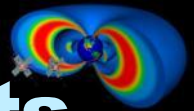


Relation between Dusk-side Precipitation and Electron Acceleration/Loss Process in Radiation Belt

Jaejin Lee, Kyung-Chan Kim, JungA Hwang, Yeon-Han Kim, Young-Deuk Park (KASI)

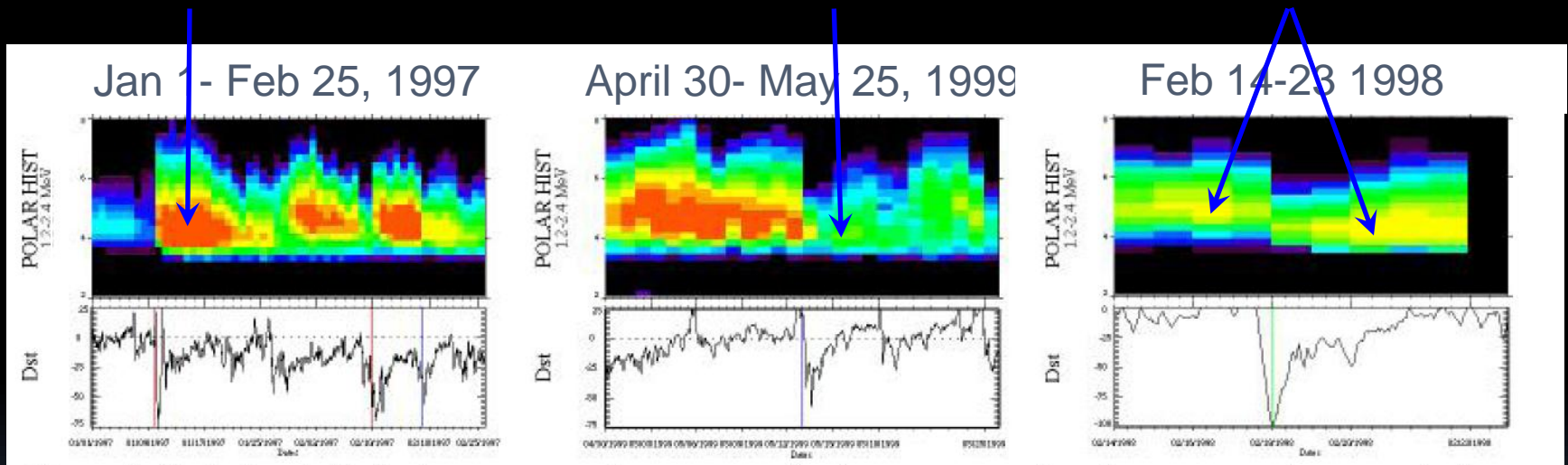
Different responses for Storm events



Cause dramatic radiation belt enhancements

Cause dramatic radiation belt suppression

Cause no dramatic effects on radiation belts



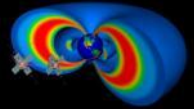
Acceleration Dominant

Loss Dominant

Acceleration-Loss
Equivalent

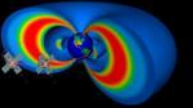
Relation between acceleration and loss process

Reeves et al., 2003.



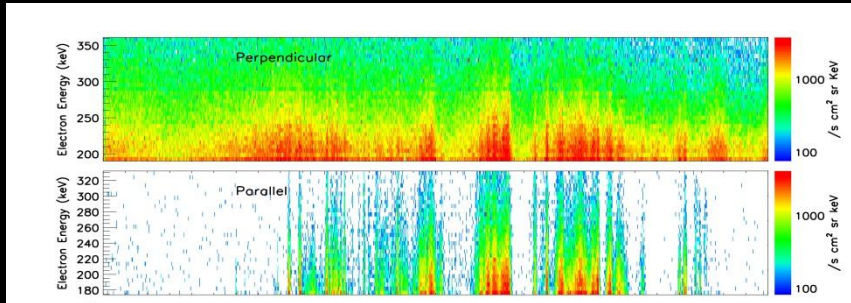
Electron Loss Process

- **Move out from magnetosphere**
 - Magnetopause shadowing
- **Precipitation into atmosphere**
 - Wave-Particle Interaction
 - Pitch angle scattering by field line curvature

