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Plasma waves and electrostatic structures near propagating boundary layers in the inner terrestrial magnetosphere: Van Allen Probes and THEMIS observations DAVID MALASPINA, University of Colorado, LASP, JOHN WYGANT, University of Minnesota, ROBERT ERGUN, University of Colorado, LASP, GEOFF REEVES, RUTH SKOUG, BRIAN LARSEN, Los Alamos National Laboratory — A broad range of plasma wave phenomena, only recently reported in the near-equatorial inner terrestrial magnetosphere, have been detected using the Van Allen Probes. These phenomena include electrostatic structures, such as double layers and phase space holes, as well as plasma wave modes including nonlinearly steepened whistler waves and kinetic Alfvén waves. The ubiquity of these structures is now confirmed, but it is not understood what role these structures and waves play in the dynamics of the inner magnetosphere and radiation belts. To quantify their importance, it is necessary to understand their distribution, generation, and impact on particle populations. In this study, we demonstrate a strong correlation between the occurrence of these phenomena and plasma boundaries, including the inner edge of the plasma sheet, propagating injection fronts, and the plasmapause. Further, we find that these structures and waves are continually generated as these boundaries propagate through the inner magnetosphere. Understanding the generation mechanisms of these structures and waves, as well as their impact on particle populations stands to benefit significantly from careful theoretical treatment, numerical simulation, and laboratory experiments.

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