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Nonlinear wave-particle interactions in the outer radiation belts: Van Allen Probes results OLEKSIY AGAPITOV, FORREST MOZER, Space Science Laboratory, University of California Berkeley, ANTON ARTEMYEV, UCLA, JAMES DRAKE, Institute for Physical Science and Technology University of Maryland, IVAN VASKO, Space Science Laboratory, University of California Berkeley — Huge numbers of different nonlinear structures (double layers, electron holes, non-linear whistlers, etc. referred to as Time Domain Structures - TDS) have been observed by the electric field experiment on board the Van Allen Probes. A large part of the observed non-linear structures are associated with whistler waves and some of them can be directly driven by whistlers. Observations of electron velocity distributions and chorus waves by the Van Allen Probe B provided long-lasting signatures of electron Landau resonant interactions with oblique chorus waves in the outer radiation belt. In the inhomogeneous geomagnetic field, such resonant interactions then lead to the formation of a plateau in the parallel (with respect to the geomagnetic field) velocity distribution due to trapping of electrons into the wave effective potential. The feedback from trapped particles provides steepening of parallel electric field and development of TDS seeded from initial whistler structure (well explained in terms of Particle-In-Cell model). The decoupling of the whistler wave and the nonlinear electrostatic component is shown in PIC simulation in the inhomogeneous magnetic field system and are observed by the Van Allen Probes in the radiation belts.

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