

Saturn kilometric radiation periodicity before and after equinox

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Abstract

The rotation period of Saturn's magnetosphere was found to vary with time, and changing periodicities were identified in magnetic fields [1], radio emissions [2], and charged particles [3]. In this presentation we show the varying period of Saturn kilometric radiation (SKR) from 2004 to early 2014, a time period of almost 10 years.

From 2004 until early 2009 SKR had two periods, 10.8 h and 10.6 h, attributed to SKR radiated from the southern and northern hemisphere, respectively [4]. The periods converged during 2009 and show a complicated behavior afterwards which we will analyze in more detail. Our analysis is first applied to the complete SKR signal, and second to SKR intensities separated by spacecraft latitude and wave polarization, with right-handed SKR attributed to the northern hemisphere and left-handed SKR to the southern hemisphere. We apply the so-called tracking filter analysis [5], and we will also simply follow the phases of normalized SKR intensity maxima (north and south) with time. Both analyses yield similar results. A comparison of SKR periodicities after equinox to the planetary period oscillations of the magnetic field [6] shows major differences, and we will try to explain the deviations. We also identify minor SKR components where the modulation phase deviation exceeds one rotation each time Cassini completes one orbit, i.e. this is consistent with the characteristic of a searchlight-like signal. However, the main SKR signal still acts like a clock with a modulation phase independent of the local time of the Cassini spacecraft.

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References

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