Plasmaspheric $H^+$, $He^+$, $He^{++}$, $O^+$, and $O^{++}$ Densities and Temperatures

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OBJECTIVE

The objective for a new GCPM, call it GCPM*, is to take advantage of extensive plasma density and temperature measurements performed with the Ruminating Ion Mass Spectrometer (RIMS) that provide plasma densities and temperatures for five ion species: $H^+$, $He^+$, $He^{++}$, $O^+$, and $O^{++}$. Further, it is intended that these data will be used in the DATASET display to the right. The density profile as a function of altitude suggests that connection is best ordered spatially by $L$-shell and sometimes by altitude or radial distance. The gaps in this solution set result from expected that there will be a strong dependence on geophysical or space weather conditions, even though these quantities were derived some time ago from the Ruminating Ion Mass Spectrometer onboard the Dynamospheric Explorer (DSEX) satellite over the years 1981-1994. Some of the quantitative properties are presented. Densities are found to have one behavior with lower statistical variation below about $L=2$ and another with much greater variability above that $L=2$ with $L=3$ expected to be smooth in value and gradient. Samples of the existing GCPM are shown below.

SUMMARY

Three areas are shown to the right. The first provides a quick look at an initial set of equations that can be used to describe some, but not all, of the densities and temperatures. This is a preliminary look at the products sought through this investigation. Perhaps not unexpectedly there is a perponderance of relatively ordered spatial relationships between L-value and altitude on $H^+$ density. The center graphic shows the spatial coverage in the magnetic equatorial plane of temperatures below 3 eV, again increasing with L-value. The temperature ratios of He+/H+ are tightly centered around 1.0 except for the middle plasmasphere between 1.3-1.5, and 4.5 where like temperatures can be significantly higher. The temperature of $He^{++}$, $O^+$, and $O^{++}$ are consistently higher than $H^+$.

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