Ray tracing study on Jovian hectometric attenuation lanes

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Jupiter's hectometric (HOM) radiation, whose polar sources are located along the auroral magnetic fields with the L-shell >7 and <11 [*Ladreiter et al.*, 1994] or L-shell >10 [*Menietti et al.*, 2003], extends thorough the frequency range from a few hundreds kHz to either 3 MHz [*Carr et al.*, 1983], 7 MHz [*Barrow and Desch*, 1989] or 10 MHz [*Imai et al.*, 2011a]. In the time-frequency diagram, the sinusoidal decreased intensities appear below ~3 MHz, thereby being so-called attenuation lanes [*Higgins et al.*, 1995]. It is believed that they result from the ray refraction of a higher plasma density between HOM sources and an observer, which originates from plasma media either along Io's L-shell [e.g., *Gurnett et al.*, 1998; *Higgins et al.*, 2001; *Menietti et al.*, 2003] and/or in Io plasma torus [*Boudjada et al.*, 2011]. Recently, *Imai et al.* [2011b] found, based on the occurrence probability analyzed from the Cassini/RPWS data, that the attenuation lanes have different frequency drifts in the right- and left-hand polarization profiles. Also, the authors showed a higher occurrence probability of the HOM emissions next to the attenuated regions. Because these additional clues lead us to closely assess their mechanism, we have performed a three-dimensional ray tracing of the attenuation lanes from both northern and southern hemispheres of Jupiter. We will show the results of these ray tracing calculations and suggest the most plausible scenario of the attenuation lanes.

References

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