Voyager Bulletin

MISSION STATUS REPORT NO. 35 FEBRUARY 19, 1979

Mission Highlights

As Jupiter looms larger and larger in Voyager 1's "eyes", anticipation and excitement are building back here at home. Members of Voyager's world-wide science community will be converging on the Jet Propulsion Laboratory, operations base for the mission, this week, taking up their short residences for the Encounter activities. A press conference at NASA Headquarters, Washington, D.C., on February 22 will present results to date, and the press corps will begin to descend on JPL February 26.

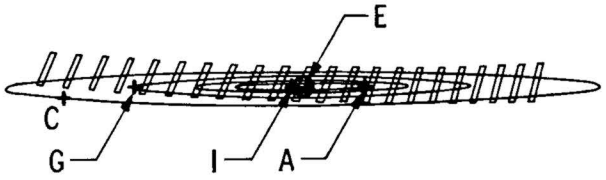
The flight team, meanwhile, continues flying the craft, checking it out, instructing it, and guiding it in for its close-up look at the giant planet and its satellites on March 4, 5, and 6.

UVS Scans System

Although the highest resolution images and closest approaches to the six bodies (Jupiter, Amalthea, Io, Europa, Ganymede, and Callisto) will not be obtained until the 39-hour Encounter period, much is being learned on the approach legs about the system as a whole.

Daily system scans by the ultraviolet spectrometer (UVS) sweep from the edges of one side of Callisto's orbit to the opposite side, searching for ultraviolet emission sources and distributions, and for gaseous clouds associated with some of the satellites. During these scans, the scan platform is stepped across the system at a very low rate (about 0.0052 degree per second), moving in either azimuth or elevation. Some of the slews produce a "sawtooth" pattern of coverage, while others step straight across the system, with the long axis of the instrument's field of view slit perpendicular to Jupiter's equatorial plane.

On February 18, the spacecraft was maneuvered so that the UVS slit was parallel rather than perpendicular to the plane of the ecliptic. The spacecraft was taken off Canopus and Sun lock and oriented by its gyro system in order to accomplish this "VERTSCAN" maneuver. The UVS then rastered across the system for about 7-1/2 hours, looking for contours of atomic hydrogen, taking the system's temperature, and looking for changes in temperature which might occur in the torus clouds. All of the data were recorded to be played back the next day.



UVS SYSTEM SCAN – The UVS is scanning the Galilean system from one edge of Callisto's orbit to the other. The satellites are (from left): Callisto, Ganymede, Io, Europa, and Amalthea.

First Callisto Images Targeted

The first targeted images of Callisto were taken through six filters on February 18, and are being processed through the mission and test imaging system (MTIS) and Image Processing Lab (IPL) at JPL. The resolution is calculated at about 140 kilometers per line pair, the highest resolution ever obtained of Callisto. Mapping of the satellite will continue this week.

Trajectory Correction Maneuver Scheduled

Voyager 1's final pre-Encounter trajectory correction is scheduled for February 20. The hydrazine thrusters will fire for approximately 2-1/4 minutes, changing the velocity and direction to deliver the spacecraft right to Jupiter's doorstep.

Knowledge of the exact paths of the spacecraft and target bodies is essential for loading the final pointing instructions for the scan platform. There is little margin for error, as the optical instrument's fields of view range from 0.10 degree to 3.5 degrees.

3 x 3 Mosaics to Begin

Jupiter has grown so large that 2 x 2 narrow angle mosaics, taken for the last 10 days, will soon no longer cover the disk, and 3 x 3 mosaics will begin on February 21. The disk will be covered in a grid of overlapping images taken at nine pointing positions.

NASA
National Aeronautics and Space Administration
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

Encounter Minus 14 Days

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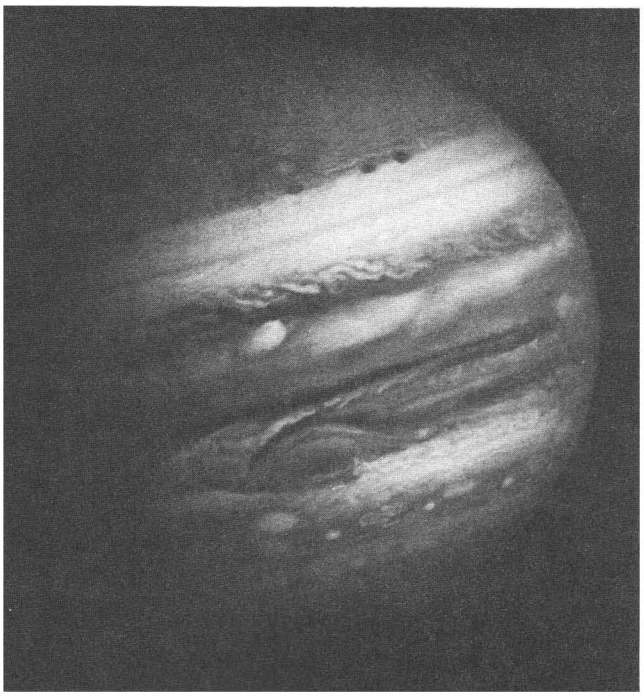


