

Thermal mapping of Saturn's main rings by Cassini CIRS: Temperature variations with changing viewing geometry

L. Spilker (1), N. Altobelli (1), S. Pilorz (1), C. Leyrat (1), C. Ferrari (2), S. Edgington (1), B. Wallis (1), J. Pearl (3), F. Flasar (3)

(1) Jet Propulsion Laboratory/California Institute of Technology, Pasadena, CA, USA, (Linda.J.Spilker@jpl.nasa.gov), (2) CEA Saclay/University Paris 7, France, (3) Goddard Spaceflight Center, Greenbelt, MD, USA

After three years in orbit around Saturn, the Cassini Composite Infrared Spectrometer (CIRS) has acquired a broad set of thermal measurements of Saturn's main rings (A, B, C and Cassini Division) for a number of different viewing geometries, most of which are not available from Earth. These thermal measurements include information on physical temperature as well as filling factor. Thermal mapping of both the lit and unlit faces of the rings is being performed within a multidimensional observation space that includes solar phase angle, spacecraft elevation, solar elevation and local hour angle.

The largest temperature variations on the lit face of the rings are driven by variations in phase angle while differences in temperature with changing spacecraft elevation are a secondary effect. Ring temperatures decrease with increasing phase angle suggesting a population of slowly rotating ring particles [1]. The largest ring temperatures are measured at zero degrees phase angle. The lit A and B rings both show temperature decreases with decreasing solar elevation while temperature changes in the C ring and Cassini Division are more muted. Variations in the geometrical filling factor are driven primarily by changes in spacecraft elevation. For the least optically thick region of the C ring, the filling factor variations are almost exclusively driven by spacecraft elevation. Our preliminary evaluation of the data set acquired to date will be presented.

This research was carried out at the Jet Propulsion Laboratory, California Institute of

Technology, under contract with NASA, and at CEA Saclay supported by the “Programme National de Planetologie”.

References [1] L. Spilker et al., PSS, 54, 1167 (2006).