



## Short-term variability of Saturn's Radio Period

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The internal rotation rate of giant planets has been derived from measurements of the magnetospheric low-frequency radio emissions, thought to be tied to the internal planetary magnetic field. At Saturn, the intense auroral Kilometric Radiation (SKR) was found, in the Voyager era, to be strongly modulated at a period of  $10 \text{ h } 39.4 \pm 0.12 \text{ min}$ . But subsequent SKR observations by Ulysses and Cassini showed that Saturn's radio period varies by up to 1% at timescales of months to years. The only model proposed to date for this long-term variation invokes modulation of SKR source locations in local time by the solar wind (SW) fluctuations. Here we report a new method for measuring the SKR period more accurately than 1% on a timescale of a few days. Applying it to Cassini radio data, we demonstrate that the period fluctuates by  $\pm 1\%$  with a characteristic time of 20-30 days. These short-term fluctuations correlate with SW speed variations at Saturn, thus corroborating the above model. This result is a step toward the determination of Saturn's true rotation period.