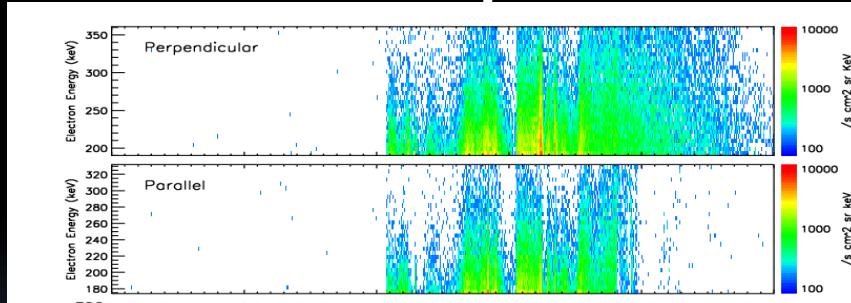


Energetic Electron Precipitation

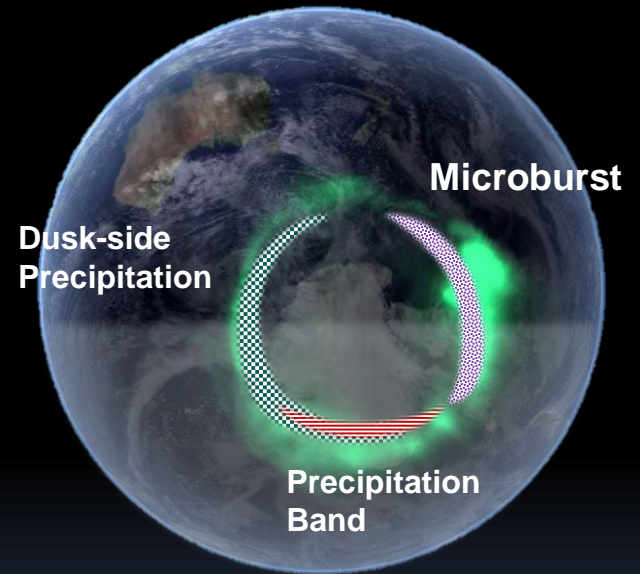
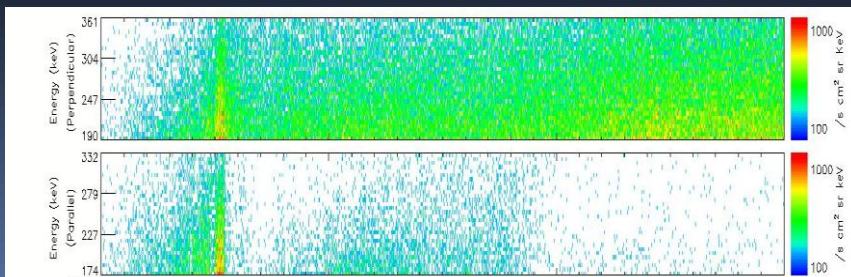
■ Electron Microbursts

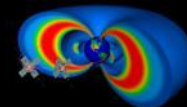


■ Dusk-Side Precipitation



■ Precipitation Band(Spikes)





NOAA POES Data Analysis

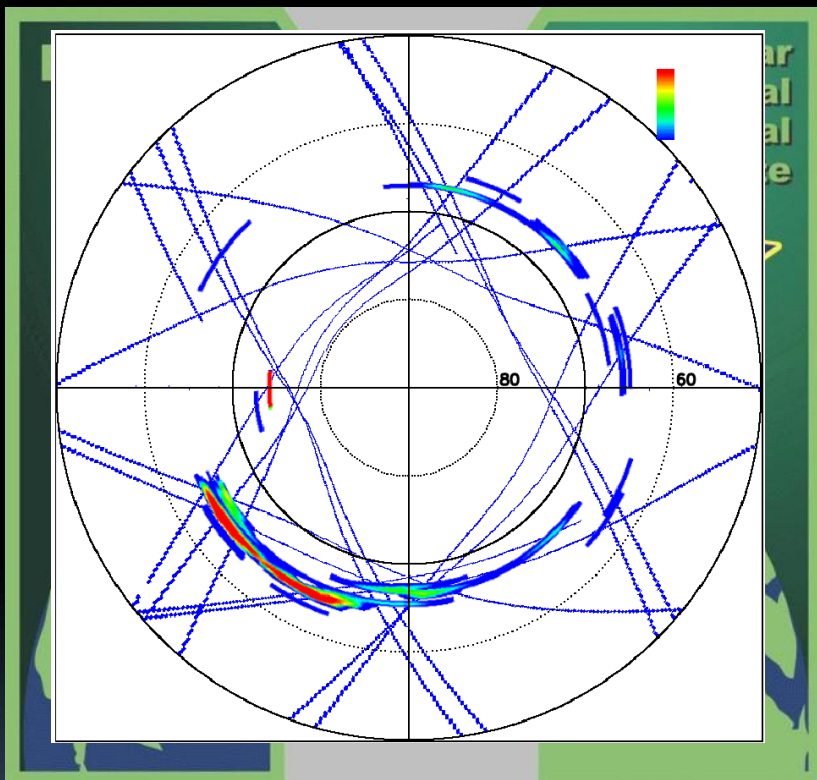
Low Altitude (830 km) Polar Orbits

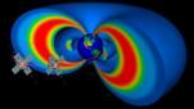
Instrument: Medium Energy Proton and Electron Detector (MEPED)

