The main objectives:

1. the CS spatial scale and current density

2. dawn-dusk distributions of CS parameters

3. mechanisms of current formation and current carriers

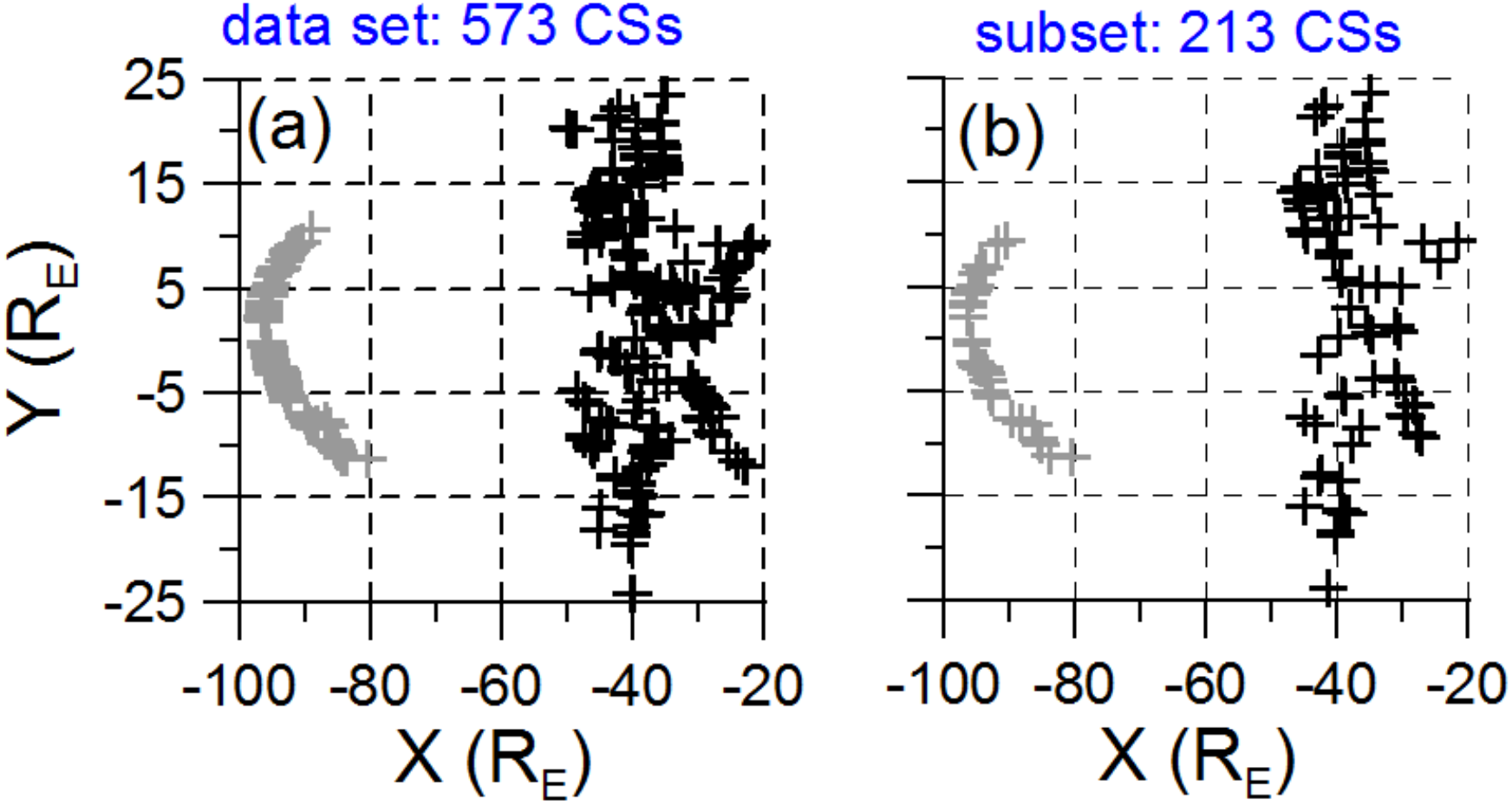
Analyzed Geotail data

1. magnetic field (3s time resolution)

