

The Disappearance of the Post-Midnight High Energy Ion Plasmasphere

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The Van Allen Probes Helium Oxygen Proton Electron (HOPE) instrument measures a high energy tail of the thermal plasmasphere that has strong MLT dependence in the near Earth space. In our study, we statistically analyze a 16 month period of HOPE data, looking at quiet times with a Kp index of less than 3. The high energy plasmasphere tail is the upper 5% of plasmasphere energies, consisting of ions between 1 - 10 eV. We calculated plasma densities over this energy range and see that there is strong depletion in O⁺ and H⁺ from 1-4 MLT and a similar but less dramatic density decline in He⁺. Our results are compared with the Van Allen Probes Electric Fields and Waves (EFW) instrument space craft potential to rule out spacecraft charging. We conclude that the post-midnight ion disappearance is due to diurnal ionospheric temperature variation and charge exchange processes.