Now **six** satellite data is available

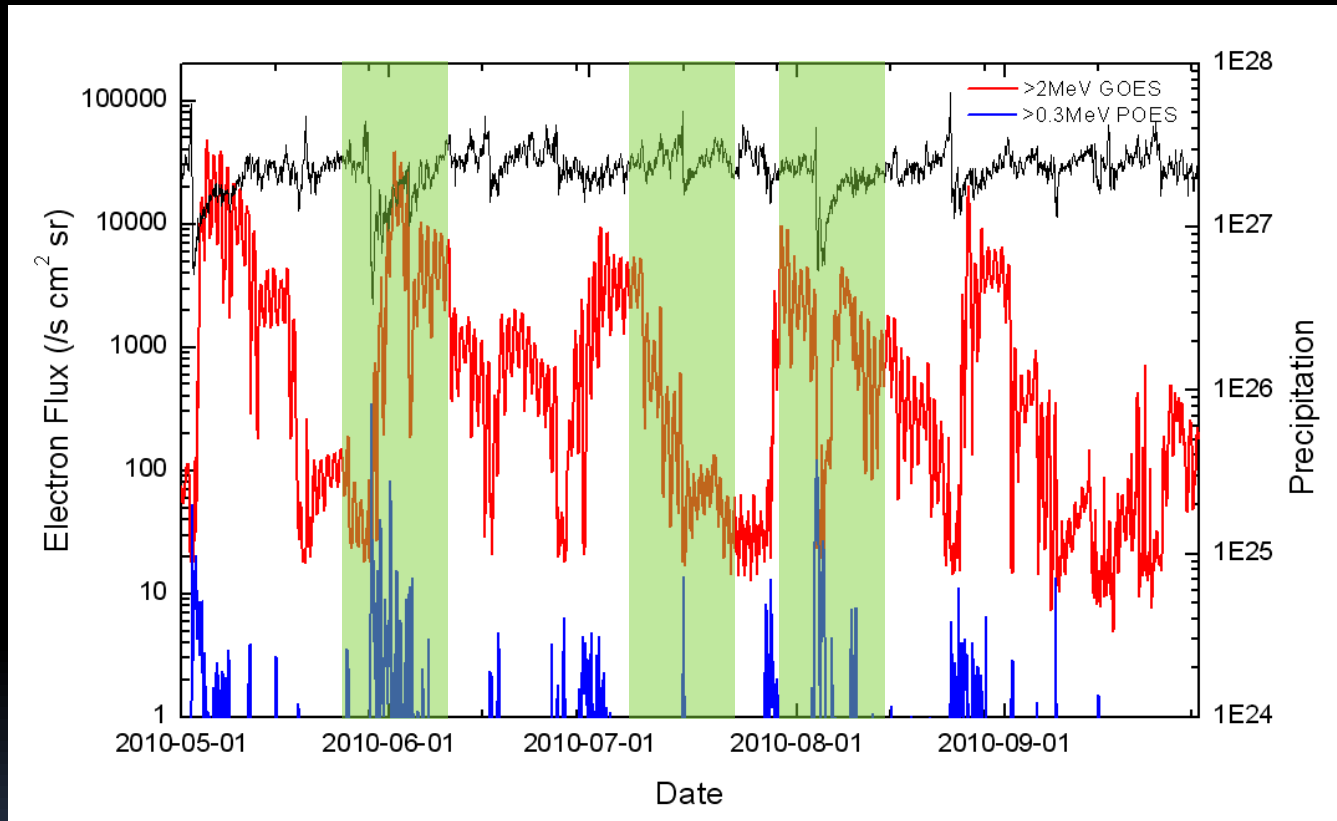
Analysis

- Display six satellites orbits on geomagnetic coordinate for two hours
- Assume north and south pole precipitation is symmetric
- Interpolate parallel component electron flux on the same magnetic latitude