2. ion moments (12s time resolution)

3. aberrated GSM coordinate system is used (4^o aberration)

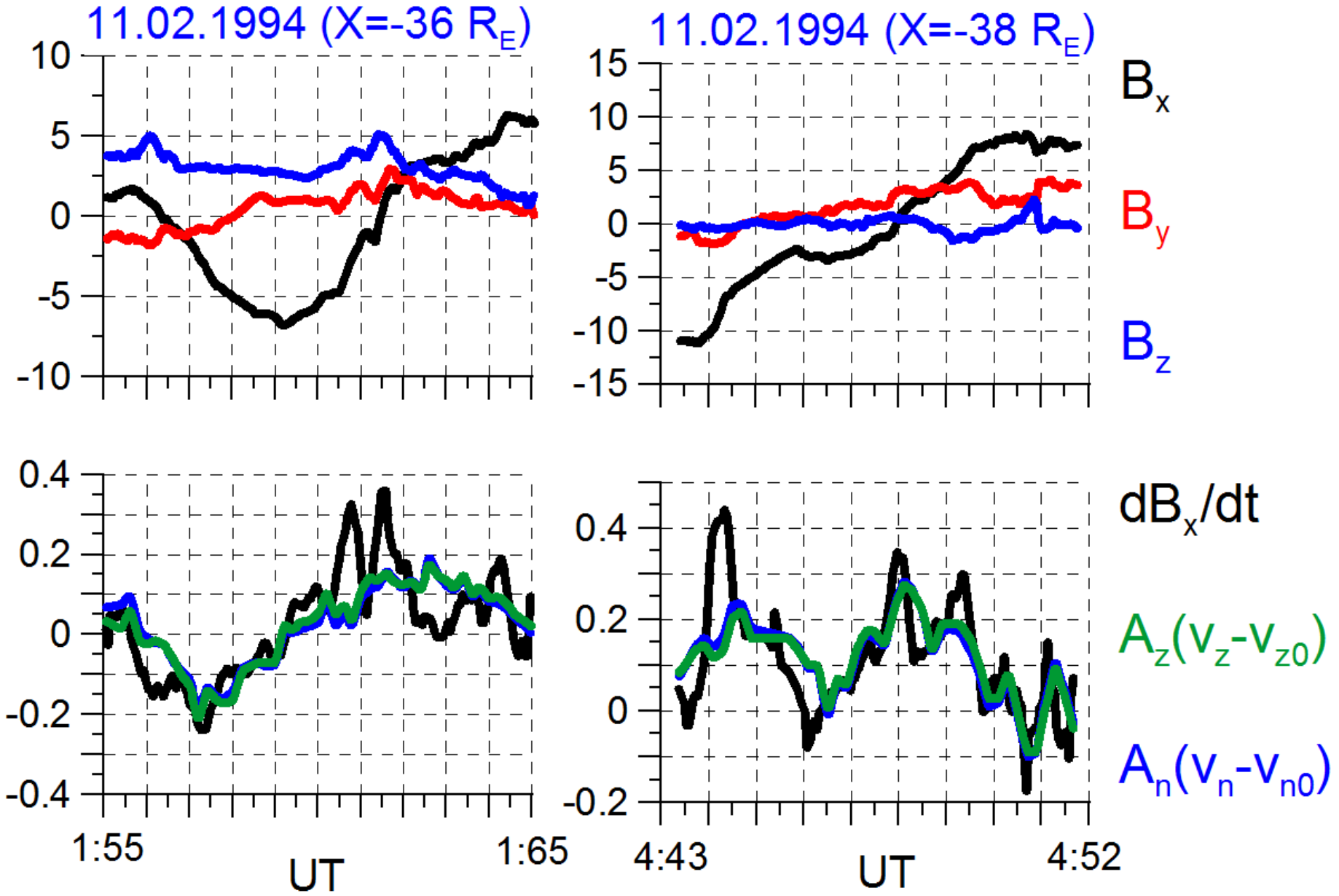
CS crossings by Geotail in 1994-1995



Data set criteria:

