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The Role of Heavy Ions in the Generation of EMIC Waves

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The effect of EMIC waves, generated by a positive ion temperature anisotropy on Earth's RC dynamics is one of the best known examples of wave-particle interaction in the magnetosphere and the most controversial mechanism of RC losses. Under certain conditions, relativistic electrons with energy ≥ 1 MeV can be removed from the outer RB by EMIC wave scattering during a magnetic storm much faster than by any other loss mechanisms. That is why the calculation of EMIC waves are very critical part of the LWS program. Systematic studies of magnetosphere-plasmasphere-ionosphere coupling are needed in order to provide EMIC waves forecast on a global scale and include WPI processes in the RB modeling. To quantify the EMIC wave effects on the RC-ion and RB-electron dynamics, a self-consistent theoretical description of the ions, electrons, and EMIC waves should be employed in future RB studies. This talk will emphasize the role of the heavy ions in the EMIC waves formation on a global scale and their nonlinear coupling with lower hybrid waves.