

Jupiter

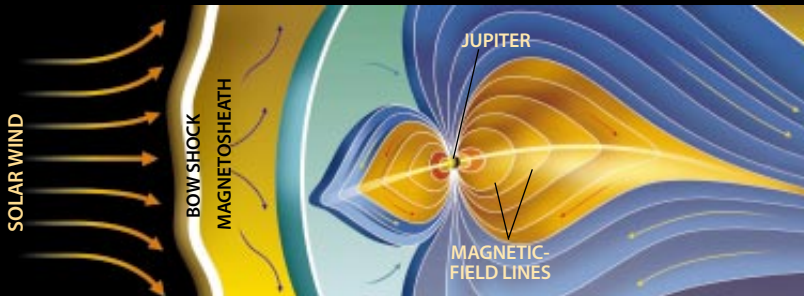
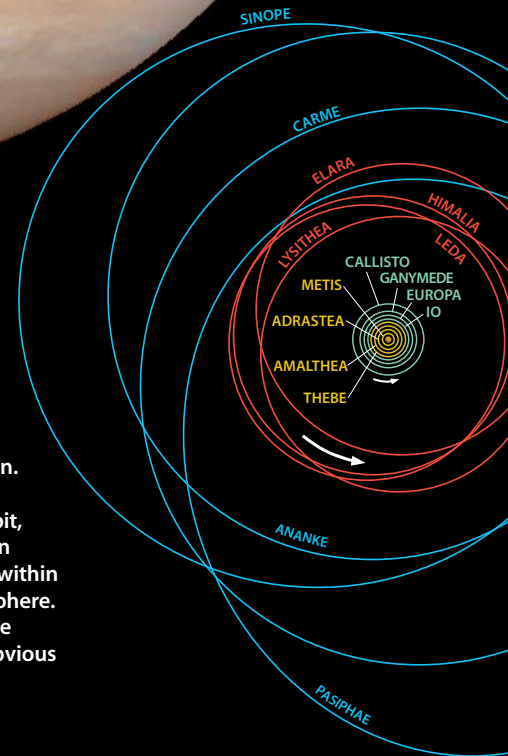


SIZE COMPARED WITH EARTH

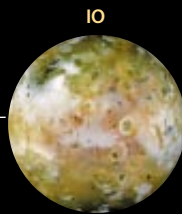
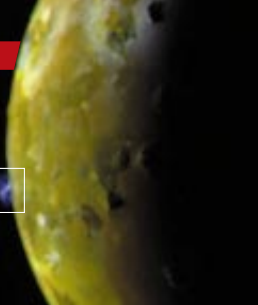
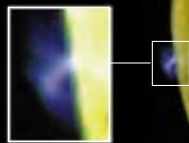


NASA/U.S. GEOLOGICAL SURVEY (top); NASA (middle left); ANDREW CHRISTIE (bottom)

JUPITER'S MOST CONSPICUOUS FEATURE, the Great Red Spot has persisted in the atmosphere since the first detailed observations of the planet were made. Two Earths could rest in the region marked by the spot. The material making up the spot appears to complete a counterclockwise rotation in 12 hours. Based on Voyager photographs, the interior of the spot is relatively stable. The Great Red Spot is thus a gigantic vortex, with wind speeds approaching 400 kilometers (250 miles) an hour.

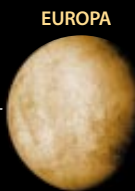


IMMENSE JOVIAN MAGNETOSPHERE is larger than the sun. Its tail spreads out beyond Saturn's orbit, meaning that Saturn finds itself at times within Jupiter's magnetosphere. Solar winds push the field, causing the obvious asymmetry.



