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North-south asymmetries in the rotational modulation of Saturn's kilometric radiation and auroral hiss

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Abstract

It has been known for some time that Saturn Kilometric Radiation (SKR) has two distinct components, each with a different clock-like rotational modulation period [1]. Recent measurements by the Cassini spacecraft at high northern and southern latitudes have now shown that the first component, which has a modulation rate of about 799 deg/day, originates from the southern auroral region, and the second component, which has a modulation rate of about 816 deg/day, originates from the northern auroral region. A similar hemispherical asymmetry is also displayed by auroral hiss, which is a whistler mode emission generated in Saturn's auroral regions. Auroral hiss also has a rotational modulation, but with characteristics of a rotating beam rather than a clock-like source. In the northern hemisphere the rotational modulation rate of auroral hiss (817 deg/day) matches almost exactly the modulation rate of the northern SKR source. Because of north-south differences in the orbital coverage, the rotation rate of auroral hiss in the southern hemisphere is more difficult to measure accurately, but can be shown to have a poor phase correlation with auroral hiss in the northern hemisphere. These new results suggest that the auroral plasma does not rotate at the same rate in the two hemispheres, which has important implications on how rotational motions are coupled from the deep interior of Saturn into the magnetosphere.

References

[1] Kurth, W.S., Averkamp, T.F., Gurnett, D.A., Groene, J.B., and Lecacheux, A. (2008) *JGR, 113,* A05222, doi:10.1029/2007JA012861.