

Energy Transfer from the Heliosphere and the Dynamics of the Van Allen Radiation Belts

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The Van Allen radiation belts are composed of energetic protons and electrons trapped in electromagnetic drifts encircling Earth. The so-called "outer zone" radiation belts, a population found primarily at radial distances of 3-7 Re, exhibit significant temporal and spatial variability, with particle fluxes observed to vary over orders of magnitude on time scales ranging from minutes to periods commensurate with the solar cycle. A central focus of radiation belt research is concerned with understanding the direct and indirect transmission of energy from the heliospheric environment to the individual particles comprising the belts. In this work we review the various mechanisms by which energy is thought to be transferred from the solar wind to the radiation belts, and discuss recent advances in modeling and new observations from the NASA Van Allen Probes mission providing insight into the structure and dynamics of the belts.