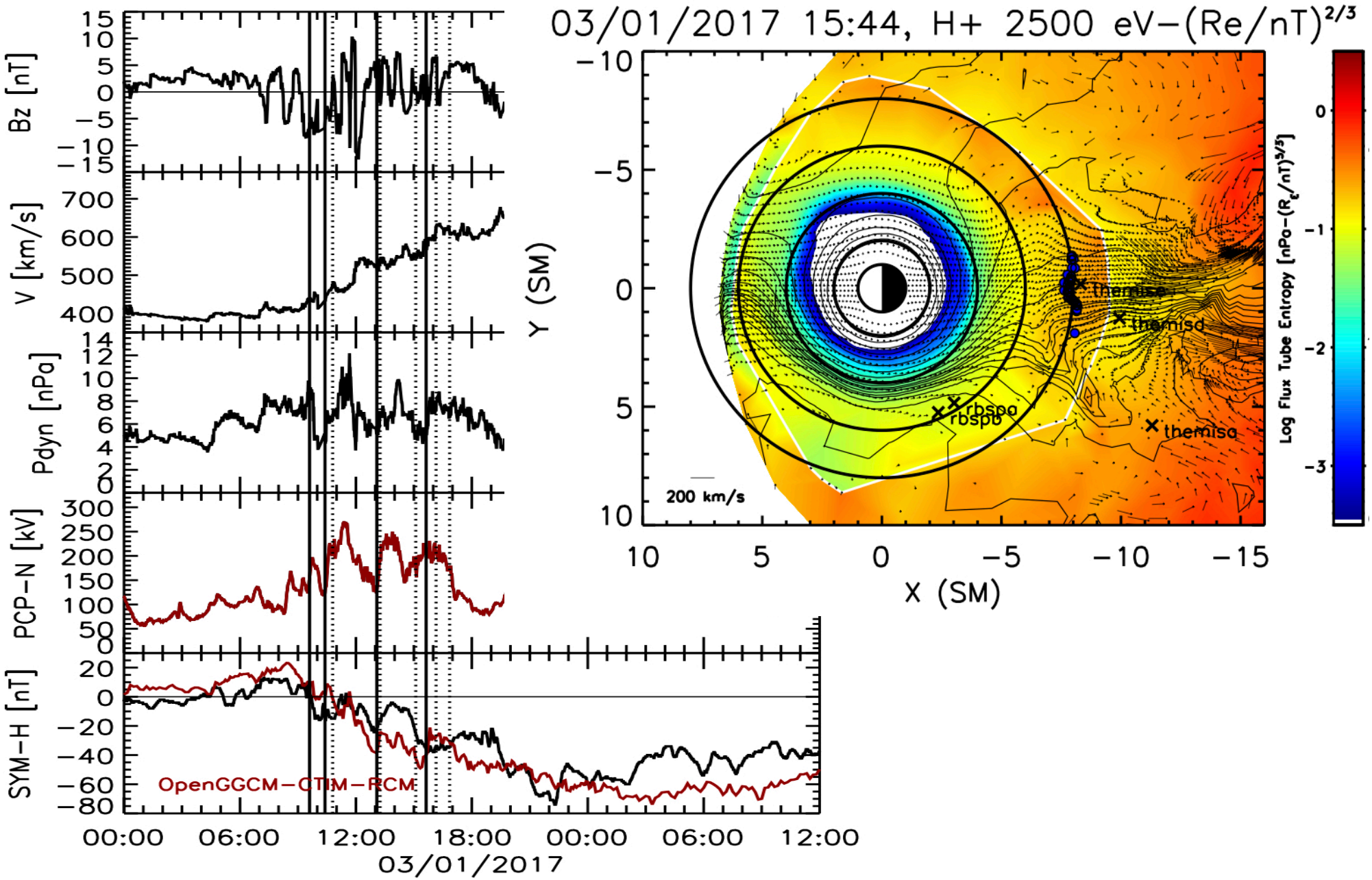
