N92-12890

First Spacecraft Encounter with an Asteroid Approaches . . . . . D. J. Tholen

During the course of the Galileo spacecraft's journey to Jupiter, it will make two excursions through the main asteroid belt, which is situated between Mars and Jupiter. The first excursion occurs between the two Earth gravity assists being used to direct the spacecraft to its ultimate destination and involves a close encounter with the asteroid 951 Gaspra; the second excursion occurs two years later during the final approach to Jupiter and will likely involve yet another asteroid flyby, this time with 243 Ida.

The first of these asteroid flybys will take place on 1991 October 29. In preparation for this encounter, ground-based astronomers have been studying the target asteroid with a variety of techniques to characterize this object, thereby complementing the spacecraft observations and enhancing the overall scientific return from this mission.

Below is a figure showing the brightness of the asteroid as a function of time. Data from several nights between January and April of 1990 have been folded with a period of 7.04246 ± 0.00006 hours, which represents the synodic rotational period of the asteroid. Colorimetry obtained concurrently with the lightcurve shows subtle variations in color, but only at the one standard deviation level of signficance. The evolution in the rotationally averaged brightness of the object during the opposition suggests that the sub-Earth latitude was changing significantly, a situation that could not occur if the obliquity of the rotation axis were low, thus a moderate to high obliquity is inferred. The overall shape of the lightcurve implies an asymmetrical shape for the asteroid, with axis ratios of about 1.6 to 1.1 to 1.

Gaspra is a small (about 15 km diameter) asteroid near the inner edge of the main asteroid belt. It's spectral classification is S, suggesting a composition similar to those of stony-iron meteorites.