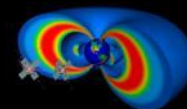




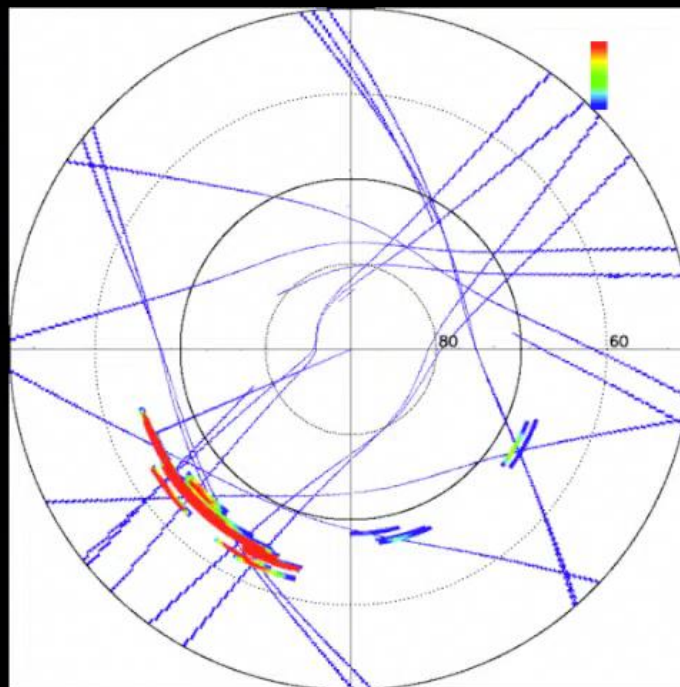
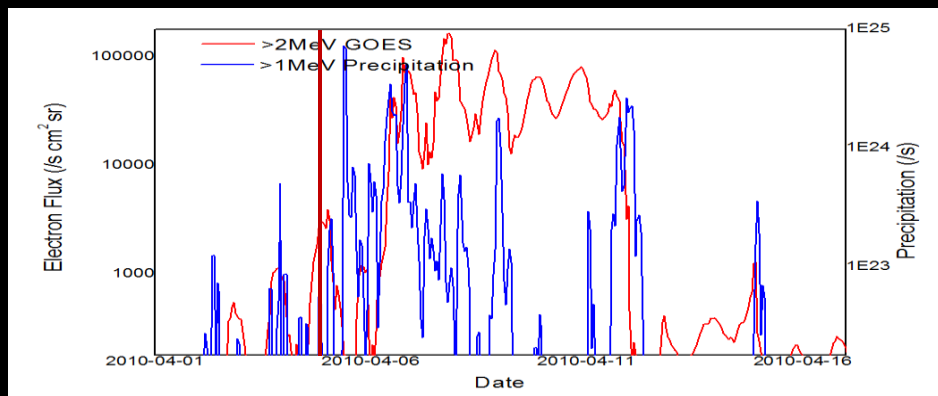
Geomagnetic effect

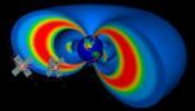


- Geomagnetic field disturbances trigger energetic electron precipitations
- The electron flux on GEO orbit is controlled by electron precipitation and acceleration.



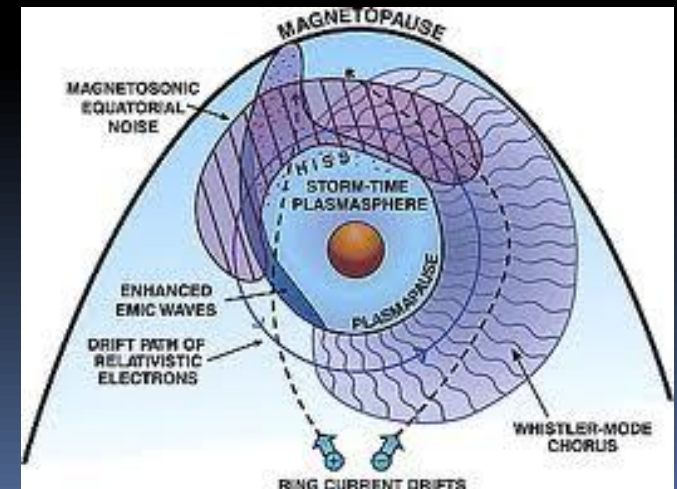
Precipitation & Flux variation

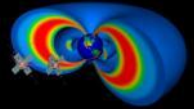




What we learnt from POES data

- Energetic electron precipitations are strongly coupled with electron flux density variation on GEO orbit.
→ Electron precipitation might be a main loss process
- Most strong precipitation events occurred in dusk to midnight sector.
→ Dusk-side precipitation might be very important loss process
→ EMIC waves?





Open Problems

-Maybe resolved by RBSP observation

EMIC waves are a left-hand polarized ion cyclotron waves.

To satisfy the resonance condition with electron gyro-frequency

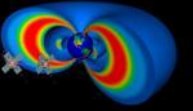
$$\omega - k_{\parallel} v_{\parallel} = \frac{n\Omega_e}{\gamma}$$

Traveling in the same direction with electrons

Typical resonant energies are > 10 MeV

- Can the electron acceleration and loss be caused at the same time by same process?
- What is the mechanism scattering electrons in dusk-side?

→ This might be answered by RBSP observation.



Thank You