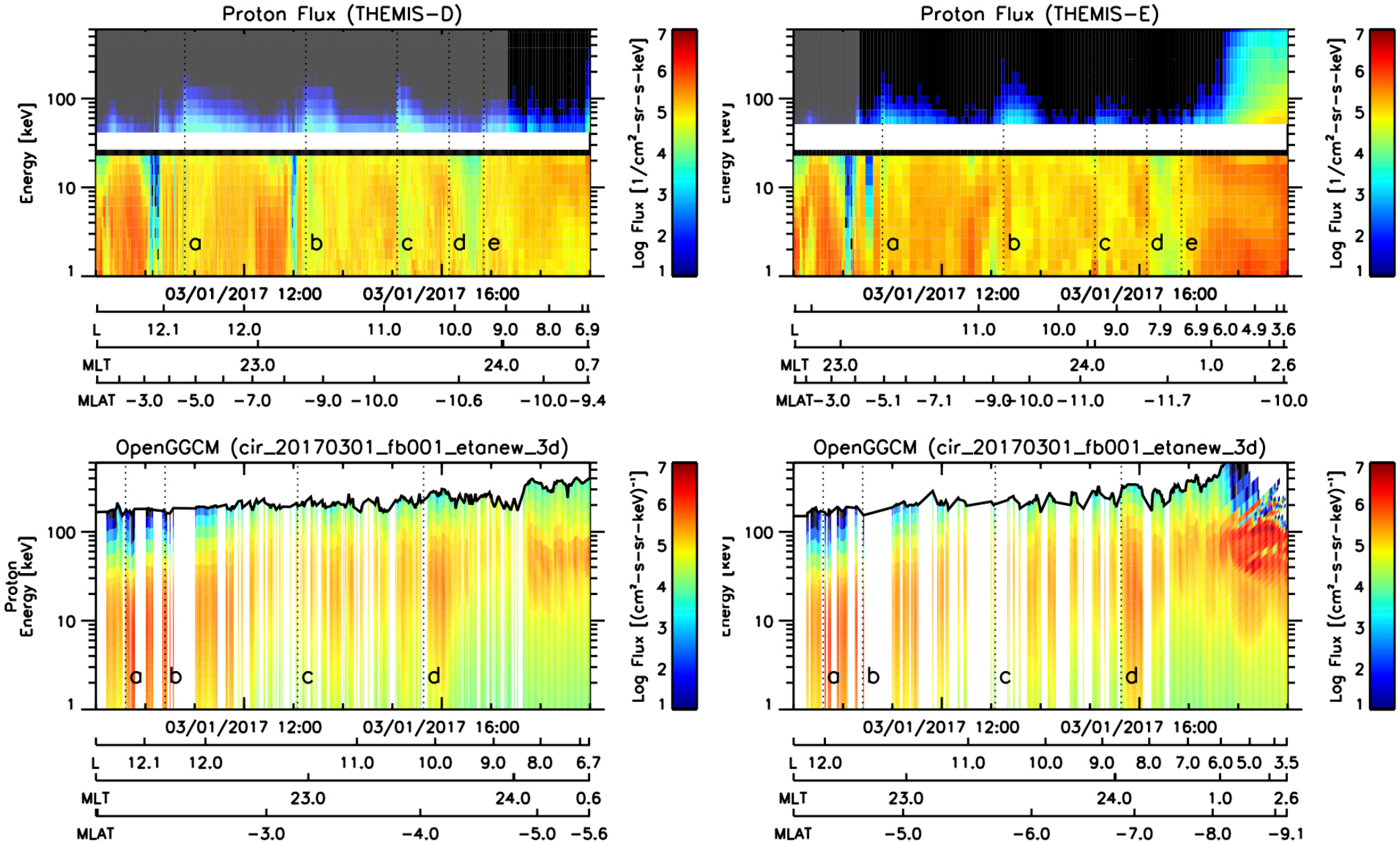
