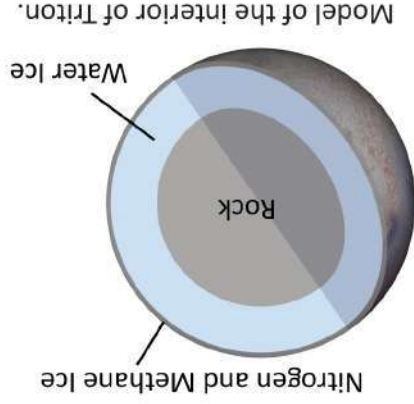
Rounded rocks and pebbles made of water ice, observed by the Huygens probe.

SURFACE

213

Triton may have a large liquid or slushy ocean beneath its frozen surface.

SUBSURFACE

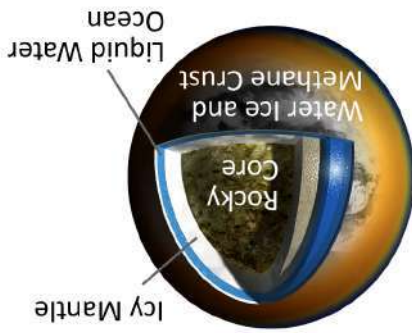


Model of the interior of Triton.

255

Titan is thought to have an extremely salty subsurface ocean of liquid water.

SUBSURFACE



Model of the interior of Titan.

135

Tethys' surface is made almost entirely of water ice.

SURFACE

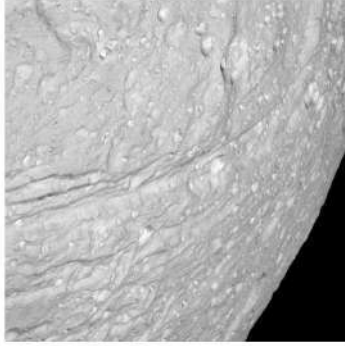
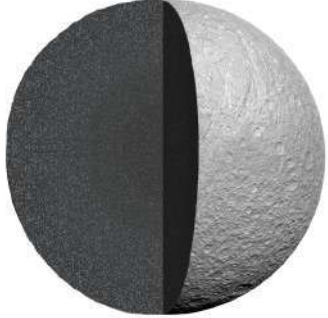


Image from the Cassini spacecraft shows steep, icy cliffs and craters.

134

Based on its low density, Tethys is made almost entirely of water ice.

SUBSURFACE

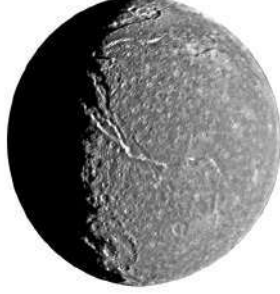


Tethys' internal structure is unknown.

17

Titan's surface is made of water ice and carbon dioxide ice.

SURFACE

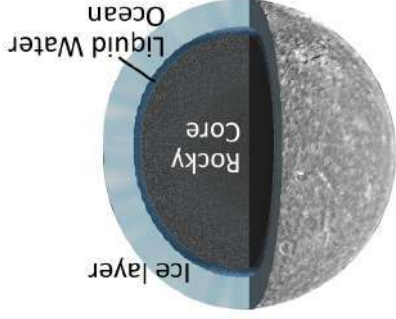


The Voyager 2 spacecraft captured images of Titan, showing craters as well as long rifts and canyons.

156

There may be a layer of liquid water at the boundary of Titan's core and mantle.

SUBSURFACE



Model of the interior of Titan.

0

Titan's thick atmosphere contains nitrogen and methane, with very little water.

ATMOSPHERE



Titan's layered atmosphere in an image from the Cassini spacecraft.



Triton

A moon of Neptune



Gravity



Rock



Ice



Umbriel

A moon of Uranus



Gravity



Rock

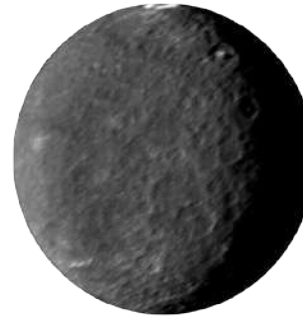


Ice



Umbriel

A moon of Uranus



Gravity



Rock



Ice



Uranus

The seventh planet from the Sun



Gravity



Ice



Gas



Venus

The second planet from the Sun



Gravity



Rock



Vesta

A Main Belt Asteroid



Gravity



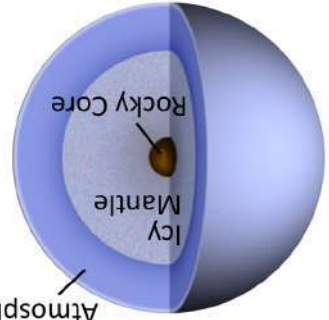
Rock

200

SUBSURFACE

The ice giant, Uranus, is thought to have an icy mantle beneath its atmosphere.

Model of the interior of Uranus.

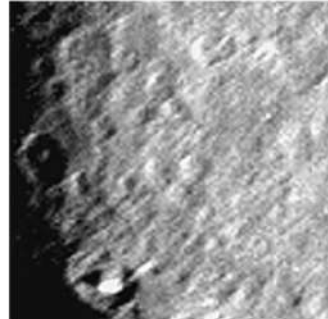


15

SURFACE

Umbriel's surface is made of water ice and carbon dioxide ice.

Umbriel's cratered surface imaged by the Voyager 2 spacecraft.

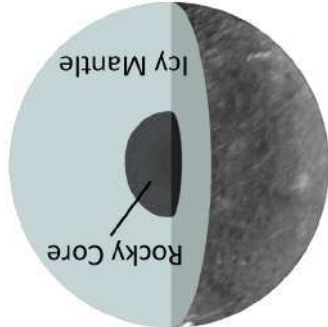


138

SUBSURFACE

Based on its density, Umbriel is made of mostly water ice.

Umbriel may have a small rocky core and an icy mantle, but much is still unknown.

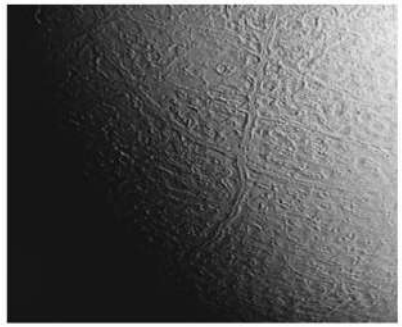


24

SURFACE

Neptune's moon Triton has a mostly water ice crust.

Dirty water ice on Triton, observed by Voyager 2.

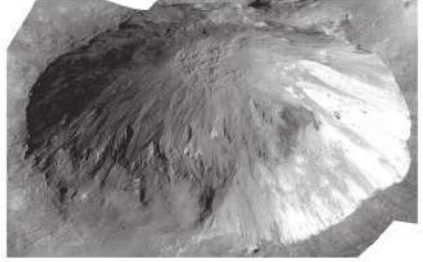


0

SURFACE

Vesta almost certainly does not have water ice today.

Gullies in a crater on Vesta, imaged by the Dawn spacecraft, likely formed by landslides.



46

ATMOSPHERE

The atmosphere of Venus consists of 0.002% water vapor.

Venus' atmosphere observed from the Pioneer Venus orbiter.

