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Narrowband radio emissions and their relationship to rotating plasma clouds and magnetic disturbances at Saturn

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The RPWS (Radio and Plasma Wave Science) instrument onboard the Cassini spacecraft has frequently detected series of narrowband electromagnetic emissions that are associated with magnetospheric storms as detected by transient intensifications of Saturn kilometric radiation (SKR). Frequency-time spectrograms show that the strongest narrowband emissions tend to occur at frequencies near 5 kHz with bandwidths of about 2 to 3 kHz. Other bands also occur at higher frequencies, sometimes as high as 50 kHz. Analysis of all the events detected until mid-2007 shows that the emissions tend to be observed more frequently on the nightside of the planet and at high latitudes. The longitude of the Sun based on the SKR longitude system (SLS3) recently developed by Kurth et al. organizes the narrowband radio emissions better than the SLS3 longitude of the spacecraft, indicating that the modulation of the radio emissions is acting more like a flashing light than a rotating beacon. The narrowband radio emissions are believed to be produced by mode conversion from electrostatic waves near the upper hybrid frequency at about L $\approx$ 7 to 10 and latitudes of $\pm$ 30 degrees at steep plasma gradients in the inner magnetosphere This theoretical prediction is consistent with direction finding results. The rotating hot plasma clouds revealed by the MIMI/INCA instrument are recognized as a possible source for narrowband radio emissions since these two phenomena are well correlated with respect to periodic-

ity, intensity, and radial distance. We are also investigating the relationship of these phenomena to magnetically disturbed periods detected by the Cassini magnetometer.