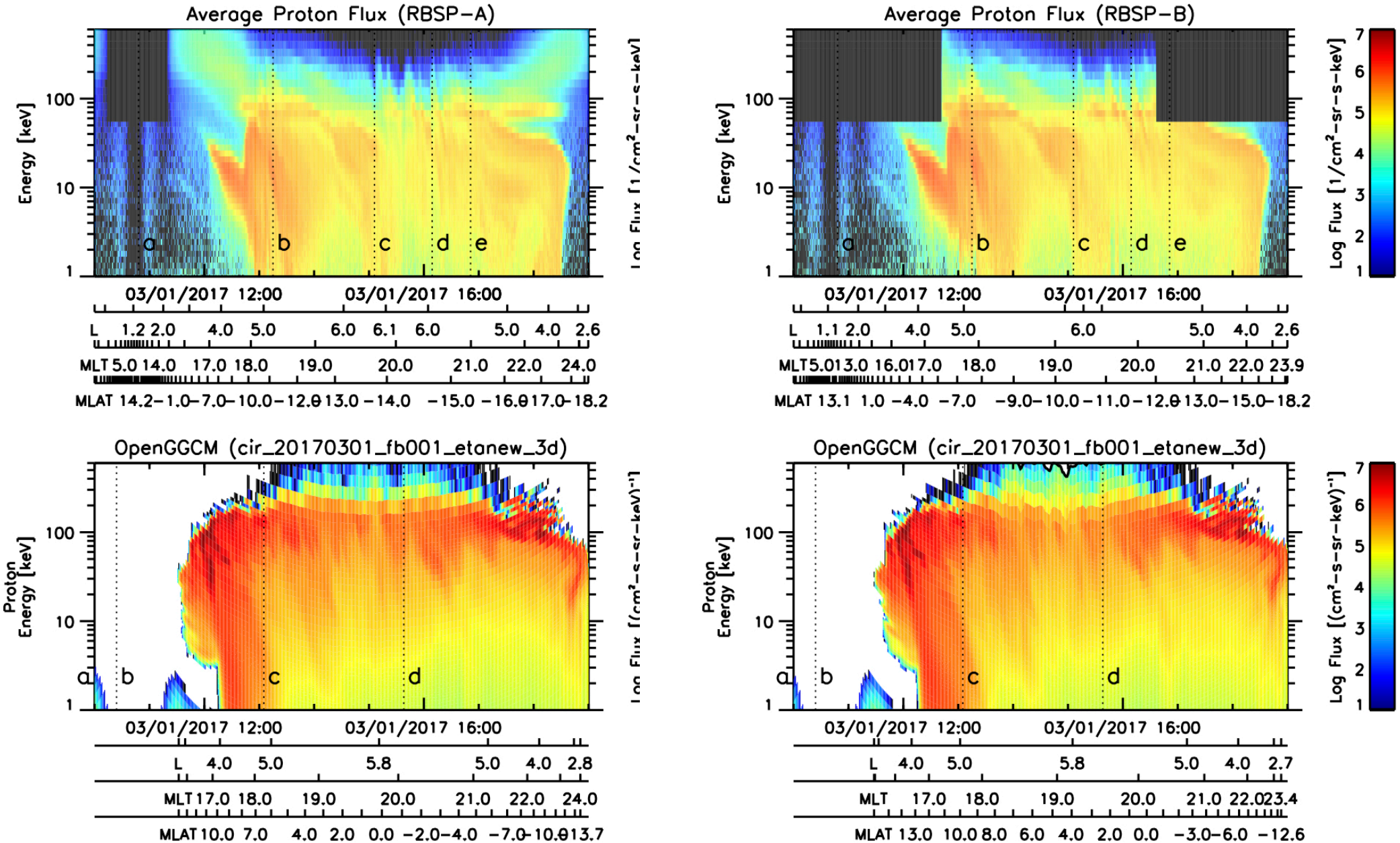
3/1/2017 CIR-driven Storm



