Jupiter orbiter to launch in 1989

When the unmanned mission to Jupiter was scheduled to begin in 1982, NASA officials planned to deploy the Galileo orbiter and probe from the space shuttle. The direct voyage was expected to take about 18 months.

Five delays later — due mainly to rocket propulsion problems and the setback in the shuttle program — Galileo is now set for a 1989 launch date during the revamped shuttle program's ninth mission. The setbacks, however, have changed how Galileo will reach the fifth planet from the sun, lengthening the journey to six years.

To avoid possible damage to the shuttle, NASA officials have decided not to launch Galileo with a high-energy, liquid-fueled Centaur rocket. Instead, they will use a smaller launch vehicle and a route that will take advantage of the gravitational fields of Venus and earth.

After Galileo is launched from an apparatus set adrift from the shuttle Discovery during October 1989, it will fly around Venus and then twice around earth before being hurled toward Jupiter, each time changing its trajectory slightly and gaining momentum. The craft will provide the first direct sampling of Jupiter's atmosphere and the first extended observations of the planet and its moons.

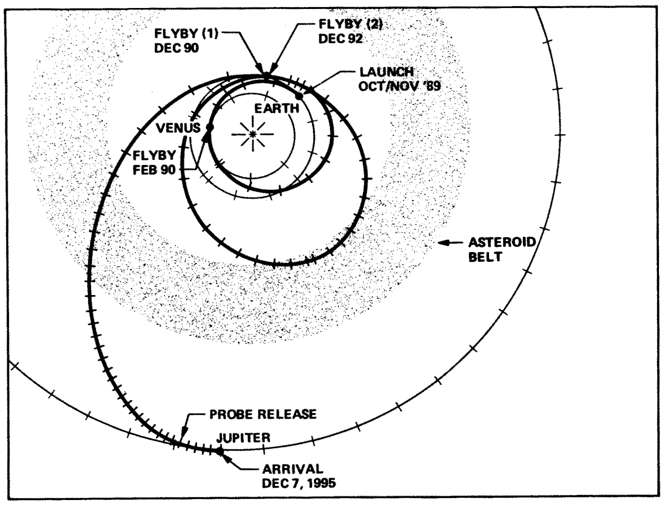
Because of Galileo's longer and more complex route, NASA scientists say they will be able to obtain more science from the mission, such as inner-planet observations and the first asteroid flybys. And they are confident the new course will work perfectly.

"There will be no miscues in this billiard game we're playing," said Galileo project manager John Casani last week at a NASA news conference in Washington, D.C., announcing the mission, which was named after the Italian scientist who discovered Jupiter's four large moons in 1610.

During February 1990, the 5,870-pound Galileo will fly within 9,300 miles of Venus and will search for evidence of lightning storms that were suggested during the Pioneer 12 flight. It also will measure the planet's atmospheric composition and distribution.

During the first return to earth 10 months later, Galileo will fly by at an altitude of about 620 miles. Then, during October 1991, it will pass within 620 miles of the asteroid Gaspra, located in the asteroid belt between Mars and Jupiter. Galileo will take pictures of the 10-mile-wide asteroid to correct its flight path, and will also observe Gaspra's composition.

After a 200-mile-altitude flyby of earth during December 1992, Galileo will pass the asteroid Ida, which also is located in the asteroid belt and which is twice as wide as Gaspra. Here the craft will make observations similar to those made during the Gaspra flyby, thus allowing scientists to directly observe asteroids for the first time.



The Galileo program, which will cost more than $1.3 billion, is a joint effort between the U.S. and West German governments. The West Germans designed the spacecraft's propulsion system and several of the 16 instruments that the orbiter and probe will carry on its unorthodox route.

In addition, during both earth flybys, Galileo will examine the moon's dark side, enabling scientists for the first time to map this section of the lunar surface using infrared.

In July 1995, almost five months before Galileo reaches Jupiter, its probe will be released. Shortly after entering the planet's atmosphere, the 737-pound probe will deploy a parachute, and for 75 minutes the probe will relay information to Galileo, which will have just entered Jupiter's orbit.

For the next 22 months, Galileo will make 10 orbits of Jupiter, each time coming within about 125 miles of Jupiter's four largest moons, which range in size between earth's moon and Mercury. During this part of the voyage, Galileo will take pictures of the moons that will have 20 to 100 times better resolution than those taken by Voyager 2 in 1979. After Galileo's instruments begin to wear out and stop functioning, the orbiter will continue in permanent orbit of Jupiter.

— S. Eisenberg

Link between earthquakes and El Niños?

The periodic, massive climatic upheavals known as El Niño-Southern Oscillations (ENSOs) may be triggered by intense tectonic activity in the seafloor near Easter Island in the East Pacific, a seismologist reported this week at the fall meeting of the American Geophysical Union in San Francisco.

Daniel A. Walker, from the Hawaii Institute of Geophysics in Honolulu, found that all five ENSOs occurring between 1964 and 1987 were preceded by spells of numerous earthquakes along the East Pacific Rise — one of a worldwide set of seafloor spreading centers that produce new oceanic crust.

"Since 1964 the track record on that correlation is, as far as I'm concerned, five for five," Walker told SCIENCE NEWS. "If you pick out the five most intense periods of tectonic activity that have occurred since 1964, you'll see that they coincide — within about six months — with all these five El Niños."

The ENSOs — a reorganization in Pacific climate patterns — bring torrential rains to normally arid parts of South America, while Australia and Indonesia suffer from abnormal droughts for up to a year and a half. On average, ENSOs recur every four to five years, but the timing and severity of the cycle are highly irregular.

Since the turn of the century, scientists have attempted to develop theories that explain the El Niño (an East Pacific warming trend) and the southern oscillations (abnormal shifts in air pressures over the Pacific), which were originally thought to be separate phenomena. In the last two decades they have learned that ENSOs result from an interaction between the ocean and the atmosphere. Without completely understanding how ENSOs begin, meteorologists have discovered that the ocean and atmosphere combine forces as an amplifier, generating a full-blown event out of some subtle initiating factor.

According to Walker, this factor may be tectonic activity. When he analyzed the seismic history of a long stretch of the East Pacific Rise around Easter Island, he found that the ridge tends to stay relatively quiet for a period of five to seven years, averaging only 1.8 earthquakes a month. Punctuating these quiescent times are periods of intense activity, which last only one or two months. During one active period, 21 earthquakes shook the ridge.

While the correlation between earthquakes and the onset of ENSO events may be coincidental, Walker suggests that the