

Investigation of ion components in the plasmasphere using plasma wave observations from Van Allen Probes observations

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Magnetosonic waves (MSWs) (or equatorial noise) are electromagnetic emissions whose properties can be described by the cold plasma extraordinary mode. MSWs are typically observed between the proton cyclotron frequency and the lower hybrid resonant frequency generated by the ring distributions of energetic protons. Our previous studies indicated that MSWs becomes left-handed (LH) polarized inside the plasmasphere when the wave frequency becomes lower than the cross-over frequency. Since the local cross-over frequency depends on the local ion composition, it is possible to investigate the local ion compositions by estimating the frequency at which polarization reversal of MSWs takes place. Taking into consideration of this point, we estimate the local ion compositions by estimating both the cross-over frequency and the $L=0$ cut off frequency that also depends on the local ion compositions. We use both EFW and EMFISIS data from Van Allen Probes to study the frequency spectrum of MSWs. In this study, $M/Q = 2$ ion is identified as have reported by Matsuda et al. [2016]. We also find that the ion composition depends on the radial distance from the Earth at relatively low altitude. We will report this result and the spatial distribution of the ion composition from the statistical survey of the Van Allen Probe observations.