Simulation vs. Observation (THEMIS)

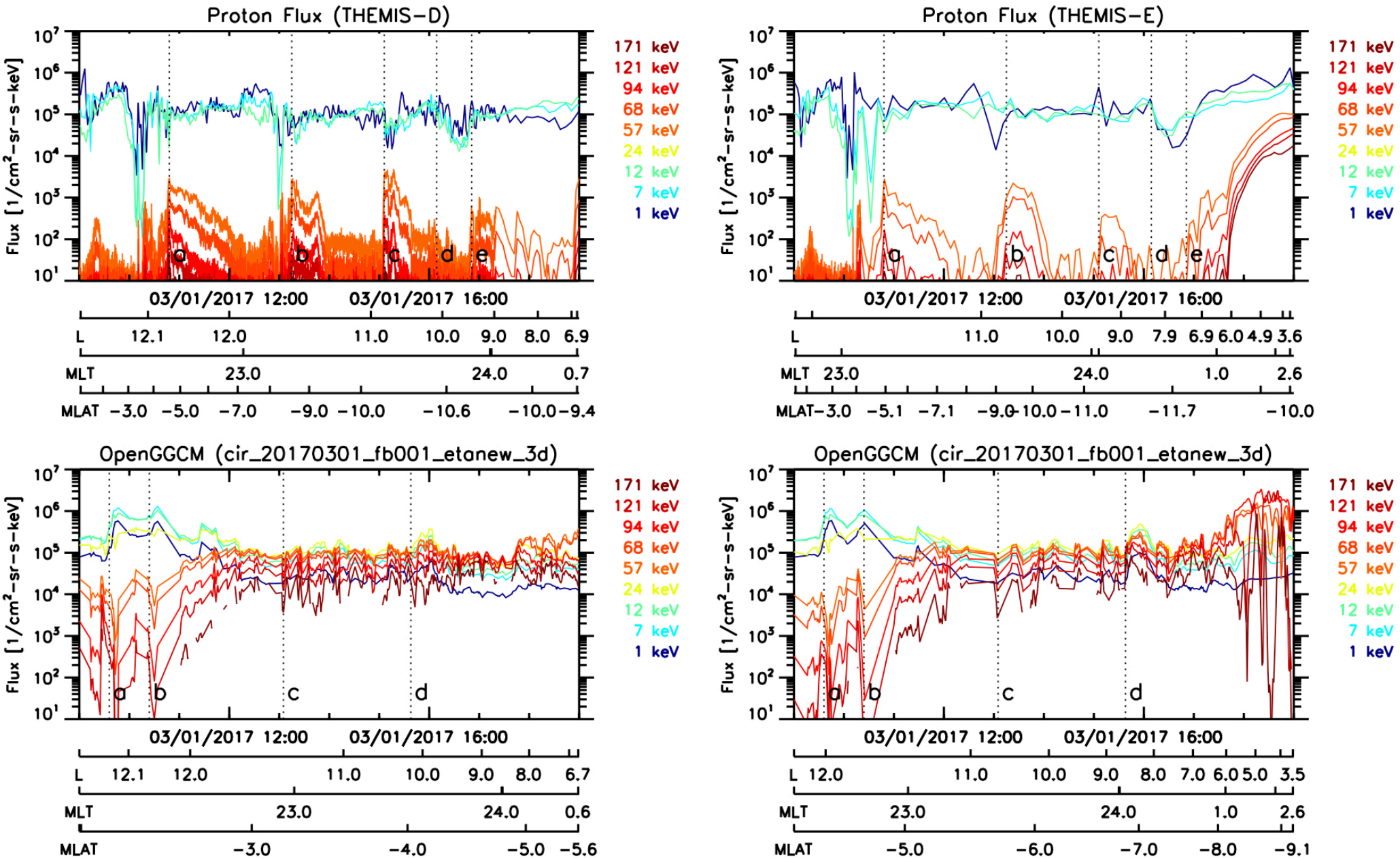


Simulation vs. Observation (RBSP)