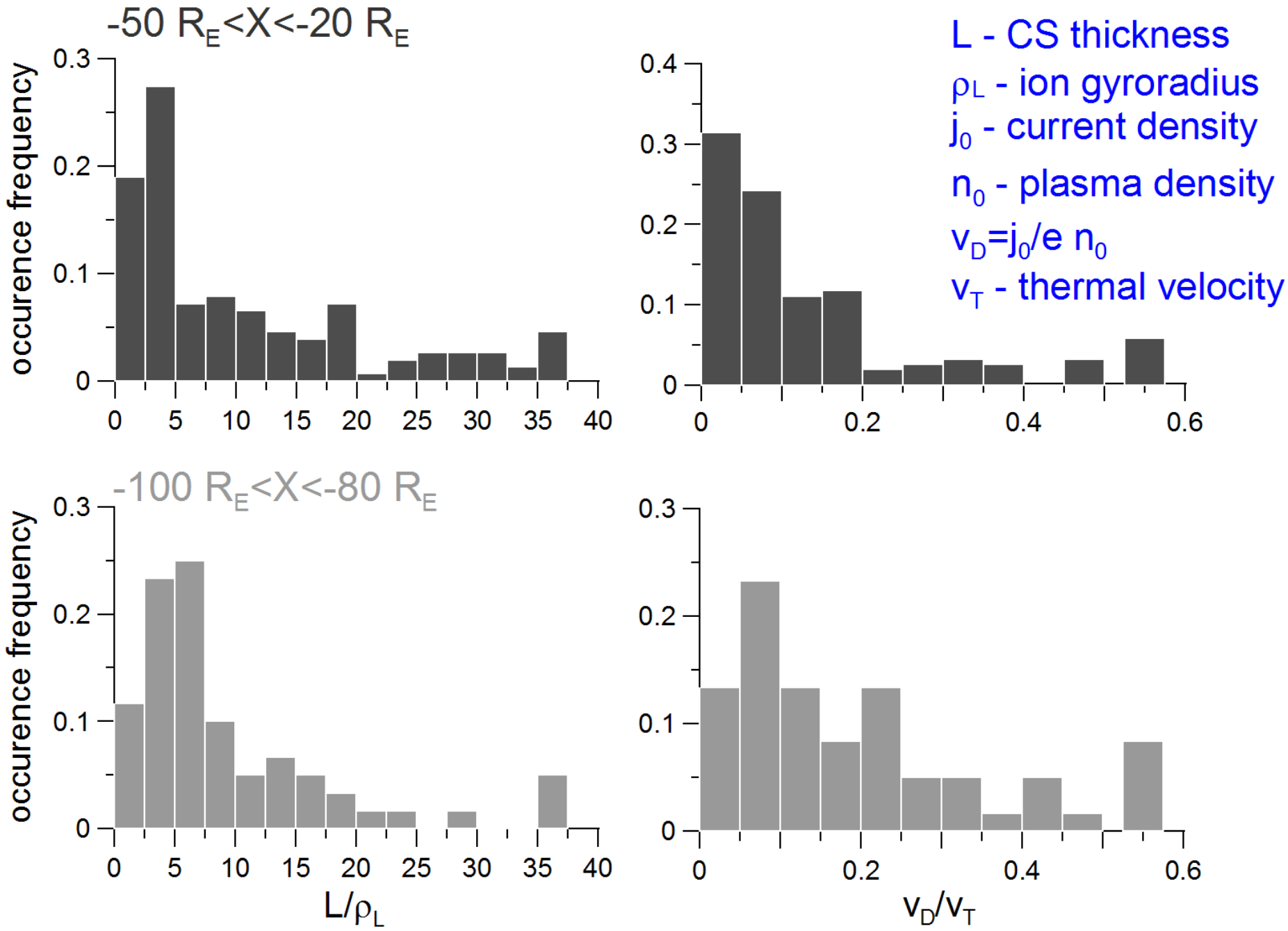
1. the neutral sheet (Bx=0) is crossed
2. max|Bx|>0.3 Bext, where Bext is the lobe magnetic field

