Longitudinal study of thermal waves in Jupiter's atmosphere.

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We report observations of Jupiter's upper tropospheric and stratospheric temperature fields near 200 mbar and 10 mbar, respectively, which were derived from images of Jupiter in the middle-infrared between wavelengths of 7 and 20 μm from the NASA Infrared Telescope Facility, using the JPL MIRLIN camera. The observations were amde during three periods in 1999: June/July, August and October, and in a period of almost weekly observations between December 20, 2000, and Jan 5, 2001. Longitudinal structure was examined in detail, particularly the North and South Equatorial Belts (NEB and SEB). Certain features appear to persist over the 3-month period in 1999, although considerable variability is seen. Several persistent features in the NEB are found to rotate at a speed of approximately -9 m/s with respect to the System-III rate. Other features either rotate at eifferent speeds or have evolved between the observations epochs. Very little consistency between observing epochs is seen in the longitdinal power spectrum of the NEB or SEB. The cold region associated with Great Red Spot (GRS) position rotates at a speed of -3 m/s with respect to System III,South equatorial belt (SEB) lonigiudinal structrue is more muted and shows fewer small warm features in comparison with the NEB. No obvious correlations are seen between longitudinal structure in the NEB and SEB. Rotation of features in the SEB appear to be similar to the rotation of the GRS. Stratospheric waves, prominent in mid-latitudes, display prominent drift rates that as similar to those in the troposphere.