Geophysical Research Abstracts, Vol. 7, 06738, 2005
SRef-ID: 1607-7962/gra/EGU05-A-06738

Keck Near-infrared Observations of Saturn's Main Rings, E and G Rings Bracketing Earth's August 1995 Ring Plane Crossing

G. Verbanac (1), I. de Pater (2), M. Showalter (3), S. Chau Martin (4), J. Lissauer (5)

(1) Faculty of Science, Geophysical departement, University of Zagreb, Horvatovac bb (verbanac@irb.hr), (2) Astronomy Department, 601 Campbell Hall, University of California at Berkeley, CA 94720 (3) Center for Radar Astronomy, Stanford University,Stanford, CA 94305, (4) Astronomy Department, 601 Campbell Hall, University of Berkeley,CA 94720, (5) Space Science Division, MS 245-3, NASA Ames Research Center Moffett Field, CA 94035

We present results of near-infrared (1.24 – 2.26 micron) observations of Saturn's main ring, as well as its faint E and G rings, taken with the W. M. Keck telescope during August 8–11, 1995, surrounding the time that Earth crossed Saturn's ring plane RPX). These observations have been used to study the evolution of the brightness of the main rings as the viewing angle changed. We combined our data with Hubble Space Telescope (HST) results, which span the 12-hour around RPX, when Saturn was not visible from Earth. We will present both edge-on ring profiles and radial profiles obtained by ''onion-peeling" the edge-on data. Before RPX, when the dark (unlit) face of the rings was observed, the inner C ring (including the Colombo gap), the Maxwell gap, Cassini Division and F ring region were very bright in transmitted light. After RPX, the main rings brighten rapidly, as expected. The profiles show east-west asymmetries both before and after RPX. Prior to RPX, the evolution in ring brightness of the Keck and HST data match one another quite well. The west side of the rings showed a non-linear variation in brightness during the last hours before ring plane crossing, suggestive of clumping and longitudinal asymmetries in the F ring. Immediately after RPX, the east side of the rings brightened more rapidly than the west. A quantitative comparison of the Keck and HST data reveals that the rings were redder before RPX than after; we ascribe this difference to the enhanced multiple scattering of photons passing through to the unlit side of the rings.

Our E/G ring data confirm that the E ring is very blue. Its radial and vertical structure

are found to be remarkably similar to that apparent in the HST ringplane crossing data at visible wavelengths, reinforcing models of the ring's peculiar narrow or very steep particle size distribution. Our data show unambiguously that the satellite Tethys is a secondary source of material for the E ring. The G ring is found to be distinctly red, similar in color to Jupiter's main ring, indicative of a (more typical) broad particle size distribution.