CS spatial scale: dBx/dt vs v_z or v_n

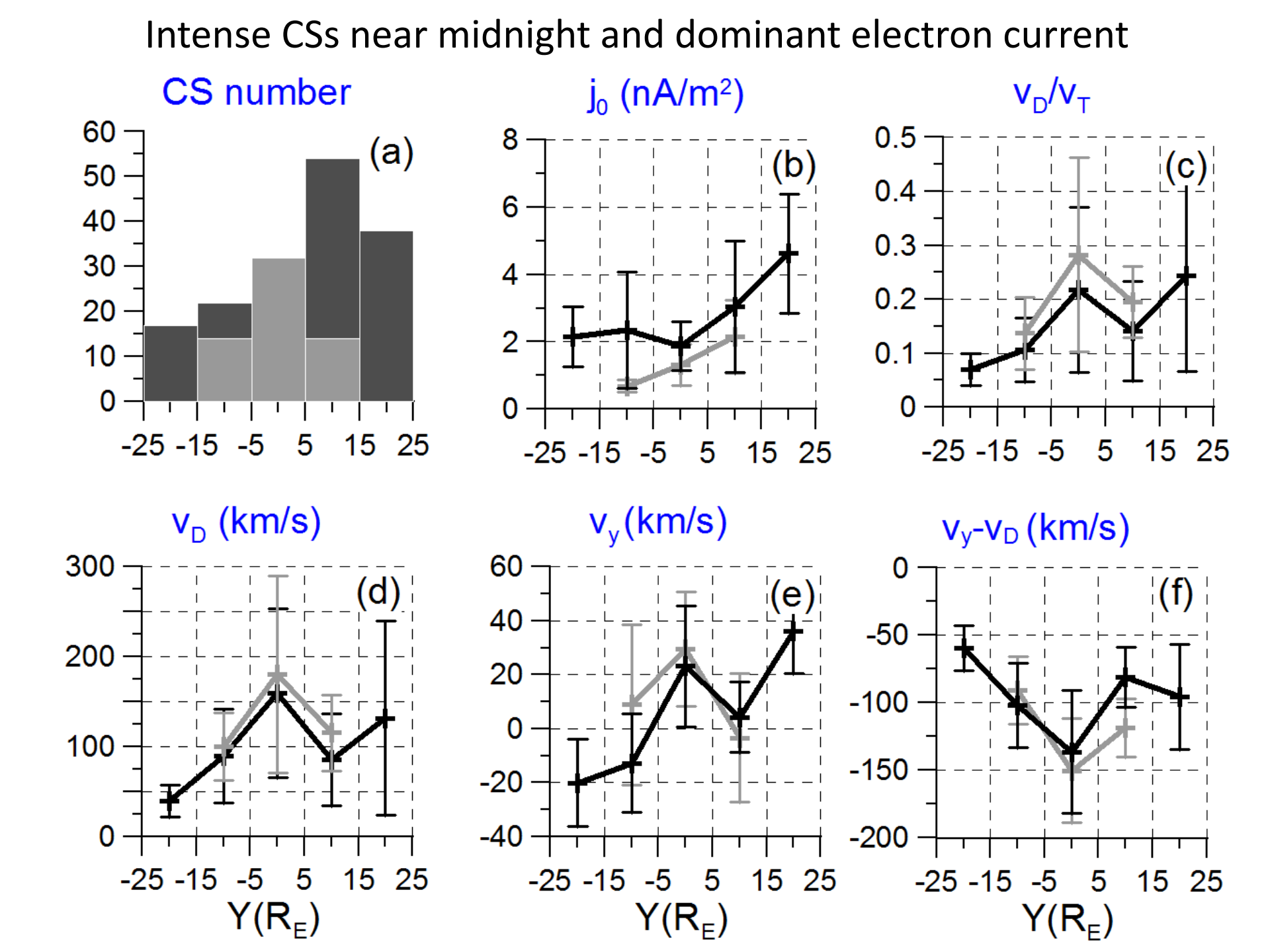


Hoshino et.al. , 1996; Sergeev et.al., 