



Comparison of SKR phases with magnetic field phases after Saturn equinox

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The varying periodicity of Saturn kilometric radiation (SKR), magnetic field perturbations, and other rotational phenomena in Saturn's magnetosphere have been measured by various Cassini instruments for several years. While SKR clearly showed two periods attributed to the northern and southern hemisphere before Saturn equinox (August 2009), its behavior is more intricate afterwards. Northern and southern SKR have similar periods and phases from March 2010 until February 2011 and from August 2011 until June 2012, which is partly in disagreement with periods obtained from the magnetic field measurements. We will show that further insight into this problem can be obtained by a direct comparison of the SKR phases with magnetic field phases, with all phases ideally being displayed with respect to a common guide phase. After the application of certain phase shifts it is possible to bring the phases of the three magnetic field components (radial, azimuthal, co-latitudinal) into a good agreement with the SKR phase of the corresponding hemisphere. We will mathematically prove that it is the co-latitudinal magnetic field component that needs to be tracked during time intervals of similar northern and southern SKR periods and phases. Not taking this special case into account leads to the differences between SKR periods and magnetic field periods. Furthermore, no correction of the SKR phases with respect to the local time of the spacecraft is needed and SKR can be treated like a clock-like source, whereas the rotating magnetic field perturbations are corrected for the position of Cassini.