Relations between ULF waves and ion distributions in the magnetosphere: MMS observations

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Recent studies investigating wave-particle interactions between Pc5 waves and ions in the magnetosphere have shown selective local enhancement of O^+ ion fluxes due to drift-bounce resonance [e.g., Oimatsu et al., 2018; Zong et al., 2012; Yang et al., 2011]. However, there has not been a sufficient number of comprehensive studies that focused on the relation between ULF waves and ion flux variations. As a result, it is not clear if ULF waves generally play an important role in modifying ion populations. Recently, the Hot Plasma Composition Analyzer (HPCA) onboard the Magnetospheric Multiscale (MMS) constellation have been making ion composition measurements in the energy range 1 eV to 40 keV in the magnetosphere. The present study uses the HPCA data to investigate the relation between ULF waves and H^+ and O^+ ion distributions in the energy range below 40 keV. Fluxes of ionospheric origin O^+ ions in the magnetosphere are correlated with solar wind speed and wave power in the Pc5 frequency band on the dayside, on the other hand, H^+ fluxes do not show such correlation. In the presentation, we provide details of these results and discuss the general influence of ULF waves on ion dynamics in the magnetosphere.