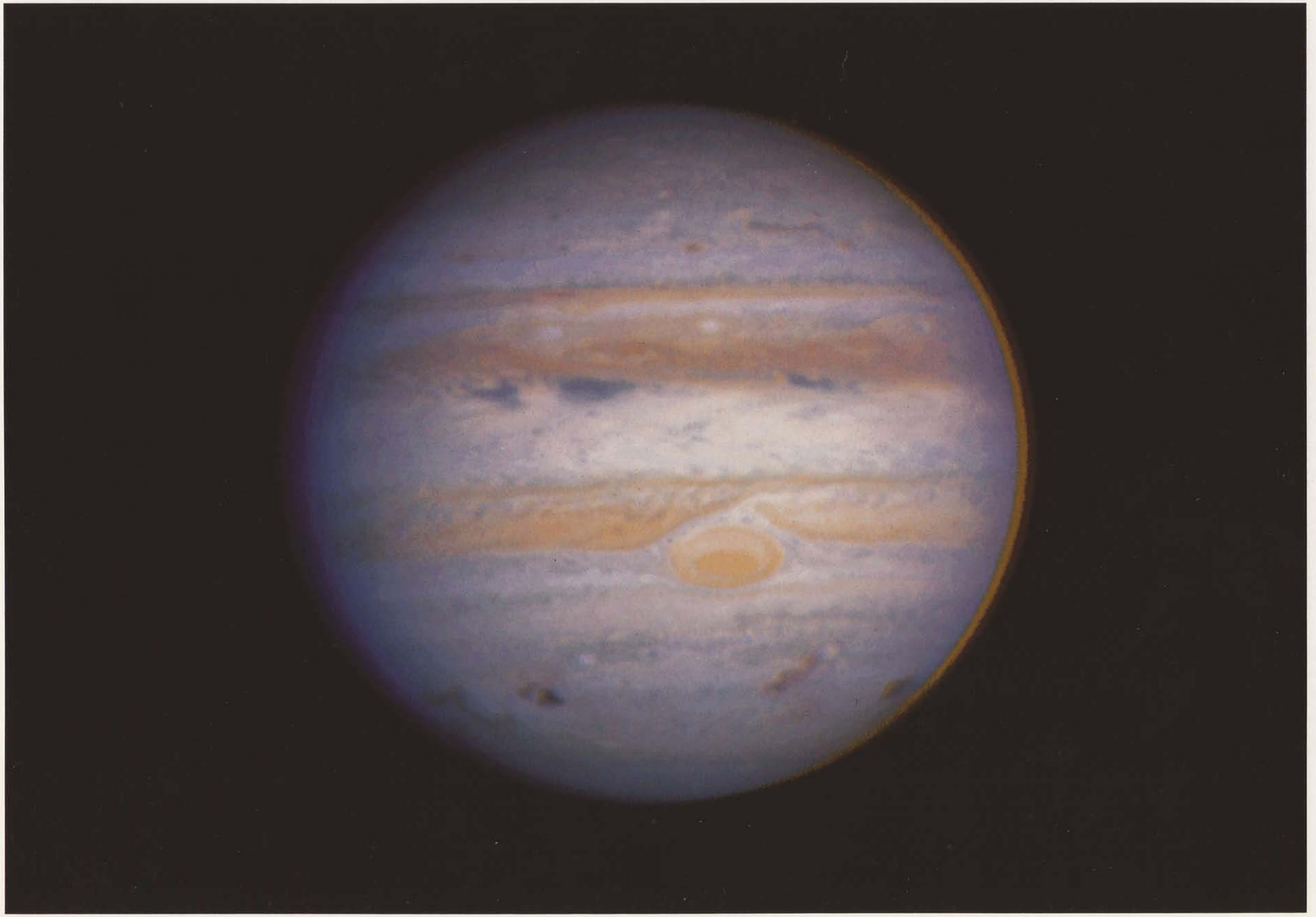
National Aeronautics and Space Administration

Hubble Color Image of Multiple Comet Impacts



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NASA's Hubble Space Telescope resolves eight impact sites on Jupiter from the collisions of the fragmented comet, Shoemaker-Levy 9. This image was taken on July 22, 1994, shortly before the last comet fragment plunged into Jupiter's atmosphere. The impact sites appear as dark "smudges" lined up in Jupiter's southern hemisphere. The smudges are chemical debris cooked in the tremendous fireballs produced by each impact. The dark material was ejected high above the bright multicolored cloud tops. This material is now caught in the weak winds of Jupiter's upper atmosphere and will likely be dispersed in a band around the planet.

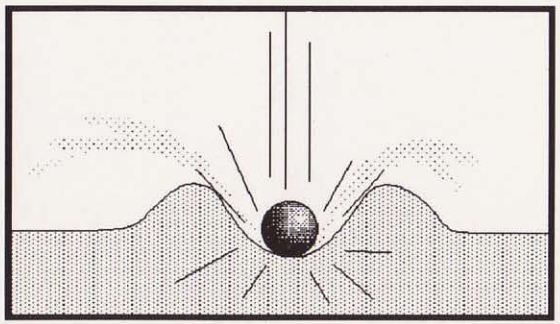
The comet crash was of tremendous significance because it represented the first time astronomers were able to predict that a comet would strike a planet, and then watch it happen. It was also a very rare event. Comets of this size strike Jupiter only once every millennium or so.

Comet Shoemaker-Levy 9 was discovered by astronomers Eugene and Carolyn Shoemaker and David Levy on a photograph taken the night of March 24, 1993, with a telescope on Palomar Mountain in California. Further observations later showed that the comet was in orbit around Jupiter, and had closely passed the giant planet in July 1992. During this close approach, Jupiter's gravity broke the fragile comet into the many pieces seen in this image. Comets are "dirty snowballs," chunks of dust, and ice that formed when our Solar System was born more than 4 billion years ago. Comet Shoemaker-Levy 9 had orbited Jupiter for dozens of years.

For the Classroom

Investigate the effects of impacts on planets by experimenting with impacts on solid and liquid surfaces. You will need the following materials:

- Shallow tray filled with fine-grained sand (about 3-4 centimeters deep)
- Steel ball bearings (1-2 centimeters in diameter)
- Mixing bowl partially filled with a viscous liquid, such as corn syrup
- Eye protection



While wearing eye protection, drop or throw ball bearings onto the sand surface from various heights. Observe the effects of the impacts. Compare the size (diameter and depth) and shapes of the craters produced to the velocities of the ball bearings. Sketch a profile of each crater you created. Examine the effects of impacts on liquid surfaces by dropping the same ball bearings into thick liquids. Do the impacts create any lasting effects in the liquids? Can you think of a way to model impacts in a moving liquid? What do you think would be the effects of impacts in a gaseous atmosphere? Examine pictures showing the comet impacts on Jupiter. Jupiter's turbulent atmosphere is gaseous at the top and liquid at greater depth. If you have a video camera available, try taping the impacts in solids and liquids to study the stages of crater formation. Play the video back in slow motion.

The Hubble Space Telescope is managed by NASA's Goddard Space Flight Center in Greenbelt, Maryland, for the Office of Space Science at NASA Headquarters.

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