



An SLS5 Longitude System Based on the Rotational Modulation of Saturn Radio Emissions

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Despite the close axisymmetry of Saturn's internal field, Saturn radio emissions like Saturn kilometric radiation (SKR) are modulated due to planetary rotation. Similar modulations are also observed in magnetic field perturbations, charged particles, and energetic neutrals. The internal rotation rate of Saturn ($810.8^\circ/\text{day}$) was originally assigned by the IAU based on the modulation period of SKR observed by Voyager (10.656 h). Later observations by Ulysses and Cassini revealed that the SKR modulation has two periods, one associated with each hemisphere, which vary by $\sim 1\%$ over the time scale of years. The hemispheric asymmetry may arise from different solar illuminations in the two polar regions, which leads to different strengths of the rotating field-aligned currents in the two hemispheres. With the completion of Cassini mission in September 2017, we now have over 14 years of observation of Saturn radio emissions, roughly from southern solstice to northern solstice. In this study, we extend the SLS4 longitude system to the end of the Cassini mission using a phase tracing method. The new Saturn longitude system (SLS5) organizes the SKR maxima around 0° longitude in both northern and southern hemispheres and it can be used to organize other phenomena observed in Saturn's magnetosphere, e.g. hot plasma injection events.