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Saturn's equatorial jet structure from Cassini/ISS

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Detailed wind observations of the equatorial regions of the gaseous giant planets, Jupiter and Saturn, are crucial for understanding the basic problem of the global circulation and obtaining new detailed information on atmospheric phenomena. In this work we present high resolution data of Saturn's equatorial region wind profile from Cassini/ISS images. To retrieve wind measurements we applied an automatic cross correlator to image pairs taken by Cassini/ISS with the MT1, MT2, MT3 filters centred at the respective three methane absorbing bands of 619nm, 727nm, and 889nm, and with the adjacent continuum CB1, CB2, and CB3 filters. We obtained a complete high resolution coverage of Saturn's wind profile in the equatorial region. The equatorial jet displays an overall symmetric structure similar to that shown the by same region in Jupiter. This result suggests that, in accordance to some of the latest compressible atmosphere computer models, probably global winds in gaseous giants are deeply rooted in the molecular hydrogen layer. Wind profiles in the methane absorbing bands show the effect of strong vertical shear, $\sim$40m/s per scale height, confirming previous results and an important decay in the wind intensity since the Voyager era ($\sim$100 m/s in the continuum and $\sim$200 m/s in the methane absorbing band). We also report the discovery of a new feature, a very strong and narrow jet on the equator, about only 5 degrees wide, that despite the vertical shear maintains its intensity ($\sim$420 m/s) in both, the continuum and methane absorbing band filters.

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