

Analysis of Saturnian planetary rotation following the knowledge on Jovian radio emission

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We report on the Saturnian Radio Emission (SRE) recorded at Saturn by the Cassini Radio and Plasma Wave Science experiment (RPWS). We attempt to estimate the planetary rotation by applying the spectral method previously considered for the Jupiter radio emissions. This technique consists to distinguish between the spectral patterns occurring during one full Jovian rotation. Hence symmetrical features act around the axis of the planetary magnetic field due to the hollow cone beam. Therefore arc shapes appear with different orientations, i.e. vertex-early and -late arcs. This spectral ‘symmetry’ is fortified by the inclination between the geographical and the magnetic axes.

The Saturnian radio emissions exhibit more spectral complexity because both axes (i.e. magnetic and geographic) are quasi-aligned. Arc shapes are not frequently observed as in the case of Jupiter. We illustrate in our analysis that there is possibility to separate between Saturnian planetary rotations. Their occurrences are compared to the classic technique based on the variation of the Saturnian Kilometric Radiation (SKR) versus the sub-solar phase and the observation time (Kurth et al., JGR, 113, 2008). We discuss and we show that in several cases the planetary rotation accuracy is less than few minutes when combining both methods. We emphasize on spectral features by showing that the SRE and the SKR exhibit similar planetary rotation despite a difference in the emission frequency range.