

THE LONGITUDINAL AND SEASONAL VARIATION IN PLASMASPHERIC DENSITY

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Due to the tilt of the geomagnetic field, there is a longitude-dependent asymmetry in ionospheric solar illumination at opposite ends of magnetic field lines in winter and summer months. This difference is greatest at American longitudes, where, for example, the 300° longitude field line extending 2.5 Earth radii into space has its southern hemisphere footprint in Antarctica near 65° geographic latitude and in the northern hemisphere at 42° latitude. We combine ground-based observations of VLF whistlers and ULF field line eigenoscillations with in situ measurements by the CRRES and IMAGE spacecraft to determine the annual and longitudinal variation in electron and ion density in the equatorial plane. For example, we find that at American longitudes both the electron and ion mass densities at 2.5 Earth radii are about 2.7 times larger in December at solar maximum than in June. At Australian longitudes the December : June ratio of mass densities is ~0.6. The IMAGE spacecraft EUV experiment also provides information on He⁺ densities, allowing estimates of the seasonal variation in ion composition in the inner magnetosphere.

plasmasphere, ionosphere, plasma waves, whistlers

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