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Studies from Cassini's high-inclination orbits: ion cyclotron wave belt

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Surrounding Saturn is a cloud of neutral water-group molecules. When these particles are ionized and accelerated by Saturn's corotating magnetized plasma, they generate ion cyclotron waves. When the inclination of the Cassini spacecraft's orbits rose to about fifty-five degrees in late 2006, new insights into the behavior of these ion cyclotron waves were obtained as the spacecraft passed through the equatorial plane, revealing latitudinal structure of the wave belt. Centered at the magnetic equator the wave amplitude grows with height in either direction, reaching a maximum at +/- 0.2 Rs and then decreasing until they disappear by +/- 0.3 Rs. Doppler shifts caused by the motion of the spacecraft reveal that these waves propagate primarily away from the equatorial plane. Using these high-inclination orbits, we study the wave growth and damping regions and their propagation characteristics. These properties give insight into the structure and ionization of Saturn's water cloud.