



Water-group ion cyclotron waves: Evidence for a time variable loss rate of water from the E ring

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Waves at the gyrofrequency of water-group ions have been found throughout a large portion of the E ring by both Cassini and earlier missions. The waves are left-hand polarized and travel along the magnetic field. Their source is most probably ions accelerated from keplerian to corotational velocities by the magnetospheric electric field when these ions are created from water in the E ring. Such “ring beam” ion distributions are unstable to ion cyclotron wave growth if their pickup velocity is sufficient to provide enough energy to overcome the natural damping in the thermal plasma. Most surprisingly Cassini finds the amplitude of the waves to be quite variable. We report herein on the statistical properties of the waves, including their region of occurrence and temporal variation.