GALILEO'S NEAR INFRARED MAPPING SPECTROMETER (NIMS) SCIENCE OBJECTIVES AND OBSERVATIONAL PLANS FOR IO R. Lopes-Gautier, R. Carlson, W. Smythe (Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91109), L. Soderblom (U.S. Geological Survey Branch of Astrogeology, Flagstaff, Arizona) and the Galileo NIMS Team.

One of the primary objectives of the Galileo mission is to investigate the nature of Io's dynamic volcanism. The Near Infrared Mapping Spectrometer (NIMS) is a remote sensing instrument aboard Galileo which combines imaging and spectral capabilities and will be used to map the composition and temperature of Io's surface and plumes. The NIMS observing plan for Io and selected observation designs will be presented.

NIMS has the unique capability to image and obtain spectral data simultaneously and is the first instrument of its kind to be flown in a planetary mission. The spectral range of NIMS is from 0.7 to 5.2 microns, which spans two regions: surface reflected light and emitted thermal radiation. NIMS will investigate both the surface mineralogy and the temperature of Io's surface features, as well as search for selected atmospheric species.

The main NIMS science objectives at Io include: (i) determining the composition of the surface units 50 km or larger on one hemisphere; (ii) determining the composition of selected surface units less than 10 km in size; (iii) characterizing the composition and temperature of flows and plumes; (iv) setting limits on the density of atmospheric SO_2; (v) measuring cooling of hot spots during eclipses; (vi) mapping shifts in surface composition and temperature with time.

Galileo's best opportunities for observing Io will take place during Jupiter orbit insertion (JOI), during which the spacecraft will fly by Io at a range of 1,000 km. NIMS's priorities during this period will be (i) to obtain high spatial resolution samples of selected areas at high spatial resolution (a few km) and medium spectral resolutions (50 to 204 wavelengths); (ii) to obtain global coverage at moderate spatial resolutions (around 50 km) and high spectral resolutions (204 to 408 wavelengths); and (iii) to map part of Io's darkside and the Loki plume using NIMS's thermal channels together with Galileo's photopolarimeter radiometer (PPR).

During the subsequent eleven orbits over a period of two years, NIMS observations will focus on monitoring changes in surface composition (such as SO_2 distribution) and temperature with time, using mainly moderate spectral resolutions (50 to 204 wavelengths). Observations of both the dayside and nightside will be made and will cover most longitudes at spatial resolutions ranging from about 100 to 1000 km. Additional observing opportunities during the tour will be provided by eclipses of Io by Jupiter, which will allow NIMS to investigate hot spots down to about 200K.