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Saturn ring temperature changes before and after ring equinox

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The Cassini Composite infrared spectrometer (CIRS) retrieved the temperatures of Saturn's main rings at solar elevations ranging from 24 degrees to zero degrees at equinox (August 2009) as the sun traversed from the south to north side of the rings. Over this broad range of solar elevation the CIRS data show that the ring temperatures vary as much as 29K- 38K for the A ring, 22K-34K for the B ring and 18K-23K for the C ring. Interestingly the unlit sides of the rings show a similar decrease in temperature with the decreasing solar elevation.

As equinox approached, the main rings cooled to their lowest temperatures measured to date. At equinox the solar input is very small and the primary heat sources for the rings are Saturn thermal and visible energy. Temperatures are almost identical for similar geometries on the north and south sides of the rings. The ring temperatures at equinox were: C ring, 55-75 K; B ring, 45-60 K; Cassini Division, 45 – 58 K; and A ring, 43 – 52 K.

After Saturn equinox the solar elevation angle began to increase again and the temperatures on both the lit (north) and unlit (south) sides of the rings have begun to increase as well.

Ring thermal models developed by Flandes and Morishima are able to reproduce most of the equinox temperatures observed by CIRS. Results before and after equinox will be presented.

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