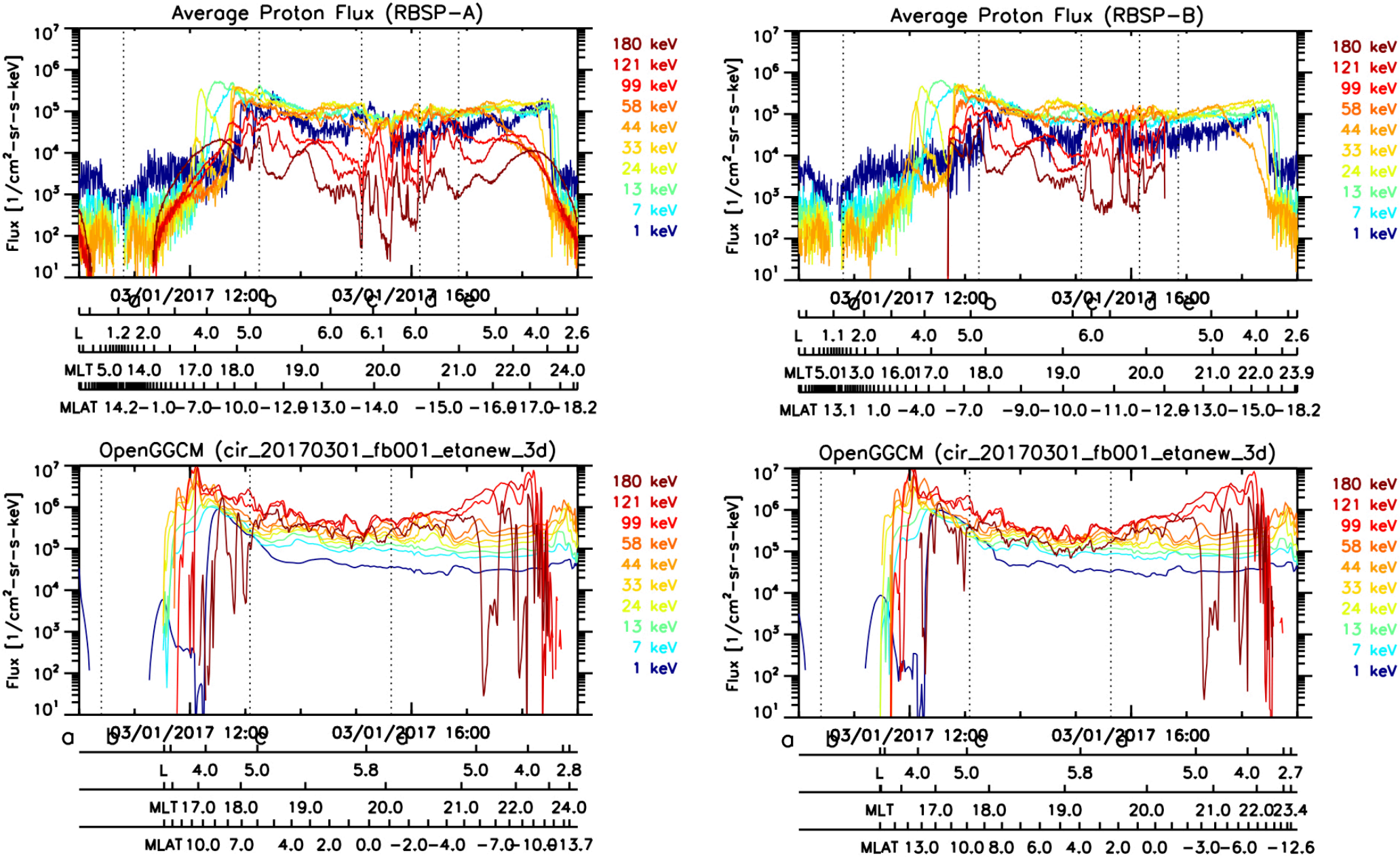


Extra Slides

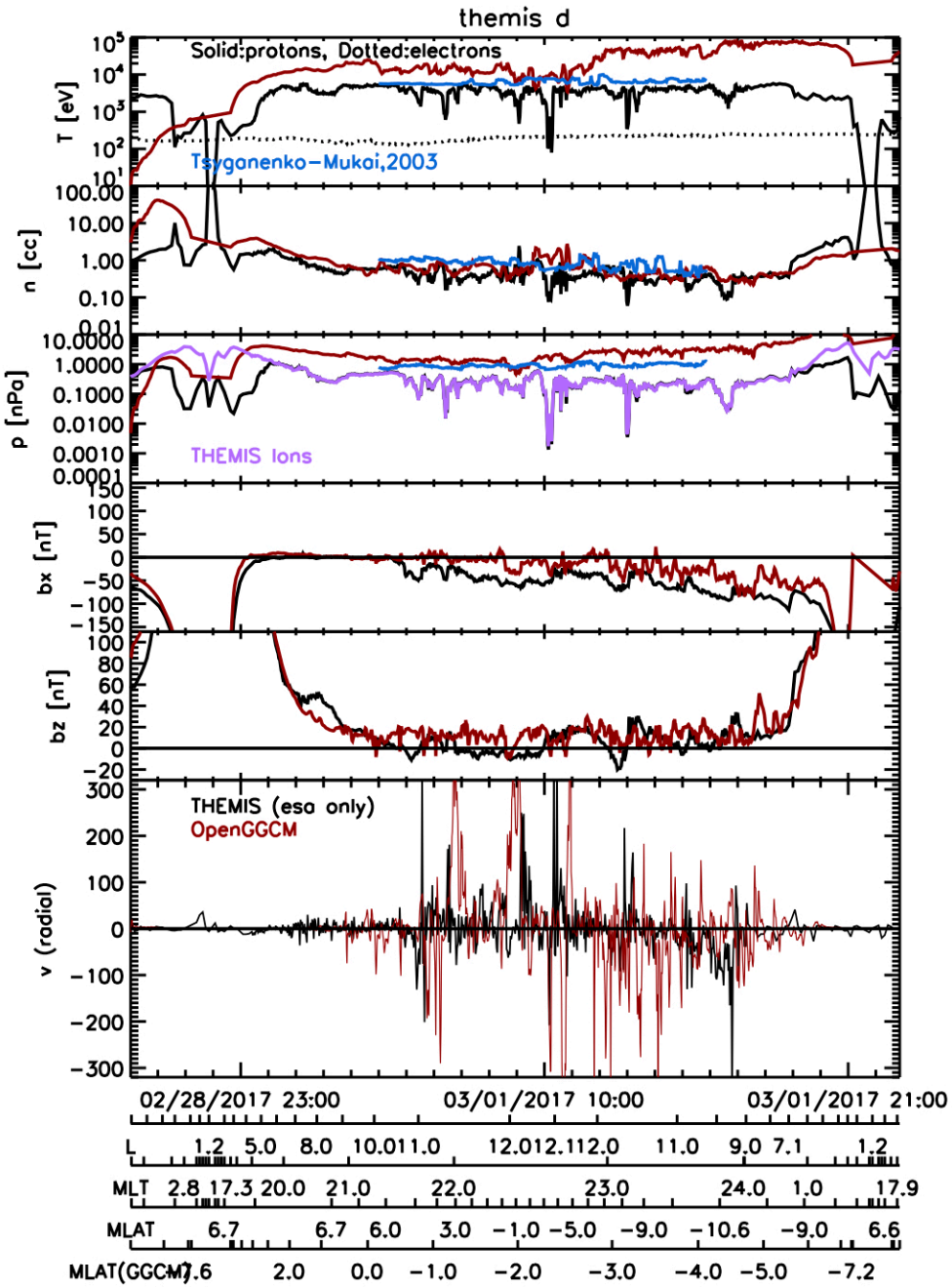
Simulation vs. Observation (THEMIS)



Simulation vs. Observation (RBSP)