CLOSER AND CLOSER – Objects as small as 600 kilometers (375 miles) across can be seen in this image taken by Voyager 1 on February 1, 1979, at a range of 32.7 million kilometers (20 million miles). Different colors in clouds around the Great Red Spot seem to imply that the clouds swirl around the spot at varying altitudes. The bright cloud in the equatorial region north of the Great Red Spot appears to be where bright clouds originate, then stream westward. The images also show apparently regular spacing between the small white spots in the southern hemisphere and similar positioning of dark spots in the northern hemisphere. A major activity will be to understand the form and structure of the spots and how they may relate to interactions between the atmospheric composition and its motions. The bright ovals south of the Great Red Spot were seen to form about 40 years ago, and have remained much the same ever since, while the Great Red Spot itself has been observed for hundreds of years.

Voyager 1 is accelerating toward Jupiter at a velocity of 13.2 kilometers per second (29,428 miles per hour), the gravity of the giant planet now influencing the spacecraft more than that of the Sun. Voyager 1 will continue to slowly pick up speed on its inbound leg, until closest approach on March 5 when the pull of Jupiter will accelerate the craft to about 36 kilometers per second (80,970 miles per hour)! And as the spacecraft flashes past the planet, the gravity will slow it gradually until in June it will be travelling towards Saturn at about 22.8 kilometers per second (51,000 miles per hour).

Activities Increasing

On February 21, the photopolarimeter (PPS) will point to the satellites, searching for sodium and mapping the distribution of this neutral atom as a function of Io's position and Jupiter's magnetic field.

Europa will pass behind the planet on February 22, affording an opportunity to observe an eclipse of the satellite. Measurements will be taken to determine any temperature changes on Europa as it emerges from the shadow of the planet. These changes could provide insight into the satellite's composition, as a rocky surface would react differently to the temperature change than would an icy one.

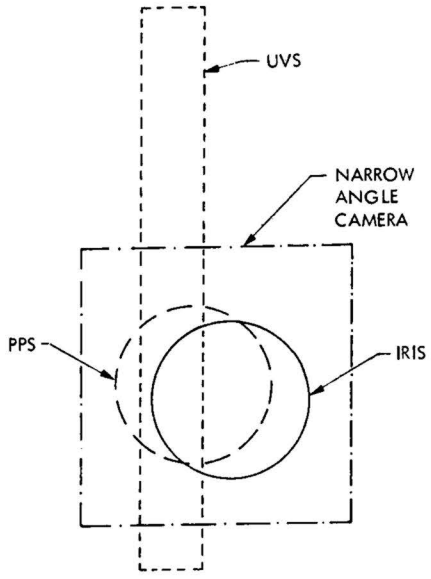
Searching for wind patterns travelling at greater than 100 meters per second (223.2 miles per hour), the imaging system will take a quick look at large regions of Jupiter on February 24. Lower wind speeds will be detected during closest approach.

On February 25, the first targeted image of Ganymede will be taken. Also, Voyager 1 is expected to cross the bow shock sometime next week, about February 26.

Summary

Voyager 1 is 15.2 million kilometers (9.5 million miles) from Jupiter, travelling with a heliocentric velocity of 13.2 kilometers per second (29,428 miles per hour). It has traced an arc through space of 988 million kilometers (614 million miles) since it left the Earth on September 5, 1977. It is now 644 million kilometers (400 million miles) from Earth, and radio signals take 35 minutes 42 seconds to cross this distance.

Voyager 2 is cruising quietly, 100 million kilometers (62 million miles) from Jupiter. Its heliocentric velocity has slowed to 11.5 kilometers per second (25,707 miles per hour), and its arc distance (the total distance travelled) is about 987 million kilometers (613 million miles). Radio signals take 31 minutes 40 seconds to travel the 571 million kilometers (355 million miles) between the spacecraft and Earth.



FIELDS OF VIEW – The FOV's of the optical instruments on Voyager's scan platform overlap so their data can be correlated.