1998; Runov et.al., 2012

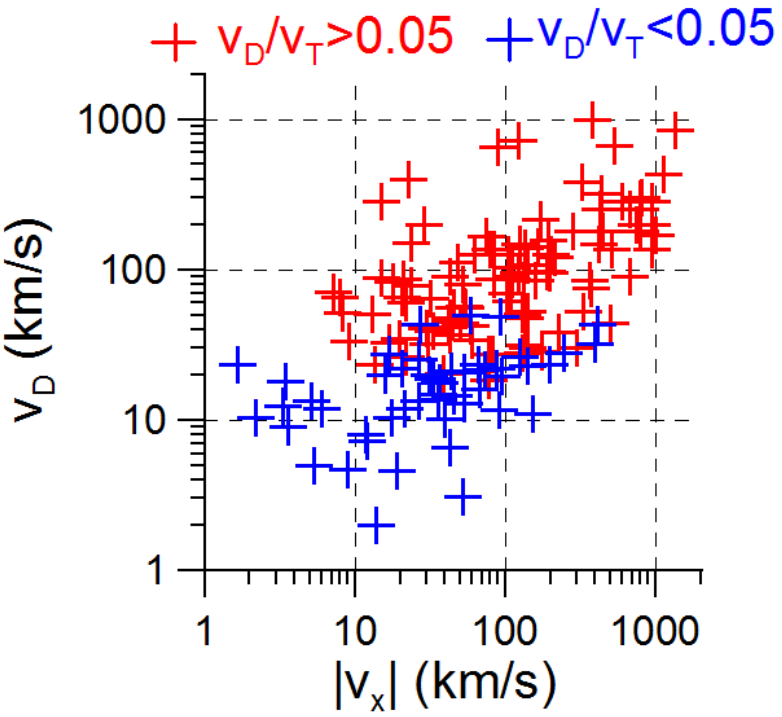
Thin and intense CSs are abundant in both regions