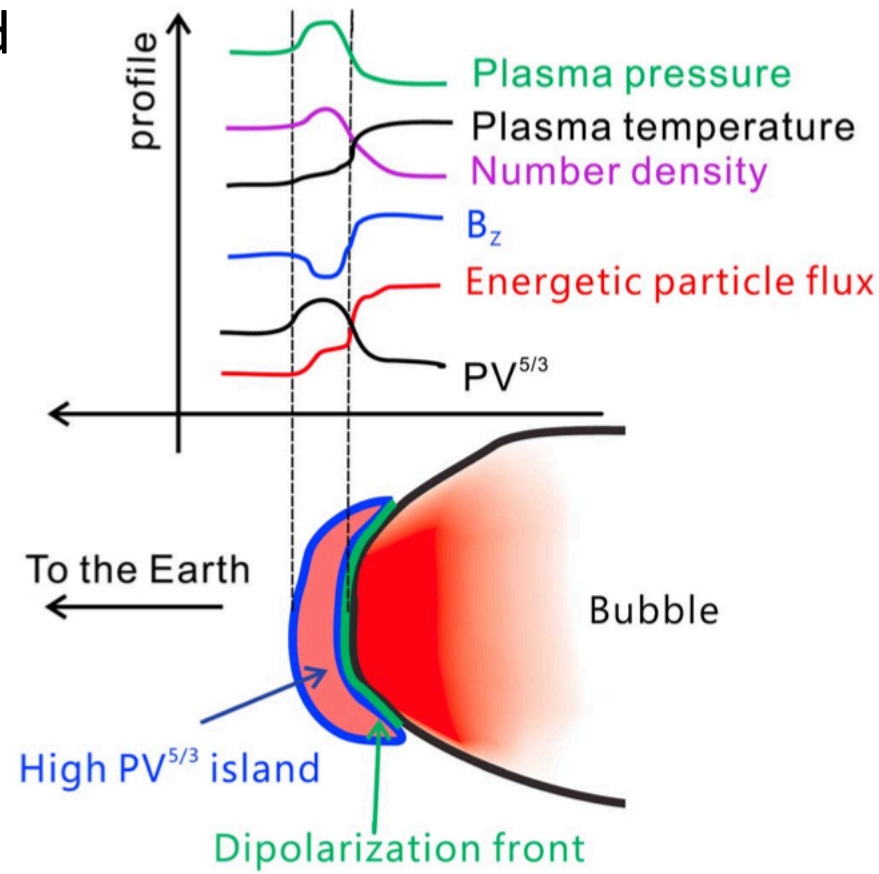


Model Parameters vs THEMIS



Plasma Sheet Injections

- Narrow (1-3 R_E) channels of earthward-moving plasma
- Flow Bursts
  - Short-duration (1-2 min) high-speed flows (generally V>400 km/s)
- Bursty Bulk Flows (BBFs)
  - Segments of moderate-speed flows (generally V>100 km/s) with flow burst(s)
- Usually accompanied by dipolarization front
- Primary means of plasma transport into inner magnetosphere during active times



Yang et al., 2011

Model Components

- OpenGGCM
  - 3-D stretched cartesian grid
  - Solves semi-conservative MHD equations for single fluid
    - Plasma energy, not total energy, conserved
  - Solves ionosphere potential on 2-D spherical grid using conductances, field-aligned currents
  - Main inputs: solar wind plasma parameters, interplanetary magnetic field
- CTIM (Coupled Thermosphere-Ionosphere Model)
  - Models chemical and photo-chemical reactions
  - Determines conductances
  - Main inputs: FACs, auroral precipitation, solar EUV
- RCM (Rice Convection Model)
  - 2-D ionosphere grid representing footpoints of flux tubes
  - Solves motion of flux tubes due to potential, magnetic induction and drift
  - Main inputs: outer boundary conditions, ionosphere potential

Model Coupling Methodology

- OpenGGCM -> Ionosphere
  - Sends MHD density, pressure, auroral precipitation, FAC
  - Receives Ionosphere Potential
- RCM -> Ionosphere
  - Receives Ionosphere Potential
  - Sends RCM FACs, auroral precipitation
    - Blends with MHD values
- RCM -> OpenGGCM
  - Convert flux tube content to pressure and density (and vice-versa)
  - Receives MHD pressure, density at boundary
    - Flux tube volume-weighted averages along field line
  - Sends RCM pressure, density
    - Nudge MHD P, n values (RCM influence greater in inner region)
    - RCM feedback slowly ramped up after MHD initialization period