Observations	Purpose	Comment	Citation
Unexpected Discoveries		Science: Three Belts PRL: Double Layers Nature: Zebra Stripes	Baker et al. , 2013 Mozer et al., 2013 Ukhorskiy et al., 2013
1. Determine spatial / temporal variations of medium & high energy electron & proton angle & energy distributions, faster than drift times, interior & exterior to acceleration events	Determine time history of energization, loss, & transport for hazardous particles. Understand / quantify source of these particles & source paths. Enable improved particle models	Science: Dynamic 3 belts GRL: MeV precipitation Nature: Zebra Stripes generation GRL: Eigen Mode electron decay Prep: Inner region injections GRL: Non-Storm rel. electron enhance. GRL: Non-Storm rel. electron enhance. GRL: Substorm e-belt enhancement GRL: Dynamic modeling: Obs. waves/seed GRL: Model dropout with MP JGR: Precip vs. trap. Rel. Elect (loss rate)	Baker et al. 2013 Blum et al. 2013 Ukhorskiy et al. 2014 O'Brien et al. 2014 Gkioulidou et al. 2014 Su et al. 2014 Schiller et al. 2014 Foster et al., 2014 Tu et al., 2014 Hudson et al. 2014 Li et al. 2013
2. Derive electron & proton radial phase space density profiles for medium & high-energy electrons & protons on timescales short compared to storm times.	Distinguish between candidate processes of acceleration, transport, & loss, & statistically characterize these processes versus solar input conditions.	Science: PSD Profiles. Local acc. GRL: PSD tracks multi acc. Processes JGR: Causes of sudden dropouts	Reeves et al., 2013 Baker et al. 2014 Turner et al. 2014

Observations	Purpose	Comment	Citation
3. Determine spatial/temporal variations of charged particle partial pressures & their gradients within the inner magnetosphere with fidelity to calculate pressure-driven currents	Understand how large-scale magnetic & electric fields in the inner magnetosphere are generated & evolve, their role in the dynamics of radiation belt particles, & their role in the creation & evolution of the plasma environments for other processes	Prep: Injections role in Pressures Prep: Global electric (2 SC) GRL: Role of injections in ring current	Gkioulidou et al. 2013 Thaller et al. 2014 Yu et al. 2014
4. Determine spatial/temporal variations of low-to-medium energy electron & ion energy, composition, & angle distributions on timescales short compared to drift periods	Understand/quantify the conditions that control the production & propagation of waves (e.g. EMIC, whistler-mode chorus and hiss); & determine the wave propagation medium	GRL: Model with observed seed pop. GRL: Storm plasmasphere erosion GRL: Dynamic He distributions	Tu et al. 2014 Foster et al. 2014 Gerrard et al. 2014
5. Determine the local steady & impulsive electric & magnetic fields with fidelity to determine the amplitude, vector direction, and time history of variations on a timescale short compared times required for particle measurements	Determine convective & impulsive flows causing particle transport & energization; determine propagation properties of shock generated propagation fronts; & inferring total plasma densities	Prep: Dynamic electric fields	Thaller et al. 2014

Observations	Purpose	Comment	Citation
6. Determine spatial/temporal variations of electrostatic & electromagnetic field amplitudes, frequencies, Intensities, directions & temporal evolutions with fidelity to calculate wave energy, polarization, saturation, coherence, wave angle, and phase velocity for (A) VLF, and ELF waves, & (B) random, ULF, and quasi-periodic fluctuations	Determine the type / characteristics of plasma waves causing particle energization & loss: including wave growth rates; energization & loss mechanisms; diffusion coefficients & loss rates; plasma densities; ULF waves versus irregular fluctuations effects on radial transport; and statistical maps of wave fields versus position and conditions	Nature: Whistler Acceleration Nature Expr: ULF Energization GRL: Hiss Elect Losses (3rd belt) Nat. Ph: Hess Elect Losses (3rd belt) GRL: Whistler statistics fr.Precip. GRL: ULF Drift Resonance GRL: Injection caused Hiss GRL: Kinetic Alfven parallel res. GRL: Chorus fine scale: wave vec. GRL: Direct Whis-P interaction obs. GRL : Pc-1 observations mapped. GRL: ULF Drift resonance generation GRL: EMIC non-effect on rel. elect. GRL: EMIC VAP localization vs. gnd. JGR: More on Hiss Elect. Losses GRL: Hiss generated precipitation	Thorne et al. 2013 Mann et al. 2013 Thorne et al. 2013 Shprits et al. 2013 Li et al. 2013 Claudepierre et al. 2013 Li et al., 2013 Chaston et al. 2014 Santolik et al. 2014 Fennell et al. 2014 Paulson et al. 2014 Dai et al. 2014 Usanova et al. 2014 Mann et al. 2014 Ni et al., 2013 Li et al., 2014
7. Provide concurrent, multipoint measurements sufficient to constrain global convective electric field & storm-time electric and magnetic field models	Convert particle measurements to invariant coordinate systems; infer loss cone sizes; & model effects of global electric & magnetic field variations on particle distributions	Prep: Global electric GRL: Multipoint PSD matching JGR: New Neural L* for VAP data	Thaller et al. 2014 Morley et al. 2013 Yu et al. 2014

Observations	Purpose	Comment	Citation
8. Track/characterize transient structures propagating through the inner magnetosphere with fidelity to determine amplitude, arrival times, and propagation directions	Determine which shock related pressure pulses produce significant acceleration, & provide estimate of their significance relative to other energization mechanisms	Prep: Shock Propagation	Foster et al. 2014
Miscellaneous		GRL: Wave interactions with SC	Malaspina et al. 2014