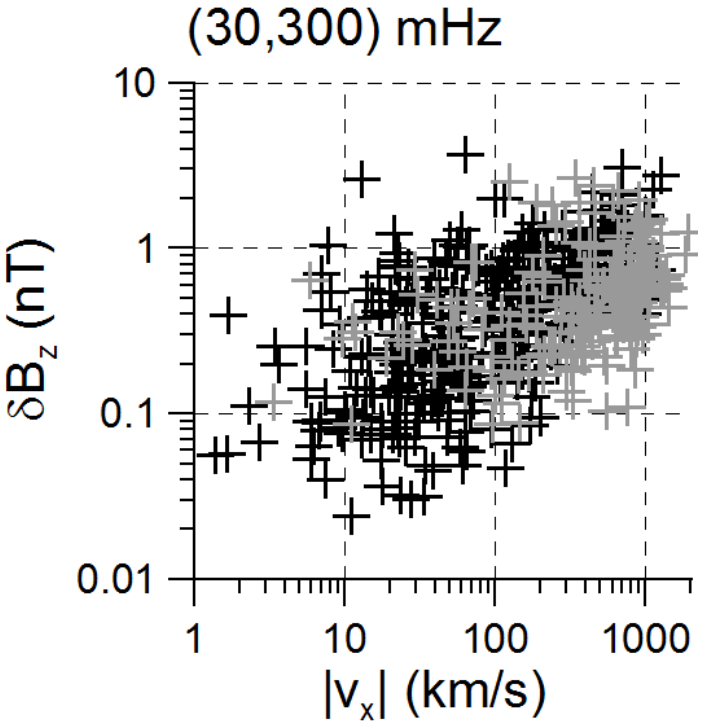


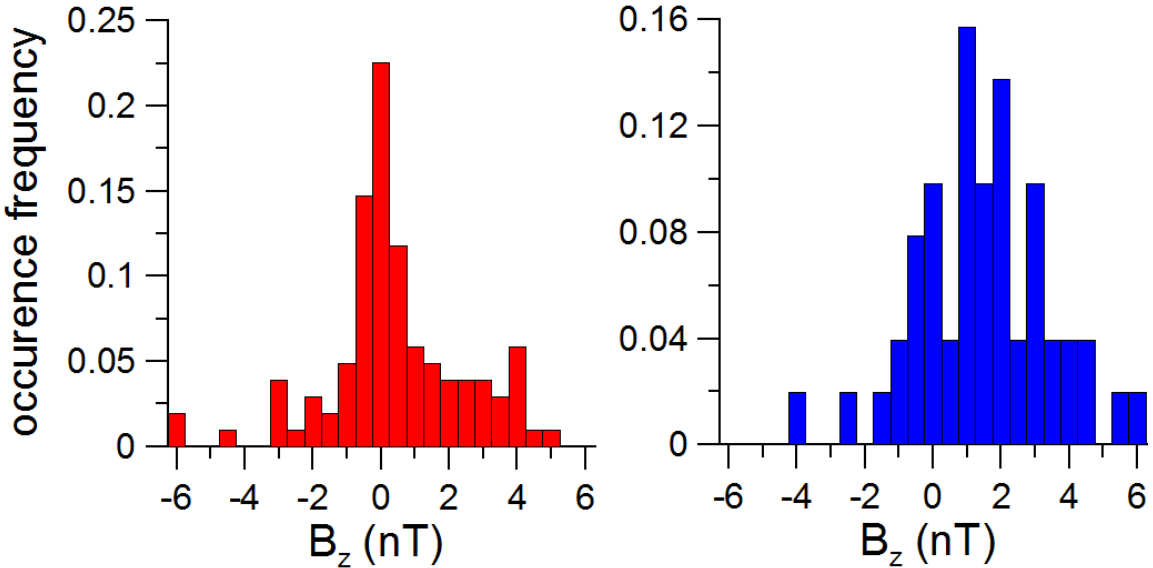
Intense CSs near midnight and dominant electron current



Intense and weak CSs, turbulence level and the current formation







1. Speiser ions accelerated near the neutral sheet

2. Turbulent transport along the dawn-dusk electric field

3. Electron curvature drift

Summary and how ARTEMIS can be used to get better understanding of the CS kinetic structure and dynamics

1. *Thin and thick CSs are observed near and beyond the Lunar orbit. Thin CSs are observed rather frequently. Most intense CSs are observed near the midnight and associated with fast ion flows.*

ARTEMIS spacecraft separated in space should be helpful for understanding formation of thin CSs. ARTEMIS spacecraft allow to determine the CS orientation and the CS thickness more precisely and on a more regular basis. ARTEMIS should allow understanding the kinetic CS structure and mechanisms of current formation.

2. *Electrons are likely main current carriers in most of observed CSs. Electric field Ex or significant electron pressure anisotropy should be present.*

ARTEMIS can be used for the analysis of electron population. This should provide the estimate of the electric field Ex that is important for electron heating/cooling in the course of their earthward transport.