

Plasma Density Distributions along the Magnetic Fields: The Coordinated Observation of Arase and Van Allen Probes

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Plasma density distributions along the magnetic fields are studied using coordinated observation of Arase and Van Allen Probes.

From radio and plasma waves observed by the PWE onboard Arase and the EMFISIS onboard Van Allen Probes we identify upper hybrid resonance frequencies and determine in-situ electron number densities. Due to the difference of inclination of orbits of Arase and Van Allen Probes, we can measure electron number densities at different magnetic latitudes on the same field line by utilizing data obtained by both Arase and Van Allen Probes. Such data sets provide information of field aligned density distributions.

On the other hand, The MGF onboard Arase measures the static magnetic field and low-frequency magnetic field variations. From the MGF data, we obtained field line resonance (FLR) frequency and estimated equatorial plasma mass densities. Solving the FLR wave equation, we assumed power-law density distribution with value of power law index which is estimated from the above-mentioned electron density measurements. Furthermore, we derived average ion mass from mass density and electron density with the assumption of quasi-neutrality of plasma.

We will report plasma density distribution in the inner magnetosphere including the plasmasphere, plasma trough and plume.