

Time Dependence of Near-Infrared Zonal Waves in Jupiter's North Equatorial Belt

Joheen Chakraborty – Columbia University

Mentor: Glenn S. Orton – Jet Propulsion Laboratory/California Institute of Technology

Images of Jupiter's North Equatorial Belt (NEB, 7–17° N) display recurring atmospheric wave patterns in the 2–2.28 micron near-infrared range. We investigate the time dependence of the wave patterns using the Lomb-Scargle periodogram and Fast Fourier Transform methods, paying special attention to how their behavior correlates with periodic NEB expansions (NEBEs), which exhibit a 3–5 year cycle. Lomb-Scargle wave powers of NEB cylindrical maps display an apparent periodicity (with a frequency of ~ 3) during the time span between sequential NEBE start dates. Applying the FFT to composite maps covering all longitudes yields similar results as for the longitudes covered by single images. Moreover, the wave powers exhibit a longitudinal dependence, with higher System-III longitudes favoring higher wave powers throughout the entire periodic cycle. Further observations of trends in wave power and wavenumber will improve our understanding of NEB wave behavior, e.g. differences between measurements that sample different altitudes in Jupiter.