Survey of the Favorable Conditions for Magnetosonic Wave Excitation

Kyung-Chan Kim (1) and Yuri Shprits (2,3,4)
(1) Daegu University, College of Education, Science Education, Gyeongsan, Gyeongbuk, Korea, Republic Of
(kyungchan80@gmail.com), (2) Helmholtz Centre Potsdam, GFZ German Research Centre for Geosciences, Potsdam, Germany, (3) Institute of Physics and Astronomy, University of Potsdam, Potsdam, Germany, (4) Department of Earth, Planetary, and Space Sciences, University of California, Los Angeles, California, USA

The ratio of the proton ring velocity \( V_R \) to the local Alfven speed \( V_A \), in addition to proton ring distributions, plays a key factor in the excitation of magnetosonic waves at frequencies between the proton cyclotron frequency \( f_{cp} \) and the lower hybrid resonance frequency \( f_{LHR} \) in the Earth’s magnetosphere. Here we investigate whether there is a statistically significant relationship between occurrences of proton rings and magnetosonic waves both outside and inside the plasmapause using particle and wave data from Van Allen Probe-A during the time period of October 2012 to December 2015. We also perform a statistical survey of the ratio of the ring energy \( E_R \), corresponding to \( V_R \) to the Alfven energy \( E_A \), corresponding to \( V_A \) to determine the favorable conditions under which magnetosonic waves in each of two frequency bands \( f_{cp} < f \leq 0.5f_{LHR} \) and \( 0.5f_{LHR} < f < f_{LHR} \) can be excited.