Geophysical Research Abstracts
Vol. 15, EGU2013-10601, 2013
EGU General Assembly 2013


# Global model of lower band chorus in the inner magnetosphere

Oleksiy Agapitov (1,2,3), Artemyev Anton (1,4), Krasnoselskikh Vladimir (1), Breuillard Hugo (1), and Rolland Guy (5)

(1) LPC2E/CNRS-University of Orleans, Orleans, France, (2) LE STUDIUM, Loire Valley Institute for Advanced Studies, Orleans and Tour, France, (3) National Taras Shevchenko University of Kiev, Kiev, Ukraine, (4) Space Research Institute, RAS, Moscow, Russia, (5) CNES, Toulouse, France

The global distribution of the whistler wave amplitudes and wave normal angles has been studied using STAFF-SA data from Cluster for lower-band chorus and hiss waves. We present the probability distributions of wave amplitudes and wave-normal angles based on the statistical study of wave measurements obtained from the Cluster spacecraft from 2001 to 2010. The wave magnetic and electric field amplitude distribution on the day side has a minimum near the equator. As latitude ($\lambda$) increases up to $15^\circ - 25^\circ$, wave amplitudes increase to maximum values of the wave magnetic field of 90 pT during low geomagnetic activity periods and reaching up to 200 pT for high geomagnetic activity. The night sector wave amplitude distribution has a peak of about 100 pT near the equator ($-15^\circ < \lambda < 15^\circ$) during high geomagnetic activity periods. The distribution of wave normal polar angle $\theta$ at the geomagnetic equator was concentrated in a $30^\circ$ cone, with a maximum around $10^\circ - 15^\circ$. The probability density functions of the wave amplitudes and wave-normals are usually non-symmetric and have significant non-Gaussian tails. The plasmasphere hiss showed the most clear dependence of $\theta$ on $\lambda$ for all wave amplitudes: $\theta$ mean value increases and roughly equal to $2 * \lambda$ for $\lambda > 10^\circ$, reaching the resonance cone at $\lambda\sim30^\circ - 40^\circ$. Chorus and hiss waves out of the plasmasphere propagated away from the equatorial source region starting from $\theta$ mean values about $15^\circ$. As $\lambda$ increases, the $\theta$-distribution spreads toward more oblique angles. A rapid decrease of the probability to find very oblique waves with $\theta > 60^\circ$ at $\lambda > 25^\circ - 40^\circ$ is observed, thus field aligned waves become dominate at $20^\circ < \lambda < 35^\circ$. The attenuation of oblique lower-band chorus and hiss is more significant with increasing of the $L$-shell, in the night sector and during high geomagnetic activity. Then wave-normals approach the resonance cone, waves propagate in a quasi-electrostatic mode till their reflection at at $\lambda\sim25^\circ - 40^\circ$ that is seen in the growth of wave electric field amplitudes $\lambda > 20^\circ - 30^\circ$. The observed properties of $\theta$ distribution partially can be explained by effects of wave Landau damping along the ray path.