IO

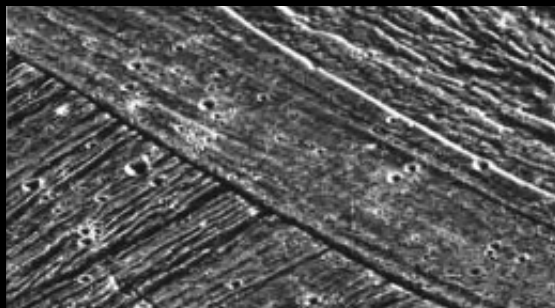
JUPITER



EUROPA



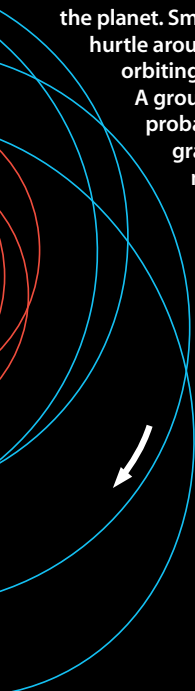
GANYMEDE



CALLISTO



FOUR DISTINCT CLASSES OF SATELLITES orbit giant Jupiter. The Galileans (*green*) travel in almost perfect circles close to the planet. Small nearby moons (*yellow*) hurtle around Jupiter, with two orbiting in just seven hours. A group of small moons (*red*) probably were captured by gravity. Finally, outer moons (*blue*) revolve in the opposite direction in highly elliptical and tilted orbits.



CROSS SECTION OF JUPITER reveals its layers. Cold clouds of ammonia, hydrogen and water rest atop hot liquid hydrogen. Go deeply enough into the planet, and pressure and heat cause the hydrogen to behave like liquid metal. Finally, the planet's center is a nugget of molten rock.

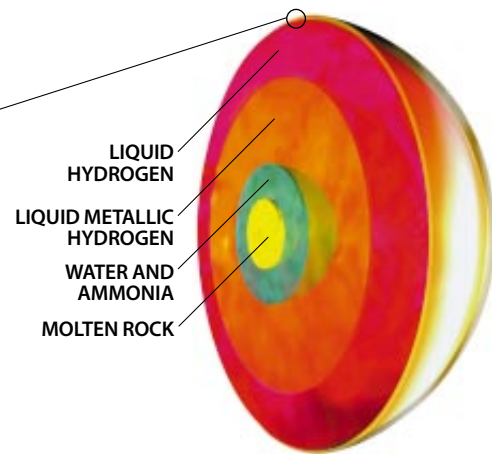


Jupiter represents a departure from the four relatively tiny rock planets that precede it as we travel away from the sun. It is the first of the four “gas giants,” planets that dwarf Earth and that have no solid surfaces. Jupiter does everything on a grand scale. It is larger than all the other planets combined, and its moon Ganymede is bigger than Mercury.

Jupiter’s hydrogen and helium content once led astronomers to think that the planet formed out of the same gas cloud that gave rise to the sun. More recent analysis of the subtleties in Jupiter’s chemistry point to a solid core, with perhaps the mass of 10 Earths, about which the rest of the planet formed. Jupiter also differs in kind from the terrestrial planets by radiating more energy than it receives from the sun. In 1994 fragments of Comet Shoemaker-Levy 9 slammed into Jupiter, thrilling observers.

FOUR GALILEAN SATELLITES

bear the name of their discoverer. Innermost Io suffers massive volcanic activity, caught by Voyager’s camera (*top left*), that continually resurfaces the planet. Europa also seems to be continually resurfaced, but based on infrared spectra, this smallest of the Galilean moons appears to be covered with water ice, emerging from the interior and freezing at the surface. This false-color view shows contaminants in the ice (*red*) and vast frozen plains (*blue*). The presence of liquid water under that ice cover, along with organic molecules, has led some scientists to speculate that Europa’s ocean may harbor some of the biochemistry necessary for life. The largest Galilean moon, Ganymede, is likely a mostly rocky core with a largely icy surface. That surface is marked by grooves hundreds of meters deep that run for thousands of kilometers, probably the result of early tectonic activity. Kin to the rest of the Galilean satellites but different in kind, Callisto’s surface shows no evidence of any resurfacing since its craters were first formed by impacts some four billion years ago. The photographed cliff, causing the shadow (*left*), is part of a ring left by an impact.



JPL/CALTECH/NASA (all photographs); BRYAN CHRISTIE (bottom left); ANDREW CHRISTIE (bottom right)