Saturn's Global Zonal Winds Explored by Cassini/VIMS 5-μm Images

Aaron Studwell, Liming Li, Xun Jiang, Kevin H. Baines, Patrick M. Fry, Thomas W. Momary, Ulyana A. Dyudina

Geophysical research letters. , 2018, Vol.45(14), p.6823-6831
https://doi.org/10.1029/2018GL078139

Abstract
The Cassini Visual and Infrared Mapping Spectrometer (VIMS) 5-μm images are used to derive Saturn's global zonal winds around the 2,000-hPa level. The comparison of zonal winds between 2,000 and 300–500 hPa shows a general consistency of wind structure between the two pressure levels on a global scale. However at some latitudes, the magnitude of the zonal winds differs between these levels. The equatorial zonal winds are stronger downward, while the zonal winds in the middle and high latitudes are generally weaker downward. These new wind measurements also imply that barotropic and baroclinic instabilities probably exist through the relatively deep atmosphere at some latitudes. Finally, our analysis reveals that the VIMS winds in the two polar regions are basically constant with time except for a westerly jet centered at ~88°N, which decreased from 135 ± 7 m/s in 2008 to 91 ± 12 m/s in 2017.