Hubble's ringside view of the impacts!

By Zac Pujic

Repaired just in time, the Hubble Space Telescope has produced some of the most detailed images of the impacts of Comet Shoemaker-Levy 9 into Jupiter. Rarely in the history of astronomy has an image produced by a telescope created the world-wide excitement amongst the astronomical community, and the community in general, as the first impact image produced by the HST. Elsewhere in this edition, images I obtained from the electronic bulletin board have been used to illustrate Greg Bryant's overview. I have collected some of the best images of the event for this 'ringside' pictorial summary.

Image 1 (below)

This image shows two views of the impact zone on Jupiter of Fragment G of Comet Shoemaker-Levy 9. The image on the left was made in green light with the Planetary Camera channel of the WF/PC-2. The image on the right is the same field taken through the WF/PC-2 methane filter. Close examination of the images reveals radial markings present in the crescent structure. This suggests that it was formed by the ejection of material from the central impact site.

Spectroscopic observations by the HST of the G impact site revealed emission lines of magnesium, silicon and iron as well as absorption lines of ammonia and carbon disulphide. These originated from the cometary fragments. Although Jupiter and Comet Shoemaker-Levy 9 shared the same overall elemental abundance, the metals in Jupiter had long ago sunk toward the core of Jupiter, leaving a hydrogen/helium enriched outer atmosphere which made it easy to detect the metal and sulphur lines in the spectra taken by the HST. These observations were particularly interesting because most observers expected to find hydrocarbons, not metals (or sulphur-containing compounds) in the spectra of the impact sites.

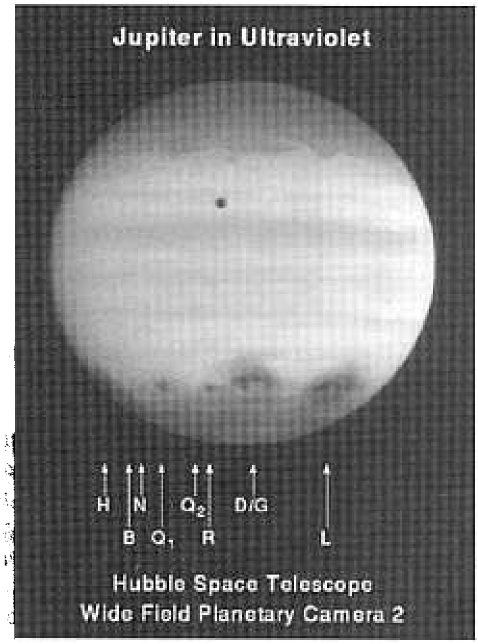


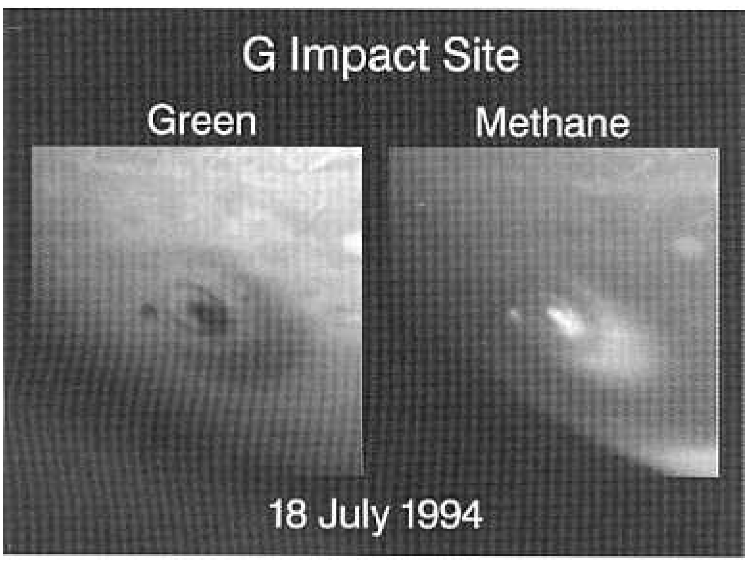
Image 2 (left)

An ultraviolet image of Jupiter taken by the WF/PC-2 of the HST about 2.5 hours after R's impact. The image shows Jupiter's atmosphere at a wavelength of 255 nm after several impacts. The most recent impact was by Fragment R which is below the centre of Jupiter (third dark spot from the right). A large dark patch from the impact of Fragment H is visible rising on the morning (left) side. Proceeding to the right, other dark spots were caused by impacts of Fragments Q1, R, D and G (now one large spot), and L, with L covering the largest area of any seen thus far. Small dark spots from B, N, and Q2 are visible with careful inspection of the image. The spots are very dark in the ultraviolet because a large quantity of dust is being deposited high in Jupiter's stratosphere, and the dust absorbs sunlight. Scientists will be able to track winds in the stratosphere by watching their evolution.

These spots will likely spread out over the weeks to come and may lead to heating of the stratosphere by solar absorption, causing changes in the local cloud structure.

All images courtesy The Hubble Space Telescope Jupiter Imaging Team.

Image 1



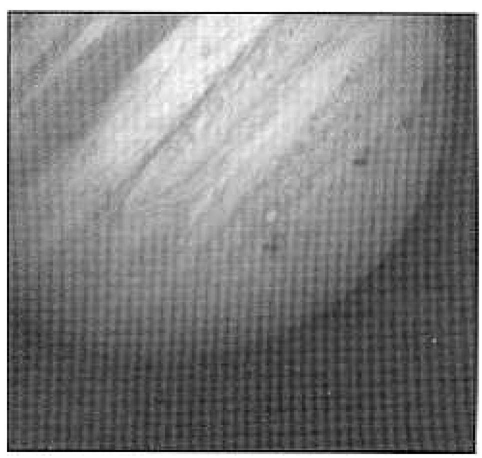


Image 3 (right)

Image of Jupiter with the Planetary Camera of the WF/PC-2. Eight impact sites are visible. From left to right are the E/F complex (barely visible on the edge of the planet), the star-shaped H site, the impact sites for tiny N, Q1, small Q2, and R, and on the far right limb the D/G/S complex. The D/G/S complex also shows extended haze at the edge of the planet. The features were seen to rapidly evolve on time scales of days. The smallest features in this image, which is a composite from three filters at 953, 555 and 410 nm, are less than 200 kilometres across.